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The toilet tripod: Understanding successful sanitation in rural India

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ABSTRACT

Building toilets and getting people to use them is critical for public health. We deployed a political ecology approach specifically to identify the multi-scalar political, economic, and environmental factors influencing toilet adoption in rural India. The research used ethnographic and technical methods in rural villages of West Bengal and Himachal Pradesh over the period September 2012 to May 2013. The elements of successful sanitation adoption depended on three factors (i.e., *toilet tripod*): (1) multi-scalar political will on the part of both government and NGOs over the long term; (2) proximate social pressure, i.e., person-to-person contact between rural inhabitants and toilets; (3) political ecology, i.e., assured access to water, compatible soil type, and changing land use. This research contributes to studies of sustainable development and global public health by developing a theory and framework for successful sanitation.

1. Introduction

As part of a global health and development agenda, the Millennium Development Goals (MDGs) to halve the proportion of people without sustainable access to sanitation by 2015 is falling far short of its goal. Most of the deficit is in sub-Saharan Africa and South Asia (World Health Organization, 2013). Practitioners, policy makers and academics have been grappling with the challenge that sanitation presents and most do not agree that there is a single right approach. Many now agree that supply driven interventions – large scale interventions and subsidies that focus on subsidized latrine construction – have not helped with MDG targets. Critics have highlighted that they are captured by the more wealthy, do not reach the poor, are poorly designed and constructed, or are not culturally appropriate (Jenkins and Scott, 2007; Mara et al., 2010; Jenkins and Sugden, 2006).

Therefore, the focus of policy and research has shifted to the creation of demand for sanitation because low demand at the household level has been blamed for the failure of sanitation initiatives (Evans, 2005; Jenkins and Sugden, 2006). Demand-side approaches focus on health education, social marketing, community action, supporting household behavior change and enabling small scale entrepreneurial initiatives with state as facilitator. Public investment is focused on changing institutional approaches to sanitation and supporting these demand-creating approaches—investing in software rather than hardware (Evans, 2005; Jenkins and Scott, 2007; Jenkins and Curtis, 2005; Jenkins and Sugden, 2006; Peal et al., 2010). The focus on creating demand has led to important findings that individual and households' motivations to build and use toilets has more to do with comfort, convenience, status, privacy, and dignity than with perceived public health benefits (Evans, 2005; Jenkins and Scott, 2007; Jenkins and Curtis, 2005; Jenkins and Sugden, 2006; Peal et al., 2010). We take a broader view and argue that successful sanitation hinges on the interaction of demand, supply, scale and political ecology while paying attention to how poverty, inequality and access to resources act as constraints to sanitation. Our research also highlights that most research on sanitation fails to adequately address the politics of access to environmental resources (in other words, political ecology) that are critical to sustainable sanitation adoption.

The current paper complements previous research on motivations to build, adopt, and sustain latrine usage over time (Devine, 2009; Jenkins and Scott, 2007; Rheinländer et al., 2010) by applying a political ecology framework to the problem of sanitation adoption. A political ecology approach examines human–environment relationships at the intersection of economics, social norms, and unequal social relations of power (e.g., gender and caste). As King (2010) proposes, political ecology approaches offer new insights into studies of disease, health discourses, and how health is shaped by relationships between humans and humans, and humans and their environments. Halvorson et al. (2011) apply a political ecology approach to great effect in their study of the social-ecological aspects of diarrhea and water quality by mothers in Mali, finding that seasonality not only impacts perceptions of water quality, but also the ability to use toilets. In their study of the anomaly of dengue fever in a planned Malaysian city, Mulligan et al. (2012) use a political ecology approach to bring together

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(1) an understanding of 'the city' as a material manifestation of social relations and (2) how the environment surrounding the body may infect it. They found that planning a modern, global city took precedence over creating a healthy environment for its denizens. We deploy a political ecology approach specifically to identify the multi-scalar, political and environmental factors influencing toilet adoption in rural India. Sanitation interventions seek to modify human patterns of open defecation, but seldom deeply consider the socio-spatial dynamics and environmental factors that support the development and sustainability of toilet usage (Jewitt, 2011). These projects often ignore how family political relations (e.g., women's lack of decision-making power) and variable access to resources (e.g., periodic water scarcity) impact toilet usage by all family members (O'Reilly, 2010).

Many sanitation practitioners and researchers acknowledge that toilet interventions must move beyond building toilets, and instead focus on engaging the social and economic factors that will lead to toilet adoption. Scholars have highlighted that toilet adoption comes from providing the right kinds of toilet designs (Devine, 2009), community involvement (Kar and Chambers, 2008), involvement of the state (Black and Fawcett, 2008), finding locally specific solutions (Waterkeyn and Cairncross, 2005) and understanding people's ideas and values around sanitation (Rheinländer et al., 2010; Drangert and Bahadar, 2011). For Drangert and Bahadar (2011), the critical starting point was to understand perceptions of impurity (*najas*) of different types of human waste and forms of excretion. Rheinländer et al. (2010) underscored the importance of understanding what sanitation means for the targeted populations, so that interventions may be crafted that are culturally acceptable and positively reinforcing. The work of Robinson (2006) and Joshi et al. (2011) indicated that communities, even poor communities, know already about good hygiene behaviors but lack the means and incentives to build or use facilities.

The research used mixed-methods for data collection about toilet adoption, and was conducted in rural villages of West Bengal and Himachal Pradesh over the period September 2012 to May 2013. We relied on Passive Latrine Use Monitors (PLUMs) to gather daily data on households' toilet use. PLUMs verified that toilets were in use as families reported, triangulating interviews (Clasen et al., 2012). We also used ethnographic methods to gain an in-depth understanding of social practices and specific cultural contexts, because hygiene values are embodied in hygiene practices (Rheinländer et al., 2010). Ethnography does what quantitative research cannot: deepen our understanding of the motivations of rural dwellers to change their sanitation behaviors, and the shifting constraints and opportunities they face in making those changes.

The data show that successful toilet adoption, i.e., when members of a household use toilets habitually, depends on three factors: (1) *multi-scalar political will* on the part of *both* governmental and nongovernmental organizations (NGOs); (2) *proximate social pressure*, i.e., person-to-person contact between rural inhabitants with their neighbors, and with toilets; and (3) *political ecology*, specifically, changing land use, assured access to water, and compatible soil type. Each of these three analytical categories forms one leg of the *toilet tripod of successful toilet adoption*. We use the *toilet tripod* metaphor to illustrate that toilet adoption is a complex, long-term process dependent on local environmental contexts, and also state, national, and international support Fig. 1.

Our intention to add complexity to sustainable sanitation debates complements recent work by global health scholars concerned with inequalities in health across people and places (Brown and Moon, 2012). As argued by Dorling et al. (2007) disparities in health are much more complicated than simple dichotomies, e.g., rich/poor. Instead, others argue that inequalities

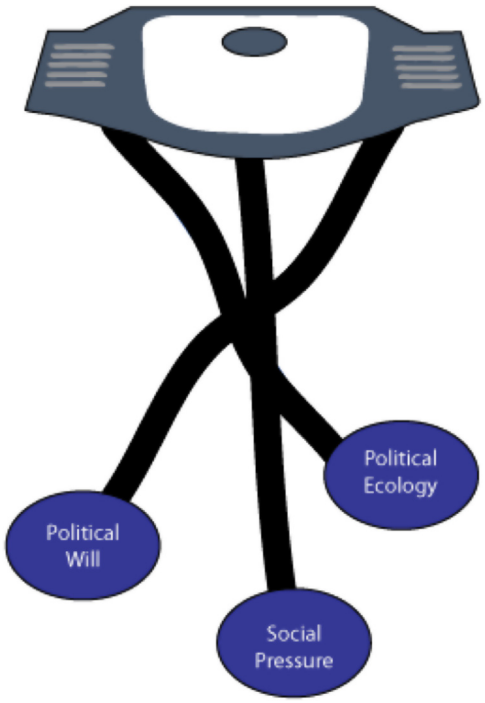

Fig. 1. The toilet tripod.

in health may occur through multiple, combining factors (Curtis and Riva, 2009). Brown and Moon (2012, p. 14) argue that health inequities are related to "inequitable access to a myriad of environmental, economic, political and social resources"—key concerns of political ecologists generally, and political ecologies of health specifically (Kalipeni and Oppong, 1998; King, 2010). We emphasize that toilet adoption is a product of social relationships and their spatiality at multiple scales (O'Reilly, 2010). We sought to understand how toilet adoption occurs within the multi-scalar dynamics of knowledge and power that affect local actors' relationships to their environments (Bryant and Bailey, 1997; Watts and Peet, 2004). Conversely, we analyzed how local environments are impacted by both distant and proximate decisions in ways that may encourage toilet adoption. The toilet tripod suggests a synthetic approach to understanding toilet adoption that we expect will assist toward the Millennium Development Goal for sanitation, thereby improving inequalities in global public health.

2. Theorizing sanitation uptake

Much research on sanitation adoption investigates marketing approaches, demand creation and/or community-led approaches in an attempt to find ways to boost toilet adoption without subsidies. Jenkins and Curtis (2005) found in rural Benin that the lack of desire for a toilet, not constraints alone, was the primary reason people chose not to build. If one or more of eleven toilet-acquiring drives were present, individuals became toilet adopters. These drives related to: (1) prestige; (2) well-being; and (3) restrictions on mobility (e.g., illness); and (4) desire to increase rental income. Gender, life stage, education, occupation, experience of travel, wealth, and physical and social geography of the village environment were recognized as important influences on/conditions for underlying drives. Cost, lack of available credit, design, soil type, and family problems were found as constraints. In a later paper, Jenkins and Scott (2007) put forward a behavior decision model based on preference–intention–choice stages of an individual's decision to build a toilet in Ghana. They used given social

categories to organize frequency of expressed drives into 'notable lifestyle differences' and 'village environment.' They recognized that environmental constraints on usage were important (e.g., soil type, space limits, water table height) but concluded that marketing to those in the preference and choice stages would cost-effectively increase adoption. Santos et al. (2011) sought to improve upon Jenkins and Scott's (2007) model by developing a hybrid choice model using data from urban Brazil that was able to respond to individual decisions as scenarios changed. In an attempt to make forecasting accurate, they incorporated a set of latent attitudinal variables that would explain how household demographics influenced sanitation technology decisions. Unlike Jenkins and Curtis (2005), they found that cost was of the least importance for the urban households of their sample. Attitudes towards sanitation, number of children, age, and gender carried the most weight in people's decisions to connect to sewerage. Similarly, Devine's (2009) SaniFOAM behavior change framework sets out a procedure through which to analyze sanitation behaviors and gather information on local conditions (known as behavioral determinants, i.e., factors that constrain or enable health behavior) so a project manager can develop an effective program. Devine drew on Jenkins and Scott's (2007) preference–intention–choice stages, but recommended targeting families after they signal their intention to build.

The research above focused on discovering when, where and with whom marketing approaches might have the most impact; however, building a toilet or connecting to a sewerage system is only the first stage of sustainable toilet adoption. Although they set their sights on individuals as decision makers, Jenkins and Scott (2007, p. 2439) recognize that poverty and lack of access to credit are constraints "[m]arketing is unlikely to be able to fully address…and laws, public policies, and other mechanisms are required." Likewise, Devine's (2009) framework may be useful for a project manager, but it fails to investigate 'behavioral determinants,' i.e., the very factors, conditions, and decisions that are made and changed on a day-to-day basis and impact toilet building and usage. Santos et al. (2011) attempted to capture changing circumstances over time, but identifying attitudes toward sanitation gives little insight into how the attitudes evolved in that particular space/time. Furthermore, demographics like gender and age are 'given' categories, and without investigation, we cannot learn the social dynamics that generated the preferences of those categories, and therefore, we cannot explain the anomalies of preference that they contain.

Community Led Total Sanitation (CLTS) approaches supply the answer for the poorer sections of society when marketing approaches fail. CLTS approaches are subsidy-free and rely on feelings of shock and shame. When communities are shocked into learning the impact of open defecation on their own and their neighbors' health, a realization dawns that practices of individuals affect communities as a whole (Robinson, 2006; Kar and Chambers, 2008). Discussions of CLTS describe triggering communities as a smooth process, remaining vague on any conflicts (Bongartz et al., 2010; Harvey, 2011; Pattanayak et al., 2009). Concerned that CLTS may exacerbate existing inequalities, Stangl and Trasi (2011) argued that shaming impacts marginalized groups more severely and may work against improvements in health behavior. Furthermore, social relationships of power play a role in creating limits and opportunities for individuals' adoption of sanitation, regardless of approach (O'Reilly, 2010). In addition, even those favoring demand creation approaches recognize that the giving of subsidies may be necessary to bring aboard non-adopters (Devine, 2009) and contributes to the equitable distribution of public resources (Santos et al., 2011).

As Watts (1983) wrote in a seminal paper, environmental problems and natural disasters cannot be studied in isolation. Hurricane Katrina demonstrated to the world that the political economic context within which human–environment interactions are situated is critical to understanding which people and which places are impacted. By political economy, we mean the relationships between politics and economic processes that impact how individuals and communities use their environment to make a living. Political ecologists hold that social structures (e.g., *de jure* and *de facto* laws, institutions, and policies) and economies (from local to global) matter deeply for understanding the causes and cures to interlinked human–environment problems. For example, if places to defecate are disappearing, how is that related to state or local government policies, changing markets, and encroachment of public lands? The condition of the physical and social environment is interwoven with local and non-local power dynamics that reveal themselves as key factors for influencing toilet adoption and sustainability. Our historical approach considers how structural changes occur over time, and their influence on households' decisions on toilet use and sustainability.

In contrast to sanitation research reviewed above, individuals cannot be extracted from their social, political, and/or environmental context. In rural India, individuals act on a social stage in environmental conditions influenced by political decisions that combine to constrain and enable their choices. This paper seeks to fill a gap in discussions of sanitation solutions and global health discourses by arguing: (1) sanitation is fundamentally a human–environment relationship in rural places; (2) sustainable sanitation adoption can only be understood by synthesizing how the multiple elements of environmental context, government regulations/policies, and proximate social relations come together; and (3) analytical weight must be given to the complexities of toilet adoption as a lived experience.

3. Background and methods

We conducted the research in two geographically and economically different Indian states, i.e., West Bengal and Himachal Pradesh. Both have made some of the greatest improvements in sanitation coverage in the past 20 years. In 2011, 41.2 percent of rural West Bengal was without toilets, down from 56.3 percent in 2001 (Central Bureau of Health Intelligence, 2005, 2011) and 59.6 percent in 1992 (IIPM, ORCM and EWC n.d). In Himachal Pradesh those numbers are even more impressive. In 1991, 87.4 percent did not have toilets (IIPM, ORCM and EWC n.d), in 2001 the figure dropped to 66.6 percent and in 2011, 30.9 percent of household do not have toilets (Central Bureau of Health Intelligence, 2005, 2011).

Two Gram Panchayats (GPs, i.e., political subdivisions comprising multiple small villages) that won the Clean Village Award (*Nirmal Gram Puraskar*) in the past 3–5 years were selected in each state. This selection criterion ensured that (1) a GP had achieved almost 100 percent sanitation coverage; (2) villagers had been bombarded with health and sanitation messages previous to receipt of the award; and (3) at least at one time, there was strong leadership in the GP pushing for sanitation improvements. Selected GPs were of mixed caste and class composition to enable a broad, socio-demographic cross-section of participants. A detailed history of sanitation projects in the block (i.e., next largest political subdivision after GP; sub-district) and in the district (i.e., the next largest political subdivision after block) was compiled.

The two GPs in West Bengal were located in 24 South Paraganas District. WB1 (a pseudonym, as are all names in this paper) was linked to commercial fishing and urban areas through road, rail and river linkages. WB2 was only accessible by boat. Residents of both GPs practiced agriculture and fishing, while remittances from male family members working in urban areas were an important income source. In both areas Hindu agricultural castes dominated, Scheduled Castes (SC, *dalit* or ex-untouchable)

formed the minority, and there were small numbers of Christian, Muslim and *adivasi* (tribal or native) households. The poorest, who were usually *adivasi*, Christian, or SC, generally lived nearest to the levees that held back the Bay of Bengal, supporting themselves by fishing and honey gathering.

In Himachal Pradesh, both field sites were located in Shimla District. Seventy percent of HP2 households were employed in government jobs and commuted daily or weekly from Shimla. The strong economy of HP1 is founded on commercial fruit cultivation. Communities in Himachal Pradesh are extremely homogenous and close knit; often whole villages comprise one sub-caste group and are an extended family. Villages in these two GPs were dominated by Rajput (high) castes, with very few Brahmin (highest) and SC households. In HP1, and some migrant Nepali families lived in the area to provide labor for fruit picking.

Our fieldwork covered a total of 16 person-months between September 2012 and May 2013. A minimum of 600 households (either individuals or groups of adults) were interviewed about family composition, individual family members' use of latrines, toilet building history, and their understanding of human waste, sanitation, and hygiene (see Table 1). Repeated informal visits (participant observation) allowed us to observe individual family members' (of all ages) sanitation habits. The team dropped by households at different times of day and observed if family members were using the toilet, leaving for open defecation, and/or how children's feces were handled. (It is possible that the mixed gender of the team influenced men's or women's use of toilets during our visits.) A cross-section of households was selected based on judgment sampling to represent each GP as a whole. Interviews were recorded and extensive field notes were taken. Interested villagers were solicited to participate in the research after being informed of the research goals, work plan, and consent documents. Local research assistants were used at all field sites.

We used data collected from Passive Latrine Use Monitors (PLUMs) for quantitative analysis of toilet usage. PLUMs were installed in about half the households where interviews were taken. PLUMs recorded the number of latrine events per household per day. These toilet usage events were divided by the number of family members to figure the per capita toilet use by household. Toilet usage events were also aggregated at the village scale so study villages could be compared (O'Reilly et al., Under Review). Combined with ethnographic research, PLUMs triangulated and validated our knowledge about latrine use behaviors (Clasen et al., 2012).

Table 1
Sociodemographic characteristics of households.

	All	WB1	WB2	HP1	HP2
Number of households	607	150	156	151	150
Age of interviewees					
18–24	44	15	13	3	13
25–30	59	18	15	8	18
31–35	74	20	19	17	18
36–40	76	23	18	17	18
41–45	60	21	15	14	10
46–50	75	19	19	19	18
51–55	54	13	13	18	10
> 55	165	21	44	55	45
Marital status					
Married	547	141	147	133	126
Single	25	1	5	5	14
Widowed	35	8	4	13	10
Divorced/separated	0	0	0	0	0
Education					
Illiterate	100	34	32	14	20
Did not complete primary school	66	28	26	6	6
Completed primary school	43	14	8	7	14
Some secondary school	240	57	69	76	38
Completed high school	83	5	9	24	45
In or completed College	75	12	12	24	27
Sanitation facility					
Open defecation	2	0	0	0	2
Crude pit toilet	2	2	0	0	0
Basic pour flush toilet (low cost kaccha)	172	70	98	1	3
Sanitary toilet (pucca toilet)	428	77	58	150	143
Public toilet	0	0	0	0	0
Shared toilet	3	1	0	0	2
Water scarcity					
2–4 months	35	0	0	30	5
None	572	150	156	121	145

4. The toilet tripod

In this section we discuss our ethnographic evidence that suggests toilet adoption occurs at the intersection of political will, proximate social pressure, and political ecology with political economy as a through-running thread.

5. Leg 1—Multi-scalar political will backed by sustained state funding

Local availability and use of toilets reflects the multi-scalar nature of political will. By political will we mean "the will to govern." In the case of sanitation its multi-scalar nature includes: international protocols such as the MDGs; national programs such as the Total Sanitation Campaign; local and regional sanitation policies such as sanitary marts; funding for sanitation at the local, regional and national level; local mobilization of human resources. The dynamic, interactive nature of political will was crucial to the successful adoption of toilets. The local government was proactive at both block and panchayat levels, but without the economic resources, pressure in the form of awards and deadlines, and the involvement of local and national NGOs, local administrators would have been ineffective. Meeting targets and winning the award was an issue of local pride, but also of pressures at other scales. Training of local officials and elected and informal leaders occurred at local, block, and district levels. Global, national, and state-level discourses also played a role in pressure and education, for example, discourses like the MDGs (global); Total Sanitation Campaign (national); Clean Village Award (state); and Open Defecation Free (ODF) campaigns (state and local).

During research, political will was most visible at the state, district, block, Panchayat and local levels but the actual impetus for many of the sanitation interventions were fueled by national level programs such as the Total Sanitation Campaign (TSC) and the Clean Village Award also known as the Nirmal Gram Puruskar (NGP). The role of the international funding and targets played an important role at all levels. The influence of these institutions was diffuse. International funding and targets were rarely mentioned during household and informational interviews. However, during dissemination of our findings to policy makers and other stakeholders, it became clearer that the urgency of meeting MDG sanitation targets and the pressure applied by the international community on the governments were important factors sustaining political will. For example, targets set by international institutions gave rise to state and district level targets. Multiple initiatives by the government, e.g., TSC, NGP, and 100 percent Open Defecation Free (ODF), were sustained over decades. Subsidies were used to get people to build toilets, and toilet adoption was later supported with education, community mobilization, and sanctions. The state leveraged local informal (e.g., respected former NGO fieldworkers

or women's group members, etc.) and formal leadership and institutions (panchayat officers, some of whom were associated with local NGOs) to educate and mobilize citizens. Sanitation messages and sanctions were supported from all sides, i.e., from both elected and unofficial leaders, and local NGOs that had gained local trust.

While the particular intervention histories and political contexts varied between states and study sites, political will played out in very similar ways. In West Bengal block-level and local-level governments (e.g., block development offices and GPs, respectively) worked collaboratively with NGOs to implement sanitation interventions. In WB1, NGOs commenced work on toilet interventions with GP cooperation in 2005. In WB2, toilet interventions were initiated by a grassroots NGO over 30 years ago, but they were boosted by national, state, and local government efforts through the TSC, NGP and ODF drives. Nearly every household in WB2 had been positively affected by the NGO's work in agriculture, education, and health. For this reason the NGO had considerable credibility with the local people. The interventions gained steam with the NGP drive between 2004 and 2005. WB2 won the NGP in 2007, and WB1 won the NGP in 2008.

During the NGP drive, the majority of households in both WB1 and WB2 could not afford to build toilets. Low-cost *plate paikhanas* (cement pans with gooseneck trap) were made available for Rs 250 for most households. Below Poverty Line (BPL) households paid even less for them. The low-cost plates were manufactured by the NGOs and subsidized by the panchayat. These low-cost toilets were not people's ideal because their cabins were made of plastic sheeting that needed periodic reconstruction, and their pits were shallow, requiring the digging of a new pit often. However, the *plate paikhana* was preferred over a *khata paikhana* (dry pit toilet) and open defecation. One middle-aged Muslim woman who shares a toilet with her large extended family said that a plate paikhana was all they could afford even though they preferred a nicer toilet: "We built a plate paikhana. We are not so rich that we can spend Rs 20,000–25,000 on building a good sanitary paikhana. We built a plate paikhana so that at least our honor [samman] could be protected." Both Muslims and Hindus mentioned protecting womens' honor, although religious norms were stricter for Muslim women in terms of general seclusion, including that Muslim women bathed behind screens in their personal ponds, whereas Hindu women did not. Since we interviewed only in households that had toilets and were being used, it is difficult to evaluate whether Muslim women were more likely than Hindu women to use toilets because of seclusion norms. We did find however that cultural norms regarding privacy for women, especially younger women, were shared across religious groups. At the time of this research, five years after the NGP awards, at least 50 percent of WB2 households and 40 percent of WB1 households were still using their original plate paikhana. The rest had upgraded to sanitary paikhanas (ceramic pans with gooseneck trap, usually with a brick cabin).

Unlike West Bengal (WB), toilet interventions in Himachal Pradesh (HP) were conducted only by local government institutions. NGOs were not involved. GPs implemented the first toilet drive between 1985 and 1990, based on directives from the state government with funding channeled through block development offices. Subsidies were available to everyone except government employees. Initially, subsidies included wheat (in exchange for labor), a pan/plate, pipe from pan to pit, building materials like cement. A second round of subsidies in the early 1990s involved cash, ranging from Rs 1200 to Rs 2000. Although the subsidy was insufficient to build a toilet, many respondents told us that it was substantial enough that they felt compelled to take advantage of it. One SC male interviewee explains that he could not forego the subsidy, "We were given about Rs. 1500 through the IRDP [Integrated Rural Development Program] scheme, which I did not think was sufficient to build the toilet. Nevertheless, we still got it built." In 2000, the TSC was introduced by the HP state on the directive of the central government. The TSC campaign culminated in the NGP drive in 2005; both HP1 and HP2 won the award in 2007 and 2008, respectively. Recognizing that most households had built toilets but were not using them, the TSC in HP focused on education and sanctions to encourage usage (HP Rural Development Department senior official, personal communication, January 2013).

In both WB and HP, subsidies were combined with a massive education campaign on sanitation. One male SHG group leader from WB1 talked about the process of education: "There was a lot of resistance then to taking the plate paikhanas. We had to explain that open defecation causes pollution, and that flies and mosquitoes that sit on feces will spread germs and diseases. Then, people became aware and built their own toilet or still are using panchayat's plate paikhana." A female Panchayat member HP1 shared how they educated people about sanitation: "I got the villagers aware of toilet usage and its benefits in door-to-door campaigns. We told them if you defecate anywhere, the feces would contaminate our water sources especially when it rained."

Material sanctions were employed as disincentives to open defecation. Sanctions included withholding of subsidized food benefits, agricultural assistance and other aid given to households. In WB2, the local NGO could withhold its own benefits, besides the panchayat's subsidies and entitlements it was authorized to give. In WB1, the GP issued yellow cards to those who had toilets. With these cards people accessed their entitlements to subsidized grain, oil and kerosene, school admissions for children, and caste and death certificates. The yellow card was an effective motivator of toilet building since many households depended on these subsidies. One older SC interviewee talked about the importance of the yellow card: "If you don't have a toilet, nothing will be provided to you."

In HP, sanctions were used also, but to a lesser extent, as more people already had toilets. One woman ward member in HP explained that although many households had toilets for themselves, their laborers were practicing open defecation. The GP threatened these people with fines if they did not provide at least a basic pit toilet for their laborers. Material sanctions were an important aspect of political will because local government supported their deployment and withstood pressure against them. Sometimes stronger social sanctions were applied.

In 2010, when WB1 was still not open defecation free, an international NGO trained the panchayat and other local leaders in CLTS "shock and shame" methods. The panchayat health secretary explained that taking pictures shamed people into discontinuing open defecation: "Some people came, sat there, and started defecating. We took pictures of them. This is how we stopped people." Shock and shame were used to force those who were not able or willing to use toilets—usually poorer households. One poor male interviewee commented that he was forced to build a toilet after being caught defecating in the open: "They used to check if we went for open defecation in the morning. The panchayat members and another man came and threatened us. We built this toilet the same day."

"Shock and shame" methods were considered too extreme in HP; CLTS would make people build toilets but did not insure that they would be used, according to the Rural Development Department official. "Besides, geography mattered," he said, "In HP, households were scattered and distant in rural places, so who would be around to pressure people?" Instead of CLTS, the Department chose a more humane and effective strategy it called "hand holding." The "hand holding" approach centered on catering to the needs of individual households to insure that almost any

obstacle they faced would be overcome with community support. For example, one ward member in HP2 explained that her women's group volunteered their labor to help poor households dig pits and construct cabins from plastic sheeting. However, in HP1 some local leaders shared that they sometimes used more severe social sanctions such as encouraging people to throw rocks at those defecating near water bodies, usually Nepali laborers without access to toilets.

6. Leg 2—Proximate social pressure driven by economic change

A combination of increased wealth, better connectivity of villages to urban areas, and nearby relatives/neighbors contributed to the adoption of toilet usage. Over the last generation, rural people in HP have been more exposed to urban lifestyles through government jobs, education and marketing of commercial produce. The current *pradhan* (leader) of HP1 spoke about an economic boom experienced by the region because of commercial fruit cultivation, "After they started growing fruits there was a sudden growth in the economy in this belt. There was a rise in the household income." In HP2 economic prosperity came from employment in the public sector. Often these jobs came with accommodation or "quarters" and had toilets. As one male interviewee explained, they were exposed to toilets when they visited the urban areas: "When we went to Shimla or Rampur, we saw toilets. This influenced people to build toilets."

Similarly, wealth enabled many families to send their children to study in Shimla, where some family members lived during the week and came home on the weekends. Urban residence not only habituated people to using toilets, it fueled toilet building in their villages. One interviewee talked about feeling pressured to have a real toilet in his village since his children were being educated in the city, "Since my children are studying in Shimla, we also think it's not nice to have a dry pit toilet when I have people coming over to my house."

In West Bengal, exposure to urban lifestyles occurred throughout-migration by young men to urban areas in search of work. Out-migration increased the recipient rural household's available cash. One housewife from WB1 whose husband worked in Kolkata said that their higher incomes allowed them to build a toilet: "We have money. Everyone is building their own toilet. We also built a sanitary paikhana and have been using it." Beyond remittances, communities in West Bengal mentioned that recent income increases due to betel leaf (*paan*) cultivation and higher prices for local seafood enabled them to build and use toilets.

Many interviewees in the four study sites mentioned that as increasing numbers of neighbors and relatives were building toilets, they felt compelled to do the same. One male interviewee from WB2 explained that his decision to build a toilet fueled toilet building among his neighbors: "When I made a toilet, everyone watched and started taking a toilet gradually." One elderly male interviewee from HP1 explained that he built a toilet because it was what everyone was doing at that time: "Toilets are a necessity. There was a wave when everybody was getting a toilet built, so I also built it." A daughter-in-law from WB1 shared that they felt the pressure to be "civilized" and built a toilet, "When everyone started to be clean, the environment started to be clean and civilized. Then we built a toilet. When everyone started building toilets we felt embarrassed [because we did not have one]." Neighbors also confronted each other about polluting air, land, and water resources. One male interviewee from WB2 shared that pressure from neighbors dissuaded them from going for open defecation: "If you had to go for open defecation, you had to shit near someone's pond because of water availability. The owner will quarrel with you if you use the same pond that is used for irrigation. Won't it be disgusting if it is dirty?"

Social pressure was also gendered and generational. One male interviewee from WB1 built a toilet because it was not socially acceptable for women family members to defecate outside: "We men could defecate anywhere. Women had problems, because people used to pass by all the time. During the daytime, where would women go to defecate? That was the problem." Gendered ideas of privacy and self-respect were capitalized on to change behavior. For example, one "motivator" involved in the WB1 toilet drive relates that he used ideas of women's self-respect to get people to build toilets: "People were defecating in the bushes or hidden places. We explained that you have women in your family. If someone suddenly appears while the women are shitting, what will happen then?" When daughters matured, it was unacceptable for them to go for open defecation, as it was for daughters-in-law who married into the village. A penurious SC woman who literally lived on a levee in WB2 told us that she built a subsidized toilet because: "There is a daughter-in-law in my house. Women have respect [samman]. Launch boats come with tourists from Kolkata on the river and anchor there [near the levee where they can be seen]. We did not have toilets at our times. But now can daughter-in-law go outside?" Another male interviewee from WB2 talked about the changed expectations of the younger generation with respect to toilets: "Will our daughter-in-law use a khata paikhana? We are people of a different generation. We can defecate in a khata paikhana, would it be possible for the younger generation to do so?"

7. Leg 3—Political ecology supported by state investment

Over the last three to four decades, land use changes, increasing availability of water and individual households' ability to deal effectively with sewage because of well-draining soils have led to toilet adoption. Land use changes led to denser settlements, and the clearing of forests for building homes and for agriculture served to thwart open defecation. One respondent from WB1 told us that population pressure made it difficult for them to defecate outside: "We came here from outside [elsewhere] and built the house. There were no other households around. We, men, used to shit anywhere and women used to shit in the khata paikhana. Then population gradually increased so that men or women could not defecate outside."

Before toilets were built in WB1 and WB2, it was common practice for adults to defecate directly into the water. The Sundarbans are landscapes defined by their closeness to water bodies. The field sites were surrounded by brackish rivers and traversed by smaller canals and streams. Many had "hanging toilets" that were crude cabins built above the water which provided more privacy than open defecation, and removed the insecurity of searching for safe, suitable places to defecate. Much of the education and sanctions during WB toilet drives focused on the polluting of public water bodies. "If everyone defecates in the canal" said one interviewee, "the water will become dirty. Mosquitoes will grow. So, defecating in the canal is prohibited [by the panchayat]." This woman interviewee was alluding to the sanctions placed on hanging toilets over the canal in WB1. Changing use of water bodies in WB has also led to toilet use. In WB2, the government built sluice gates, converting the tidal river that ran through the GP into a "canal" that was less saline. During the monsoon, residents used it for irrigation, so defecating into it was not tolerated. Fishing had become more lucrative, so the *panchayat* began leasing canals for fishing, which further pressured those who were still defecating directly into water bodies. One female interviewee from WB2 explained that eating fish from those

waters dissuaded people from using hanging toilets: "People dislike toilets at the side of the canal. People catch fish and crabs there. We also catch them. We have to eat them too. It's not good to defecate in the canal."

Improved access to daily water at multiple sources was an important factor contributing to toilet use and adoption in HP. Over the last 30 years, the Irrigation and Public Health Department has worked to ensure better access to water. Water is "lifted" (i.e., pumped) to villages from streams below. Where settlements were at the tail end of a water supply line, their quantity and regularity of supply was negatively impacted. One woman interviewee from HP1 related: "We get an irregular supply of water. We have to get water from the hand pump and spring. The water from the hand pump is used only for the toilet as it is not suitable for drinking." As this woman's quote suggests, difficulties with water were not so extreme that people could not use their toilets. Households alleviated their water problems by building or buying large water storage containers, building subsidized rainwater harvesting systems, or collecting water from existing sources and carrying it back to their households.

Soil porosity and ecology contributed positively to toilet use in HP. With the exception of a few households, most families reported that they never had to empty their pits. They explained that the soil was stony and absorbent. Organisms in the soil converted the feces to compost quite rapidly. One male interviewee from HP2 explained that his pit had hardly filled even though it was used for several years: "The pit won't fill till 100 years. We don't put [any] soap[y] water so the worms don't die. When we opened it, we saw that it was only filled only 10 percent." HP pit design took advantage of the soil porosity/ecology. Masons built pits with rocks or brick on the side walls, leaving earth on the bottom for leaching and composting. All households regardless of their socioeconomic status built very similar toilet pits—differences in class showed in the size of the pit. In more congested areas of villages, pits were shared with 2–3 toilets between neighboring houses. The fact that pits did not fill quickly eased most tensions from pit-sharing.

Even though the water table was high in many areas of WB and people had problems during periodic flooding, most people with pit toilets did not need to empty their pits more than every two to three years. The soil allowed feces to compost. The deeper the pit the less frequent was the need to empty them, handle the feces, or worry about water logging during the monsoon season. Farmers used composted feces as fertilizer after pits were emptied. One male farmer from WB2 reported that he used the composted feces on his fields: "In six months the feces will turn into soil, then it can be taken out with spade. We spread it in the fields. It will work as fertilizer." When flooding occurred, usually during the monsoon rains, people often had no choice but to go for open defecation as their toilets would be filled with water for days at a time.

8. The intertwining legs of the toilet tripod

Through a political ecology approach, the metaphor of the toilet tripod emerges. The toilet tripod highlights how geography matters, i.e., different 'legs' are stronger in different locations. For example, in HP the driving forces were strong household economies that fomented strong proximate social pressure, with political will playing a secondary role in subsidizing toilets during the NGP drive. In WB, political will at the national, state and local scale played the most significant role in toilet building and adoption, with increasing household incomes playing a secondary role in households pressuring those on the social margins to build and use toilets.

The two states included in the study had different political ecologies, which enables us to illustrate how the legs of the toilet tripod also *intertwine* at each location. In HP, soil ecology and a widely-adopted pit design combined to provide toilets with near-infinite capacity. Users did not fear that they would fill, so they used them as needed. The soil types and high water table in WB meant pits needed more frequent moving and/or emptying. Proximate social pressure and political will in the form of state-funded NGO trainings united to convince villagers to compost feces and later use them as agricultural fertilizer, resulting in toilets that got used. Political will and political ecology merged when the state made long-term investments in HP water accessibility. In HP, easier access to water year after year, not only facilitated the use of toilets that were already built, but provided everyday examples of the ease of toilet usage for would-be builders, and reduced women's work fetching water.

In WB previously subsistence seafoods became valuable, leading the local GP to lease water bodies to fishers for fishing and aquaculture. A market-led rise in the seafood prices led to enclosing the commons (i.e., halting public access to canals for open defecation). These two processes combined with proximate social pressure from neighbors seeking to protect their livelihoods. Political will supported the land use change that brought revenue to the local government. Education and sanctions during WB toilet drives focused on the polluting of private and public water bodies, a further indication of the significance of political will in successful sanitation adoption.

The toilet tripod represents both the building of *material* infrastructure and *abstract* social changes that are learned behaviors. The case of a felt need for toilets for women illustrates this idea well. The political ecology leg of the toilet tripod gives insight into how land use changes mattered for disabling previously available spaces for open defecation. As we know, visibility and modesty during defecation is gendered, and for women in both HP and WB (as elsewhere in rural India) women face greater stringency on not being seen publicly relieving themselves. These ideas of modesty and privacy were leveraged in both HP and WB to convince families to build toilets across socio-economic categories. Political will mattered because subsidies enabled anyone to build, including the poorest, who felt the social pressure of concealing women behind toilet cabin walls, no matter how flimsy.

Each leg of the toilet tripod articulates with the others in ways that led to successful sanitation in WB and HP. What the metaphor does less well is show the multi-scalar nature of the legs. For example, political will at a local scale included sanctions, pressure from local leaders and activists, and education that heightened demand for toilets. Political will was also shaped by global political economy, e.g., the setting of the Millennium Development Goals, international organizations funding sanitation interventions, etc. Major power struggles between multi-scalar state and non-state institutions did not compromise the benefits of NGO involvement in WB, nor did the WB grassroots NGO protect its turf against inroads made by the state. Both governmental and non-governmental institutions initiated toilet building interventions in WB2 and WB1 at different times. These separate institutions ended up working collaboratively to implement toilet interventions. Boundaries were blurred between state/local institutions and NGOs so much so that many interviewees could not distinguish between the role of the local government institutions and the NGOs in toilet interventions.

9. Conclusions

Our research demonstrates that successful sanitation is paradoxical: although shitting is one of the most personal of bodily processes, sanitation is a community endeavor impacted by politics and economies distant from site of defecation (see also Drangert, and Bahadar, 2011). Our finding that community pressure of both the positive and the punitive kind was effective in

getting individual households to construct and use latrines builds on Rheinländer et al.'s (2010); see also Metwally et al., 2007) argument that hygiene practices derive from community-held notions of proper behavior and concepts of illness.

Our findings appear to suggest that shaming, fines, and withholding of benefits are elements of successful sanitation that we would endorse because they increased toilet building and usage. However, their targets were always those already on the furthest margins of society, e.g. SCs, outsiders, and the poorest. We are convinced by the work of Stangl and Trasi (2011) who argue for replacing negative with positive triggers and for paying attention to structural and political ecological constraints on changing unhealthy behaviors, e.g., poverty and water inaccessibility, respectively (see also Waterkeyn and Cairncross, 2005; Movik and Mehta, 2010; Joshi et al., 2011). Despite huge efforts to include the poorest and most marginalized, each study site had households that did not have toilets or struggled to sustain toilet use. These households were poor (i.e., political will), lived at a distance from the main settlement (i.e., proximate social pressure), had trouble accessing water, emptying their pits, and/or lived close to forests or river banks (i.e., political ecology).

The toilet tripod gives the policy maker and practitioner a framework through which to ascertain positive and negative conditions on the ground, but points to the necessary connections between environmental and political conditions that enable toilet adoption. We assert that a search for missing, broken, or weak tripod legs can diagnose a lack of successful sanitation adoption at a study site, and/or its causes. We theorize that the conditions for successful toilet adoption arise over time and due to the influence of actors at many scales. For example, the political ecology leg of the toilet tripod played its most influential role at the local level, but local environments are impacted by both distant and proximate decisions in ways that may encourage toilet adoption (see also Konteh, 2009). The research also highlights that toilet users are created over time through enabling structures. When national and state governments meet their obligations to provide the infrastructure for a thriving population, connections between the state and village governments can make in-roads into changing people's lives for the better.

We have sought to contribute to a better understanding of sanitation in poor countries as part of a global goal of sustainable development and health equality. Sustainable development, sound environmental programs, and good health are inextricably interlinked (Konteh, 2009). This research contributes to work on inequalities in health across people and places by demonstrating the complex factors that combine to constrain and enable successful sanitation (Brown and Moon, 2012; Pearce and Dorling, 2009; Curtis and Riva, 2009). Building on Brown and Moon (2012) and Birn et al. (2009), we find that successful sanitation depends on access to environmental, economic, political and social resources. And, importantly, they need to come together over time in a single place. As with other public health interventions, if it does not exist this resource network must be created if toilets are to be built, used, and become a normal part of everyday life. For poor countries this problem is particularly pressing, as they face what Lopez et al. (2006) call the 'double burden' of disease, i.e., diseases of poverty *and* of affluence. We have shown through a political ecology approach in two different geographic locations and four different populations in rural India that the specifics of the toilet tripod vary from location to location, but their success remains the same.

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