



**1) FICEK, F., NOVOTNÝ, J. (2019):** Comprehending practitioners' assessments of community-led total sanitation. *Health Promotion International*, 34, 6, e129–e138.

**Autorský podíl/Share of authorship 80 %**

# Comprehending practitioners' assessments of community-led total sanitation

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## Summary

Around 2.3 billion people in developing countries still lack access to improved sanitation facilities and almost one billion practice open defecation (OD). The Community-Led Total Sanitation (CLTS) has recently become a particularly popular approach used in more than 60 countries. CLTS is a behavior-change approach that aims to ignite community action and make OD socially unacceptable without providing any external financial or material support to individual households. CLTS is sometimes perceived as a revolutionary approach that has proven to be highly cost-effective in abolishing OD. However, it has been criticized for its use of unethical practices and questioned with respect to the sustainability of its outcomes and the limited health benefits it can generate. Based on semi-structured interviews with development workers experienced in the implementation of CLTS in 14 different countries, this paper seeks to examine practical views on the issues surrounding this approach. We found that despite acknowledging some of the controversies and the possibly limited sustainability of results, CLTS is generally considered an effective and satisfactory tool for improving sanitation conditions. Practitioners first of all accentuate the normative importance of the elimination of OD attained through CLTS without weighting on (the absence of) evidence on the longer term effects or impacts on health. However, a need for various modifications of CLTS according to local social and natural environments was strongly expressed, including changes that go against the core principles of CLTS like no subsidies and no technical assistance principles.

**Key words:** sustainable development goals, community based intervention, community health promotion, global health, health behaviour

## INTRODUCTION

In 2015, an estimated 68 percent of the world population had access to improved sanitation facilities meaning approximately 2.3 billion people did not. Of these people, 892 million practised OD (WHO/UNICEF, 2017). A great deal of work thus remains to achieve the Sustainable Development Goal (SDG) of ensuring access to adequate sanitation for all by 2030 (UN, 2015). Sanitation targets in global strategic frameworks have

catalysed sanitation programs across the world. A recent meta-analysis nevertheless documented only modest impacts of sanitation interventions on latrine access and use (Garn *et al.*, 2016), though it was argued that a high dependence of sanitation on contextual conditions makes the aggregate inferences difficult (Novotný *et al.*, 2018).

The once predominant focus on the supply of sanitation infrastructure (esp. toilet construction) has been increasingly supplemented and sometimes replaced by

interventions concerned with creating demand and facilitating change in sanitation behavior (Chambers, 2009; Peal *et al.*, 2010). Community-led total sanitation (CLTS), addressed in this article, has recently become a prominent approach to change sanitation behaviour. Since its first implementation in Bangladesh in 1999–2000 (Chambers and Kar, 2008), the CLTS movement has spread around the world and has already been used in approximately 60 countries, some of which have integrated it as part of a national sanitation policy (IDS, 2017a).

The CLTS represents an attempt to replace earlier top-down interventions based on the provision of subsidized sanitation facilities and also a departure from approaches to change sanitation behaviour through one-way education about health risks. It uses a set of participatory facilitation tools to ignite community-wide behaviour change with the goal to eliminate OD in an entire community. The CLTS brings community dynamics into the center and targets both positive and negative social drivers such as the perception of social norms, social learning, social capital, trust and mutual collaboration, social sanctions and social surveillance based on recognition that sanitation (linked to health) is a common good (e.g. Mosler *et al.*, 2018). As shown by Sigler *et al.* (2015), the CLTS can't be linked to a single behaviour change theory but its various components combine inputs from multiple behaviour change models such as the Transtheoretical Model, Social Cognitive Theory and Health Belief Model that primarily describe individual-driven behaviour. Understanding to mechanisms operating behind the CLTS interventions is thus an uneasy task.

The CLTS quickly gained a reputation for being an inexpensive, simple and effective strategy for the elimination of open defecation (OD). However, recent research indicated that, similar to its potential to improve human health (Pickering *et al.*, 2015), the sustainability of outcomes achieved through CLTS is debatable, especially when used as a standalone approach (Crockner *et al.*, 2017). Moreover, CLTS has significantly been criticized due to the use of unethical practices such as shaming, stigmatizing and punishing community members (Bartram *et al.*, 2012; Engel and Susilo, 2014; Galvin, 2015) and yet another concern addressed a risk of its acontextual and mechanistic applications (Bardosh, 2015). It has also been argued that manipulating emotions can be destructive for a community from a social justice perspective (Morales and Harris, 2014) and that the primary focus on social pressure can adversely affect the potential for upward shifts through the sanitation ladder under certain conditions (Novotný *et al.*, 2017).

A recent systematic review proved that the empirical evidence on CLTS effectiveness is weak (Venkataramanan *et al.*, 2018). Scholarly literature about CLTS mainly consists of grey literature, critical commentaries by academic experts and what continues to be a limited number of rigorous empirical assessments. Less analytical literature has been published about how the implementation of CLTS is evaluated by the practitioners responsible for its implementation at a grassroots level. We managed to identify just two such studies; one focused specifically on the role of external technical support (Papafilippou *et al.*, 2011) and the other on the behavior-change techniques used in CLTS (Sigler *et al.*, 2015).

After a brief overview of the debates and evidence surrounding the use of CLTS, the main objective of the present article is to examine the assessments of CLTS by development practitioners. The analysis is based on qualitative evidence obtained through semi-structured interviews with 19 practitioners experienced in the implementation of CLTS across 14 different countries. The interviews were structured to address CLTS issues discussed in previous literature such as contextual modalities and reasons for implementation, complementary tools and strategies, perceived strengths and constraints, CLTS controversies and overall assessments of the approach. The survey was undertaken as a part of a wider research project to inform our subsequent work on a CLTS evidence synthesis about the practitioners' perspective.

## THE CLTS APPROACH AND DEBATES SO FAR

The implementation of CLTS consist primarily of triggering, which should lead to the realization of the harmful impacts of OD in a community and to initiating collective action towards an open defecation free (ODF) environment. But with similar importance, pre- and post-triggering activities are core parts of CLTS. Pre-triggering involves the selection of a community, gaining understanding of the local context, establishing a relationship with local leaders and identifying possible risks and challenges. Post-triggering refers to the various activities focused on enabling and encouraging the construction of latrines, and a participatory monitoring of progress, including the verification and certification of the community ODF status, subsequent monitoring to sustain the status and possibly even boost communities' progression up the sanitation ladder (Chambers and Kar, 2008). CLTS has been constantly evolving (Chambers, 2009) and contextual modifications are encouraged (Chambers and Kar, 2008). Besides local adaptations, large-scale modifications of CLTS when



integrated into national sanitation policies can also be found, such as in the Indonesian national strategy Sanitasi Total Berbasis Masyarakat (STBM) or the Ethiopian Community-Led Total Sanitation and Hygiene (CLTSH) (IDS, 2017a; IDS, 2017b). Although it thus might be difficult to find CLTS implementation in a 'pure' form, its main salient assumptions and features can be summarized as follows:

- Community-level action: Sanitation is comprehended as a collective asset and the focus on the community level enables the power of social factors such as social conformity, social networks and collective action driven by mutual collaboration, solidarity and surveillance to be harnessed.
- Focus on perceived social norms: Introducing a new social norm around the unacceptability of OD is considered a key pre-requisite for changing sanitation behavior and achieving the ODF status of a community.
- Participatory persuasion: Participatory facilitation towards self-assessment and community's own decisions rather than direct persuasion through information promotion is thought to catalyze collective action.
- Use of both positive and negative emotions: Positive and negative emotions and social motivations are expected to be more effective in creating demand for community action and behavior change than didactic education.
- No subsidies: Self-construction of latrines from locally available materials rather than externally provided or subsidized latrines is thought to be important for inducing a sense of ownership and eliminating the belief that the government or NGOs are responsible for sanitation.

Despite the popularity of CLTS in practice, there is still very limited research evidence on how successful it is with respect to sustained changes in sanitation conditions and on its potential to improve human health (Venkataramanan *et al.*, 2018). On the one hand, CLTS is known to be cost-effective and relatively successful in increasing sanitation coverage within a short period of time (e.g. Mehta and Movik, 2011; Pickering *et al.*, 2015). On the other hand, this is often achieved by means of low quality and non-durable sanitation facilities (Papafilippou *et al.*, 2011; Pickering *et al.*, 2015; Crocker *et al.*, 2016; Novotný *et al.*, 2017b). There are concerns that CLTS has a limited effect on the health of targeted communities particularly as, due to the construction of inadequate latrines, the rise in sanitation coverage and elimination of OD does not guarantee

lower disease transmission and improved health (Galvin, 2015; Pickering *et al.*, 2015). This is further reinforced by the inadequate monitoring of CLTS performance and inflated statistics on the CLTS achievements (USAID, 2018). As such, one of the topics discussed in our interviews was the practitioners' assessment of the quality and sustainability of sanitation changes achieved through CLTS.

Ethical controversies around CLTS represent an important issue. These controversies are concerned with the denial of fair treatment and protection under the law to people practicing OD, excessive shaming, social stigmatizing, the denial of resources needed for livelihood (Bartram *et al.*, 2012; Sigler *et al.*, 2015) and a return to colonial practice, where any deviation from western standards is perceived as disgusting and backwards (Engel and Susilo, 2014). As Bartram *et al.* (2012) puts it, some of these controversies arise from a conflict between community good and personal rights. Even noble goals such as improving peoples' sanitation safety are problematic if used to justify the suppression of human rights. Sigler *et al.* (2015) indicates that practitioners are instructed to uphold human dignity as a priority during the implementation of CLTS, while one of the objectives of the present study has been to reevaluate this argument.

Sanitation involves complex human-environment interactions. Therefore, various adaptations of interventions to local conditions are typically necessary (Coffey *et al.*, 2014; Novotný *et al.*, 2018). Modifications to fit local context are also encouraged in the CLTS guidelines (Chambers and Kar, 2008) and elsewhere (Kariuki *et al.*, 2012). There are also concerns that the rising popularity of CLTS poses a risk of standardization, simplification and mechanistic application (Bardosh, 2015). Various modifications of CLTS can be undertaken including the combining of CLTS with other sanitation strategies such as sanitation marketing (Chambers and Kar, 2008; Chambers, 2009; Sigler *et al.*, 2015), which aims to establish sustainable sanitation market functioning without subsidies and offer affordable products for all income groups (Nabembezi and Nabunya, 2017). Integration with various other methods is also common. In the Indonesian and Ethiopian national sanitation strategies, the use of CLTS techniques has been integrated with the focus on hygiene promotion, handwashing, water treatment and other hygienic measures (IDS, 2017a; IDS, 2017b).

A major issue is whether and how CLTS can be combined with external material support or subsidies. Although it contradicts one of the main principles, it

was argued that external aid is often needed as it is unrealistic to expect that lacking resources can be generated based on community solidarity. Previous literature suggests that it is not therefore uncommon to provide aid during CLTS implementation in practice (Sigler *et al.*, 2015). In this context, Galvin (2015) or Papafilippou *et al.* (2011) invokes a pragmatic strategy of hybrid approaches strongly reflecting local context (e.g. lack of knowledge or infrastructural resources) even if it breaches the basic CLTS principle of not receiving external support. For example, in Bangladesh, behavior-change interventions alone did not improve the sanitation situation, but when combined with subsidies, sanitation coverage and OD increased and decreased, respectively (Guiteras *et al.*, 2015). An important goal of this research was to uncover which modifications under which circumstances were applied by the interviewed practitioners.

## METHODS

The material utilized in this qualitative study comes from semi-structured interviews with practitioners experienced in the implementation of CLTS. To address diverse contexts, our intention was to cover as many countries as feasible rather than target a larger number of practitioners working in the same country. Altogether, 41 practitioners were contacted, mostly by email and invited to interview. Eventually, 19 practitioners from 6 different organizations (plus 2 freelancers) with experience across 14 different countries were interviewed (Table 1). Of the 19 interviews, 5 were conducted face to face, 13 were conducted via Skype and 1 informant opted to provide detailed written responses. An interview instrument was developed, tested and consulted with a CLTS expert prior to the survey. In addition to an introductory part, it consisted of 19 open questions separated into three sections: fact checking, CLTS implementation and contemplation. The focus was on the specific experiences, attitudes and opinions of the interviewees on projects where the CLTS approach was used. We decided to withdraw informants' names to avoid potential setbacks. Although the respective organizations are identifiable from the codes assigned to individual interviewees in Table 1, the statements presented in the Results Section represent personal opinions and cannot be taken as the official views of these organizations. The material was processed using MAXQDA 12 software. Responses were classified by codes and sub-codes and analysed according to common topics and areas where practitioners agreed or disagreed. The discussed topics were then compared with

theoretical background to explain underlining attitudes and opinions.

## RESULTS

### Motivations and goals behind CLTS use

The main reasons for applying CLTS were positive experiences and results from previous projects (ETPPIN, KENPI, UGDPI, CAMUN, MLWPI, PAKWA, ZMSNV). MYNUN and MARUN reported that their organizations heard about satisfactory results of CLTS, contacted Kamal Kar and then started their own projects. Official state's policy (ETPPIN, KENPI, ETIWA, IDSPI) and official organization's policy (ANGPIN, HAITUN, ETIWA, IDSPI, MARUN) were also mentioned. General motivations for improving sanitation (HAITUN, UGDPI, ETIWA, IDSPI, MYNUN, MARUN, MLWPI, ZMSNV) such as to lower mortality and morbidity (ANGPIN) with extra attention to child survival (ETPPIN, KENPI, ANGUN, MYNUN, MARUN) or women's health and safety (ANGUN and ETPPIN) were often reported as the major motivations and goals behind CLTS use. Surprisingly, none of the interviewees referred to the cost-effectiveness of CLTS or the relative ease of its implementation.

### Combination with other approaches and modifications of CLTS

CLTS was most frequently combined with Sanitation Marketing (SM), as affirmed by KENPI, ETPPIN, ETPUN, ETIWA, CAMUN, IDSPI, MYNUN, MLWPI, PAKWA and ZMSNV. Participatory Hygiene and Sanitation Transformation (PHAST) was also, but less often, mentioned in this context (ANGUN, CAMUN and MLWPI). CLTS was combined with microcredits in just one case (PAKWA). Interviewed practitioners also admitted combining CLTS with rewards and punishments. Rewards in the form of subsidies disbursed after the latrines were constructed (INDCLTS) and water supply schemes for the village or hygienic facilities for local schools (PAKWA). Forms of punishments were decided by the community itself (ETPUN, ETPFRL2) or the traditional leaders, who can, for example, impose a fine. This was confirmed by IDSPI: *'When member of the community still open defecate, they give punishment, by the traditional leaders, like a fine!'* Eight practitioners revealed usage of either direct subsidies or external technical assistance. UGDPI used subsidies for latrine construction in harsh natural conditions and lobbied for government-built public toilets, while CAMSNV provided subsidies for the poorest households. In Haiti,

**Table 1:** Background characteristics of interviewees

Practitioner's country and organization	Code	Work and project description
1. Cambodia, SNV	CAMSNV	General work on sanitation program involving CLTS
2. Angola, People in Need	ANGPIN	Participation on large scale CLTS project implemented in four provinces and targeting population of 90 000
3. Angola, UNICEF	ANGUN	Participation on an umbrella sanitation project implemented in 10 provinces and targeting population of 1 242 850
4. Ethiopia, UNICEF	ETPUN	Policy work and general support for CLTS projects
5. Ethiopia, Freelance I	ETPFRL	General support for CLTS projects
6. Ethiopia, Freelance II	ETPFRL2	General support for CLTS projects
7. East Timor, WaterAid	ETIWA	Participation on smaller scale CLTS project targeting population of 3000–4000
8. Pakistan, WaterAid	PAKWA	Participation on long-term sanitation project in Punjab targeting population of 300 000
9. Cambodia, UNICEF	CAMUN	General support for multiple sanitation projects targeting population of 410 187
10. Kenya, Plan International	KENPI	Participation on long-term sanitation project implemented in Homa Bay, Kwale, and Kili counties and Mathare informal settlements, targeting population of 600 000
11. Malawi, Plan International	MLWPI	Participation on long-term sanitation project implemented in six districts and targeting population of 1 000 000
12. Zambia, SNV	ZMSNV	Participation on long-term country-level sanitation project
13. Indonesia, Plan International	IDSPI	Participation on long-term sanitation project targeting population of 135 000
14. Uganda, Plan International	UGDPI	Participation on small-scale sanitation project implemented in Tororo district and targeting population of 41 300
15. Myanmar, UNICEF	MYNUN	Participation on short-term sanitation project implemented in four townships and targeting population of 200 000
16. Mauritania, UNICEF	MARUN	Participation on long-term whole country sanitation program targeting population of 1 632 895
17. Ethiopia, People in Need	ETPPIN	Participation on sanitation project in Wolayita Zone in the Ethiopian Southern Nations, Nationalities and Peoples' Region
18. India, CLTS Foundation	INDCLTS	Policy work and general support for CLTS
19. Haiti, UNICEF	HAITUN	Participation on short-term sanitation project implemented in Belle-Anse Arrondissement and targeting population of 50 000

some regions received subsidies for latrine construction which later hindered pure CLTS in other regions (HAITUN). ETPPIN, ETPUN, KEPIN and ANGPIN offered some sort of technical assistance mostly consisting of the provision of tools (e.g. shovels) and assistance in designing the latrines in a sustainable way. In Pakistan, demonstration latrines were built, as described by PAKWA: '*... and these demolatrines are built in the households which are selected by those communities and they are the poorest of the poor among the poor, either female headed or someone with disability. And in every village, we built one or two*'.

Some adjustments to CLTS in a given social, cultural, or natural context were reported by all but one of the informants (ANGPIN), though some of these

modifications referred to what is described in the CLTS guidelines. For example, ETWA and UGDPI labelled the use of SM as a modification. HAITUN had to modify CLTS tools as they appeared to be too shocking for local communities. MLWPI added more follow up visits to the three standard visits if needed. MARUN highlighted CLTS implementation in urban and peri-urban regions as a successful modification. MYANUN used CLTS to promote the use of toilets rather than their construction as poor households usually cannot afford to build them. According to this view, CLTS itself doesn't solve this problem so MYANUN combines it with SM. UGDPI also described continuing in the community cooperation initiated by CLTS. They realized that demand for water increases after inducing sanitation change through



CLTS, so they try to focus on water access as part of the follow up activities. A large portion of Angola's population consists of nomadic tribes, so ANGUN provided them with GPS devices, thus the tribes can keep a log of their camps and avoid places where there could be faeces in the open. In other regions, ANGUN uncovered how linking the outbreaks of cholera to latrine usage during a triggering session can help generate demand for better sanitation: *'When CLTS was introduced in Cunene region, it was flat CLTS. And locals thought it doesn't concern them. But when they started to get sick with cholera, they started to pay attention: 'We eat faeces? Explain that!' And when we explained what was going and they said stop, we need to do something, or we drop dead'*. IDSPI described adjustments to the Indonesian national strategy (STBM) as a principal modification of CLTS.

The social aspects of CLTS in terms of how communities are approached during CLTS were reported comparatively less often among the modifications. ETPPIN offered long-term cooperation and support to those community members who were interested in sanitation promotion. ETWA persuaded local governments to officially commit to achieving ODF and to closely monitor the progress of villages in their constituency. ZMSNV deliberately skipped communities where the chief smelled of alcohol. IDSPI utilized the influence of priests in catholic communities to achieve behavioural change. ZMSNV reported traditional leaders being able to legally enforce ODF and generally letting community actors modify CLTS according to their knowledge of their community. PAKWA described a whole sector modification through regular meetings where sanitation actors share their ideas and experiences. CAMUN said they did not use some of the more controversial techniques of CLTS such as an 'Army of Scorpions', which is when groups of children are responsible for sounding an alarm whenever they see someone practising OD (Chambers and Kar, 2008).

### Challenges faced during CLTS implementation

The following categories of challenges were reported: socio-political, socio-cultural, environmental, unsuitability of certain CLTS tools and obstacles related to clashes with other interventions (particularly those based on subsidies). Some development practitioners described disputes with government representatives over the means of implementing CLTS (ETPPIN, KENPI, ANGPIN, MARUN). Efforts to achieve formal government targets rather than genuine demand for improving sanitation resonated in the responses obtained from

IDSPI experienced with the implementation of CLTS in Indonesia. He explained that after the official verification of the STBM status (i.e. an analogy to ODF status), communities usually lack the motivation to continue in their efforts to improve sanitation conditions and sustain sanitation change. Facilitators working with ETPPIN lied about monitoring results to make the project appear more successful and, arguably, to achieve formal targets. ETPUN's local construction workers lacked knowledge of latrine construction and refused to build them. ETPFRL2 said local health workers responsible for co-operation in CLTS implementation were severely underpaid. ANGPIN noted that CLTS is highly demanding in terms of human resources and there is often not enough people for follow up. According to ETWA, cooperation is very difficult in East Timor because of numerous ongoing humanitarian and development projects. MYNUN encountered issues while implementing CLTS in large communities. ANGUN, ETPUN and ETPFRL reported problems with uncooperative communities. CAMSNV and INDCLTS reported a lack of solidarity, cooperation and community effort between community members, which implies a key obstacle for the CLTS approach. Only one informant (IDSPI) mentioned low participation of women and people with disabilities as an obstacle. KENPI and UGDPI both talked about problems related to CLTS implementation in urban regions. They tried working with tenants but because of high mobility and short-term lease, they were unable to successfully complete an intervention. UGDPI and ANGUN reported culturally determined perceptions of faeces. In Angola, faeces are taboo, and it is complicated to even start a conversation about them. In Uganda, however, they are not considered dangerous at all.

Regarding environmental challenges, rain and flooding was designated by ANGUN, MLWPI and ZMSNV as major constraints because they destroy many latrines. ETPUN and MYNUN referred to rain in connection with the agricultural season as an obstacle for CLTS, as community members were pre-occupied with agricultural work. UGDPI, HAITUN and MYNUN mentioned difficulties with latrine construction in desert and rocky environments and in marshy regions with high water tables. KENPI witnessed constructed latrines destroyed by termites.

Practitioners working in Ethiopia (ETPUN, ETPPIN, ETPFRL2) described latrines designed by communities as totally unsustainable. CLTS techniques were also found problematic in Haiti because people demanded concrete latrines and found some of the tools too shocking which eventually hindered the achievement of ODF status (HAITUN). ZMSNV has negative experience

with demonstrative use of human faeces during triggering. Six practitioners mentioned that communities were expecting subsidies during CLTS interventions because of their experiences from other programs (HAITUN, IDSPI, MLWPI, ZMSNV, ETWA, INDCLTS). However, INDCLTS might be potentially biased since her organization actively promotes pure CLTS as an alternative to government subsidy programs.

### Ethical controversies around CLTS

Although ethical questions surrounding the use of CLTS represent a major critique of this approach in academic literature, these issues were mentioned relatively less often during our interviews with development practitioners. This is not to say that informants were ignorant of these concerns. Eight of them mentioned that CLTS interventions can lead to the abuse of disadvantaged community members and amplification of social inequalities, especially if these concerns are not addressed during the training of facilitators and preparation. ANGPIN, INDCLTS, HAITUN, MYNUN and ZMSNV reflected on ethical questions related to shaming people during CLTS sessions. They did not dismiss these practices but were in strong agreement that they must be done sensitively and in a correct manner. KENPI and UGDPI realized problems with shaming, too, but simultaneously considered the focus on these emotions as highly effective. ANGUN, MLWPI and ETWA view knowledge of the local context, appropriate CLTS adaptations and leaving the decisions in the hands of communities as crucial for abuse prevention. IDSPI, PAKWA, CAMUN and MARUN had no such issues with CLTS or as IDSPI put it: *'I think we can use public shaming occasionally, it is a good shock therapy for them'*. Direct criticism came only from ETPPIN who did not defend CLTS in any way and criticized the politicization of sanitation in Ethiopia: *'We came to officially ODF regions, which weren't really ODF. But the government had achieved its goals, right?'*

### General assessment of CLTS

Regardless of critique, practitioners reported that they are generally satisfied with CLTS as an approach and most of their objections are linked to the contextual specifics which they have to deal with. Overall satisfaction was explicitly expressed by ZMSNV, IDSPI, ETWA, ETPRFL, ANGPIN, UGDPI, HAITUN, CAMUN, MAURUN and MYNUN. The latter interviewee, for example, contemplated: *'I really like CLTS, we don't tell people what to do. They realize for themselves what is right'*. Another six practitioners, though also generally

satisfied with CLTS, specified various aspects where they would like to see improvement. ETPPIN emphasized a need for flexibility with respect to designing and implementing the approach. It means thinking constantly about possible upgrades and modifications but also the integration or selection of other approaches if they are more suited to a given context or if something does not work. KENPI deems it necessary to link CLTS to SM and develop CLTS+. CAMSNV considered CLTS the most powerful approach for behavioural change but simultaneously maintained that it cannot be overestimated and understood as an all-encompassing approach to attaining a sanitation safe environment. According to MLWPI, CLTS should never be used as a stand-alone approach. PAKWA thinks the CLTS approach is not developed enough for its massive application.

## DISCUSSION AND CONCLUSIONS

CLTS is often considered a successful and effective sanitation promotion approach and interviewed practitioners generally agree with this assessment. After all, most of them achieved positive results with this approach, at least regarding the short-term targets set for the projects they referred to in their interviews. Previous experience with CLTS and the perception of its positive results (in terms of the above noted short-term goals) were also the most often reported factual reasons for using CLTS (together with situations when the use of CLTS was pre-determined by the design of programs and policies framing a project in question). However, we noted that the conception of 'positive results' didn't match the most often reported motivations for the use of CLTS in terms of the expected effects on human health. Although health effects are promoted as the primary goals, whether and to what extent CLTS can help improve health and lower mortality is still debatable (Pickering *et al.*, 2015; Freeman *et al.*, 2017; Sinharoy *et al.*, 2017). Indeed, a recent systematic review that addressed specifically the evidence on CLTS concluded that 'CLTS has been rolled out with minimal rigorous evidence on its effectiveness and impact on sanitation and health outcomes' (Venkataramanan *et al.*, 2018, p. 026001-14). The interviews indicated that practitioners generally neither weigh in on their own evidence on actual health impacts nor on the limited and inconclusive evidence that exists in literature. They instead implicitly acknowledge the biological plausibility and general acceptance that improving sanitation is an important condition for improving human health due to the incidence of infectious diseases and lower mortality (Fewtrell *et al.*, 2005; Wolf *et al.*, 2014). This doesn't come as a surprise because causal links



between sanitation interventions and health is difficult to isolate (e.g. Schmidt, 2014). The focus on whether assumed pre-conditions for health improvements are in place should be sufficient motivation to invest in sanitation (e.g. Carter, 2017).

Perhaps more importantly, our research indicated that there is very limited if not no knowledge among practitioners about whether and how increases in sanitation coverage attained within a relatively short-term period of a project's life are sustained and followed by upward shifts in the sanitation ladder. This is a critical point, particularly regarding CLTS, which often results in poor and non-durable latrines by addressing motivations to end OD rather than to invest in the improvement of sanitation facilities (e.g. USAID, 2018). Some of the interviewees anticipated sustainability issues and expressed reservations towards CLTS, typically concerning its principle of no external aid during implementation. Overall, however, these contemplations only marginally resonated in the practitioners' assessments of the CLTS approach. This can be interpreted in the light of recent literature that increasingly calls for 'a routine incorporation of technical support in the post-triggering stage' (Venkataramanan *et al.*, 2018, p. 026001-13).

Interestingly, non-health goals such as gender relations, women specific issues, or school attendance were only marginally reflected in the reported motivations and targets, although they are emphasized in literature (Hirve *et al.*, 2015; Sclar *et al.*, 2017).

While the primary and secondary WASH barriers described in the famous F-diagram are well known, the findings above indicate that there is less understanding and awareness of the logical pathways between sanitation change and its expected health and non-health effects. More specifically, the route between sanitation interventions and sanitation conditions should be more carefully separated from the route between sanitation conditions and their health and non-health impacts. Similarly, the interpretation of evidence on each of these two parts of the logical model of sanitation should not be confused. Although this may be a general challenge for the trainings of WASH practitioners, we think that this understanding of a logic model of sanitation is particularly needed with respect to CLTS because it has become increasingly apparent that this approach targets only its initial part (i.e. the elimination of OD) but may be ineffective and even counterproductive in regards to further steps towards the desired health and non-health impacts of sanitation change. In general, understanding to processes operating behind the CLTS intervention has been limited, both theoretically and empirically, which exacerbates a risk of its mechanistic application.

Congruently with CLTS guidelines, we found high flexibility in the applications of this approach in practice. Our results suggest that practitioners are quite open to various modifications of prescribed techniques and their combination with related approaches such as SM or PHAST. We interpret this finding as a predominantly positive message because it has become increasingly clear that CLTS should not be used as a standalone approach to sanitation change (e.g. Crocker *et al.*, 2017). The reported use of CLTS together with SM also indirectly indicates efforts to address some of the sustainability challenges discussed above.

Among various departures from the main principles of CLTS, the use of subsidies represents a particularly debated issue (Papafilippou *et al.*, 2011; Sigler *et al.*, 2015; Galvin, 2015). In our sample, several of the interviewees acknowledged the combination of CLTS with direct subsidies or technical assistance. At the same time, they reported generally good experiences with the use of targeted subsidies for disadvantaged households, thus providing sanitation to people whose needs would otherwise be overlooked (Hirve *et al.*, 2015). Subsidies and technical assistance were also considered to address the sustainability of latrine constructions, especially in harsh environmental conditions. Although the environmental challenges reported during interviews are generally applicable sanitation constraints, they may be particularly relevant with respect to the CLTS as they result in low quality, non-durable sanitation facilities. The opinion that people are not always able to construct adequate sanitation facilities by themselves, even if there is support from within their community, seems to be relatively prevalent. In such cases it seems difficult to defend the CLTS no-subsidy or external assistance principle. However, these circumstances should be carefully identified because, as also confirmed by our interviews, (earlier) subsidy-oriented sanitation interventions can shape a genuine demand for sanitation in a negative way. These findings agree with calls for a hybrid CLTS approach (Galvin, 2015) or with the empirical evidence of the better results of sanitation interventions that combine 'smart' subsidies with community mobilization (Guiteras *et al.*, 2015). Although sanctions and punishments are permitted according to the CLTS handbook (Chambers and Kar, 2008), they are often discussed in connection with possible human rights violation (Bartram *et al.*, 2012). These tools were reportedly used only in several of the projects referred to in our interviews. In fact, it seems to be very difficult to find an example of a CLTS application in its pure form.

Our survey identified various challenges and obstacles that practitioners faced in their applications of

CLTS. Although the majority of these constraints apply to other sanitation interventions too, some are particularly relevant with respect to CLTS design. For example, a lack of cooperation and inequality within targeted communities is a known barrier for the successful implementation of participatory community-led methodologies and another type of sanitation strategy may be more appropriate in such contexts. All of these comments and findings underline the key importance of understanding the local context, formative surveys and efforts to avoid a one-size-fits-all model of CLTS applications (Tilley *et al.*, 2014; Galvin, 2015; Bardosh, 2015).

Our research confirmed that practitioners are generally aware of potential ethical controversies around practices used in the CLTS approach. At the same time, however, the prevalent view can be labelled as a pragmatic one. The majority of informants defended CLTS and their own way of implementing this approach because they believe in its effectiveness. They mostly concentrated on the barriers and problems related to the practical feasibility of their project and didn't elaborate on ethical controversies in more detail.

As researchers, work on this study provided us with an opportunity to confront academic views and evidence on CLTS with the perspectives and understandings of development practitioners. This exercise uncovered at least two notable divergences. The first is a contrast between the predominantly positive assessments, popularity, and massive use of CLTS in practice and the so far very limited evidence of its results, particularly with respect to longer-term impacts. The second is a divergence between the content of academic critique of which a considerable part addresses ethical issues around CLTS implementation and rather pragmatic views of practitioners mainly concerned with various contextual specifics or about the lack of materials and skills hampering improvement in the sanitation situation within a community without external assistance.

## FUNDING

This work was funded by the Czech Science Foundation [grant number GA15-21237S].

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**2) HUMŇALOVÁ, H., FICEK, F. (2023): Sanitation strategies for reducing open defecation in rural areas of India and Ethiopia. AUC Geographica, 58, 1, 51–63.**

**Autorský podíl/Share of authorship 50 %**

# Sanitation strategies for reducing open defecation in rural areas of India and Ethiopia

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## ABSTRACT

Sanitation change continues to be on the forefront of the global development agenda, even as it is becoming clear that the targets established in the Sustainable Development Goals will not be met. But since improving access to safely managed sanitation facilities remains a cost-effective and impactful measure to improve people's lives, it is still important to assess currently implemented policies to be able to learn from best practices and to understand how different approaches work under different contexts. This paper provides comparative analysis of country-level policies in India and Ethiopia, two countries that achieved notable progress in eliminating open defecation through distinct sanitation strategies, with the aim of confronting the advantages and disadvantages of both approaches. While in India the primary emphasis has been on the supply-side, i.e., provision of subsidized sanitation infrastructure, Ethiopian strategy prioritized the demand-side by addressing change in sanitation behavior through Community Total Led Sanitation. The analysis shows that neither of the strategies can fully achieve the sanitation change and a combination of both seems to be the most impactful approach in combating open defecation. It also argues that policymakers must consider not only local socioeconomic and budgetary constraints but also historical, institutional, sociocultural, and geographical specifics in deciding what type of subsidies would be the most fitting. At the same time, they also need to address the appropriate social norms to achieve the desirable change in sanitation behavior.

## KEYWORDS

sanitation change; environmental health; India; Ethiopia; Sustainable Development Goals

Received: 30 January 2023

Accepted: 4 May 2023

Published online:

Humňalová, H., Ficek, F. (2023):

Sanitation strategies for reducing open defecation in rural areas of India and Ethiopia.

AUC Geographica 58(1), QQQ–QQQ

<https://doi.org/10.14712/23361980.2023.5>

## 1. Introduction

The sixth Sustainable Development Goal (SDG) includes a target to end open defecation (OD) and secure access to adequate and equitable sanitation for all by 2030, which has been recognized as one of the most challenging features among all SDGs' targets (Moyer and Hedden 2020). The progress has been uneven so far (e.g. WHO/UNICEF 2019; Desphande et al. 2020) and it is unlikely that the global sanitation target will be met (UN 2018; Sadoff et al. 2020). The aim of this study is to provide a comparative analysis of sanitation policies used to address household-level sanitation in India and Ethiopia; two large countries that are major influencers of recent trends in the global sanitation indicators. Despite their dissimilar levels of socioeconomic development, until recently the majority of both Indian and Ethiopian households practiced OD (Tab. 1). However, between 2000 and 2017, Ethiopia and India achieved the largest and third largest decrease in OD rate worldwide, accounting for 4% and 60% global reduction of people practicing OD (WHO/UNICEF 2019). The more recent data (WHO/UNICEF 2021) shows further reduction of OD in both countries with India being ahead.

The strategies adopted by India and Ethiopia led to distinct outcomes (Tab. 2) with distinct remaining issues. In Ethiopia, the dominant sanitation infrastructure is low-quality facilities that do not ensure safe separation of fecal material from human contact (see Novotný and Mamo 2022). This makes presumed health impacts of the widened availability of latrines uncertain (Freeman et al. 2022; Aragie et al. 2022) and presents a risk of OD slippage (Abebe and Tucho 2020). Unimproved sanitation facilities are much less prevalent in India, but the key challenge

is to ensure consistent use of available toilets (Coffey et al. 2014; Jain et al. 2020; Gupta et al. 2020), which seems to be less an issue in Ethiopia (e.g., Novotný et al. 2018a).

## 2. Objectives and methods

The aim of the article and its main contribution to the knowledge on sanitation practice is a comparison of the two diametrically different sanitation policies and strategies to combat OD. Both national strategies are on the opposite side of the current sanitation practice spectrum; India with fully subsidies toilet constructions and Ethiopia focusing on behavior change. This juxtaposition clearly shows each one's advantages or disadvantages and yields important lessons learned for further upgrades to or implementation of any revised sanitation directions either of the two countries or countries with similar trajectories might employ.

We used comparative analysis to explore both strategies across four domains: Political framing and support, Main narratives and legal ground, Financing, and Sanitation approach, which is further divided into sub-domains: behavior-change components and technology promoted. These domains were selected as the most contested ones based on our literature review.

In the remainder of this article we will firstly outline the development of sanitation policies in India and Ethiopia, especially the most recent sanitation schemes. The next section will compare in detail both countries' strategies along two main dimensions: political support and sanitation change approaches, each of which covers several domains. The concluding

**Tab. 1** Basic development indicators and open defecation rates in rural and urban areas in India and Ethiopia.

	Population (millions)	GDP per capita (PPP, international dollars)			Human Development Index			Population practicing open defecation (%)		
		2020	2000	2019	Change (%)	2000	2018	Change (%)	2000	2017
India	1380	1920	6980	363	0.497	0.647	130	74	24	15
Ethiopia	115	507	2720	537	0.283	0.470	166	77	26	17

Sources: Data on GDP are from the IMF World Economic Outlook (October 2020), Human Development Index is based on UNDP data for Human Development Report, 2019 (Conceição 2019); Sanitation data are from WHO/UNICEF (2019, 2021).

**Tab. 2** "Ladder" of sanitation services available in rural and urban areas in % (2020).

Type of sanitation service	India			Ethiopia		
	Total	Rural	Urban	Total	Rural	Urban
Improved safely managed (private toilet, handwashing facility with soap and water)	46	51	37	7	4	16
Improved basic service (private toilet)	25	17	42	2	1	6
Improved limited service (facility but shared with other households)	12	8	19	9	3	31
Unimproved (sanitation facility which does not ensure separation of excreta from human contact)	2	2	0,4	65	71	45
No service (open defecation)	15	22	1	17	21	3

Source: WHO/UNICEF (2021).



section discusses lessons learned and possible examples for the rest of the world to follow in the run up to 2030.

### 3. Overview of sanitation policies

#### 3.1 India

Inadequate sanitation received some attention during colonialism as a case of poor health. After independence it received little attention until the 1980s (Duggal 1991; Khan 2006; Mushtaq 2009), when India introduced the Central Rural Sanitation Program. This first national sanitation scheme was ultimately unsuccessful, purely supply driven, and focused on the provision of uniform pour-flush toilets, which mostly remained unused (WSP 2010; Mohapatra 2019).

The scheme was restarted in 1999 as the Total Sanitation Campaign, aiming to make India open defecation free (ODF) by 2012. Although it called for a bottom-up community-led approach and for more emphasis on the information, education, and communication activities, it retained fixation on toilet construction (Hueso and Bell 2013; Barnard et al. 2013; Mohapatra 2019). And while toilet coverage increased rapidly, the subsidized toilets were of poor quality, and again remained unused (Patil et al. 2014; Coffey et al. 2014; O'Reilly et al. 2017; Sinha et al. 2017). The Total Sanitation Campaign was remodeled into Nirmal Bharat Abhiyan in 2013, with the goal of universal access to sanitation set for 2022. This scheme was supposed to extend the focus on community-led approaches, but the issues remained. The implementation was inconsistent, poorly received, exclusionary, riddled with political interference, and toilet coverage increased only modestly (Routray et al. 2017; Mohapatra 2019).

On October 2<sup>nd</sup> 2014, Narendra Modi launched Swachh Bharat Mission (SBM). Latrine construction was supposed to be again supplemented by various behavior change activities and information campaigns. It was implemented on an unprecedented scale and gained strong political support but faced criticism that it was dominated by construction of subsidized toilets (Kumar 2017; Mohapatra 2019; Novotný et al. 2018b; Andres et al. 2020; Exum et al. 2020). But there is also evidence that the SBM performs better than the previous schemes and could support wider sanitation change (Curtis 2019; Hutton et al. 2020). While the toilet provision across rural India was the main focus of the SBM until 2019, the following second phase addresses the sustainability and behavioral aspects of sanitation change (e.g. Sarkar and Bharat 2021). It is also related to the ongoing government scheme called Jal Jeevan Mission that focuses on the provision of water at the household level to overcome a major barrier for toilet use in India (<https://jaljeevanmission.gov.in>).

#### 3.2 Ethiopia

Measures addressing hygienic sanitation in Ethiopia have been incorporated into government health programs since the mid of the 20th century. More specifically, introduction of health services dates back to 1946 when the international community sponsored training of health assistants and sanitary inspectors. This can also be characterized as the rise of Ethiopian endeavors towards sanitation change. Since then, the sanitation agenda has come indirectly under the Federal Ministry of Health (FMOH) competences and stayed exclusively there until recently (Kloos 1998; Feleke 2019).

The milestone in addressing sanitation issues is the introduction of the Health Extension Program (HEP) in 2003 which serves among other things as the implementation channel for national sanitation strategy and confirms the direction of sanitation being closely linked to public health policies. The newest program, called One WASH National Program (OWNP) reflects problems of the current sanitation situation including strategies, financing and implementation. It has officially recognized the close linkages between water, sanitation and hygiene (OpenWASH 2016) aiming to achieve their universal access to all. The OWP and its related documents were signed by four different ministries (Water, Irrigation and Energy; Health; Finances; Education) proving an inclination towards the multi-institutional approach (National WASH coordination office 2018). The OWP stresses good governance; efficient use of human and financial resources; and capacity development at all levels as the key components of improving sanitation.

### 4. Confronting current sanitation policies in India and Ethiopia

#### 4.1 Political framing and support

##### 4.1.1 India

In an unprecedented shift from previous schemes, through the SBM sanitation received one of the highest priorities among domestic policies, together with massive political support and attention. Public officials led by the Prime Minister Modi spearheaded the drive for sanitation change which was delegated to the Ministry of Drinking Water and Sanitation. The SBM actually became one of the most important policies of his administration, which also realized there are votes and publicity in toilets. Political representatives on the highest level committed themselves to sanitation and this commitment trickled down to the lower levels (Kumar 2017; Curtis 2019). But this political support goes hand in hand with overall politicization of social policies by the ruling party. This includes reproduction of caste and gender hierarchies which are now supported as drives for social mobility. Occupational caste

hierarchies are reimagined to provide a sense of inclusion and empowerment through pride and unity without tackling traditional purity-pollution hierarchical distinction (Gudavarthy and Vijay 2020). These issues coupled with former failed sanitation programs could be initiating distrust towards the government in states that are not ruled by Modi's BJP (Curtis 2019). However, there does not seem to be any difference in SBM outcomes in states governed by BJP and those governed by opposition parties so far (Bhattacharya et al. 2018).

#### 4.1.2 Ethiopia

In a show of a strong political will to improve sanitation, the Ethiopian government very proactively integrated SDGs in governmental strategies and documents (ONEWASH national program) with the promise to achieve access to adequate and equitable sanitation and hygiene for all and end open defecation by 2030 (Baye 2021). In cooperation with foreign actors the government defined the need to tackle sanitation through an integrated and multi-sectoral approach (Wateraid 2016; OneWASH 2019). Following this shift a wide WASH platform was established and several new strategic documents and programs were launched including One Wash National Program (OneWASH 2019; WHO 2015).

In spite of this proactive approach, sanitation remains a low political priority in Ethiopia. It is somewhat buried within a wide development portfolio, surmounted by water, hygiene and other issues that are perceived as more directly linked to health (WaterAid 2016). It is important to note that this article was written during the so-called Tigray War accompanied by hunger, thus the sanitation priority is lower than usual. Sanitation programs have been implemented through the Health Extension Program as one out of its 16 types of provided health-related services (Alemu et al. 2019; Banteyerga 2011). The coordination of activities beyond the federal level has been questioned as well as a lack of clear ownership of implementation and budget, lack of reliable or consistent data, along with a lack of clarity on roles and responsibilities are causing drawbacks in sanitation change (Freeman 2013; Abraham et al. 2019). The state, labelled as authoritarian (Aalen and Tronvoll 2009), works more in command and control manner. The Ethiopian government put pressure on achieving successful results in health services, including construction of latrines and declaration of ODF status. Households are forced through the HEP to own latrines but their quality and impacts on health are not relevant. It is more about positive numbers than the real health and dignity impacts (Melberg et al. 2019).

## 4.2 Main narratives and legal ground

### 4.2.1 India

SBM represents a paradigm shift in framing of sanitation in India. It became part of a broader strive

for modernization, which also created better conditions for adopting modern toilets. Narendra Modi replaced the Nirmal Bharat Abhiyan with SBM soon after his election, creating his own signature cleanliness program, which spilled over into the political landscape, clearly demarking a line between "old dirty corrupted" India, and a "modern clean country" under his leadership. There is also no longer an aim to address caste and gender hierarchies, in a departure from previous rights-based social equality programs, which however did not enable social mobility and current approach is perceived as more honest (Curtis 2019; Gudavarthy and Vijay 2020). This also required changing traditional Hindu discourse surrounding purity and pollution (e.g. Coffey et al. 2014) which Modi's BJP successfully challenged (Curtis 2019). Public officials led by the Prime Minister broke taboos surrounding cleanliness and participating in SBM was seen as an enhancement of one's social status (Kumar 2017).

But India still lacks union or state law regulating rural sanitation, which thus has to be regulated by administrative directions. In this regard, SBM is focused mostly on individual needs without framing them in terms of individual rights. Making people responsible for sanitation and unable to hold the government accountable for the promises made (Cullet 2019), especially since the supreme court tends to decide environmental cases in a selective manner (Iyengar et al. 2019). But even if the right to sanitation was further cemented in law, there is no guarantee that it would be enforced. As is the case with manual scavenging, which is illegal in India but still practiced (e.g. Coffey et al. 2014).

### 4.2.2 Ethiopia

Ethiopia's constitution from 1994 contains an article about ensuring a clean and healthy environment for all Ethiopians as a constitutional right, encoding access to improved sanitation. Nonetheless, also here we can find similarities with India, as no national law regarding access to improved sanitation currently exists (Côrtes et al. 2016). Meaning there is no enforceability and no legal recognition of the right to sanitation.

Policies and policy areas which directly underpin the sanitation sector and create a regulatory framework in Ethiopia are three: water, health and environment (MoH 2005; OpenWASH 2016). However, health is the main driver for sanitation change and efforts to achieve sanitation for all are rooted in maximization of public and private health benefits. That is why the primary policy in terms of sanitation action is a health policy, titled the Health Policy of the Transitional Government and implemented through the Health Extension Program. The introduction of the Health Extension Program represented an important paradigm shift from a long-standing curative focus to one of prevention (MoH 2005).

### 4.3 Financing

#### 4.3.1 India

On a macro level, SBM has been financed by the Indian government, which, in order to engage in such a massive task, negotiated a loan with the World Bank. Institutions like UNICEF, WaterAid, Bill and Melinda Gates Foundation, or the Tata Trust, provided technical support to and financial assistance for hiring sanitation consultants (Curtis 2019).

On a micro level, toilet construction is subsidized by up to 12 000 INR, of which usually 60% comes from the central government and 40% comes from the state governments. Information, education and communication activities received a maximum of 8% of the project expenditures, (Ministry of Drinking Water and Sanitation 2018). In alignment with previous schemes, money spent on toilet construction was ex-post reimbursed to the household, which was criticized as ignorant to structural inequalities, and reinforced tendencies to not adopt toilets. It left no space for beneficiaries' inputs, and since higher castes often constructed toilets according to notions of purity and pollution, subsidized toilets become a symbol of caste and class discrimination (O'Reilly et al. 2017; Jain et al. 2020).

#### 4.3.2 Ethiopia

The sanitation sector in Ethiopia has been financed by a wide range of funding mechanisms. The financial resources were mobilized through the federal government and regional budget allocation, bilateral aid, donor support in the form of grants and loans, NGOs resources allocation, or Woreda and Community contributions (OneWASH 2016; Haile 2009). Nonetheless, the sector stays heavily aid-dependent (WSP 2010). To create a transparent cash flow a new financing system was set up and there is a division of transparent accounts (FIN 2019).

In terms of microfinancing, there is an agreement at the governmental level that the hardware subsidies are not supported in any kind (Alemu et al. 2017; WSP 2010; WHO 2015). However, there appeared to be recent recommendations from foreign NGOs (IRC) to subsidize the poorest households via the Ministry of Agriculture's Productive Safety Net Program (Achenbach 2022) but still not implemented in official policies as well as in the practice. The micro-financing mechanism is based on the idea of a sanitation ladder. People buy the cheapest solution with no subsidy and immediately as it is possible they try to improve it.

### 4.4 Sanitation approach: behavior-change components

#### 4.4.1 India

Lack of behavior change is presumably the most criticized aspect of Indian programs and the government failed to reorient from latrine construction in past

schemes (Kurup 1991; Barnard et al. 2013; Hueso and Bell 2013; Routray et al. 2017). SBM guidelines designate information, education and communication activities as a core aspect of the program and declare toilet construction as only supplemental to behavior change, though only a fraction of the budget was allocated to it (Ministry of Drinking Water and Sanitation 2018). There is also a discrepancy between the official narrative and a covert narrative believed by implementing officials who perceive information, education, and communication activities as secondary (Hueso et al. 2018), even as OD is still practiced in states officially declared as ODF (Exum et al. 2020). Strikingly, notable behavior change occurred not in villages but in government offices where previously uninterested and disgusted officials started to be deeply involved in sanitation (Curtis 2019).

Diverse motivational components, both those aiming at positive motivation and coercive measures, were part of SBM. The Nirmal Gram Pushkar, a clean village award connected to a financial incentive, was not reinstated for SBM due to tenuous results and difficult verification process (Bernard et al. 2013; Mohapatra 2019). But model early-win districts were selected to motivate skeptical district officials and village leaders were encouraged with dashboards where they could update and compare their progress, with the best ones receiving prizes and praise on social media (Curtis 2019). The dashboards predominantly show the number of toilets constructed (Department of Drinking Water and Sanitation 2020). Coercive measures were heavily utilized during SBM, as officials pressured villagers to construct a toilet under a threat of government's benefits and rations withdrawal, or directly with fines and arrests by the police. Members of lower castes and BPL households were more often affected by the coercive measures and were further associated with filth because they are forced to use toilets that are not made according to notions of purity and pollution, and subsidies meant for them are captured by higher castes (O'Reilly et al. 2017; Cullet 2018; Gupta et al. 2020).

#### 4.4.2 Ethiopia

Unlike India, behavior change approaches have been central to Ethiopian sanitation programs. After some NGOs successfully implemented Community-Led Total Sanitation (CLTS) in rural areas of Ethiopia, CLTS got wider acceptance and was formally adopted by the Ethiopian government as a key national sanitation approach. The Ministry of Health developed the National CLTS Implementation Guideline to support the uptake of CLTS throughout the country (more specifically, Ethiopian variants of CLTS have been referred to as CLTSH – Community-Led Sanitation and Hygiene). The implementation is rolled out across the country through the Health Extension Program (UNICEF 2017) and via woreda-level trained professionals (One Wash 2016). The main stress is to



address social determinants of health and affect the behavior of targeted groups (Asseffa et al. 2019).

The CLTS approach is community based, assuming that community behavior changes gradually. It involves early adopters (model families), then moving to the next group ready to change. Those resistant to change are gradually conditioned to change because of changes in their environment (Chawica et al. 2012). After some criticisms of the HEWs only visiting households and using household-centered approach, rather than CLTS community methods, the Ethiopian government in its One WASH program II (2018) officially addresses the need for designing a “community-centered approach”. This new approach officially activates members of communities and other actors at the community level, such as community leaders, health sector actors, development agents, teachers and students etc. Community based approach is meant to be complementary to CLTS approach and to enhance other efforts and follow ups to change sanitation practice (National WASH coordination office 2018). Nonetheless it is a new initiative which has not yet been evaluated and monitored, thus there is no evidence of real results.

The official motivation strategies used to implement sanitation programs are mainly ODF certification, which rewards the community’s achievement and encourages them to further improve sanitation behavior and increases the ownership of the entire process. However, the competition between villages encourages some officials to declare ODF status before it is reached. It creates strong pressure on constructing latrines but not on behavior change itself (Behailu 2015). It was reported that the pressure may take a form of sanctions (mostly financial, exceptionally jail or threatening by it) of households without latrines (Novotný et al. 2018a). Moreover, 15% of households fall back to open defecation after declaration of ODF status within one or two years after village ODF declaration. The reasons vary but one of them is incorrect implementation of CLTS activities (Abebe and Tucho 2020).

#### 4.5 Sanitation approach: technology promoted

##### 4.5.1 India

Twin pit pour flush toilets have been most widely recommended under SBM, although states can choose different options. Row toilets or complexes are also recommended, but their design should keep them affordable, e.g. the pits should not be unnecessarily large, while also making the superstructure acceptable for the beneficiaries. Community Sanitary Complexes should be constructed in places where individual latrines are not suitable, usually due to lack of space, or at public places (Ministry of Drinking Water and Sanitation 2018). The concept of sanitation ladder is therefore not utilized in India and twin pit pour flush toilets are the basic sanitation facilities

provided. But there is a broader “WASH ladder” which starts with the provision of a toilet and continues with a household tap water connection or a concrete house (Ministry of Jal Sakthi 2019).

Twin pit pour flush toilets were chosen for their relatively easy fecal sludge management, but they are often not accepted and misunderstood by the communities. To prevent pit emptying people tend to merge the two pits or disconnect the toilet altogether. Containment pits are preferred but they are often built in poor quality and without proper management knowledge (Gupta et al. 2020; Chandana and Rao 2021). Water scarcity also represents a major barrier in community acceptance, as people in water-scarce regions prefer to use water for washing rather than sanitation (Bhattacharya et al. 2018).

##### 4.5.2 Ethiopia

The National sanitation strategy recognizes the need for different variations of latrines depending on regional context, geographical conditions, desires of local population etc. (Ministry of Health 2005). Unlike in India, there is an agreement at the governmental level that the hardware subsidies are not supported in any kind. The complete responsibility for building latrines lies in households themselves (Alemu et al. 2017; WSP 2010; Ministry of Health 2005). At the same time the Ethiopian sanitation strategies work with the idea of a sanitation ladder. It assumes that people start with a basic latrine construction and when they have an opportunity they improve their latrines. For those reasons people are encouraged to build traditional pit latrines with basic structures from various local materials in order to reduce the costs and quickly adopt improved sanitation behavior.

Nonetheless the cheapest solution does not always lead to behavioral change. As the evaluations showed the change is not as sustainable as it is officially proclaimed (Asseffa et al. 2017; Crocker et al. 2017). The current numbers (One WASH 2018) shows that 20% still has no access to latrines and most of the rest only to unimproved traditional pit latrines (Fig. 1).

## 5. Discussion

Throughout the past decades India and Ethiopia have developed their own specific approaches, both on paper and on the ground. And while much was achieved and many mistakes were made, their shared experience offers a great lesson to the rest of the world, that is running out of time to successfully fulfill SDG 6.2. by 2030. The following section and a summarization in Tab. 3 aims at distilling lessons learned from sanitation change drives in India and Ethiopia and offering best practices for other countries to follow.

Sanitation change habitually lacked strong political support, but the trend is rather improving (WaterAid



Fig. 1 Examples of household toilets common in rural Ethiopia (right side) and rural India (left side). Source: The authors.

Tab. 3 Confronting sanitation policies in India and Ethiopia.

	India	Ethiopia
<b>Political support and prioritization of sanitation</b> <i>Is there political will and support to improve sanitation? and political motivation?</i>	<ul style="list-style-type: none"> <li>Sanitation received <b>top priority</b> among domestic policies.</li> <li>Retained political commitment.</li> <li>Intertwining with ideological goals of right wing Hindu nationalism.</li> </ul>	<ul style="list-style-type: none"> <li>Sanitation has <b>not been among top development priorities</b>, and not even among WASH policies.</li> <li>There is political will for sanitation change.</li> </ul>
<b>Implementation fidelity</b>	<ul style="list-style-type: none"> <li>Implementation <b>did not follow the policy guidelines</b>, especially in prioritizing behavior change measures.</li> </ul>	<ul style="list-style-type: none"> <li>Policies are only <b>poorly reflected in practice</b>, and there is a high return rate to OD.</li> </ul>
<b>Main narrative(s) / framing/ Legal ground</b> <i>What is the development paradigm, how is the sanitation approach legally grounded?</i>	<ul style="list-style-type: none"> <li>Main political narrative for sanitation change is <b>modernization</b>.</li> <li>Sanitation recognized as a right but <b>not enforceable</b> due to lacking laws.</li> </ul>	<ul style="list-style-type: none"> <li>Main political narrative for sanitation change is <b>preventative health</b>.</li> <li>Sanitation recognized as a right but <b>not enforceable</b> due to lacking laws.</li> </ul>
<b>Financing (incl. Hardware subsidies)</b>	<ul style="list-style-type: none"> <li>Interventions <b>fully funded by the government</b>.</li> <li>At individual level standardized households hardware subsidies are a core aspect of SBM.</li> </ul>	<ul style="list-style-type: none"> <li><b>External funding</b></li> <li>Policy of <b>no hardware subsidies</b> for individuals</li> </ul>
<b>Technology promoted/used</b> <b>Sanitation ladder</b> <i>What types of toilets etc. are used?</i>	<ul style="list-style-type: none"> <li>Twin pit pour flush toilets were built in a majority of cases, disregarding local context.</li> <li>Sanitation ladder not utilized.</li> </ul>	<ul style="list-style-type: none"> <li>Widespread usage of <b>dry pit latrines</b>.</li> <li>Concept of <b>sanitation ladder relied upon</b> for upgrading but assumed progression along sanitation ladder has not occurred.</li> </ul>
<b>Behavior-change</b> <b>Community based</b> <i>Is behavior change included in sanitation approaches? And are they community based?</i>	<ul style="list-style-type: none"> <li><b>SBM did not prioritize behavior change approaches</b>.</li> <li>Community-based approaches not utilized and subsidies reproduced caste hierarchies.</li> </ul>	<ul style="list-style-type: none"> <li>The Ethiopian government applied the CLTS approach complemented by sanitation marketing.</li> <li>CLTS is a community based sanitation approach which stresses <b>behavior change</b>.</li> <li>The core of sanitation approaches is <b>behavior change</b></li> </ul>



2016), as exemplified by both Ethiopia and India, even as the overall narratives differ. India frames SBM as a part of an overall modernization effort and issue of cleanliness - both in a physical and spiritual way, while Ethiopia constructs sanitation primarily as a health issue preventing the spread of diseases. This is not to say that sanitation in India is in no way seen as a tool for improving health, but the narrative communicated to the population revolves around shifting the country into the 21st century. These divergent narratives offer some deeper view into different motivations and subsequent results of sanitation policies. Health benefits of sanitation change are intangible and difficult to recognize in the short term. Linking the adoption of toilets to modernization as well as physical and spiritual cleanliness means a stronger leverage and directly measurable goal which is achievable by delivering sanitation facilities to every household. At the same time, it can be argued that the modernization narrative subverts behavioral aspects of sanitation change, as it is linked with toilet ownership, rather than use, thus disconnecting behavior change from the program's objective.

Political support is undoubtedly crucial for successful sanitation change. And we have seen politicians using the sanitation theme to win elections, as they did in India (Curtis 2019). And while this is generally a positive trend, inclusion of politicization of sanitation is also concerning, as again demonstrated by the Indian experience. SBM is now too important to fail and officially reported achievements are often exaggerated (Curtis 2019; Exum et al. 2020). Further, it created a political narrative around social policies that labels critics as outsiders disintegrating the nation, while encountered issues are blamed on previous governments' right-based programs, which in turn makes Modi's regime programs reproducing caste and gender hierarchies seen as more efficient (Gudavarthy and Vijay 2020). Although it is clear that gaining political support enables massive change in a short time, policy makers must be cautious when entangling sanitation policies with politics. A possible safeguard, that neither Ethiopia or India deployed, would be a legal framework that would codify the right to sanitation into the national legislature, which could provide the public with means to keep politicians accountable by making them entitled to sanitation, rather than responsible for it (Cullet 2018).

The actual implementation and realization of sanitation policies is also dissimilar. Modi's government singled out sanitation by granting it top priority among domestic policies and establishing a dedicated ministry of Jal Sakthi. While in Ethiopia sanitation became part of a broader One WASH program, an integrated, multi-sectoral, and multi-level approach created in response to uncoordinated projects and programs. This should minimize duplication of activities and spending, but requires a complex coordination and clarity of stakeholders' roles. In contrast, the

Indian single institution approach allows for a more streamlined process. This reflects local contexts, as water supply is a far greater issue in Ethiopia, where the emphasis is more on water resource activities and sanitation is just an accessory. With limited resources, it is seen as unfeasible to prioritize sanitation (Siraj and Rao 2016). India meanwhile struggled with often culturally grounded dislike of toilets and a preference for OD (Coffey et al. 2014; Sinha et al. 2017), and thus needed to mobilize attention into this single category. Integration of water-related sectors under one management is a popular trend in the current development discourse but in this case it can be argued that it was the preferential treatment of sanitation in India that led to the massive improvement in coverage under SBM, and thus might be advantageous for countries that are seriously falling behind in achieving sanitation change.

Both countries used different strategies for achieving sanitation change. Ethiopia has followed a global trend in using CLTS, which primarily targets behavior change through construction of new social norms with no external financial support. Indian programs meanwhile heavily relied on subsidized toilet construction and behavior change activities were only marginally implemented. Similarly, Ethiopia successfully utilized community-driven aspects of CLTS, where communities pressure individuals to alter their behavior due to changes in their environment. In the Indian context, community focused interventions are troublesome due to the omnipresent structural disadvantages and caste hierarchies, which often put an overwhelming blame for failing to adopt safe sanitation on individual households, thus creating social stigma towards usually disadvantaged groups (Jain et al. 2020). And while this could have been overcome by proper planning and context-sensitive policies, we would argue that SBM had neither of those.

Ethiopia and India also applied diverse motivational components for changing people's behavior. Both use some form of awards or recognition for ODF villages. India shifted its awards into the digital sphere, while Ethiopia kept its standardized certification protocol. Coercive measures are more complex and there have been documented cases of abuses and hard pressure in both countries. When withdrawal of government's benefits and rations, or direct fines and arrests by the police, are used as a tool to pressure villagers into constructing a toilet, lack of sanitation is used as a basis for denial of fundamental rights rather than an entitlement flowing from fundamental rights, which is again associated with the fact that both countries lack a sanitation-related legal framework. This is a frequent issue with development policies and goals, to which countries sign up but ultimately do not prescribe these policies into laws (Cullet 2019). In India these aspects of command and control are inherently bound to caste relationships and graded inequality, as they unevenly affect lower castes and



poor households (O'Reilly et al. 2017; Cullet 2018; Gupta et al. 2019).

The financing mechanisms for toilet construction in both countries are on the opposite ends of the spectrum. While the Ethiopian policy strictly forbids any individual household subsidies for latrine construction, in line with basic principles of CLTS, toilet construction in India is fully subsidized. The household subsidies definitely bear much of the responsibility for India's rapid rise in sanitation access but it is too early to fully judge what their long term effect will be. Traditionally, individual subsidies are blamed for hindering behavior change, but in this case they could have had an important role in creating a critical momentum to kick start a sustainable sanitation change. Meanwhile the Ethiopian approach, with complete responsibility for latrine construction left on individual households, pushes the families to the cheapest solutions, which are often low quality and non-durable latrines, not accepted by owners. It is followed by the idea of sanitation ladder where the individuals climb up to reach the better sanitation solutions immediately as they can.

Paradoxically, although toilets available to households in India are generally of much higher quality than in Ethiopia (Fig. 1), inconsistent use seems to be comparatively more of an issue there. Water demands for toilet use for both flushing and post-defecation cleansing, sanitation rituals and culturally shaped perceptions of purity and pollution, or attitudes towards toilets specific technology and safe fecal sludge management (Coffey et al. 2004; Routray et al. 2015; O'Reilly et al. 2017; Yogananth and Bhatnagar 2018; Satyavada 2019). Low acceptance and prevailing misconceptions about the rate in which the pits fill up point towards lack of beneficiaries' participation in the design process (Jain et al. 2020). But Ethiopia struggles with a similar issue as high rates of observed slippage from previously ODF declared communities is linked to low technical quality and non-durability of constructed latrines (Crocker et al. 2017; Delea et al. 2019; Abebe and Tucho 2020). Although according to estimates, people in rural Ethiopia tend to use toilets relatively consistently, if they satisfy at least simple hygienic conditions. Although there has been considerably less research on behavioral aspects of toilet use in Ethiopia than in India, possible explanations may lead to the chosen sanitation strategy that created social pressures on toilet use but also the mechanisms of surveillance by local authorities generally related to the command-and-control nature of Ethiopian governance (Novotný et al. 2018a).

The analysis shows that relying solely on behavioral approaches and sanitation ladder are not very efficient strategies, if implemented without any external financial support. Similarly, it is ineffective to simply provide every household with a subsidized toilet without further activities that would ensure sustainable use. The former "Ethiopian model" achieved some

behavioral change of inhabitants but pushed them to build latrines which do not fulfill their hygienic norms, with households not stepping up the sanitation ladder, but rather slipping back to OD. The latter "Indian model" led to a massive construction of hygienic toilets, but it in no way guaranteed sustainable sanitation change. Frail sense of ownership, poor targeting of subsidies that amplified preexisting structural inequalities, or lack of local participation and context insensitivity, might also be sources of slippage to OD in the long run.

Thus providing at least some financial assistance, especially to disadvantaged groups, which would allow them to construct safe, durable, acceptable, and appropriate toilets, should be used in tandem with behavior change approaches. And while the massive amounts of both political and financial resources available in India remain inaccessible for most countries, including aid-dependent Ethiopia, smart targeting of subsidies in combination with context sensitive community interventions could also lead to a critical momentum and multiplication effect (e.g. Pakhtigian et al. 2022) necessary for a wide-scale change. At the same time communities should be involved in selecting the final design and other decision-making processes to retain ownership. It is questionable whether the financial support should cover the whole cost of the facility, as in the case of the "Indian model". It will be important to closely monitor slippage rates back to OD in both countries to further evaluate both strategies. Nonetheless, the combination of changes to social norms and at least partial financial support to individuals seems to distill as the way towards widespread improved sanitation. With local context remaining crucial, continuous research into the micro-level conditions affecting sanitation change is still necessary to design sanitation policies. Though as shown by Chakraborty et al. (2021), an exaggerated focus on micro-level is also problematic since sanitation determinants tend to be geographically clustered and population-level studies are also necessary to fully understand how sustainable sanitation change can be achieved.

## 6. Conclusion

This article provided a comparative analysis of sanitation policies adopted in India and Ethiopia. Countries that recognized sanitation among their development priorities, implemented large-scale national programs, but chose contrasting approaches. Although both achieved remarkable progress in increasing toilet coverage, they faced specific challenges concerning sustainability of sanitation change and full realization of health and social benefits associated with hygienic and equitable sanitation.

As 2030, the ultimate deadline for the global community to achieve extraordinary advances in the

human condition, is less than a decade away, we must turn our attention to what was achieved in the past years and collectively learn from all the successes and failures alike. The strive of India and Ethiopia for universal safe sanitation offers a fair share of both. And with drastically different strategies can serve as examples and cautionary tales for other countries on the same journey. Each point where the Indian and Ethiopian policies clash can serve as a starting point for further research into suitability of national policies in countries such as Cambodia, where CLTS was also heavily deployed but calls for targeted household subsidies appear in recent literature (e.g., Kohlitz et al. 2021). And while it would be foolish to say that such effort would ensure that the World would fulfill the target 6.2 of the SDGs, it could nonetheless contribute to it.

## Acknowledgements

The authors gratefully acknowledge support from the Czech Science Foundation [Grant number GA19-10396S].

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**Autorský podíl/Share of authorship 35 %**



## Social determinants of environmental health: A case of sanitation in rural Jharkhand

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### HIGHLIGHTS

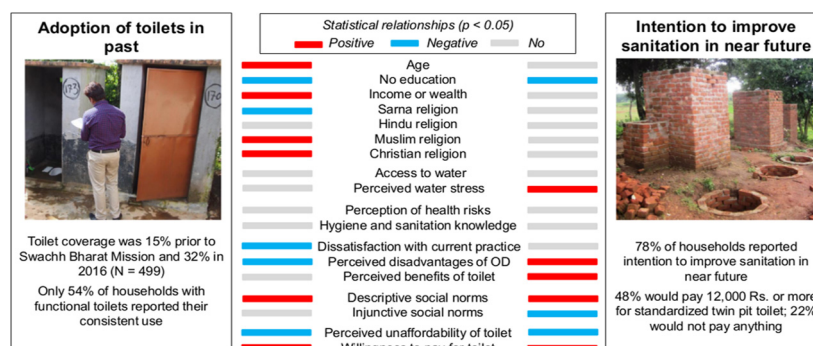
Cross-sectional analysis of household-level sanitation drivers in rural Jharkhand

Identified low availability of toilets accompanied with their inconsistent use. Low demand and perceived risks didn't explain variation in sanitation outcomes.

Key importance of descriptive social norms but adverse effects of injunctive norms

Structural barriers should be addressed together with social norms and attitudes.

### GRAPHICAL ABSTRACT



### ARTICLE INFO

#### Article history:

Received 2 February 2018

Received in revised form 19 June 2018

Accepted 19 June 2018

Available online xxx

Editors: Simon Pollard and Jay Gan

#### Keywords:

Environmental health

India

Sanitation

Social norms

Toilets

### ABSTRACT

An estimated 56% of households in rural India defecated in the open in 2015, making India the most significant contributor to the global sanitation burden. This cross-sectional study uses data collected in 2016 from 499 households in rural Jharkhand to understand the constraints of latrine adoption and drivers of sanitation preferences (plans to adopt toilets and willingness to pay for toilets). Focusing on a region with a large tribal population, the study examines two types of predictors, namely structural factors (objective socioeconomic, sociocultural and ecological characteristics) and psychosocial drivers (perceived unaffordability of toilet, hygiene and sanitation knowledge, perceived health risks, attitudes, both descriptive and injunctive social norms, and perceived water stress). We found that structural constraints related to educational, economic and sociocultural inequalities predict toilet ownership. Low sanitation rates can neither be attributed to a lack of expressed demand nor lack of recognition of the disadvantages of open defecation. Similarly, variations in sanitation preferences are neither explained by differences in hygiene and sanitation knowledge nor by understandings of sanitation health risks. We found that perceived unaffordability, attitudes (perceived benefits of toilet and disadvantages of OD) and perceived descriptive social norms are of key importance. This implies a potential for persuasive strategies that manipulate social norms around sanitation, particularly if they simultaneously address perceptions around financial unaffordability of toilets and around the benefits of toilets. Importantly, however, attempts to change sanitation preferences by acting on forces of social (dis)approval (i.e. through perceived injunctive social norms) may be ineffective and generate negative unintended consequences.

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**Abbreviations:** OD, open defecation; SBM, Swachh Bharat Mission (Clean India Mission); PAIT, plan to adopt or improve toilet in the near future; RANAS, Risk, Attitudes, Norms, Abilities, and Self-regulation factors; WTP, willingness to pay for standardized twin pit toilet; SD, standard deviation.

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## 1. Introduction

It is estimated that in 2015 only 39% of the global population used adequate sanitation facilities and more than one billion practiced open defecation (OD), mostly in rural areas of low- and middle-income countries. Nearly half of those who practiced OD in 2015 were from India which recorded a national OD rate of 56% (WHO/UNICEF, 2017). Earlier national sanitation programmes in India did not fulfil expectations due to implementation shortcomings and neglect of attention to the behavioural underpinnings of sanitation (Hueso and Bell, 2013; Freeman et al., 2016; Hueso et al., 2017). The current Swachh Bharat (Clean India) Mission (SBM) has addressed sanitation with unprecedented political support and scale. Despite progress, it is quite uncertain whether the acclaimed SBM goal to eradicate OD by 2019 will be met and whether the officially recorded new toilets will actually be both usable and consistently used.

The SBM implementation guidelines outline a multi-component campaign to address both behavioural and infrastructural sanitation dimensions (GoI, 2014). Considerably narrower understandings, however, prevail in practice. The 'latrine-first' narrative has arguably been the most prevalent one, particularly among government officers (Hueso et al., 2017). It conceives the material unaffordability of toilets to be the primary barrier largely attributable to structural constraints such as poverty and socioeconomic inequality, possibly interrelated with ecological and sociocultural constraints. The provision of subsidized toilets is thus seen as a necessary first step, with the expectation that the health and other benefits of toilets will be realized after gaining access. This view tends to ignore various psychosocial determinants of sanitation behaviour, particularly those beyond traditional cognitive awareness about health risks.

The unsatisfactory results of previous Indian sanitation programmes and increasing popularity of community-led behaviour change approaches gave rise to another narrative that can be referred to as the 'demand-first' narrative. In this view psychosocial drivers including the socially constructed perception of unaffordability of toilets are assumed to determine the low demand for toilets. The creation of a genuine demand represents the main priority, to be achieved through the triggering of communities with the aim of establishing new social norms around sanitation, changing attitudes, risk-perception and igniting collective action to improve sanitation.

Based on data collected in 2016 through interviews and observations in 499 households covering 2966 individuals, this study examines sanitation in rural Ranchi district, Jharkhand, a socioculturally diverse region with a considerable adivasi (tribal) population. In addition to a descriptive characterization of sanitation conditions at the beginning of SBM implementation, a general objective of the study is to examine and compare the role of structural factors emphasized by the latrine-first narrative and psychosocial drivers stressed in the demand-first narrative. In this paper, structural factors denote objective socioeconomic, sociocultural, and ecological characteristics and psychosocial factors refer to subjective constructs measuring factual hygiene and sanitation knowledge, perceived health risks, perceived unaffordability of toilets, attitudes towards OD and toilet use, perceived water stress, and perceived descriptive and injunctive social norms. In order to understand the constraints of latrine adoption in the past as well as the drivers of future sanitation preferences the following three outcomes are analyzed: (1) the ownership of toilets built prior to SBM, (2) plans to adopt or improve toilets in the near future (PAIT), and (3) willingness to pay for toilets (WTP). The first research question is thus: Which structural and which psychosocial factors associate with toilet ownership prior to SBM and reported sanitation preferences (PAIT, WTP)?

There is ample evidence that differential sanitation rates in India mirror various socioeconomic, sociocultural, and spatial inequalities (Ghosh and Cairncross, 2014; O'Reilly and Louis, 2014; Banerjee et al., 2017; O'Reilly et al., 2017; Coffey et al., 2017a,b; Sinha et al., 2017; Geruso and Spears, 2018). Nevertheless, it is less clear whether these

differential sanitation rates are primarily caused by poverty and financial constraints as the latrine-first narrative invokes, or by socially determined differences in demand as the demand-first narrative implies. The policy implications inferred from available research tend to point towards one of the two directions. For example, drawing on a case study of sanitation drivers in Uttarakhand, O'Reilly et al. (2017) emphasizes the need to address poverty, marginality, and physical and socio-political remoteness, while being critical of behaviour-change approaches that tend to ignore the structural causes of sanitation and health inequalities. By contrast, the most resonant inferences of studies based on a larger survey conducted across five north Indian states emphasize that socio-culturally determined preferences for OD rather than poverty explain low sanitation rates in India (Coffey et al., 2014, 2017a; Hathi et al., 2016). The latter reasoning is supported by Banerjee et al. (2017) who found a low preference for toilets in India compared to other consumer durables. Possible explanations refer to a socio-culturally determined dislike of cheap latrines and aversion to the emptying of pits embedded in purity-pollution-untouchability issues and caste inequalities (Coffey et al., 2014, 2017a; Gupta et al., 2016) or related to gendered social norms and needs (Sinha et al., 2017). Yet another reason may be the traditional focus on the provision of subsidies that may undermine demand to invest in sanitation. Although distinct, these potential sources of behavioural distortions imply that the perceived unaffordability of toilets is largely a social construct and may not correspond to the factual affordability and, more generally, to socioeconomic differences between households. This assumption is tested in the second research question: Is the perceived unaffordability of toilets dependent on socioeconomic and educational inequalities or is it socially constructed?

We further assume that the social construction of perceived unaffordability can be shaped by perceived social norms around sanitation. Another goal of this study is thus to explore the role of perceived social norms in regards to the analyzed sanitation outcomes. Congruent with the focus theory of normative conduct (Cialdini et al., 1990), we distinguish between perceptions of descriptive social norms and injunctive social norms. In this study, descriptive social norms comprise opinions on the prevalence of OD or latrine use, whereas injunctive social norms capture opinions on social (dis)approval for the behaviours. It is known that descriptive and injunctive social norms act on distinct forces such as the desire for making a correct choice and the desire to gain social approval or avoid social sanctions for noncompliance, respectively. Therefore, these two types of social norms perceptions may have different and at times antagonistic effects on the analyzed outcomes, such as when people disapprove certain behaviour but still practice it (Cialdini et al., 1990).

With respect to the Indian context it can be expected that descriptive rather than injunctive social sanitation norms will be consequential due to the prevalent latrine-first narrative. Strategies to address injunctive social norms by activating social (dis)approval and social sanctions mechanisms have until recently been less used, and have reportedly had little success (Hathi et al., 2016; Gupta et al., 2016). An exception was the 'No Toilet, No Bride' campaign initiated in Haryana in 2005 that, however, established a specific link between sanitation and marriage and thus focused on a specific segment of population (Stopnitzky, 2017). In the present context, we expect that although people are generally aware that toilets represent a correct choice, social disapproval towards OD is typically not strong and it is uncertain whether and how the power of injunctive social norms can be utilized.

A recent study from rural Ethiopia illustrates that perceived social norms around sanitation are not only influential directly, but also indirectly because they work as a 'social filter' that can interact with other sanitation determinants (Novotný et al., 2017). Their study showed that those factors which are subject to social construction, rather than established through respondents' own experience, are particularly likely to interact with perceived social norms (Novotný et al., 2017, p. 11). The perceived unaffordability of toilets may thus represent



a plausible and practically important candidate for such interplay with perceived social norms. These arguments are tested in our *third research question(s)*: What are the effects of perceived descriptive and injunctive social norms on analyzed sanitation outcomes? Does the perception of social norms interact with psychosocial variables in the effects on sanitation preferences?

## 2. Materials and methods

### 2.1. Data collection

The survey took place in September and October 2016 in Angara and Kanke blocks of Ranchi district, Jharkhand. We purposively selected 12 Gram panchayats with the help of a local NGO whose own work does not focus on sanitation. Within the panchayats, 20 clusters (individual villages or groups of smaller habitations) of roughly similar size were selected randomly from two groups of habitations located on and off a main road, respectively. A random walk technique was used to sample households within the clusters. Heads of households were preferentially interviewed, though if unavailable another adult member (preferably spouse) was interviewed. Five trained enumerators conducted the interviews in Hindi language, the principal language spoken in the region. The survey consisted of structured household interviews ( $N = 499$ ) that comprised 84 questions to the respondent and direct observations of 17 parameters of sanitation facilities completed by the enumerator. In addition, two of the co-authors visited several of the villages to meet key informants such as the Mukhiyas (elected leaders), Jal Sahiyas (water helpers), masons constructing toilets under the SBM, and implementing NGOs. Although not directly used in the quantitative analysis, the qualitative material provided important insights regarding institutional arrangements around sanitation and other contextual information.

### 2.2. Ethics

All participants and informants participated in the study voluntarily and were assured of anonymity and confidentiality. Free and informed consent was obtained orally, a decision taken in view of the local context in which, we felt, asking for written consent would have left many respondents feeling uncomfortable. The project was approved by the institutional ethical committee of Charles University [approval number 2015/32].

### 2.3. Measures

The first outcome, toilet ownership prior to the SBM implementation, was expressed as a binary measure which distinguishes households with a private toilet when excluding those who obtained toilets under SBM in 2016. As shown below, the SBM beneficiaries represent a specific subgroup different from other toilet-owning households. The second outcome variable captures the intention to improve sanitation conditions of a household measured by the self-reported plan to adopt or improve a toilet (PAIT). This was constructed as a dichotomous measure from questions ascertaining whether a household planned to construct or obtain a toilet in the near future (in the case of latrine non-owners) or to improve a toilet (in the case of latrine owning households). The third outcome, willingness to pay for a toilet (WTP), was constructed using a contingent valuation procedure, similarly as in Gross and Günther (2014). The standardized twin pit toilet constructed under SBM was used as the reference toilet. As a first bid, respondents were asked whether they would pay at least 12,000 Rs. (around USD 180) of their own money for such a toilet, which corresponds to the amount of toilet provided by the government under SBM. If the response was no, respondents were asked whether they would pay at least 6000 Rs. If they again disagreed, they were asked to specify the amount. If the answer was zero, they were asked whether they would

be interested only if the toilet was provided for free (including via government subsidy). In this way, we were able to classify the responses into the following four categories of WTP: (1) only if for free; (2) up to 6000 Rs.; (3) between 6000 and 12,000 Rs.; (4) 12,000 Rs. or more.

The structural predictors considered in this study with their basic descriptive statistics can be found in Appendix A. They include standard demographic, socioeconomic, and sociocultural characteristics of both respondents and their households, such as self-reported income ascertained as cash and kind income, change in economic situation over the past two years, primary source of livelihood, attained education of the respondent and/or household head, religion, social category, land ownership, housing characteristics, and ecological characteristics namely water accessibility and drinking water source.

Unlike structural characteristics, psychosocial predictors are subjective constructs selected based on relevant conceptual frameworks (Mosler, 2012; Dreibelbis et al., 2013) together with consideration given to the context and goals of this study. Their specification and basic descriptive statistics appear in Appendix B. They can be divided into the broader types including the factual sanitation and hygiene knowledge, perception of social norms, perceived risks, attitude variables, and ability and self-regulation variables. Typologically, this classification resembles that of the RANAS model (Risk, Attitudes, Norms, Abilities, and Self-regulation factors) by Mosler (2012), though the specific measures used in this study only partly overlap with those of the RANAS model. Perceived descriptive and injunctive social norms around sanitation were elicited using a 5-point Likert scale for a set of questions and statements. The items used for the construction of social norms measures used in this study (as described in Appendix B) were determined based on an analysis of consistency between particular question and statements. Interestingly, we found a weaker negative relationship ( $p = 0.071$ ) between the measures of perceived descriptive and injunctive social norms used in this study suggesting the relevance of assumptions derived from the focus theory of normative conduct.

In addition to the structural and psychosocial measures specified in Appendices A and B, respectively, a number of other questions were put to the respondents, such as self-reported defecation practices of household members in four different time spells (day, night, rainy and dry seasons). Various sanitation parameters were also assessed through direct observation by the enumerators, including the characteristics of toilets such as their type and various indices of their functionality related to the presence and condition of slabs, walls, roof, door, pan and water seal, pits, or the availability of water and soap. These observational characteristics were used to determine toilets under construction as well as unused or dysfunctional toilets, i.e. those with broken or blocked pans or missing basic components preventing use.

### 2.4. Data analysis

Binary logistic regressions were used to model the three sanitation outcomes analyzed in this paper. Although WTP was originally constructed as a four-category ordinal measure, regression parameters were unstable across particular WTP categories and we thus decided to run separate logistic regression models with two binary outcome variables constructed from the extreme categories of the original WTP scale. Toilet ownership was always considered as a control variable when modelling PAIT and WTP to account for distinct choices faced by latrine owners and non-owners in their intentions to improve their sanitation conditions and invest in a toilet. As for the presumed causality, the PAIT was conceptualized as a measure of intention to improve the sanitation conditions of a household with WTP considered as a potential predictor of this intention.

The regression analyses were conducted using the SPSS complex samples module when accounting for the clustering of the data at the level of 20 clusters. The specification of particular regression models was constrained by the sample size and concerns about (multi)collinearity between predictors. To identify relevant predictors from a larger

number of theoretically substantiated variables, we proceeded in the following three stages strategy. In the first stage, a baseline model consisting solely of statistically relevant structural predictors was determined for each dependent variable by a stepwise exploration of the effects of potentially relevant structural predictors (as in Appendix A) in two hierarchical steps. In the first step we explored the role of demographic, sociocultural, and general education variables. In the second step we examined socioeconomic and socio-ecological factors considered together with variables identified as relevant in the first step. Those structural variables with *p*-values below 0.1 attained in the first or the second step or with a non-negligible contribution to explained variance were eventually included in the final baseline models. In the second stage, we consecutively included particular psychosocial variables into the baseline models and recorded their regression estimates and associated change in the overall model fit. The third stage of regression analyses tested the interactions between the perceived social norms and other psychosocial variables in their effects on sanitation preferences (PAIT, WTP). Continuous variables were standardized by *z*-scores to allow better comparability of regression coefficients (i.e. all regression coefficients below refer to standardized beta coefficients).

**3. Results**

*3.1. Sanitation conditions in the surveyed region*

Of the 499 surveyed households, 68% didn't have their own toilet and 3% of households had toilets under construction. Of the families owning functional latrines, 54% (17% of the entire sample) obtained their toilet in the year of our survey, predominantly under SBM. This implies that toilet coverage prior to SBM implementation was 15%. Most of the toilets (93%) had solid walls and a roof ensuring basic privacy, and had a solid slab, whereas 81% had a water seal, and 63% had water available for pouring and anal cleansing. The toilets constructed under SBM were standardized twin pit latrines of a uniform design.

Self-reported use of toilets was inconsistent in many of the households owning toilets. Only 54% of respondents from households with a functional latrine said that they usually use their toilet in all four time spells (day and night time in rainy and dry seasons). The usage of toilets was higher during the rainy season (86% and 87% of toilet-owning households for day and night time, respectively) than in the dry season (63% and 69% for day and night time, respectively). Importantly, the consistency of toilet utilization was significantly higher for early adopters compared to families with toilets constructed recently under SBM (Fig. 1). In addition, the length of ownership was positively associated with the consistency of use even within the sub-sample of households who adopted toilets prior to SBM. The reported OD rates were only marginally (up to 2%) lower for women than for men, children, and elderly members of households.

Exploration of bivariate relationships between the selected structural variables and the three sanitation outcomes of this study appears

in Appendix C. The basic descriptive statistics for psychosocial variables (Appendix B) indicated relatively low hygiene and sanitation awareness. Also our qualitative interviews confirmed that the initial phase of SBM implementation in our research site was predominantly focused on the disbursement of subsidies and construction of subsidized toilets.

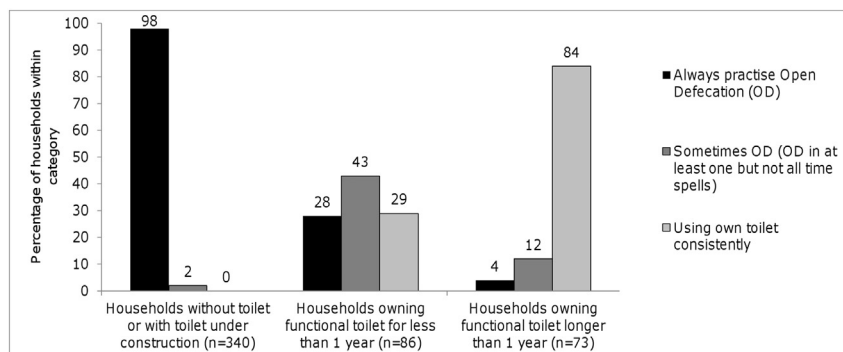
Despite this fact, three-quarters (78%) of respondents reported that their household planned to construct or improve a toilet in the near future. Almost half (48%) of respondents would pay 12,000 Rs. or more for a toilet, while only 22% would not pay anything. This suggests a relatively high demand for toilets that can also be linked to a high injunctive norms-perception. For example, 87% of respondents said that all people in their village should defecate in a latrine. It contrasts with perceptions of the actual situation, i.e. descriptive social norms. For example, 23% of respondents maintained that nobody and 57% stated that only a minority of people in their village usually defecate in a toilet.

Privacy, comfort, and positive health effects were similarly often mentioned as the main advantages of toilets by 50–53% of respondents, while adverse health effects (63%) and privacy issues (44%) were the two most often reported disadvantages of OD. The perception of health risks was relatively high. Around 90% of respondents thought that it is probable or very probable that they can get sick by defecating in the open or by using a dirty latrine and nearly 60% of respondents selected OD among two most likely causes of acute health problems.

*3.2. Predictors of ownership of toilets built prior to SBM*

Regression estimates for structural variables identified as predictors of the ownership of toilets built prior to SBM are reported in Table 1. The significant positive effects of respondent's age reported in Table 1 indicate a lower probability of toilet ownership for younger families. Household income and type of house were found to be significant which indicates that material wealth represents an important factor for the adoption of toilets prior to SBM. Comparatively stronger effects were, however, identified for attained education and religion. Regarding the latter, Sarna households (•worshippers of nature) had the lowest probability of owning a toilet built before SBM while Muslim and Christian households had the highest probability, when holding the effects of other variables constant. Religion was correlated with social category in our sample as nearly all Sarna and Christian (few in number) but only one-fifth of Hindu families belonged to the category of Scheduled Tribes. However, social category was not significant if considered instead of religion in our regressions. In general, the results confirm the importance of structural factors in terms of attained education and both socioeconomic and sociocultural drivers for latrine adoption prior to SBM.

Table 2 presents results obtained for particular psychosocial variables when analyzed together with the •baseline structural predictors (i.e. when included into the Step 2 model as specified in Table 1). Risk perception and measures of hygiene and sanitation awareness were unrelated to toilet ownership. As expected, the perceived descriptive



**Fig. 1.** Self-reported sanitation practices by length of toilet ownership.

**Table 1**  
Structural predictors of adoption of toilet prior to SBM.

	Step 1 (demographic, sociocultural, and general education variables)		Step 2 (incl. socioeconomic and socio-ecological variables)	
	Beta coefficients	Standard errors	Beta coefficients	Standard errors
Age of respondent	0.562	0.193	0.589	0.221
If female respondent	0.341	0.190	0.222	0.232
Religion				
Hindu	1.049	0.409	0.667	0.452
Muslim	2.647	0.819	2.568	0.936
Christian	2.181	0.634	2.265	0.599
Sarna	Reference category		Reference category	
Attained education (higher of respondent or household head)				
No	2.672	0.741	2.209	0.724
Up to lower secondary	1.323	0.234	1.074	0.264
Higher secondary	0.724	0.327	0.585	0.329
College	Reference category		Reference category	
Income (log of)			0.434	0.143
Type of house				
Mud-walled and similar			1.960	0.445
Semi-concrete or semi-mud-walled			0.706	0.324
Concrete			Reference category	
Type of water source				
Private tap or well			0.939	0.604
Public tap			0.742	0.797
Public well			0.469	0.713
Hand pump			Reference category	
Nagelkerke R <sup>2</sup>	0.207		0.401	
Cox & Snell R <sup>2</sup>	0.117		0.227	
N	499		499	

## Notes:

Significant at the 0.01 level.  
0.05 level.

norms, but not injunctive norms, were found to be significant. Finally, while the perception of advantages of toilets was similar for toilet owning and not-owning families, those without toilets reported significantly more disadvantages of OD than those with toilets.

Dissatisfaction with current sanitation practice was strongly associated with the absence of toilet, reflecting the already indicated high

demand for toilets. Unsurprisingly, perceived financial unaffordability revealed the strongest association (a negative one) with toilet ownership. Those unwilling to pay for a toilet recorded on average a significantly lower probability of having a toilet, though this relationship may apparently lead in both directions. Although the intention to improve sanitation conditions (PAIT) was comparatively lower among toilet owners, the difference between the two subgroups was not statistically significant if the effects of other considered predictors of toilet ownership are taken into account.

### 3.3. Perceived unaffordability of toilets among toilet non-owning households

The 68% of respondents from households without a toilet reported that a lack of money represents a major reason for not adopting a toilet. None of other reasons, such as lack of material or manpower, need for external support, shortage of water, or lack of space were reported by >5% of these respondents. The subgroup of households without a toilet who said that money represents a main reason for the absence of toilet was not significantly different from other toilet non-owning households' regarding their average socioeconomic characteristics (Table 3). This implies that the perceived financial unaffordability of toilets is largely socially constructed and not strictly dependent on a household's material wealth or education.

### 3.4. Predictors of plans to adopt or improve toilets (PAIT)

Regression coefficients for the relationships between structural factors and PAIT are reported in Table 4. Neither sociocultural factors (religion and social category) nor socioeconomic variables were found to be statistically significant predictors of PAIT with the exception of improvement in a household's economic situation. Unsurprisingly, the ownership of a functional toilet was the strongest predictor of PAIT. This variable was included to control for the distinct choices faced by toilet owners and non-owners in their intentions to improve their household's sanitation condition. If this predictor is excluded from the Step 2 model in Table 4, the pseudo-R<sup>2</sup> indices would decrease by more than a half of their value. These results show that structural factors, except the absence of education, are not important predictors of PAIT.

**Table 2**  
Psychosocial predictors of adoption of toilet prior to SBM (regression estimates when particular variables were included into the Step 2 model in Table 1).

	Beta coefficients	Standard errors	Contribution to Nagelkerke R <sup>2</sup> compared to Step 2 model in Table 1
Knowledge of hygiene and sanitation messages	0.229	0.133	0.006
If at least some awareness about diarrhoea prevention	0.486	0.317	0.006
Perceived descriptive social norms	0.728	0.224	0.046
People in this village think you should use a latrine for defecation (injunctive norms)			0.001
Strongly agree	0.194	0.382	
Agree	0.049	0.462	
Disagree or don't know	Reference category		
Perceived vulnerability to diseases due to OD or dirty toilet	0.234	0.161	0.006
If OD selected among two most likely causes of health problems	0.011	0.352	0.000
Perceived benefits of toilet	0.015	0.181	0.000
Perceived disadvantages of OD	0.348	0.148	0.013
If dissatisfied with current sanitation practice	3.626	0.497	0.202
Perceived financial unaffordability of toilet	2.766	0.521	0.138
WTP			0.057
If only for free	2.156	0.465	
>0 Rs. but than 6000 Rs.	1.716	1.523	
>6000 Rs. but <12,000 Rs.	0.726	0.354	
12,000 Rs. or more	Reference category		
PAIT	1.168	0.610	0.023
Perceived water stress	0.633	0.422	0.011

## Notes:

Significant at the 0.01 level.  
0.05 level.

**Table 3**  
The perceived financial unaffordability of toilet in the subgroup of households without toilets by selected socioeconomic variables (bivariate relationships).

	Money barriers as major reason for not owning toilet		p-Value
	Yes (N = 230)	No (N = 110)	
Annual household income (average in Rs.)	75,984	79,847	0.571
Share of households who reported that their economic situation has improved over the past two years	0.35	0.35	1.000
Land ownership (average in ha)	0.69	0.88	0.258
Type of house (shares in subgroups)			0.558
Mud-walled and similar	0.66	0.34	
Semi-concrete or semi-mud-walled	0.68	0.32	
Concrete	0.74	0.26	
Share of households with illiterate head	0.33	0.32	0.806
Attained education (shares in subgroups)			0.554
No	0.71	0.29	
Up to lower secondary	0.69	0.31	
Higher secondary	0.68	0.32	
College	0.58	0.42	

F-test was used to determine p-value in the cases of continuous variables, and Chi-square test was used for categorical variables.

The effects of psychosocial predictors on PAIT are examined in Table 5, which presents regression estimates obtained for particular psychosocial variables when included into the baseline Step 2 model as in Table 4 (labelled as main effect models in Table 5). In addition, the three right columns of Table 5 show how perceived descriptive and injunctive social norms interact with individual psychosocial variables in their effects on PAIT. The estimates of interaction effects were

**Table 4**  
Structural predictors of PAIT.

	Step 1 (demographic, sociocultural, and general education variables)		Step 2 (incl. socioeconomic and socio-ecological variables)	
	Beta coefficients	Standard errors	Beta coefficients	Standard errors
If elderly in household	0.578	0.238	0.461	0.283
Attained education (higher of respondent or household head)				
No	1.752	0.448	1.479	0.433
Up to lower secondary	0.337	0.479	0.148	0.394
Higher secondary	0.565	0.484	0.336	0.521
College	Reference category		Reference category	
If economic situation improved over past two years			0.670	0.250
Type of house				
Mud-walled and similar			0.591	0.328
Semi-concrete or semi-mud-walled			0.239	0.435
Concrete			Reference category	
Type of water source				
Private tap or well			0.368	0.597
Public tap			0.940	0.481
Public well			0.060	0.571
Hand pump			Reference category	
Toilet ownership at the time of survey	2.013	0.327	2.285	0.266
Nagelkerke R <sup>2</sup>	0.278		0.356	
Cox & Snell R <sup>2</sup>	0.180		0.231	
N	499		499	

Notes:  
Significant at the 0.01 level.  
0.05 level.

obtained by the inclusion of both main effect variables and their respective interaction term into the baseline Step 2 model specification as in Table 4.

Overall, the psychosocial variables are better predictors of PAIT than the structural factors examined in Table 4. However, perceived health risks, factual hygiene and sanitation knowledge, and dissatisfaction with current sanitation practice were not statistically associated with PAIT. Perceived financial unaffordability was revealed as the strongest driver of PAIT with those who reported money barriers having considerably lower intention to improve sanitation in the near future. The same holds for those unwilling to pay for a toilet. The attitudes variables in terms of the perceived benefits of toilet and perceived disadvantages of OD revealed statistically significant positive effects on PAIT. The same applies to perceived water stress implying that those who reported water shortages among major threats had on average higher PAIT.

Of the two variables of perceived social norms, only injunctive norms appeared significant in the main effect models. However, interesting results were obtained by testing their interaction effects. Although the main effect of perceived unaffordability on PAIT reported in the second column of Table 5 was strongly negative, the interpretation of the role of this variable changes notably if its interactions with norms-perceptions are taken into account: A significant positive joint effect was found for the interaction between perceived unaffordability and descriptive norms. In contrast, a significant negative interaction was revealed for injunctive norms. Importantly, these results imply that the negative effects of perceived unaffordability on PAIT are conditional on weak descriptive and strong injunctive norms. In addition, the attenuating role of injunctive social norms was also indicated by a statistically significant negative interaction effect with the perception of relative health risks associated with OD. No significant interaction between measures of social norms and other psychosocial variable was confirmed.

### 3.5. Predictors of willingness to pay (WTP) for toilets

Although WTP was originally constructed as a four-category ordinal measure, regression parameters were unstable across particular WTP categories and we decided to run separate logistic regression models with two binary outcome variables constructed from the extreme categories of the original WTP scale. Regression estimates obtained for these two outcomes are presented in Appendix D, where Tables D1 and D2 present results obtained for structural predictors and Table D3 shows regression estimates for particular psychosocial factors.

The examined independent variables explained less variance in the WTP (and particularly in the measure of unwillingness to pay) than for outcomes modelled in the previous sections. Similarly as for other outcomes, however, absence of education was statistically related to both WTP indices. Land ownership was positively related to the unwillingness to pay but not to WTP (12,000 Rs. or more). The opposite holds for self-employment as the primary source of livelihood, which revealed a negative effect on the higher category of WTP but no significant relationship with unwillingness to pay. On average, households using water from a public tap revealed a significantly lower WTP. We examined whether this could be explained by the interaction between usage of public tap and various other structural or psychosocial variables however the results proved inconclusive.

Of all the examined psychosocial variables, only the perception of descriptive social norms was identified as an important predictor of the WTP outcomes. Interestingly, this also applies to the perception of financial unaffordability which may be interpreted as another indication of the social construction of this important sanitation driver. The possible moderating role of perceived social norms was tested, in an analogous way to how the interactions were examined for PAIT in the previous section, but no significant interaction effects were confirmed.



**Table 5**  
Psychosocial predictors of PAIT.

	Main effect models		Interactions with perceived descriptive norms Beta coefficients (Standard errors)	Interactions with perceived injunctive norms (People in this village think you should use a latrine for defecation) Beta coefficients (Standard errors)	
	Beta coefficients (Standard errors)	Contribution to Nagelkerke R <sup>2</sup> in the Step 2 model in Table 4		Strongly agree	Agree
Knowledge of hygiene and sanitation messages	0.153 (0.131)	0.003	0.021 (0.114)	0.014 (0.362)	0.266 (0.304)
If at least some awareness about diarrhoea prevention	0.243 (0.200)	0.001	0.174 (0.276)	0.017 (0.705)	0.012 (0.621)
Perceived descriptive social norms	0.271 (0.148)	0.009	Not relevant	0.391 (0.346)	0.188 (0.287)
People in this village think you should use a latrine for defecation (injunctive norms)		0.014	Reported above	Not relevant	
Strongly agree	0.710 (0.330)				
Agree	0.647 (0.349)				
Disagree or don't know	Reference category				
Perceived vulnerability to diseases due to OD or dirty toilet	0.172 (0.128)	0.004	0.066 (0.087)	0.267 (0.244)	0.080 (0.383)
If OD selected among two most likely causes of health problems	0.207 (0.342)	0.001	0.284 (0.317)	1.395 (0.649)	0.940 (0.561)
Perceived benefits of toilet	0.764 (0.116)	0.071	0.014 (0.178)	0.415 (0.401)	0.732 (0.391)
Perceived disadvantages of OD	0.405 (0.123)	0.021	0.056 (0.175)	0.482 (0.293)	0.079 (0.349)
If dissatisfied with current sanitation practice	0.300 (0.276)	0.001	0.703 (0.375)	1.155 (0.734)	0.101 (0.686)
Perceived financial unaffordability of toilet	2.165 (0.542)	0.075	1.445 (0.329)	2.486 (0.761)	0.159 (0.691)
WTP (only if for free)	0.837 (0.289)	0.017	0.147 (0.334)	0.966 (0.696)	0.001 (0.740)
Perceived water stress	0.519 (0.217)	0.008	0.003 (0.266)	0.342 (0.649)	0.522 (0.654)

Regression estimates were obtained by the inclusion of particular variables and interaction terms into the Step 2 model as in Table 4.

Notes:

Significant at the 0.01 level.  
0.05 level.

#### 4. Discussion

The pattern of sanitation conditions identified in this study was characterized by a low availability of toilets together with their inconsistent use. Toilet coverage was 15% prior to SBM in 2015, and 32% due to SBM implementation by mid-2016. Overall, only 54% of toilet-owning households reported consistent use, which corroborates the findings of previous studies from rural India (e.g. Coffey et al., 2014; Jenkins et al., 2014; Sinha et al., 2017).

Self-reported toilet use notably differed between households that received toilets recently under SBM and those who adopted toilets earlier with, respectively, 16% and 71% of the subgroups reporting consistent use. These findings cast a doubt on present efforts to improve toilet use in the research site. We realized that the initial phase of SBM implementation in our research site was predominantly oriented towards the provision of subsidized toilets. Community-mobilization and information promotion activities emphasized in the SBM guidelines (Gol, 2014) were generally suppressed and most likely didn't reflect an appropriate theory of change (e.g. Routray et al., 2017). A positive relationship between length of ownership and consistency of use was also detected within the subgroup of early adopters. The results thus point to the longer-term nature of sanitation behaviour change which should be conceived of as a gradual process conditional on sustained access to functional infrastructure (in addition to other drivers). A well-suited behaviour-change technique may catalyse this process but should not be understood as a magic bullet that can eliminate all of the barriers to be crossed while moving from predominant OD towards consistent toilet use.

We analyzed the correlates of sanitation conditions (toilet ownership prior to SBM) and sanitation preferences (PAIT and WTP) where sanitation preferences represent choices that immediately precede sanitation conditions in the logical model of sanitation (Novotný et al., 2018). The simultaneous focus on these two types of sanitation outcomes has a practical appeal, because a successful sanitation strategy should not only address the barriers to latrine adoption but also target the appropriate influencers of future sanitation preferences.

To address the first research question, we programmatically distinguished between two broader categories of factors in terms of structural and psychosocial predictors and compared their relevance for analyzed sanitation outcomes. Only the variables of the attained education and perception of descriptive social norms were identified as statistically significant predictors for all three analyzed outcomes. Structural correlates in terms of age, socioeconomic factors such as income and type of house, attained education, and religion were significantly related to toilet adoption prior to SBM. However, except for education, these factors were not associated with intention to improve sanitation (PAIT) for which psychosocial predictors such as perception of toilet benefits and OD disadvantages, social norms, perceived unaffordability, and willingness to invest were revealed as considerably more consequential. It implies that ensuring access to toilets and, even more importantly, overcoming structural inequalities hindering such access represent necessary but most likely insufficient conditions for improving sanitation safety in India. Targeting relevant psychosocial drivers that can shape sanitation preferences in the right way is similarly instrumental for sustained sanitation change. Unlike many structural inequalities,

psychosocial drivers are amendable to specific sanitation interventions. Although the corroborated need to deal with both structural constraints and psychosocial underpinnings is known to many sanitation experts, we noticed that one-sided understandings converging towards either the latrine- first or demand- first narrative are still pervasive.

The positive relationship between consistency of toilet use and length of toilet ownership could be interpreted in support of the latrine- first narrative's assumption that the realization of health and other benefits of toilets are conditional upon ownership. Our results nevertheless contradict this reasoning. The early adopters of toilets neither revealed higher risk-perception than other respondents nor had they better hygiene and sanitation awareness or higher perception of the benefits associated with toilet use. We also identified a significant negative relationship between the perception of disadvantages of OD and toilet ownership, meaning that those without toilets had comparatively better awareness about the various disadvantages of OD. Ignorance about hygiene and sanitation practices or risks and benefits do not seem to plausibly explain household-level variation in sanitation conditions in our study.

Moreover, neither the measures of hygiene and sanitation knowledge nor perceived health risks were found to relate to any of the sanitation outcomes. Corresponding to the findings of a recent systematic review of behaviour change approaches (De Buck et al., 2017), our results highlight that unless other more consequential psychosocial drivers are activated traditional one-way education about sanitation practices and related health risks hold limited potential. We identified perception of toilet benefits and OD disadvantages and descriptive social norms around sanitation as two such drivers.

The literature suggests that sociocultural factors around religion and caste play an important role in Indian sanitation (e.g. Coffey et al., 2014, 2017a,b; Routray et al., 2015; Geruso and Spears, 2018). Specifically, that Muslims have generally better sanitation environments than Hindus. Also in our study religion was significantly correlated with pre-SBM ownership of toilets. Holding other observable factors constant, Muslim and Christian households had significantly higher probability of having adopted a toilet prior to SBM than Sarna and Hindu households. Although the differences were statistically significant, Christian and Muslim households represented only a small subgroup (13%) so the finding of similar sanitation rates for Hindu and Sarna families represents a primary observation. Unlike in the previous literature, neither responses to open questions on reasons for (not) adopting toilets and perceived advantages and disadvantages of different sanitation practices nor our supplemental evidence from qualitative interviews indicated any specific sociocultural explanation related to specific notions of in-purity, issues around pit emptying, differential conceptions of toilets, or preference for OD. Religion was also unrelated to any of the examined measures of sanitation preferences (i.e. PAIT or WTP). Thus the differential sanitation rates of subgroups defined by religion should not automatically be attributed to distinct sanitation preferences.

Toilet non-owning households had a comparatively higher recognition of OD disadvantages and they also revealed a significantly higher dissatisfaction with current sanitation practices as well as a high expressed demand for toilets. Lack of money was unequivocally the most frequently reported constraint to toilet acquisition. Our *second research question* asked whether this might be interpreted to support the latrine- first perspective that poverty and economic inequality are the major sanitation impediments which also determine the reported unaffordability of toilets. In contradiction to this interpretation, we found that those who reported lack of money as the main sanitation barrier often expressed a relatively high WTP. They were also on average not socioeconomically less well-off or less educated than the remaining households. Importantly, this suggests that the widespread perception of financial unaffordability of toilets has been socially constructed rather than being strictly dependent on household poverty or wealth.

The *third research question* elaborated in Introduction focused specifically on the role of perceived social norms. We hypothesized that social norms around sanitation may be involved in the processes of social construction and work as a social filter that shape the effects of perceived financial unaffordability on sanitation preferences. Our results corroborate the relevance of this reasoning. The consideration of interactions between social norms variables and perceived unaffordability showed that descriptive norms attenuate the negative effect of perceived money barriers on PAIT while injunctive norms play an opposite role and amplify this negative effect. This is an important finding that suggests positive influence of descriptive norms but possible adverse consequences of the perception of injunctive norms.

Descriptive social norms were also positively related to both WTP and adoption of toilet prior to SBM. These results indicate the key importance of perceived descriptive norms. Interestingly, the same does not hold for perceived injunctive social norms, which were neither related to the ownership of toilets nor to WTP and which negatively moderated the effects of financial unaffordability and relative risk perception on PAIT. The documented importance of descriptive social norms indicates that the notion that the adoption of toilets is a correct choice underlies sanitation change in Indian context, and by contrast, that injunctive norms acting through the mechanisms of social (dis)approval are less powerful and may even be counterproductive. We regard this as a major finding of our study which also warns against the usage of (negative) social pressures for activating injunctive norms around sanitation practices and associated mechanisms of social sanctioning and surveillance.

This cross-sectional study has some obvious limitations. First, the results should be interpreted as statistical associations that may indicate but do not prove cause-and-effect relationships. Second, the outcomes such as PAIT and WTP were measured through self-reports and may thus be subject to social desirability bias. Third, our study is based on a mild sample size of 499 households in 12 Gram panchayats, so the applicability of our findings for other contexts is conditional on a careful consideration of the contextual parameters of our research site. Fourth, we solely examined household- and individual-level correlates and outcomes but largely ignored broader political, economic, institutional, and ecological factors and conditions that may play similar or even more consequential roles on sanitation outcomes.

## 5. Conclusions

Improving sanitation should be conceived as a gradual process. It may be activated by a contextually appropriate sanitation intervention but it is unlikely that sustainable change will be achieved through specific interventions alone without addressing structural constraints related to educational, economic, and sociocultural inequalities. Although our findings warn against one-sided understandings that incline towards the latrine- first or demand- first narrative, the deep pervasiveness of the latrine- first narrative remains a core challenge for efforts to improve sanitation in India.

Low sanitation rates were neither explained by a lack of expressed demand nor by a lack of recognition of OD disadvantages. Similarly, neither variation in hygiene and sanitation knowledge nor understandings of health risks was associated with sanitation preferences. The documented key importance of perceived descriptive social norms implies a potential for persuasive strategies that manipulate social norms around sanitation, particularly if combined with efforts to heighten the perception of toilet benefits (privacy, comfort, safety as well as health benefits). However, our study revealed uncertain and potentially adverse effects of perceived injunctive social norms. This important finding implies that attempts to change sanitation preferences and behaviours by acting on the forces of social (dis)approval may be ineffective in the present context and may generate negative unintended consequences. Our results thus cast doubts on the effectiveness of techniques that use negative emotions and social pressures, even if

disregarding their ethical controversies. Specifically, this applies to the name-and-shame strategy promoted under SBM. The perception of financial unaffordability of toilets is another important area that should be addressed to improve sanitation preferences. This particularly holds if targeted together with positive pressures on descriptive social norms.

## Acknowledgements

This work was funded by the Czech Science Foundation [grant number GA15-21237S]. The study was undertaken by the Charles University in Prague and Xavier Institute of Social Service in Ranchi. We gratefully acknowledge support from these institutions.

## Appendix A. Structural variables examined in various stages of the regression analyses with their basic descriptive statistics

1.1. Demographic characteristics	
Age of respondent – mean age (SD)	32.57 (11.89)
Share of female respondents	0.56
Share of female household heads	0.13
Household size – mean size (SD)	5.96 (2.54)
Share of households with elderly (above 50) members	0.51
Share of households with children (under 5)	0.38
Share of households with disabled people	0.06
1.2. Sociocultural variables	
Religion (relative shares)	
Hindu	0.59
Muslim	0.07
Christian	0.05
Sarna	0.29
Social category (relative shares)	
Scheduled castes	0.07
Scheduled tribes	0.45
Other backward classes	0.44
Other	0.04
1.3. General education	
Attained education of respondent; of household head; higher of households head or respondent (relative shares)	
No	0.32; 0.36; 0.20
Up to lower secondary	0.38; 0.51; 0.47
Higher secondary	0.18; 0.07; 0.19
College	0.13; 0.06; 0.14
1.4. Socioeconomic variables	
Annual household income in Rs. – median; mean (SD)	66,000; 89,187 (118,286)
Primary source of livelihood (relative shares)	
Farming	0.22
Casual labour	0.48
Self-employment	0.15
Regular employment, private or public	0.15
Ownership of land in hectares – median; mean (SD)	0.50; 0.87 (1.47)
Type of house (relative shares)	
Mud-walled and similar	0.51
Semi-concrete or semi-mud-walled	0.29
Concrete	0.20
Change in economic situation over past two years (relative shares)	
Improved	0.41
Same	0.52
Worsened	0.07
1.5. Socio-ecological variables	
Time needed to collect water, in minutes, incl. waiting time – mean (SD)	9.83 (7.81)
Type of water source (relative shares)	
Private tap or well	0.31
Public tap	0.30
Public well	0.20
Hand pump	0.19

## Appendix B. Psychosocial variables, their explanation, and basic descriptive statistics

2.1. Factual sanitation and hygiene knowledge	
<i>Knowledge of hygiene and sanitation messages</i> – the sum of relevant messages reported by respondents to an open-ended question about knowledge of hygiene and sanitation messages.	
Min.; Max.; Average (SD):	0; 6; 1.51 (1.66)



(continued)

<b>2.1. Factual sanitation and hygiene knowledge</b>	
<i>Awareness about diarrhoea prevention</i> a binary variable based on question to list the three most effective ways of preventing diarrhoea. The measure distinguishes those who reported at least one relevant message from those who reported no or irrelevant responses. Share of those with at least some awareness:	0.53
<b>2.2. Perception of social norms</b>	
<i>Perceived descriptive norms around sanitation</i> constructed by averaging responses to questions: •Do people from your village outside of your household who are important to you mostly defecate in a toilet? and •Do other people outside of your household in your village mostly defecate in a toilet? measured at a 5-point Likert scale (All of them, Majority, Minority, None, Don't know). Their Cronbach's Alpha corresponded to 0.755. Standardized by z-score. Min.; Max.; Average (SD):	1.71; 2.40; 0.00 (1.00)
<i>Perceived injunctive norms around sanitation</i> gauged using statement •People in this village think you should use a latrine for defecation. Based on the inspection of data, the 3-point scale variable of injunctive social norms was constructed from the original 5-point scale question (Strongly agree, Agree, Disagree, Strongly disagree, Don't know). Distribution:	
Strongly agree	0.53
Agree	0.30
Disagree or don't know	0.17
<b>2.3. Perceived risks</b>	
<i>Perceived vulnerability to diseases due to OD or dirty toilet</i> constructed by averaging responses to the following two questions: •Do you think that you could get sick if you defecate in the open? and •Do you think that you could get sick if you use a dirty toilet? Their Cronbach's Alpha corresponded to 0.705. Standardized by z-score. Min.; Max.; Average (SD):	2.89; 0.77; 0.00 (1.00)
<i>Expected incidence of health problems due to OD or usage of unimproved latrine</i> a relative perception of sanitation risks captured by presenting respondents with six different causes of acute health problems relevant to the epidemiological context and asking them to select the two they considered most likely to occur in their family in the upcoming year. Based on this exercise, we constructed a dichotomous variable which distinguishes those who selected OD among two most likely causes of health problems. The predefined causes of health problems were used: drinking contaminated water, eating contaminated/bad food, shortage of food, defecation in the open/usage of unimproved latrines, not washing hands before eating, infection from insect or animals, other - describe. Share of those who selected OD/usage of unimproved latrine among two most likely causes of acute health problems:	0.19
<b>2.4. Attitudes variables</b>	
<i>Perceived advantages of toilet</i> the sum of perceived advantages of toilet. Asked as an open-ended question with responses subsequently classified into predefined types. Min.; Max.; Average (SD)	0; 6; 2.70 (1.16)
<i>Perceived disadvantages of OD</i> the sum of perceived disadvantages of OD. Asked as an open-ended question and responses subsequently classified into predefined types. Min.; Max.; Average (SD)	0; 6; 2.40 (1.11)
<i>Satisfaction with current defecation practice</i> a binary variable based on the respondents' overall satisfaction with both hardware and behavioural aspects of the current sanitation situation in their households. Share of those satisfied with current own defecation practice:	0.31
<b>2.5. Ability and self-regulation variables</b>	
<i>Perceived financial unaffordability (money barriers)</i> a binary variable based on open-ended questions on constraints to toilet adoption and constraints to toilet improvement. Share of those who reported high cost as a major reason for not constructing a toilet or improving their existing toilet:	0.51
<i>Perceived water stress</i> a binary variable which distinguishes those who selected water scarcity among the two most serious threats from the following six options: water scarcity, shortages of food, diarrhoeal disease outbreaks, malaria outbreaks, hikes in prices of basic commodities, losses of agricultural land or livestock. Share of those who reported water among two most serious threats:	0.34
<i>Willingness to pay for toilet (WTP)</i> constructed using a contingent valuation procedure as described in Measures section. Distribution of responses:	
If only for free	0.22
>0 Rs. but than 6000 Rs.	0.13
>6000 Rs. but <12,000 Rs.	0.17
Willing to pay 12,000 Rs. or more	0.48
<i>Plan to adopt or improve toilet in the near future (PAIT)</i> a binary variable of intention to improve sanitation conditions of a household. Constructed based on questions ascertaining whether a household planned to construct or obtain a toilet in the near future (in the case of latrine non-owners) or to improve a toilet (in the case of latrine owning households). Toilet ownership was always considered as a control variable when modelling PAIT in regression analyses. Share of those who reported PAIT:	0.78

**Appendix C. Bivariate relationships between analyzed outcomes and selected structural variables**

	Share of households owning toilet prior to SBM	Share of those planning to adopt or improve toilet (PAIT)	Average of four WTP categories (with 0 = only for free and 3 = 12,000 Rs. or more)
Religion	$p < 0.001$	$p = 0.502$	$p = 0.215$
Hindu	0.15	0.78	1.99
Muslim	0.39	0.75	2.00
Christian	0.32	0.68	1.87
Sarna	0.05	0.81	1.74
Social category	$p = 0.008$	$p = 0.357$	$p = 0.540$
Scheduled caste and scheduled tribes	0.09	0.77	1.87
Other backward classes	0.19	0.80	1.96

(continued on next page)

(continued)

	Share of households owning toilet prior to SBM	Share of those planning to adopt or improve toilet (PAIT)	Average of four WTP categories (with 0 = only for free and 3 = 12,000 Rs. or more)
General and other	0.21	0.69	1.87
Attained education (higher of households head or respondent)	$p = 0.005$	$p < 0.001$	$p < 0.001$
No (20%)	0.06	0.59	1.48
Up to lower secondary	0.14	0.84	1.91
Higher secondary	0.17	0.82	2.02
College	0.26	0.84	2.36
Household income	$p < 0.001$	$p = 0.012$	$p < 0.001$
Lowest quartile	0.07	0.72	1.57
2nd quartile	0.09	0.74	1.68
3rd quartile	0.14	0.79	2.21
Highest quartile	0.29	0.88	2.26
Land ownership in hectares	$p = 0.274$	$p = 0.083$	$p = 0.462$
Functionally landless - up to 0.2	0.17	0.82	1.94
0.2 1.0	0.12	0.75	1.85
1.1 3.0	0.14	0.80	2.05
Above 3.0	0.25	0.60	1.60
Primary source of livelihood	$p < 0.001$	$p = 0.729$	$p = 0.003$
Farming	0.11	0.75	1.85
Casual labour	0.08	0.79	1.80
Self-employment	0.24	0.79	1.92
Regular employment, private or public	0.32	0.82	2.32
Type of house	$p < 0.001$	$p = 0.152$	$p < 0.001$
Mud-walled and similar	0.05	0.75	1.67
Semi-concrete or semi-mud-walled	0.16	0.81	2.12
Concrete	0.38	0.84	2.24
Change in households' economic situation over past two years	$p = 0.186$	$p = 0.485$	$p = 0.008$
Improved	0.15	0.80	2.13
Same	0.12	0.77	1.72
Worsened	0.18	0.85	2.06
Type of water source	$p < 0.001$	$p < 0.001$	$p < 0.001$
Private tap or well	0.26	0.88	2.16
Public tap	0.05	0.63	1.40
Public well	0.11	0.82	2.03
Hand pump	0.15	0.84	2.18
Time to collect drinking water	$p = 0.001$	$p = 0.505$	$p = 0.017$
Up to 5 min	0.25	0.82	2.16
From 5 to 15 min	0.12	0.76	1.85
15 min and more	0.10	0.79	1.83

#### Appendix D. Regression estimates for the measures of WTP

Table D1

Structural predictors of unwillingness to pay (binary logistic regressions with "WTP - only if for free" as outcome variable).

	Step 1 (demographic, sociocultural, and general education variables)		Step 2 (incl. socioeconomic and socio-ecological variables)	
	Beta coef	Standard errors	Beta coef	Standard errors
If elderly in household	0.468	0.199	0.471	0.263
Attained education (higher of respondent or household head)				
No	1.150	0.501	1.272	0.508
Up to lower secondary	0.577	0.495	0.756	0.544
Higher secondary	0.496	0.613	0.574	0.619
College		Reference category		Reference category
If economic situation improved over past two years			0.866	0.416
Land ownership			0.279	0.090
Type of water source				
Private tap or well			0.364	0.354
Public tap			0.872	0.296
Public well			0.033	0.428
Hand pump			Reference category	
Toilet ownership at the time of survey	0.342	0.390	0.333	0.364
Nagelkerke R <sup>2</sup>		0.049		0.130
Cox & Snell R <sup>2</sup>		0.031		0.084
N		499		499

Notes:

Significant at the 0.01 level.  
0.05 level.

**Table D2**  
Structural predictors of willingness to pay (binary logistic regressions with "WTP willing to pay 12,000 Rs. or more" as outcome variable).

	Step 1 (demographic, sociocultural, and general education variables)		Step 2 (incl. socioeconomic and socio-ecological variables)	
	Beta coefficients	Standard errors	Beta coefficients	Standard errors
If elderly in household	0.210	0.176	0.235	0.174
Attained education (higher of respondent or household head)				
No	1.483	0.387	1.528	0.409
Up to lower secondary	0.618	0.267	0.741	0.334
Higher secondary	0.409	0.369	0.493	0.402
College	Reference category		Reference category	
Primary source of livelihood				
Farming			0.524	0.331
Casual labour			Reference category	
Self-employment			0.608	0.211
Regular private or state employment			0.660	0.329
Type of house				
Mud-walled and similar			0.565	0.213
Semi-concrete or semi-mud-walled			0.088	0.340
Concrete			Reference category	
Type of water source				
Private tap or well			0.356	0.297
Public tap			1.214	0.325
Public well			0.018	0.291
Hand pump			Reference category	
Toilet ownership at the time of survey	0.553	0.365	0.656	0.345
Nagelkerke R <sup>2</sup>		0.085		0.252
Cox & Snell R <sup>2</sup>		0.064		0.189
N		499		499

Notes:  
Significant at the 0.01 level.  
0.05 level.

**Table D3**  
Psychosocial predictors of WTP.

	WTP - only if for free		WTP 12,000 Rs. or more	
	Beta coefficients (Standard errors)	Contribution to Nagelkerke R <sup>2</sup> in the Step 2 model in Table D1	Beta coefficients (Standard errors)	Contribution to Nagelkerke R <sup>2</sup> in the Step 2 model in Table D2
Knowledge of hygiene and sanitation messages	0.025 (0.108)	0.000	0.099 (0.104)	0.002
If at least some awareness about diarrhoea prevention	0.562 (0.302)	0.016	0.280 (0.217)	0.004
Perceived descriptive social norms	0.395 (0.161)	0.030	0.287 (0.090)	0.015
People in this village think you should use a latrine for defecation (injunctive norms)		0.024		0.005
Strongly agree	0.786 (0.393)		0.328 (0.243)	
Agree	0.165 (0.213)		0.141 (0.286)	
Disagree or don't know	Reference category		Reference category	
Perceived vulnerability to diseases due to OD or dirty toilet	0.177 (0.096)	0.007	0.019 (0.091)	0.001
If OD selected among two most likely causes of health problems	0.427 (0.277)	0.010	0.107 (0.285)	0.001
Perceived benefits of toilet	0.247 (0.144)	0.013	0.127 (0.099)	0.004
Perceived disadvantages of OD	0.296 (0.164)	0.018	0.171 (0.122)	0.006
If dissatisfied with current sanitation practice	0.754 (0.439)	0.010	0.532 (0.300)	0.006
Perceived financial unaffordability of toilet	0.432 (0.235)	0.008	0.420 (0.226)	0.007
Perceived water stress	0.218 (0.259)	0.002	0.118 (0.192)	0.001

Regression estimates were obtained by the inclusion of particular variables into the Step 2 model as in Tables D1 and D2 for WTP (only if for free) and WTP (12,000 Rs. or more), respectively.

Notes:  
Significant at the 0.01 level.  
0.05 level.

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- 4) NOVOTNÝ, J., BORDE, R., FICEK, F., KUMAR, A. (2024) The Process, Outcomes and Context of the Sanitation Change Induced by the Swachh Bharat Mission in Rural Jharkhand. BMC Public Health, 24, 994.

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RESEARCH

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# The process, outcomes and context of the sanitation change induced by the Swachh Bharat Mission in rural Jharkhand, India

Josef Novotný<sup>1\*</sup>, Radhika Borde<sup>2</sup>, František Ficek<sup>1</sup> and Anant Kumar<sup>3</sup>

## Abstract

**Background** The Indian Swachh Bharat Mission (SBM) was launched in 2014 with the goal to make India open defecation (OD) free by October 2019. Although it is known that the ambitious goal was not achieved, the nature of the sanitation change brought about by the SBM in different parts of India is poorly understood. One reason is a dearth of case studies that would shed light on the performance of the SBM simultaneously across its different domains. This article provides an example of such study. Employing a Process, Outcomes, Context approach, the objective is to understand the process and outcomes of the SBM-induced sanitation change in a specific context of rural Jharkhand.

**Methods** The study utilizes data collected through field research conducted in the rural areas of Ranchi district, Jharkhand, a state in east-central India. This data was obtained via repeated cross-sectional household surveys conducted at the beginning and at the end of the SBM, supplemented by key informant interviews with SBM stakeholders.

**Findings** We identified political support of SBM implementation and its acceptance amongst the population. Female community workers became key agents of SBM implementation at local level. The SBM increased toilet coverage in the study area from 15% to 85% and lowered the OD rate from 93% to 26%. It substantially reduced structural inequalities in access to toilets, furthered social sanitation norms, improved some of the attitudes towards toilet use, but impacted less on hygiene and sanitation knowledge. The implementation mainly concentrated on the construction of subsidized toilets but less on improving public understanding of safe sanitation practices.

**Conclusions** Although the SBM reduced sanitation inequalities in access to toilets in the study area, the behaviour change component was underplayed, focusing more on spreading normative sanitation messages and less on public education. Sustainability of the observed sanitation change remains a key question for the future. This article calls for more systematic production of geographically situated knowledge on the performance of sanitation interventions.

**Keywords** Environmental health, Sanitation, Swachh Bharat Mission, Jharkhand

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## Introduction

Unsafe sanitation still accounts for a notable share of the global disease burden, especially amongst children in low- and middle-income countries [1, 2]. This is particularly true for India [3, 4], a country with a major influence on global progress towards safe sanitation [5]. The Indian government has repeatedly attempted to improve the unsatisfactory sanitation situation in the country by several large-scale sanitation campaigns such as the National Water Supply and Sanitation Programme (1954), the Central Rural Sanitation Programme (1986), the Total Sanitation Campaign (1999–2012), the Nirmal Bharat Abhiyan (2012–2014). However, these earlier schemes did not yield satisfactory results [6]. In 2014, the Swachh Bharat Mission (SBM) was launched in India as the largest ever sanitation programme with the declared goal to eliminate open defecation (OD) by October 2019. As a flagship initiative of the Indian government, the SBM gained unprecedented political support and was heavily promoted. Its implementation has also been portrayed as comparatively successful [7–9], though this is not without contestation [10–12].

The official SBM records state that toilet coverage in rural India increased from 39% in 2014 to almost 100% in October 2019 by constructing 103 million toilets and initiating toilet use amongst 550 million people across rural India [13]. However, the most recent round of the National Family Health Survey (NFHS-5) uncovered that only 65% of people in rural India used improved toilets in 2019–2020 [14]. Although this is a considerable increase from the corresponding figure of 37% reported by the 2015–16 NFHS-4 [15], a lot remains to be done to eliminate OD in India. It also indicates that official SBM records might have been inflated and/or that a substantial part of the toilets constructed under the SBM have not been used [16].

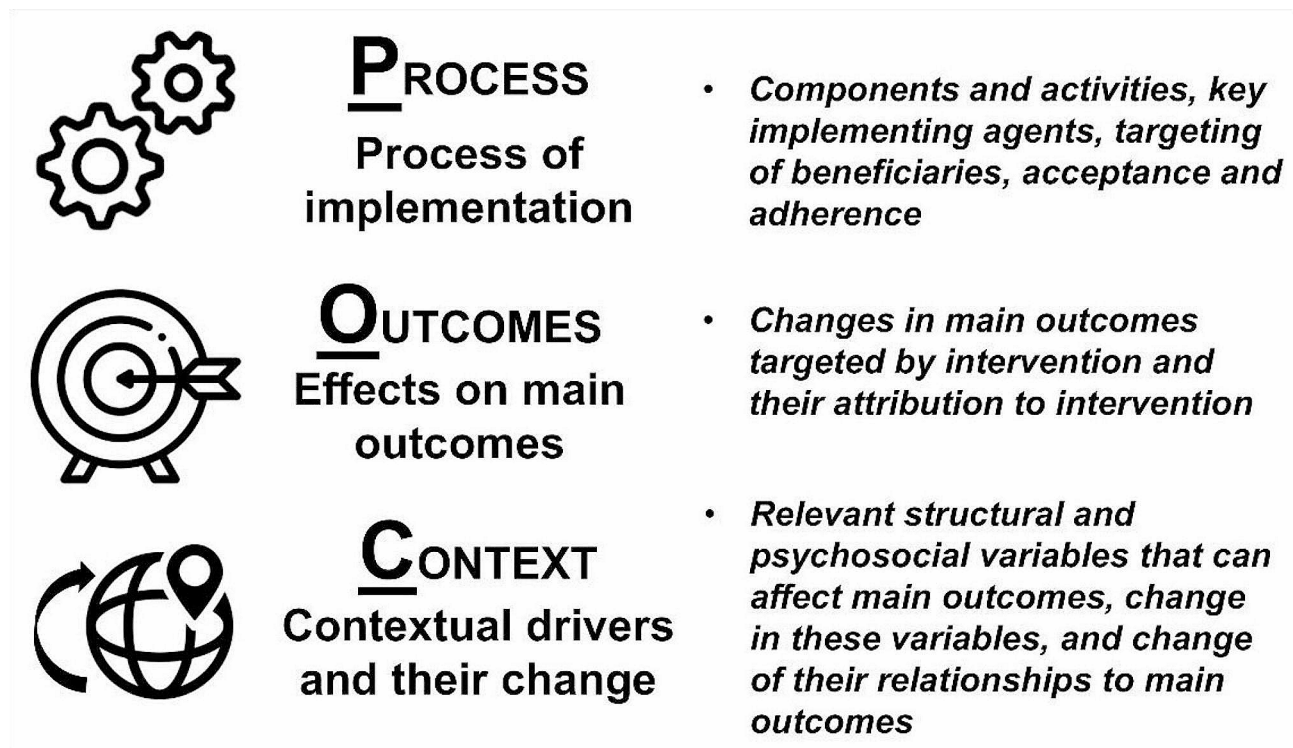
All-India estimates hide significant regional disparities in sanitation rates [12, 14, 17–20] which may reflect differences in the pre-SBM sanitation rates but may also be related to variation in SBM implementation and performance across India. The focus of this article is on rural Jharkhand, which is one of the Indian states with the most alarming sanitation situation before SBM implementation [21, 22]. The toilet coverage was only 8% based on the Census of 2011. According to the NFHS-4 survey carried out in Jharkhand in 2016, 12% of rural households used improved sanitation facilities, while the share increased to 51% as per NFHS-5 2020/21 survey [14].

Besides the development in aggregate sanitation rates, the nature of sanitation change induced by SBM in specific contexts has not been adequately understood. Published research on the SBM contains a set of studies that tested specific experimental behaviour-change adaptations of the SBM implemented in a few regions across

India such as in Odisha [23–26], Karnataka [27], Bihar [28], Gujarat [29, 30] or Punjab [31]. Although interesting, these studies shed less light on the performance of the SBM in “ordinary” settings (i.e., the majority of India, where such experimental adaptations were not implemented). Moreover, they typically examined only one or a few outcomes or selected thematic areas and often considered only part of the SBM programme period. The same holds for other research on the SBM focused on the change in main sanitation outcomes such as toilet coverage and use [12, 18–20, 32] or on specific aspects of the SBM such as its gender dimension [33–36], psychosocial stress or implementation and attitudes towards it [7, 10, 37].

Unlike in the above-mentioned literature on the performance of SBM, we seek to apply a less reductionist and more holistic view on SBM-induced sanitation change. Our general objective is to understand this change in the study area across its multiple domains. To achieve this goal, we follow a simple heuristic outlined in Fig. 1 referred to as the Process, Outcomes, Context (POC) approach, which leans towards a realist evaluation perspective [38, 39]. First, we scrutinize the process of the SBM implementation in the study area, focusing primarily on its grassroots-level implementation, key agents, and beneficiaries of the SBM. Second, we examine the changes in sanitation conditions in the study area, including the extent to which they can be attributed to the implementation of the SBM, particularly its impacts on the main outcomes of toilet coverage and use. In the third step, we analyse the role of local contextual drivers, focusing on the measurable situational variables of individuals, households, or their communities that can influence the targeted main sanitation outcomes. We acknowledge that the role of these contextual variables can change during and/or due to SBM implementation. Therefore, comparing the roles played by these variables with respect to the main sanitation outcomes before and after SBM implementation is a key aspect of our analysis in the third step.

To define these situational variables that measure local context, we draw on the basic assumption that successful sanitation interventions hinge on addressing both structural constraints and psychosocial antecedents for safe sanitation. Accordingly, following a previous study [40], we consider two types of situational variables. The first type, referred to as structural variables, includes objective characteristics, such as age, income, general education, social group, religious affiliation, etc., that help us assess the presence or absence of structural sanitation inequalities in the study area. The second type comprises subjective sanitation-related psychosocial variables, such as sanitation and hygiene knowledge, attitudes, risk perceptions, and perceived norms around sanitation. These



**Fig. 1** POC heuristics adopted in this study

variables capture the local situation with respect to the presence or absence of behavioural antecedents for safe sanitation practices. The comparison of their roles before and after SBM implementation is crucial as it addresses the underlying psychosocial mechanisms of sanitation change [41, 42].

In summary, the overarching goal of understanding sanitation change induced by the SBM in rural Jharkhand is achieved by addressing the following specific research questions:

1. How was the SBM implemented at the grassroots level in the study area, and how was it received by the local population?
2. What impact did the SBM implementation have on sanitation conditions, specifically the accessibility and use of functional toilets in the study area?

3a. Did the SBM reduce structural sanitation inequalities in the study area?

3b. How did the SBM influence the psychosocial antecedents of hygienic sanitation practices?

Our case study examines a rural part of Ranchi district in which 85% of households practiced OD as per Census 2011. It is a culturally diverse region within a Fifth Schedule (tribal majority) area, which is specific in relation to land rights, identity politics, gender dynamics and environmental knowledge/attitudes [43–45]. This regional

specificity may have shaped sanitation attitudes and behaviours as well as the implementation of SBM [40, 46].

This study is based on data collected by a mix of methods. The main data come from two cross-sectional household surveys conducted in the same set of villages, but not the same set of households, of Ranchi district at the beginning of SBM implementation in 2016 ( $N=499$ ) and after its end in 2019 ( $N=871$ ). This is supplemented by qualitative information from semi-structured interviews and focus group discussions with SBM implementers ( $N=71$ ).

Revolving around complex human-environment interactions, sanitation change tends to be highly context-dependent [47–49]. Understanding the underlying processes and contextual drivers is thus required for interpreting and generalising evidence on the change in main sanitation outcomes such as toilet coverage and use. Realistically, this task can be better facilitated by adequately scoped local case studies based on a mix of observational methods rather than through narrowly focused experimental methods [50–53]. With this article, we aim to present a case study that offers a nuanced understanding of SBM performance in a given context.



## Data and methods

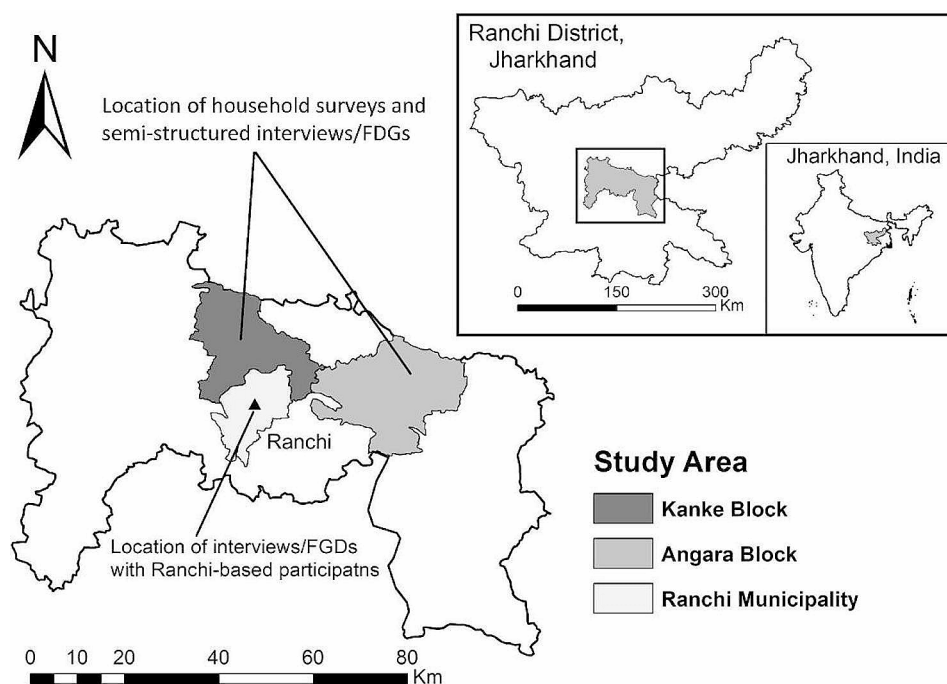
### Data

The research site comprises 12 Gram panchayats in Angara and Kanke blocks of Ranchi district of Jharkhand (Fig. 2). The panchayats were selected purposely for practical feasibility reasons in terms of the support from a local NGO. It helped us in securing necessary permissions (both formal and informal) in the initial phase of the research but played no role in the research design, data collection, analysis, and interpretation. Within the panchayats, 20 clusters (individual villages or groups of habitations) of roughly similar size were selected randomly from two groups of habitations located on and off a main road, respectively.

The first household survey was conducted in September and October 2016, at the start of SBM implementation in the study area (as detailed in [40]). The second survey occurred from mid-October to early December 2019, immediately following the conclusion of the SBM program period. The same cluster-based sampling was used for both surveys and both samples are approximately proportional at the cluster level. However, they did not cover the identical sets of households so it can be said that repeated cross-sectional design was employed. A random walk method was used to sample households within the clusters. Household heads were interviewed and if not available another adult member was interviewed. Five and six trained enumerators collected the data in 2016 and 2019, respectively. Both surveys combined structured interviews (in Hindi) with direct

observations of toilets and their surroundings. The 2016 survey was conducted in 499 households covering 2970 individuals, while the 2019 survey in 871 households covering 5037 individuals. This reflects the endline survey's more extensive examination of various SBM implementation themes. In the 2016 survey, we used an interview schedule with 84 questions and direct observations to assess 17 parameters. In the 2019 survey, we replaced some less relevant questions and added approximately 20% new questions, mainly focused on experiences with SBM implementation and attitudes toward it.

In addition, our research in the study area contained a qualitative component that provided important insights into the processes and issues around SBM implementation. Due to space limitations, we use only a part of the qualitative data collected in 2019 and 2020 when we conducted 60 semi-structured interviews and 11 focus group discussions mostly but not exclusively with various SBM implementers from the grassroots to the state-level (specification can be found in Supplementary materials S1). Only some summarized findings derived from analysed qualitative data are presented in this article. The interviews covered a wider range of topics which differed based on the types and positions of interviewees, while addressing two general thematic areas. The first covered various topics around the current and past sanitation situation, behaviours, and attitudes in the study area discussed within the nexus of sanitation, hygiene, water, and development. The second thematic area addressed various issues around SBM implementation such as the



**Fig. 2** Location of the study area and data collection

organization of the SBM at different levels (from the central and state-level to the level of individual panchayats and communities), institutional support and background, financial resources and flows, training activities, and, in particular, implementation at the ground level.

### Ethics

All participants and informants participated in the study voluntarily and were assured of anonymity and confidentiality. Free and informed consent was obtained orally as we believe that asking for written consent would have made respondents uncomfortable. The project was approved by the institutional ethics committee of Charles University [approval numbers 2015/32 and 2019/16].

### Measures and analysis

In addition to the presentation of various descriptive findings, we use binary logistic regressions to model relationships between the structural and sanitation-related psychosocial variables (considered as independent variables) and toilet adoption as the dependent variable. Toilet adoption is constructed as a dichotomous measure distinguishing those households who owned functional toilets and reported their consistent use as differentiated from the rest of the households in our sample. A functional toilet was defined as a sanitation facility that was usable at the time of our survey, which means not blocked, broken, or missing basic components necessary for its use. Consistent toilet use was measured through a battery of questions on the defecation practices of respondents and household members in rainy and dry seasons. Explanations of the structural and psychosocial variables used in the regression analyses together with their basic descriptive statistics appear in Supplementary material S2 and S3.

Regression analyses were conducted separately for the 2016 and 2019 data to allow comparisons of the roles of individual variables and changes in their roles before and after SBM implementation. In a first step, we analysed the effects of structural variables to examine whether and how SBM implementation eliminated structural inequalities in toilet adoption. In a second step, we estimated the effects of individual psychosocial variables by adding them separately to the regression model containing the statistically significant structural variables from the first step.

## Findings

### Process of SBM implementation

The SBM received strong political support from the Indian Prime Minister and bureaucratic support for it was also visible at the state level in Jharkhand. During the period of the implementation of the SBM's first phase in Jharkhand, the ruling party (for which the SBM was a

flagship program) at the centre and the state level were the same, and this can be argued to be a reason for the strong bureaucratic backing that the program was seen to receive in this context. The SBM was implemented by the Jharkhand Drinking Water and Sanitation Department and bureaucratic support for it was apparent in our interviews with state-level senior bureaucrats as well as district- and block-level SBM officers.

At the village-level in Jharkhand, Village Water and Sanitation Committees were responsible for SBM implementation under the supervision of district- and block-level officers. The committees consisted of multiple members of elected and nominated local representatives, who underwent training for SBM implementation. Amongst these representatives, Mukhiyas (village heads) and Jal Sahiyas (translated as water helpers) can be highlighted since they played an important role in SBM implementation. Jal Sahiyas are exclusively females nominated to their positions by their communities and appointed by the Jharkhand Drinking Water and Sanitation Department. It is important to note that before the implementation of the SBM their role was a technical one— they would be given water testing kits and would be tasked with testing local water quality. After the start of the implementation of the SBM their technical role increased in complexity since they were tasked with organizing the construction of SBM toilets and, in some cases, they also worked as masons to construct these toilets. In addition, they were also tasked with sanitation behaviour change communication, as well as monitoring and even enforcing usage of SBM toilets. As our interviews revealed, their SBM-related training had been primarily focused on toilet construction and its monitoring, and enforcing toilet usage. They were nevertheless not given training in the provision of information on sanitation and hygiene.

Our interviews uncovered that Jal Sahiyas were generally proud of their extensive work for SBM implementation and had enjoyed their roles as sanitation-change agents but complained about their inadequate financial remuneration. Mukhiyas had been elected to their positions at the end of 2015— their official mandate relates to acting as an intermediary between their electorate and the local rural administration. Since SBM implementation began soon after they were elected, Mukhiyas expressed that implementing this program had become the main focus of their work. The prior experience and mandates of these two key local-level SBM implementers is foregrounded since it impacts on the manner in which the SBM was implemented in Jharkhand.

The SBM provided subsidized toilets for individual rural households at a cost of Rs. 12,000 (127 USD). A large part of Mukhiyas and Jal Sahiyas' initial SBM-related work consisted in conducting surveys to determine who was eligible to receive such a subsidized toilet.

According to official SBM records, construction of the SBM toilets in the study area started in 2016 with 50% constructed in 2016-17, 11% in 2017-18 and 32% in 2018-19 and our surveys confirmed this pattern. A minor share of households (5%) in the 2019 sample were reportedly excluded from the SBM. They explained that their names were not in the list of SBM beneficiaries or that information about SBM support had not reached them. However, the excluded households were largely concentrated in a few specific panchayats.

Nearly all (97%) SBM constructed facilities visited in the 2019 household survey were pour-flush toilets with two pits, uniform in design. Almost all (98%) of the 733 interviewed SBM beneficiaries confirmed that they contributed to the construction of these facilities and 92% asserted that this contribution was obligatory. All but six of these households reported contribution by labour, mostly but not solely by digging the pits. In addition, 18% of them reported material contributions. It was reported by several Jal Sahiyas and Mukhiyas that some beneficiaries had needed to be forced to contribute their labour. However, as per 2019 survey findings, 83% of respondents said that they had not minded their contributions to toilet construction.

In addition to the toilet construction subsidy, in Jharkhand, Rs. 765 (11 USD) per toilet was additionally earmarked for administration, behaviour change communication activities, geotagging of toilets, etc. In some cases, Jal Sahiyas were involved in geotagging toilets, but their main role lay in monitoring and enforcing toilet usage. Jal Sahiyas and Mukhiyas did talk about their efforts to verbally convince SBM beneficiaries of the need to use their toilets. Some of the more coercive tactics that were also mentioned involved threats of fines/withdrawal of government benefits, or the shaming of OD practice. Similarly, a minority of 7% of respondents recalled the use of punitive coercive measures (i.e., other than verbal warnings and explanatory convincing) and 4% reported that they were threatened or embarrassed in relation to SBM implementation.

Jal Sahiyas, Mukhiyas and other local SBM implementers were also involved in other behaviour change strategies involving mobilizing school children to spearhead sanitation behaviour change. However, for sanitation behaviour change communication, principally, activities and events were conducted by SBM teams that were deployed from the district level to villages— this was described in interviews by SBM implementers from the district level. These activities and events consisted of community meetings, workshops, street plays, or mural art communicating sanitation messages. According to the 2019 survey findings, the exposure of SBM beneficiaries to such behaviour-change activities was rather moderate. Only around one-third of respondents remembered

that at least one information promotion or behaviour-change activity had been organized in their village during SBM implementation and slightly less than one-third reported participation in these activities. The reported participation was mostly in community meetings focused on hygiene and sanitation (23% of respondents reported participation) and toilet construction workshops (6%). Other events, such as street-plays, wall-paintings, transect walks, and village mapping, were mentioned solely on an anecdotal basis.

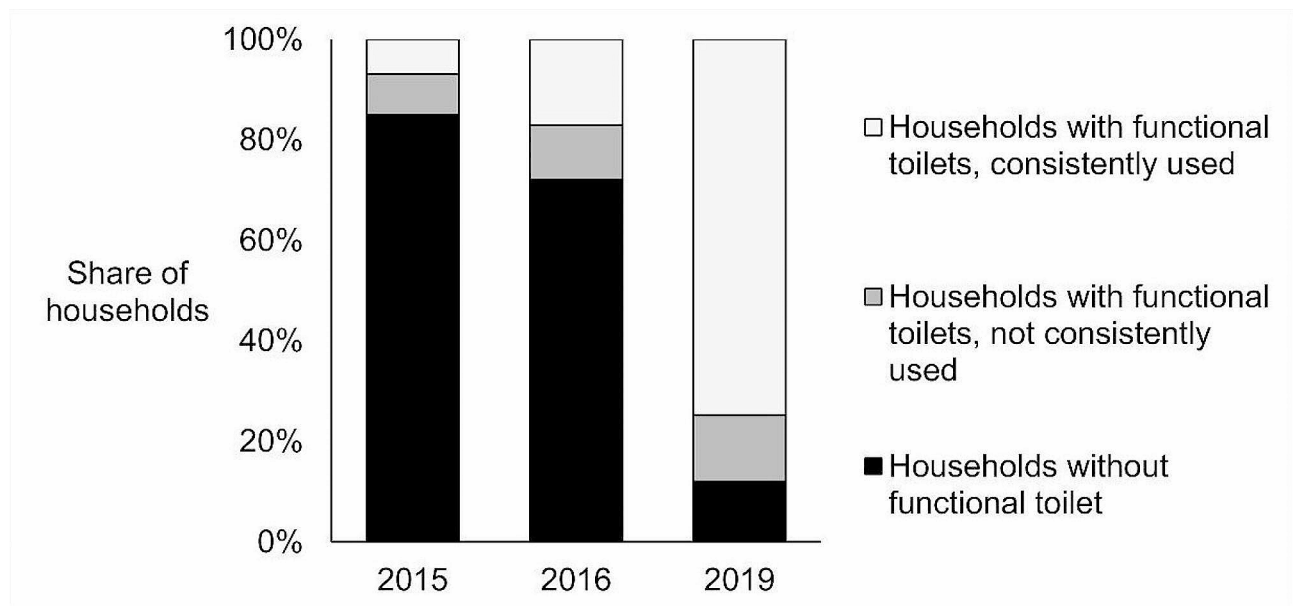
It should be noted that at the village level in Jharkhand, Swasth Sahiyas who work under the Department of Health, and maternal and child welfare workers called Anganwadi Sevikas who work under the Department of Women, Child Development and Social Security, have long been involved and trained in sanitation behaviour change communication (in each panchayat, a Swasth Sahiya and an Anganwadi Sevika were interviewed). However, we found that the SBM had not liaised with these village-level workers and volunteers since they did not work under the jurisdiction of the Jharkhand Drinking Water and Sanitation Department.

#### **Effects of the SBM on the change in sanitation conditions**

The stated objective of the Swachh Bharat Mission (SBM) was to achieve an OD-free status in India by 2 October 2019, with a focus on expanding toilet coverage and promoting toilet usage as the ultimate goals. According to official SBM data, within the panchayats under our research, the baseline toilet coverage was only 7%, but it reached 100% by 2019 (as shown in Supplementary material S4).

Figure 3 illustrates our findings regarding the changes in toilet coverage and usage. Our data from 2016 revealed that 15% of households in our sample already had functional (usable) toilets before the SBM's implementation in 2015. By October 2016, this figure increased to 28%. In our 2019 survey, we identified an 88% toilet coverage rate. Notably, approximately 98% of households that adopted toilets between 2015 and 2019 indicated that they were constructed under the SBM. This implies that around 71% of households in the 2019 sample received their toilets through the SBM, while 8% had non-SBM toilets, primarily obtained before the mission. This observation aligns with the aforementioned 15% baseline coverage from our 2016 data, suggesting that some households acquired new SBM toilets even if they already had a functional one.

In 2016, only 54% of households with functional toilets reported consistent usage, but this percentage increased to 85% in the 2019 sample. When considering the toilet coverage data mentioned earlier, it becomes evident that approximately 26% of households in the study still practiced open defecation either regularly or seasonally



**Fig. 3** Change in toilet coverage and use before and after SBM implementation

immediately after the completion of SBM implementation (as of our 2019 endline survey).

This trend aligns with respondents' opinions on the sanitation behaviour of others in their villages. About 65% of respondents stated that a minority of others primarily practice open defecation, and 18% mentioned that the majority of people in their villages do the same.

A minority of respondents in the 2019 survey (13%) explicitly admitted their preference for OD over toilet use. This was the case for 20% of those without a functional toilet, while 80% of these households denied such preference. Two-thirds of them explained the absence of a toilet by referring to a lack of space, to the fact that they were a recently settled family or did not provide any explanation. The rest of those without toilets, which corresponded to 5% of the 2019 sample, were those reportedly excluded from the SBM.

Of families with toilets and children below five, 31% and 35% reported safe disposal of children's faeces into a toilet in 2016 and 2019, respectively. According to the endline survey, a majority (69%) of families with children under five, who were provided with toilets under SBM, did not report using these toilets for the disposal of their children's faeces. Instead, the most common practice reported by 55% of these families was to discard it in open areas. If we consider burning of children's faeces also as a safe practice, 20% and 39% of all families (including those without toilets) with children under five safely managed children's faeces in the 2016 and 2019 samples, respectively. Although no less essential than the management of adults' faeces, these results indicate that the safe management of children's faeces received much less attention in SBM implementation.

**Table 1** Comparison of SBM and non-SBM functional toilets at the time of our endline survey at the end of 2019 (after the SBM implementation)

	All toilets	SBM toilets	Non-SBM toilets
Number of functional (usable) toilets	761	692	69
Years elapsed from toilet construction (average)	2.1	1.5	8.2
Toilets without apparent technical deficiencies (working water seal, slab, roof, doors, walls)	72%	70%	87%
Consistently used toilets	85%	84%	99%
Well managed and clean toilets	90%	88%	96%
Distance of toilets from house (average in meters)	7.7	8.2	1.8
Toilets located in or directly at house	39%	37%	62%
Toilets connected to piped water	11%	5%	51%
Toilets with water available at the time of survey	71%	68%	86%
Toilets with soap available	42%	39%	64%

Comparison of SBM and non-SBM toilets in Table 1 offers another perspective on the sanitation change induced by the SBM. It assesses quality standards of newly introduced SBM facilities and their convenience for users relative to the non-SBM toilets. It considers solely functional (usable) facilities, while the sample contained also 40 additional SBM toilets (5% of all SBM facilities) that were not functional (blocked, broken, or not completed). Unlike for the subgroup of SBM toilets, all surveyed non-SBM toilets were functional and they also less often revealed apparent technical deficiencies. Almost all households with non-SBM toilets (99%) reported their



consistent use, while this was true for 84% of households with SBM toilets. The most non-SBM toilets were built by households themselves, based on household demand. These toilets had also been built either in or adjacent to a house and were provided with piped water– showing that sanitation infrastructure had been built in a way to support toilet usage. It was also mentioned by Jal Sahiyas that some of the identified SBM beneficiaries who did not express demand for toilets wanted them to be built far away from their houses. Unlike non-SBM facilities, SBM toilets contained water tanks attached to the toilet from outside with an outlet tap inside. These tanks were nevertheless very rarely used.

**Contextual drivers**

**The role of structural constraints**

Table 2 reports results on the relationships between structural variables (demographic, socioeconomic, and sociocultural characteristics) and toilet adoption (ownership of functional and consistently used toilets). Regression estimates are reported for two separate models based on the 2016 and 2019 data. The results based on the 2016 data document that inequality in toilet adoption

was associated with the differences in socioeconomic or sociocultural characteristics. It implies an existence of structural sanitation inequalities related to differences in income, attained education, and religion (see also [40]). The results obtained from the 2019 data are quite different. The overall model fit was considerably weaker and none of the analysed structural variables was a statistically significant predictor of toilet adoption after the SBM. A notable positive effect (i.e., higher toilet adoption) was found for Muslim families when compared to Sarna (nature religion practised by groups that claim an indigenous status) households but even this relationship was not statistically significant.

**The role of psychosocial variables**

Table 3 shows changes in the psychosocial variables between 2016 and 2019 and the statistical relationships of these variables with the toilet adoption before and after the SBM. Let us recall that regression estimates for individual variables were obtained by including them separately into the regression model in Table 2 to account for possible confounding. In addition, Table 4 presents analogous regression estimates for few other thematically

**Table 2** Demographic, socioeconomic, and sociocultural variables, and their relationships with toilet adoption (beta coefficients and standard errors estimated by the binary logistic regressions with the ownership of functional and consistently used toilets considered as the dependent variable)

	2016 (before SBM)			2019 (after SBM)		
	Representation in the sample	Beta coefficient	Standard errors	Representation in the sample	Beta coefficient	Standard errors
If female respondent	56%	-0.059	0.296	45%	-0.140	0.154
Age of respondent	32.57	0.010	0.017	35.55	0.000	0.000
Household size	5.95	-0.071	0.066	5.78	0.017	0.034
Religion:						
Hindu	59%	0.713	0.658	57%	0.024	0.156
Muslim	8%	2.285	0.832*	8%	1.012	0.556
Christian	5%	2.421	0.591**	6%	0.014	0.555
Sarna	28%	Reference category		28%	Reference category	
Education:						
No	32%	-1.109	0.524*	38%	-0.439	0.321
Up to lower secondary	37%	-1.037	0.323**	39%	-0.229	0.264
Higher secondary	18%	-0.846	0.308*	14%	-0.066	0.336
College	13%	Reference category		9%	Reference category	
Main source of livelihood:						
Farming	22%	1.237	0.651	29%	-0.304	0.179
Self-employed	16%	0.919	0.568	13%	0.545	0.273
Other	15%	1.008	0.448*	13%	-0.325	0.224
Casual labour	47%	Reference category		45%	Reference category	
Household income (in logarithms)	0.00	1.653	0.376**	-0.05	0.025	0.396
Size of owned land (in logarithms)	-0.65	-0.039	0.145	-0.55	0.028	0.110
Nagelkerke (Cox and Snell) R <sup>2</sup>		0.25 (0.15)			0.04 (0.03)	
N	481			871		

Notes \* Statistically significant at the 0.05 level, \*\* at the 0.01 level. Accounted for data clustering. Household income normalized by the median income of a respective year. Other variables such as the presence of children below five in households, presence of elderly people in households, sex of household head, and social category (SC/ST/OBC/Other) were also examined, but none of them was statistically significant

relevant psychosocial variables that were measured only in the 2019 survey. We can see that several of the considered psychosocial variables were found to be statistically significant correlates of toilet adoption. This is especially true for the set of results pertaining to data collected in 2019.

The last column of Table 3 reveals that one of the most pronounced changes was observed for the satisfaction with one's own sanitation situation— this increased by 57%. The reported satisfaction was closely associated with toilet adoption in both pre-SBM and post-SBM data sets. That the expansion of access to toilets moved the satisfaction up once again documents a strong preference for toilet use over OD practice.

Similar observation applies to the perception of descriptive norms related to toilet use that also went up significantly hand in hand with expanding access to toilets and their use. The share of those who stated that the majority of other people in the village mostly defecate in a toilet increased by 69% from 6% in 2016 to 75% in 2019. Interestingly, these figures correspond almost exactly to the toilet adoption rates reported above. The perception of injunctive norms was strong already at the beginning of the SBM and increased slightly further with SBM implementation. It suggests an existence of social pressure on (and surveillance of) toilet use. This can be linked to findings in Table 4 on a significant negative regression coefficient obtained for a measure of social sanctions (question on what would happen to those who are spotted when practicing OD) and a significant positive coefficient obtained for a measure of social capital (question on how people in the village work together towards the common goal of making it clean).

The level of sanitation-related knowledge in our sample was rather low in 2016 and increased only marginally during SBM implementation. It may be related to the already mentioned limited exposure of local people to SBM awareness and information promotion activities. This is further confirmed by the results in Table 4 showing that only 31% of respondents recalled any such activities organized in their villages, while only 21% of them attended a village meeting that addressed hygiene and sanitation behaviour. At the same time, the relationship between exposure to these activities and toilet adoption was significant and positive confirming its importance for successful sanitation change. Moreover, in the regression analyses reported in Tables 3 and 4, all of the variables that measured sanitation and hygiene-related knowledge revealed statistically significant relationships with toilet adoption.

Willingness to pay for SBM-like toilets was a slightly lower in 2019 compared to 2016 and the opposite holds true for the measure of unwillingness to pay, which increased by 10% (Table 3). These results are not

surprising and may be linked to the role of subsidies in the SBM. In addition, willingness to pay was positively related (and the unwillingness negatively related) to toilet adoption after SBM implementation.

In both surveys, around half of respondents mentioned positive health benefits among reported toilet advantages. Perception of health risks associated with OD was also similar for both data sets. The stability of health-related perceptions can be compared to the perceptions of non-health benefits of toilets such as privacy, comfort, easy access, or safety that increased considerably more (by 19% for safety, 24% for safety, 33% for comfort, and 40% for easy access). It seems that the expanded toilet availability and use impacted more the perception of sanitation non-health benefits, which are easier to recognize based on personal experience, than the perception of health benefits of toilets, that are not immediate.

Shortages of water were perceived as a comparatively less serious problem by households in 2019 than in 2016 (Table 3). It may indicate that the expansion of toilet coverage didn't heighten general concerns about water shortages in the study area. However, unlike in the 2016 survey, the problem of water shortages was significantly more accentuated by those who didn't have or didn't use toilets after the end of the SBM implementation in 2019 (at the time of our endline survey). The latter subgroups also revealed higher concerns about difficulties associated with securing water for toilet use (Table 4). Therefore, water-related constraints (whether objective or perceived) still represent a consequential barrier for making the study area OD-free.

## Discussion

Local case studies designed to comprehensively examine the intricacies of sanitation interventions by simultaneously exploring the implementation process, changes in outcomes, and the role of contextual drivers can make an irreplaceable contribution to the evidential diversity of the performance of programmes such SBM. To our best knowledge, the published evidence on the Indian SBM represents a notable example of the absence of such studies. Although large-scale surveys and a few case studies documented that the SBM has not achieved its goal to eliminate OD practice in India [14, 16], the extent and nature of sanitation change induced by the SBM in specific local contexts are poorly understood. This motivated the present study which has sought to understand sanitation change induced by SBM in rural Jharkhand by pursuing the POC (process-outcomes-context) approach.

The SBM Implementation in Jharkhand gained political support and bureaucratic commitment. However, our study indicated a lack of convergence between the involvement of different departments contradicting calls for the use of 'whole-of-government' approaches [54,

**Table 3** Psychosocial measures, their change between 2016 and 2019, and their relationships to the ownership of functional and consistently used toilets

	2016 (before SBM)			2019 (after SBM)			Change 2016– 2019
	Repre- sentation in the sample	Beta coefficient	Stan- dard errors	Repre- sentation in the sample	Beta coefficient	Stan- dard errors	
Satisfied with current sanitation practice	31%	4.798	0.548**	88%	3.712	0.379**	+ 57%
Willing to pay Rs. 12,000 for SBM-like toilet	46%	0.831	0.446	45%	0.647	0.216**	-1%
Not willing to pay anything for SBM-like toilet	21%	0.171	0.636	31%	-0.954	0.266**	+ 10%
Health benefits acknowledged among toilet advantages	52%	-0.299	0.340	50%	0.995	0.189**	-2%
OD perceived as risk for health	63%	-0.222	0.265	66%	0.754	0.220**	+ 3%
Privacy acknowledged among toilet advantages	51%	0.611	0.353	70%	0.514	0.155**	+ 19%
Comfort acknowledged among toilet advantages	53%	0.082	0.344	86%	0.619	0.269*	+ 33%
Easy access acknowledged among toilet advantages	38%	0.199	0.330	78%	0.294	0.205	+ 40%
Safety acknowledged among toilet advantages	17%	-0.270	0.520	41%	-0.022	0.168	+ 24%
Diarrhoea outbreaks reported among serious threats	50%	-0.136	0.453	17%	0.084	0.220	-33%
Water shortages reported among serious threats	34%	0.600	0.390	28%	-0.666	0.219**	-6%
At least some knowledge on diarrhoea prevention	15%	0.772	0.324*	20%	0.832	0.247**	+ 5%
Proper use of toilet among recalled health and sanitation messages	21%	1.014	0.268**	30%	0.646	0.189**	+ 9%
Proper management of child faeces among recalled health and sanitation messages	1%	0.014	1.010	8%	0.783	0.373*	+ 7%
Stated that majority of other people in his/her village mostly defecate in toilet	6%	1.559	0.516**	75%	0.988	0.187**	+ 69%
Stated that all other people should defecate in toilet	84%	0.371	0.498	87%	0.810	0.194**	+ 3%
Agreed that people in the village think that he/she should defecate in toilet	82%	-0.957	0.386*	90%	0.661	0.259*	+ 8%
N	481			871			

Notes \* Statistically significant at the 0.05 level, \*\* at the 0.01 level. Based on the binary logistic regressions. Accounted for data clustering. Beta coefficients and standard errors obtained from the binary logistic regression when individual psychosocial predictors separately added into the regression model specified in Table 2

55]. More specifically, the Jharkhand Drinking Water and Sanitation Department was responsible for SBM implementation. Unlike the Jharkhand Health Department or the Jharkhand Department of Women, Child Development and Social Security, its grassroots-level volunteers had no prior experience of sanitation behaviour change communication and had worked in a technical capacity till the start of the SBM. Moreover, their SBM-related training also did not have a strong sanitation behaviour change focus, though the latter was clearly emphasized in the official SBM guidelines [56]. It may be linked to our observation that the behaviour-change activities were sidelined during the ground-level implementation in the study area that primarily concerned with the construction of toilets. For example, the rates of attendance and recalls of these activities were substantially lower than reported for another sanitation intervention in Odisha that had an explicit behaviour-change focus [24]. The neglect of a behaviour-change component was criticized with respect to the previous Indian sanitation campaigns [6, 57]. Our findings suggest that this problem was not eliminated in the SBM implementation in the study area (though the awareness of SBM was considerably more bolstered by its extensive coverage in media (e.g., [58])).

Our findings showed that the SBM efforts and resources were largely focused on the provision of subsidized toilets. Their construction was conditional upon obligatory labour contribution from beneficiary households. SBM beneficiaries mostly did not contest this requirement and SBM implementation more generally. Antagonistic attitudes were identified in a minority of around 5% of households, mostly because they were or felt excluded. These cases were concentrated in a few specific panchayats. Otherwise, our study uncovered a relatively good acceptance of SBM in the study area.

The results of this study showed that the share of households owning functional toilets increased from 15% to 88% in the course of SBM implementation between 2015 and the endline survey in 2019. Almost all (98%) households who adopted toilets in this period confirmed that they got them from the SBM. Some of them may have adopted toilets even if SBM implementation had not occurred so the exact (hypothetical) effect of the SBM on toilet coverage remains unknown. Given the sluggish sanitation dynamics prior to the SBM, it is nevertheless quite certain that the SBM attributes for a great deal of the observed change in the functional toilet ownership rate. When additionally considering our findings on

**Table 4** SBM-related psychosocial variables measured in 2019 only and their relationships to the ownership of functional and consistently used toilets

	Representation in the sample	Beta coefficient	Standard errors
Remembered sanitation-related activities organized in her/his village during SBM	31%	0.576	0.184**
Attended village meeting about hygiene and sanitation behaviour during SBM implementation	22%	0.742	0.166**
Knew how does double-pit system worked	53%	0.895	0.193**
Planned to reuse pit content as fertilizer	32%	0.810	0.215**
Was unhappy about contributing so much time and energy to toilet construction	16%	-1.083	0.274**
Would prefer OD if not forced to use toilet	13%	-1.327	0.235**
Found difficult to get water for toilet	24%	-1.249	0.245**
Stated that nothing happens to people who are spotted when practicing OD in her/his village	33%	-0.333	0.148*
Agreed that majority of people in her/his village work together towards the common goal of making the village clean	14%	1.243	0.347**

Notes \* Statistically significant at the 0.05 level, \*\* at the 0.01 level. Based on the binary logistic regressions. Accounted for data clustering. Beta coefficients and standard errors obtained from the binary logistic regression when individual psychosocial predictors separately added into the regression model specified in Table 2

self-reported toilet use, we found that 74% of households owned and consistently used toilets, while 26% of them practiced OD on a regular or a seasonal basis in the study area at the time of our endline survey in 2019.

Based on the NFHS-5 2020/21 data, a slightly lower OD rate of 23% and a considerably higher OD rate of 49% were reported for Ranchi district and rural Jharkhand, respectively [14]. However, the estimate for Ranchi district was determined from a sample that included not only rural but also urban households that tend to have higher sanitation rates. It is thus very likely that, compared to the averages pertaining to both rural Ranchi district and rural Jharkhand, our study area represents a region with a better sanitation situation and also better SBM performance. A plausible explanation is the proximity of our study area to the state capital because both physical and institutional remoteness tend to impact sanitation negatively [40, 59].

Earlier research documented the revealed preference for OD practice in India explained by the reluctance to

use low quality or inconvenient toilets provided under previous sanitation programmes [60, 61], though more recent research suggested the primary role of economic and ecological constraints [62]. Findings on stated preferences for OD elicited in our survey do not indicate that the former argument applies in the present context as only a small minority of respondents reported a preference for OD. However, the long-term sustainability of the observed sanitation change remains a key question. A significant share of respondents (31%) expressed unwillingness to invest in SBM-like toilets and it may affect their willingness to maintain these facilities and invest in any necessary repairs and manage pit contents. Moreover, the comparison of SBM and non-SBM sanitation facilities in our sample demonstrated that the SBM toilets had inferior quality standards and provided lower comfort for users. It heightens a risk of gradual slippage back towards practicing OD.

Of the differences revealed in the comparison between SBM toilets and non-SBM facilities, the two most significant were the lack of piped water in the vast majority of SBM toilets and their poorer accessibility. These disparities raise doubts about the sustainability of SBM toilet utilization, a concern that has been emphasized previously [23, 24, 63]. The former problem may at least partly be addressed by the ongoing Jal Jeevan Mission that plans to link all households to piped water. However, the prospects are uncertain, and Jharkhand belongs to the states with the most sluggish progress [64]. Realistically, it can be expected that a non-negligible proportion of SBM toilets will sooner or later remain unused. Follow-up monitoring and measures to minimize OD slippage is required.

We found that structural factors, such as inequalities in income, education, and religion, explained the variation in toilet adoption in the study area before the SBM (see also [40]). This included lower sanitation rates among Sarna households, nearly all of which belonged to the ST (scheduled tribes) social category. Importantly, our study confirmed that SBM implementation effectively eliminated these structural sanitation inequalities, at least in a statistical sense. After the SBM concluded, structural factors were no longer statistically significant predictors of toilet adoption in the study area. The finding that the SBM reduced structural constraints for toilet adoption in the surveyed region is significant, as emphasized by prior studies [10, 62], though we noted above that this did not hold for persisting ecological constraints related to water availability.

However, our research reveals that the SBM was less successful in addressing the psychosocial determinants of safe sanitation. Psychosocial factors emerged as strong predictors of the remaining variation in toilet adoption in our endline survey data after the SBM's conclusion.



This finding underscores the continued importance of effective sanitation-related education and behaviour-change efforts. At the same time, our results offer a few more nuanced suggestions regarding this. We saw that both descriptive and injunctive social norms around toilet use have already been established. Thanks to the wide coverage of the SBM and its massive propagation in the media, there is a widespread awareness that toilet use is recommended and required (both administratively and socially). However, a persisting gap was identified with respect to the actual understanding and knowledge about safe sanitation and hygiene practices and the implementation of the SBM didn't bring adequate change in this respect.

A notable example of overlooked awareness pertains to the safe disposal of child faeces which continues to be low in the study area after the end of SBM. This aspect of hygienic behaviour was neither adequately integrated into the SBM guidelines nor specifically addressed during SBM implementation in the surveyed region. As a result, the level of knowledge about this was generally weak both at the beginning and the end of SBM implementation. The safe disposal in households with small children increased modestly from 20 to 39%, if burying is considered a safe practice. Of those with small children and SBM toilets, only less than one-third reported using these facilities for the disposal of their children's faeces. The safe management of child faeces remains uncommon in India [24, 65] and has been generally neglected [66]. The Indian government should address this gap by more effectively integrating this aspect into health and sanitation interventions [24, 67].

That the SBM did not have a large impact on improving sanitation-related knowledge is notable and it may also have been caused by the above-mentioned low attendance at the village meetings that addressed hygiene and sanitation behaviour which had been organized by district-level SBM teams. It can also be noted that Jharkhand is a context in which witch-doctors/herbalists are approached for disease cures and health knowledge—as was found by our fieldwork. Although it is a demanding and perhaps arduous task, education and information promotion focused on providing substantive information to facilitate real understandings of the importance of safe sanitation remains a key challenge that was neglected during SBM implementation.

Certain households obtained new SBM toilets even though they already had functional ones. This could be attributed to factors like household size or multiple generations cohabiting. Another reason cited was that the new SBM toilet would be necessary soon. The observation may nevertheless also point to problems in SBM implementation.

This article has undoubtedly some limitations. First, the study was deliberately designed to focus on multiple domains of SBM performance (i.e., process, outcomes, context). It results in a wide thematic scope which necessarily comes at the expense of the depth of information provided on individual domains. Although each of them might have been possibly analysed in more detail separately, it was the core intention to cover them simultaneously within a single paper. The slicing of research findings (in our opinion a common practice in sanitation research) may overlook interdependencies between findings on particular domains and, eventually, disintegrates the picture that this local study attempts to paint. Secondly, we applied a rather narrow definition of contextual factors by considering the measurable situational characteristics of individuals, households, or communities. Although this pragmatic conceptualisation allowed us to quantitatively examine how their role changed over the course of SBM implementation, it can only partly capture the influence of wider political, sociocultural, and environmental contexts. Thirdly, toilet usage and other aspects of sanitation behaviour were examined based on self-reported information and may be subject to social desirability bias. The relevance of the estimated rates of toilet usage was nevertheless corroborated based on the question on toilet usage of others (descriptive norm). However, similar checks were not possible for other findings. For example, the evaluation of the SBM in household surveys as well qualitative interviews may also be prone to this bias, particularly if considering the politicization of the SBM and its prominence in the media.

## Conclusion

This article examined the extent and nature of the sanitation change induced by the Indian SBM in rural Jharkhand. We identified political support of the SBM implementation and its acceptance amongst the population. Female community workers became key agents of SBM implementation at local level. The SBM primarily concentrated on meeting targets regarding the construction of subsidized toilets. The behaviour change component was underplayed, focusing more on spreading normative sanitation messages and less on public education. Between 2015 and 2019, the SBM increased toilet coverage from 15% to 85% and reduced the OD rate in the study area to 26%. It curbed structural sanitation inequalities in access to functional toilets, furthered social sanitation norms, improved attitudes towards toilet use, but only negligibly impacted on hygiene and sanitation awareness. Sustainability of the observed sanitation change is uncertain and remains a key question for future research. Gradual return of at least some people to OD practice is likely due to challenges related to water unavailability, unwillingness to maintain toilets

without further subsidies, or insufficient user comfort of the SBM toilets. Secondary data suggests that the performance of the SBM in the selected study area was better than in the majority of other parts of Jharkhand. This article calls for more systematic production of contextually specific knowledge on the performance of sanitation interventions.

#### Abbreviations

NFHS	National Family Health Survey
NGO	Non-Governmental Organization
OBC	Other Backward Classes
OD	Open Defecation
POC	Process, Outcomes, Context
SBM	Swachh Bharat Mission
SC	Scheduled Classes
ST	Scheduled Tribes

#### Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12889-024-18388-y>.

Supplementary Material 1

#### Acknowledgements

We thank to all the respondents who participated in this research as well as to data enumerators. This work was supported by the Czech Science Foundation [grant number GA19-10396S]. The study was undertaken based on a collaboration between Charles University and Xavier Institute of Social Service, Ranchi. We gratefully acknowledge support from these institutions.

#### Author contributions

J.N.: Conceptualisation, Methodology, Formal Analysis, Investigation, Resources, Data Curation, Writing—original draft, Visualisation, Supervision, Project administration, Funding acquisition. R.B.: Conceptualisation, Methodology, Investigation, Data Curation, Writing—original draft. F.F.: Conceptualisation, Methodology, Investigation, Data Curation, Writing—original draft. A.K.: Conceptualisation, Resources, Supervision, Project administration.

#### Funding

This work was supported by the Czech Science Foundation [Grant number GA19-10396S]. The funding body played no role with respect to the study design, collection, analysis, and interpretation of data, or in writing the manuscript.

#### Data availability

Primary data are available from the corresponding author based on a reasonable request.

#### Declarations

##### Ethics approval and consent to participate (Human Ethics, Animal Ethics or Plant Ethics)

The project was approved by the institutional ethics committee of Charles University [approval numbers 2015/32 and 2019/16]. All participants and informants participated in the study voluntarily and were assured of anonymity and confidentiality. Free and informed consent was obtained orally as we believe that asking for written consent would have made respondents uncomfortable.

##### Consent for publication

Not applicable.

##### Competing interests

The authors declare no competing interests.

Received: 6 June 2023 / Accepted: 19 March 2024

Published online: 12 April 2024

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