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The influence of land use changes on open defecation in rural India

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1. Introduction

Between 1990 and 2011, 275 million Indians gained access to sanitation; however, India still contributes 60% of the total number of open defecators across the world (UNICEF/WHO 2013). The majority of India's 565 million open defecators live in rural areas, including many who have at least one individual household latrine (IHL, i.e., any improved or unimproved sanitation unit that does not connect to sewerage) due to multiple sanitation initiatives (UNICEF/WHO 2015). Many IHLs are not used, or only sporadically used (Sinha, Nagel, & Schmidt, 2017); latrine ownership has not automatically reduced open defecation (OD) or improved environmental health. After decades of governmental and non-governmental interventions, the *Swacch Bharat Abhiyan* (SBM; Clean India Mission) is currently underway—an ambitious, central government-led latrine building and behavior change campaign that will spend US $9 billion to eradicate OD by 2019. The SBM-U (urban) and SBM-G (rural) follows earlier, failed country-wide interventions that focused on latrine-building, thus, in addition to using subsidies as earlier programs did, financial resources are also devoted to education and behavior change. In the context of efforts to alter sanitation-related behaviors, this paper examines changes in sanitation attitudes and behaviors influenced by land use change (i.e., non-sanitation–related change) on WASH behaviors in rural villages of Rajasthan and Tamil Nadu. We find that beliefs about the necessity/desirability of latrines, and latrine usage itself, have been swayed by processes of enclosure occurring in these communities.

Current sanitation scholarship indicates that the stubbornness of OD in rural India is a complex, interconnected set of factors, including but not limited to: 1) lack of education about the health, social and economic benefits of sanitation; 2) assumptions that building costs are too high (Coffey et al., 2014); 3) caste struggles (Routray, Schmidt, Boisson, Clasen, & Jenkins, 2015); and 4) functionality of the unit (Barnard et al., 2013). Convenient access to water has been shown both to support latrine use (O'Reilly & Louis, 2014; Routray et al., 2015) *and* to play little role in latrine usage or non-usage (Coffey et al., 2014; Sinha et al., 2017). Scholarship on latrine usage finds the following positive influences: 1) sustained, multi-scale political will (O'Reilly & Louis, 2014); 2) ongoing per-to-person contact and accountability (Hulland, Martin, Dreibelbis, DeBruicker, & Winch, 2015; O'Reilly & Louis, 2014); 3) women's education (Barnard et al., 2013); and 4) religious affiliations (e.g., Muslims; Coffey et al., 2014). Social pressure, especially with regard to women's privacy, can promote building and usage, and may help establish latrine adoption as a social norm (O'Reilly & Louis, 2014; Crocker, Saywell, & Bartram, 2017). Ability to empty latrine pits matters for sustainable usage, as does a latrine in good repair, especially since decisions to use a latrine may depend on out-competing OD as the behavior that is most convenient and comfortable, or even possible (O'Reilly, Dhanju, & Goel, 2017a; Crocker et al., 2017; Sahoo et al., 2015).

Despite efforts to understand latrine use and non-use, sanitation has yet to become a major focus for geographers. Furthermore, although geography is key to water, sanitation and hygiene (WASH) behaviors, it remains underexplored in much public health scholarship. Data without geographic and broad socio-economic context may be correct, but it is not holistic (Jewitt, 2011a, 2011b), nor is it likely to consider how access to sanitation infrastructure is a function of spatialized power. For example, Desai, McFarlane, and Graham (2015) argued that *where* one defecates signals *who* one is in a social system of class, gender, caste, and communal inequalities (See also Morales, Harris, & Öberg, 2014). The Indian middle class has the political clout to insist on sewerage for their households *and* the closure of OD grounds used by the urban poor (McFarlane, Desai, & Graham, 2014). Similarly, O'Reilly et al. (2017a) took a relational approach that contrasted remote places with rural places, demonstrating that the same structural inequalities that create physical and social remoteness create circumstances conducive to continuing OD. At the scale of the body, McFarlane et al. (2014) observed that vulnerability to gender-based violence is one defining feature of 'sanitation poverty,' i.e., no access to a latrine at all; even if provided, inadequate sanitation can drive women to unsafe spaces for OD (Kulkarni, O'Reilly, & Bhat, 2017).

Our data fills a gap about sanitation uptake as an ongoing process, influenced by interventions, changing land uses, and social changes that convince rural inhabitants that OD is, or is becoming, unfeasible. The words of interviewees demonstrate the power of a geographic approach in unearthing the various *contexts* within which sanitation beliefs and practices are embedded and the socio-economic *processes* within which they may unexpectedly change. Beyond existing lists of social factors, individual characteristics, and latrines types, we contribute to WASH literature by attending to the shifting geographies of rural settlements—the literal ground where OD is practiced and latrines are

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built. The dramatic rise in 'Census Towns,' i.e., rural areas that are now urban according to Government of India guidelines (Glover, 2018), makes our contribution especially timely.

This paper is based on ethnographic research on sanitation uptake that was conducted in two culturally distinct Indian states – Rajasthan (RV; western desert India) and Tamil Nadu (TN; southern coastal India). From 2001 to 2011, the number of households without latrines dropped by 5 percentage points in rural Rajasthan, and by 10 percentage points in rural TN. Nevertheless, more than 75% of rural households were without a latrine in each of these two states, placing them among states with the lowest IHL coverage in India (Ministry of Drinking Water and Sanitation 2014). As part of a longitudinal ethnography, we traced latrine adoption in Rajasthani villages from 1997 to 2011 (other results addressed in separate papers). In shorter term ethnographic fieldwork in TN in 2012, we explored villagers' plans to stop OD in the near future.

Across the six study villages, participants spoke about land use changes that curtailed access to OD sites as the primary driver to current and expected future latrine usage. However, land use changes looked very different in Rajasthan and TN due to geographic, economic and cultural nuances. In section three, we elaborate on how different land use changes and diverse sanitation interventions produced similar outcomes for latrine uptake in Rajasthan and Tamil Nadu. We find that in addition to the many reasons for OD and/or sanitation adoption, land use changes on village peripheries figured strongly as a reason to build and use IHLs.

2. Methods

The research objective at the time of fieldwork in Rajasthan was further data collection on WASH as part of an ongoing longitudinal ethnography that began in 1997. In 2011, RV1, RV2, and RV3 villages located in Churu district were selectively sampled from the longitudinal study's sample area, based on village size (small > 250; medium ~400, and large < 500) and caste composition typical of agricultural villages in Rajasthan (dominated by Jats, with smaller numbers of SCs, and some Rajputs, Brahmins and Muslims). All were villages where the Our Water drinking water supply and sanitation intervention had taken place, and in this way they are representative only of Churu, Hanumangarh, and Jhunjhunu districts. All three village populations were known not to have adopted sanitation in 2008, despite at least one intervention, and were revisited, in part, to speak to people about WASH changes since that time. Broadly speaking, by the time of this research, most villagers had become latrine users.

Our 2012 fieldwork in TN1, TN2, and TN3 villages was located in Cuddalore and Villapuram districts of Tamil Nadu. The research objective in TN was to understand reasons for prevalent OD. Thus, we selected villages where 75% of households were without latrines—the same percentage as the rest of the state, and at least one coastal, fishing village where land use was different from agricultural, inland villages. Further selection criteria included that the study villages reflected the caste make-up of most villages in this part of TN. Inland villages comprised landed agricultural castes, that, while not the uppermost in the caste hierarchy, were the dominant castes because of their wealth and historical control of lower caste labor (TN1, 550 hhs; TN2, 480 hhs); and coastal communities comprised fishing castes (TN3, 250 hhs). Nearly all villagers practiced OD but were preparing to build and use IHLs in the near future.

Table 1 shows the various sanitation interventions in Rajasthani villages between 1995 and 2005, and in TN between 1995 and 2012. Our six study villages across Rajasthan and TN were in the post-intervention phase with no active sanitation efforts on the ground at the time of our fieldwork. We bring these two data sets together to ask: What role did geography play on behaviors that followed after subsidized latrine interventions?

In each state, sixty-five interviews of approximately one hour each were conducted in households that were purposefully selected to include all castes and classes, with and without IHLs, to learn about their sanitation habits and preferences. We roamed caste-based neighborhoods over consecutive weeks, and spoke with adult household members that were in their front courtyards, regardless of gender, and often in mixed gender groups. Interviews were recorded in the local languages (Marwari, Hindi, and Tamil) and later transcribed in English. Interview codes were developed in an iterative process, and interviews subsequently coded by hand and with MAXQDA. We collected secondary data through NGO, state and district reports, and the GOI Census of India (2011) for descriptive statistics and triangulation of verbal histories of WASH intervention histories and land use changes. Village level community participatory mapping was also used to gather information on neighborhood boundaries, water taps, households with and without IHLs, households located on *gochar* (village-governed common property land) in Rajasthan, households bordering real estate plots in TN, villages spaces used for OD, water bodies, and highways. The research protocol was approved by the Texas A&M University __ Institutional Review Board; study participants gave their verbal informed consent.

Table 1
Sanitation interventions in Rajasthan and Tamil Nadu: 1995–2012.
(Source: Triangulated key informant interviews)

Sanitation Interventions	Recipient Villages	Years active
Rajasthan		
Our Water Project (foreign donor bank and state govt.)	RV1,2,3	1997–2005
Sanitation Trust (regional NGO)	RV1,2	1997–2005
Nirmal Gram Yojana (national govt.)	RV2	2007–2008
Tamil Nadu		
One House One Toilet (state govt.)	TN1,2,3	1995–2000
Total Sanitation Campaign (national and state govt)	TN1,2,3	1996–2009
Ecosanitation Latrines (regional NGO)	TN1,2,3	2000–2010
Public Latrine blocks (state govt.)	TN1,2,3	2000-
Free Housing and Latrine (regional NGO)	TN2	2005
Kalingar Housing Scheme (state govt.)	TN1,2,3	2008–2009
Tsunami Relief Houses (national and state govt.)	TN3	2006–2012

3. Results

3.1. Rajasthan: land use changes and sanitation

Communities experienced four sanitation interventions between 1997 and 2008. The drinking water supply and sanitation intervention known as 'Our Water' introduced built numerous twin-pit or single pit, pour-flush latrines.

> Dharminder: *"There were no latrines here before Our Water came. They came and explained to people that latrines should be made and people started making then. Latrines started here after 2000–2002."*

During these years and continuing after the closure of Our Water in 2005, a local NGO built similar pour-flush latrines. Due to these interventions, the majority of households in the study area had latrines, but our 2008 fieldwork revealed that most still practiced OD due to severe water shortages (i.e., drinking water was extremely limited, so water was not used for flushing). By contrast, in 2011, water shortages had eased and villagers across caste and class groups were using their IHLs due to the closure of *gochar* surrounding their villages.

3.1.1. Increase in population and decrease in household size

According to Census of India (2011) data, while the total population and number of households increased in each village, the number of persons in each household across all villages dropped by one. Possible