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Sanitation-related psychosocial stress: A grounded theory study of women across the life-course in Odisha, India

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ABSTRACT

While sanitation interventions have focused primarily on child health, women's unique health risks from inadequate sanitation are gaining recognition as a priority issue. This study examines the range of sanitation-related psychosocial stressors during routine sanitation practices in Odisha, India. Between August 2013 and March 2014, we conducted in-depth interviews with 56 women in four life stages: adolescent, newly married, pregnant and established adult women in three settings: urban slums, rural villages and indigenous villages. Using a grounded theory approach, the study team transcribed, translated, coded and discussed interviews using detailed analytic memos to identify and characterize stressors at each life stage and study site. We found that sanitation practices encompassed more than defecation and urination and included carrying water, washing, bathing, menstrual management, and changing clothes. During the course of these activities, women encountered three broad types of stressors—environmental, social, and sexual—the intensity of which were modified by the woman's life stage, living environment, and access to sanitation facilities. Environmental barriers, social factors and fears of sexual violence all contributed to sanitation-related psychosocial stress. Though women responded with small changes to sanitation practices, they were unable to significantly modify their circumstances, notably by achieving adequate privacy for sanitation-related behaviors. A better understanding of the range of causes of stress and adaptive behaviors is needed to inform context-specific, gender-sensitive sanitation interventions.

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1. Introduction

Despite 15 years of concerted efforts under the framework established by the Millennium Development Goals (MDGs), the global sanitation crisis persists. Over 2.5 billion people still lack access to improved sanitation facilities, and 1 billion people

practice open defecation (OD) in fields, bushes, or other open spaces (WHO and UNICEF, 2014). Although global sanitation targets under the MDGs are included in the environmental sustainability goals (Goal 7), a key reason for increasing sanitation coverage is to reduce exposure to human fecal pathogens, reducing enteric disease burden among children under five (Ahmed et al., 2012; Cairncross et al., 2010; Wolf et al., 2014) and improving child growth and development (Dangour et al., 2013; Spears et al., 2013).

In India, two-thirds of the population lives with unimproved sanitation and an estimated 600 million people defecate outside, representing 60% of the global population practicing OD (WHO and UNICEF, 2014). In rural northern India, Coffey and colleagues

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describe local perceptions that open defecation is a long-standing habit, more comfortable, and provides an opportunity to “take in the fresh air” (Coffey et al., 2014, 53).

To increase sanitation coverage, India launched the Total Sanitation Campaign (TSC) in 1999 to accelerate rural sanitation development and achieve universal access to latrines by 2012. However, TSC has made only modest gains in latrine coverage (Patil et al., 2014). Though TSC incorporated financing incentives for households below poverty level and aimed to be user- and community-driven, the campaign has been critiqued for being a top-down intervention highly focused on infrastructure development. Even with increased latrine coverage, latrine use remains low, in part due to poor or incomplete construction (Boisson et al., 2014; Clasen et al., 2014). Women have been targeted as key stakeholders for the success of TSC; however, after achieving “total” sanitation coverage, many women stop participating in on-going educational meetings in their communities.

While recent policy discussions on sanitation have focused on health impacts among children under five years of age, there is growing recognition of the unique health risks women and girls face due to inadequate sanitation, including increased maternal mortality risk from unhygienic birthing practices and poor infection control (Cheng et al., 2012); uro-genital tract infections (Mudey et al., 2010) and urinary incontinence and chronic constipation (Fisher, 2006). Additionally, insufficient access to basic water and sanitation resources has been linked with psychosocial stress in other low- and middle-income countries, for example Ethiopia and Bolivia (Stevenson et al., 2012; Wutich and Ragsdale, 2008), as well as with increased risk and fear of violence in schools in South Africa (Abrahams et al., 2006), and risk of sexual violence in the slums of Delhi, India (Lennon, 2011) and Kampala, Uganda (Massey, 2011). An emerging trend toward gender-responsive sanitation approaches emphasizes the physical, social, and environmental needs of women (Tilley et al., 2013), increasing demand for gender disaggregated data (UN, 2008) and gender-sensitive programming to improve equity and dignity (de Lange, 2013; Diczfalusy, 1997; Gender and Water Alliance & UNDP, 2006). Recognizing the intimate connection between the sanitation environment and the physical and mental wellbeing of women and girls underscores the need for a contextualized understanding of sanitation-related psychosocial stress in countries where adequate sanitation facilities are lacking.

This study aims to further understanding of the psychological, social, and health impacts of sanitation routines among women of reproductive age in three distinct socio-geographic settings in Odisha, India: urban slums, rural villages and indigenous villages. Predicated on the assumption that women’s lives and their sanitation needs and experiences are not static across the reproductive period, we adopt a life course perspective, with the life course defined as the “sequence of socially defined events and roles that the individual enacts over time” (Giele and Elder, 1998, 22). Taking a life course approach allows us to examine the influence of age, context and social processes on a woman’s experience and family life and how those factors collectively impact the experience of sanitation.

2. Methods

We utilized principles of Grounded Theory in conducting this research (Charmaz, 2014). Sample selection, data collection, and analysis were done in an iterative, mutually informed process so as to be responsive to emergent themes and concepts. In Grounded Theory, findings are identified inductively through data collection and analysis rather than guided by an existing theoretical model.

2.1. Field sites

This study was conducted in Odisha, India, a state with a total population of 41 million, approximately 85% living in rural areas. Odisha lags behind other states in improvements in sanitation facilities: 78% of the population practices OD with significant disparities between urban (41% OD) and rural (88% OD) areas (Census Organization of India, 2011). This represents a higher proportion of open defecators compared to national averages (50% OD; 12% OD urban, 65% OD rural) (WHO and UNICEF, 2014).

We identified three distinct socio-geographic settings in Odisha: urban slums, rural villages and indigenous (“tribal” in emic terms) villages. These categories reflect typical resource-poor, infrastructure-restricted settings in South Asia while offering an opportunity to examine how variations in social organization, the physical and built environment, and cultural practices shaped women’s sanitation experiences. First, our sample included three urban slums in Bhubaneswar, the capital of Odisha. Bhubaneswar has an average population density of 2134 people per square kilometer and over 300 recognized slum settlements (Census Organization of India, 2011). Slums selected for this study included one large informal, densely populated slum with privately operated communal latrines and two government-authorized slum communities with limited access to government-supplied water and electricity. Private latrines were rare in all urban communities included in our study. Next, rural sites were selected from Khurda district, a predominantly agrarian region with a population density of approximately 800 people per square kilometer. Lastly, indigenous sites were selected from Sundargarh District, which has a population density of 216 per square kilometer. Over 50% of the population in Sundargarh District belongs to one of India’s Scheduled Tribes (*Adi-wasis*), ethnically distinct indigenous groups with recognized status by the Indian government, including predominately Oraron, Munda, and Kisan tribes (Census Organization of India, 2011). Women in these tribal communities were expected to have markedly different sanitation challenges than other women in our sample: population density is much lower than in other sites, many indigenous groups are matrilineal, gender roles are less defined, and more women take part in the labor force. Scheduled Tribes have also been historically marginalized by the mainstream population (Mitra, 2008). Migration and urban growth, particularly in relation to the steel industry, have increased ethnic diversity in Sundargarh District in recent years; however, the region remains relatively isolated from existing transportation and telecommunication networks. For the purposes of this study, we use the term “indigenous” to refer to women living in this tribal region.

2.2. Sample and participants selection

Data collection sites in each geographic setting were selected based on existing Asian Institute of Public Health (AIPH) partnerships or programs; specifically we selected regions where community health volunteer programs focusing on maternal and child health had been established or were under development. We identified participants from four “life stages”: adolescent girls, newly married women, pregnant women, and established adult women. Adolescent girls included unmarried women below the age of 25 who had reached menarche. Women in this group typically lived at home with their parents and extended families. Newly married women were defined as being married for less than two years. Exogenous patrilocal residence, in which the woman moves in with her new husband’s family, is common in this study population, introducing a woman to a new social and physical geography upon marriage. Pregnant women were included as a separate group due to the physical changes of pregnancy and associated changes of

the woman's role in the household. Established adult women (aged 25–45) were women married more than two years, and not currently pregnant.

2.3. Data collection

We conducted 56 in-depth interviews (IDIs) between August 2013 and March 2014. AIPH community health volunteers recruited participants in each area, who were sampled purposively from different sites and life-stage group to capture the diversity of sanitation practices within this population. Basic demographic and household characteristics were recorded during data collection and reviewed by members of the study team.

IDIs covered general sources of stress in the household, detailed descriptions of the respondent's sanitation practices and locations, challenges associated with sanitation, and ways that women adapted behaviors in response to noted challenges. IDI guides were adapted throughout the data collection process based on emergent findings specific to particular age groups or study site.

Interviews were conducted in Odia by trained female interviewers fluent in the language (including RS). Interviews lasted from 13 to 66 min (mean duration: 33 min) and were digitally recorded, hand transcribed in Odia, and reviewed for accuracy by trained interviewers. Transcripts were then translated into English by interviewers fluent in English and Odia. As a quality control measure, randomly selected English language transcripts were reviewed simultaneously with Odia recordings and documents corrected appropriately. No significant errors in transcription were noted during this review process, suggesting that simultaneous review of all transcripts was not needed.

2.4. Data analysis

Data analysis occurred in multiple phases, both concurrent with and following data collection. During data collection, the study team read transcripts and prepared initial notes and subsequent detailed summaries ("memos") of each interview. The study team discussed notes in a collaborative manner and, via discussion, allowed an emerging consensus to form. Discussions also informed adaptation of IDI guides and sampling strategies.

Mid-way through data collection, KS and KH conducted an initial round of line-by-line open-coding with a sub-set of interviews using MaxQDA (Berlin, Germany). "Open" (emergent) codes were discussed among the full research team together with notes and summaries of interviews that had yet to be coded. Through this process, a preliminary conceptual framework and final codebook were developed and applied to all English language transcripts.

After coding, a series of summary and analytic memos were completed. First, KS and KH wrote detailed summaries of emergent findings (total 56 summary memos). Analytic memos synthesized these summaries by topic, life course group, and socio-geographic area (total 28 analytic memos). Memos were discussed among the research team and iteratively compared against the emergent conceptual framework. Discrepancies or different interpretations of the data and our conceptual framework were discussed and used to revise understandings of sanitation-related psychosocial stress within this population. Our final analysis reflects the entire analysis process – including coding, group discussions, summary memos, and analytic memos.

2.5. Ethical approval

All participants provided written consent or assent prior to data collection. For children under the age of 18, both written assent

from the participant and written consent from the participant's parent were obtained. Participants were informed of their rights to terminate the interview at any time and to skip questions or topics they were uncomfortable discussing. Names and other identifiers collected during the interview were redacted during the transcription process and the original audio files destroyed. Ethical approval for this study was provided by the Ethical Review Committee at AIPH (ERC Protocol No. 2013-03) and the Institutional Review Board at Emory University (Protocol 00069418).

3. Results

3.1. Participants' characteristics

A total of 56 women participated in this study (20 urban site; 20 rural site; 16 indigenous site). Participants included 14 women in the adolescent group, 14 newly married women, 15 pregnant women, and 13 established adult women. Of these respondents, 19 had access to a sanitation facility (15 private latrine users and 4 public latrine users). Eleven of 59 participants were designated as "scheduled caste," an official designation given to historically disadvantaged Dalit groups; another 9 belonged to "Other Backwards Classes," government-identified marginalized groups. Although our definition of adolescent girls included those as young as 14 years of age, the respondents were aged 16 to 24, and therefore early adolescents are not represented in our sample. Details of study participants by life course group and geographic setting are presented in [Table 1](#).

3.2. Characterizing sanitation routines and environments

Our initial inquiry focused on urination and defecation behaviors and how these are shaped by access to sanitation facilities. However, respondents quickly challenged this narrow perspective – urination and defecation were always discussed alongside a wide range of related behaviors that included fetching water for sanitation use and personal hygiene, post-defecation cleaning, bathing, menstrual management, and changing clothes ([Table 2](#)). For the purposes of this manuscript, we define "sanitation" as encompassing this entire set of sanitation-related behaviors, unless otherwise noted.

The majority of sanitation-related behaviors took place outside of the walls of a latrine and required women to interact with both their physical and social environments. We identified three distinct sanitation environments available to study participants: public facilities, private facilities, and open-defecation sites ([Table 3](#)).

The availability of water was a key determinant of how, where, and the ease with which many of these behaviors were performed. In rural and indigenous sites, water was widely available from a variety of sources (tubewells, wells, or surface water sources). In slum sites, water sources were limited to public connections, either municipal taps or tubewells, which were highly regulated and supplied water only at specific times of the day. Respondents at all study areas reported water scarcity, particularly during the dry season, forcing them to travel long distances or wait in long queues at available sources.

3.3. Sanitation-related psychosocial stressors

[Fig. 1](#) provides a visual representation of our understanding of sanitation-related psychosocial stress among study participants. The experience of such stress was universal in the study sample – all women experienced one or several stressors related to the physical environment, social environment, or threat of sexual/gender-based violence; furthermore women described using a

Table 1
Participant characteristics.

Geography and life stage	Total	Caste or special class (N)			Age range	Sanitation environment (N)		
		ST	SC	OBC		OD	Private	Public
Urban	20	0	3	4	16–45	8	8	4
Adolescent	5	0	1	0	16–25	2	2	1
Newly married	5	0	1	1	18–23	2	3	0
Pregnant	5	0	0	2	20–32	1	2	2
Established adult	5	0	1	1	26–45	3	1	1
Rural	20	0	8	5	18–40	13	6	0
Adolescent	5	0	1	2	18–24	3	2	0
Newly married	5	0	2	1	20–25	3	2	0
Pregnant	6	0	4	0	23–32	3	2	0
Established adult	4	0	1	2	35–40	4	0	0
Indigenous	16	16	0	0	20–40	15	1	0
Adolescent	4	4	0	0	20–25	4	0	0
Newly married	4	4	0	0	22–25	4	0	0
Pregnant	4	4	0	0	20–27	3	1	0
Established adult	4	4	0	0	26–40	4	0	0
Total	56	16	11	9	16–45	37	15	4

OD is open defecation, Private is private latrine facility, Public is shared public latrine, ST is Scheduled Tribe (Oraon, Munda and Kisan), SC is Scheduled Caste (Dalit), OBC is Other Backward Class.

Table 2
Sanitation-related behaviors.

Sanitation behaviors	Description
Post-defecation cleaning	Anal cleansing with water and dhua dhoi, ritual washing of hands and feet
Bathing	The complete washing of the whole body
Changing clothes	A traditional practice where women change their sari after defecation, or change into a special sari when going to the defecation place (Women who do not change their saris will typically take a full bath and wash their clothes before returning home)
Menstrual management	Changing and disposal of pads or washing and drying of menstrual cloths
Carrying water for washing	Withdrawal of water from a water source in a bucket or bottle to take to the site of defecation

Table 3
Sanitation environments.

Sanitation environments	Description
Private facilities	<ul style="list-style-type: none"> Private latrines were present, but uncommon, in all study areas Shared by members of a household Barriers to ownership include: space, land ownership and cost Households struggle with expense of repairs or adding desired features like bathing/changing areas
Public facilities	<ul style="list-style-type: none"> Less frequent use if structural damage or if construction was incomplete (no door, roof) Found only in urban areas; only infrastructure-alternative for people without a private latrine Most were pay-per-use, with costs prohibitive – particularly for urination Shared facilities were poorly maintained, covered in feces, or lacking doors
Open defecation sites	<ul style="list-style-type: none"> Other barriers included long wait times during morning hours, closed at night, inconsistent water supplies OD common in all locations, even among respondents with access to a latrine OD took place in open fields, vacant land, or on road- or railways OD sites utilized when there were fewer people around; however, women avoided OD at night and mid-day due to fear of isolation Urination usually done closer to the home, such as just behind or beside the house

variety of behaviors to mitigate risks and exposure to these stressors. The impact of stressors was also modified by three factors: life stage, access to infrastructure, and contextual factors such as caste and geographic location.

3.3.1. Environmental stressors

Overall, women described the sites used for sanitation as difficult to reach and highly undesirable; however, lacking alternatives, they were forced to use them on a daily basis. Environmental stressors arose when the natural and/or built environment limited access to preferred sanitation sites, made those sites physically uncomfortable or unsafe to use, raised perceived health consequences from using unsanitary environments, or provoked fears and anxieties related to the supernatural.

First, barriers to accessing sanitation sites were almost universal – 51 of 56 respondents mentioned some type of natural or physical barrier to reach their preferred defecation site. Women at all sites reported walking long distances to find private, clean places for defecation and menstrual management or crossing barriers, such as high walls or fences, to reach a place deemed acceptable for defecation.

“Initially, I was unable to jump over. When I tried to jump, I tore my clothes ... The fence I jump to reach the defecation place is more than my height.”

(Newly married, urban slum)

Sanitation-related psychosocial stress (SRPS): a conceptual framework

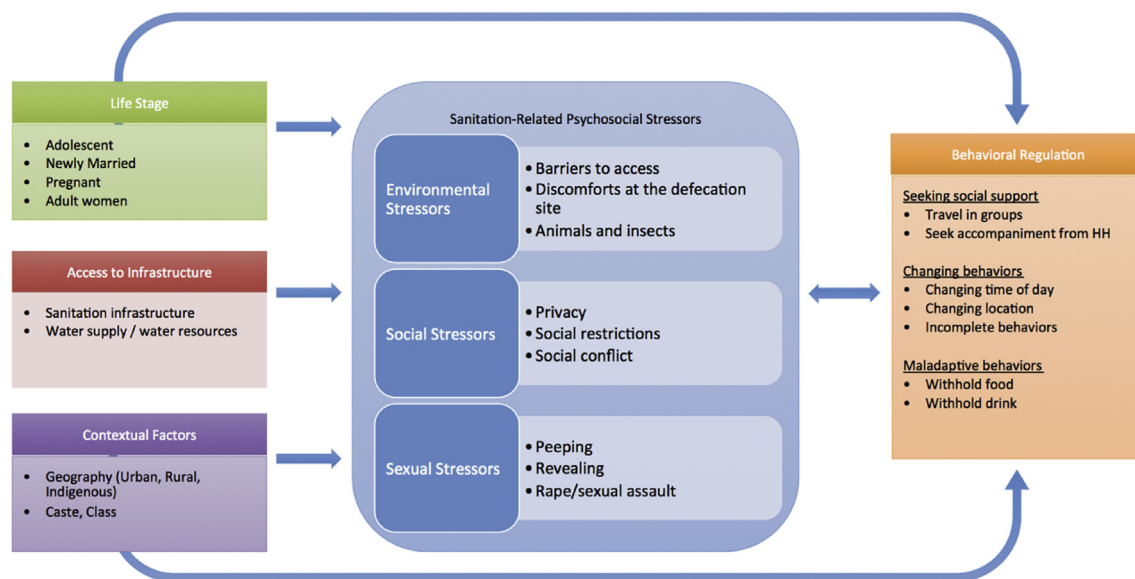


Fig. 1. Conceptual model of sanitation-related psychosocial stress.

Water access also compounded these barriers – many women reported traveling far to find locations with sufficient water for bathing and *dhua dhoi* (anal cleansing); others discussed the physical burden of carrying water long distances. Distance and carrying water became even more challenging when women were sick or had limiting physical conditions: for example, pregnant women reported more frequent urination and defecation, a need to spend more time defecating, and greater difficulties reaching preferred sites. Several women also described having difficulty post-pregnancy, specifically pumping well water and carrying heavy buckets of water.

Once women gained access to the defecation site, they described various physical discomforts and risks at defecation sites (53 of 56 interviews). This included fear of encountering snakes, mosquitoes or other animals ($n = 32$). Because most women do not wear shoes, stones, thorns and sharp rice stalks were reported as discomforts, especially when walking at night. During the rainy season, stepping in mud—possibly mud mixed with feces—was disgusting to most women and meant extra washing before returning home.

“We have no shoes so we go for defecation in bare feet, and thorns pierce our feet. We must wash our feet and remove the thorns before entering the house.”

(Adolescent, urban slum)

Women with access to a private or public facility faced a different set of barriers: many latrines were dirty, located outside the home, and lacked a bathing or changing room. Women using shared facilities in urban areas frequently reported deplorable latrine conditions and limited hours of operation. Among the 15 women in our study with private facilities, most ($n = 10$) did not have an internal water source, meaning they were often required to carry water large distances or perform private behaviors – such as anal cleansing, bathing, and menstrual management – at public or shared water sources. Almost half of women with private latrines reported facilities that were missing doors or roofs ($n = 7$).

Next, many women feared contracting infections when accessing various parts of the sanitation environments ($n = 46$). The women said an “unclean” environment for defecation or urination

caused uro-genital tract infections. Environments were considered “unclean” because coming into contact with urine, feces or bacteria of other users could make a woman sick.

“When we go for open defecation everyone’s feces will become dry but the bacteria will be there. When it rains, the bacteria will be spread around the environment, and because of that, we get infections and white discharge [from the vagina].”

(Adolescent girl, urban slum)

Women most frequently described symptoms related to uro-genital tract infections including “itchiness,” “white discharge,” and fever. These infections can be a source of embarrassment and stress for women, particularly those who are sexually active; however, women in all life stages reported urinary tract infections. Colds and fevers were also frequently mentioned. The majority of these infections were attributed to urinating or defecating at unclean places and lacking adequate access to clean water.

Finally, women feared ghosts or supernatural forces associated with strange sounds and darkness encountered during sanitation activities, particularly when women were unaccompanied ($n = 35$). The fear of ghosts was also cited in the context of isolation, dense forests, or being close to funerary sites.

“If someone died in our community and there is no electricity, I feel scared. I fear going to the latrine alone during night.”

(Newly married, urban slum)

Fears and anxiety related to the supernatural were especially pronounced among pregnant women, as supernatural forces were thought to directly impact the health of the unborn child and could cause women to miscarry:

“If you are scared, a spirit will reside in your body and miscarriage may occur.”

(Established adult, rural site)

3.3.2. Social stressors

The lack of facilities near the home forced women into a public sphere where their actions were observed and strictly governed. Social encounters and their potential repercussions were important stressors for women of all ages and in all life stages and impacted their comfort level, familial reputation, and community standing. We noted three primary drivers of social stressors in this population: insufficient privacy, social regulations governing where a woman can go and whom she can be seen with, and social conflicts over scarce sanitation resources and infrastructure.

First, privacy was a major issue for women since sanitation-related behaviors may expose parts of a woman's body. Among respondents, 51 out of 56 discussed issues of privacy related to sanitation. Because most sanitation-related behaviors took place in the open – particularly in the absence of latrines and washing facilities –public exposure was common and unavoidable. Lack of privacy elicited strong emotional responses, particularly as social and cultural strictures limit interactions with men, and being seen by men during sanitation-related behaviors was experienced as deeply shameful for women.

"I don't feel like sitting in front of boys [or men]. It is dishonorable ... I feel ashamed."

(Adolescent, indigenous site)

Even when using a facility, broken doors or simply being seen walking to the latrine or water source made women feel vulnerable.

Approximately half of study participants described a complex set of social restrictions and expectations directly affecting how they practiced sanitation (N = 29). Of all potential stressors identified in our study, social restrictions had the greatest variability by life stage. Adolescents enjoyed greater freedom and social support related to sanitation practices compared to other groups. Adolescents frequently mentioned asking family to accompany them for sanitation and are more familiar with the social and physical environment in which they live, since they have not yet left their family home after marriage. However, their freedom was not without consequences: interacting with boys or men during sanitation—whether solicited or not—could have severe implications for a girl's "prestige" and her family's ability to find a suitable marriage partner.

"[I worry] ... If they will tell something which harms my reputation. If that person says something, other people will gossip ... If anything happens with a boy, people will say 'If the girl is so good, why would that person come to her?' ..."

(Adolescent, urban slum)

Social restrictions were acutely felt during the abrupt transition from adolescence to the newly married period. Marriage, along with relocation to the home of the in-laws, introduces a new set of social restrictions on a woman's daily activities. Newly married women described intense restrictions prescribing when and where a woman is allowed to defecate and who is supposed to go with her. Rules are strictly enforced until the woman finds her place within the new household.

"In the village it's very strict. Here the daughter-in-law can go outside for sanitation but in the village it's very strict. You have to be there in the home for the whole day and night ..."

(Newly married, urban site)

Newly married women must negotiate the time, place, and

support network needed for sanitation. When they do leave the household, there are expectations for how women must behave, and failing to show due respect to elderly and higher caste members can negatively impact a woman's reputation and place in her family.

"During the daytime outside people come to take baths after cutting the paddy ... they may say [disapprovingly]: a newly married woman is coming in the mid-day for defecation."

(Newly married woman, rural)

Pregnant women face social restrictions similar to newly married women, especially when still new to their households. However, some women experienced additional restrictions aimed at protecting the life of their fetuses. For example, pregnant women were accompanied at night or restricted from practicing sanitation at times when they might be frightened by animals or scared by ghosts. Unlike other groups, most pregnant women perceived these limitations positively as essential to protecting their unborn child. Though married women of all ages faced social restrictions, adult women rarely mentioned household rules except when describing expectations for their own daughters' behavior.

Third, conflicts arising from where and how women practiced sanitation were commonly mentioned (n = 31), including scolding and punishment for taking too long to complete sanitation-related behaviors and frequent quarrels with other users. Conflicts stemmed from limited access to shared resources like latrines, open defecation sites, and water resources:

"People fight among each other. Even municipality, workers who clean the slum scold us. They scold us using different slang words like, 'why are you people making such filth (defecating at the road side)?"

(Pregnant woman, urban slum)

In rural and indigenous communities, conflicts arose when women used agricultural fields for defecation during the rainy season when crops are cultivated.

"If you go to someone's field then definitely that person will scold you."

(Newly married woman, rural)

All women faced conflicts of some sort, but the type of conflict varied by life stage: for example, parents scolded adolescents for spending too much time or being seen talking to boys, whereas newly married women were scolded for failing to follow household rules for social interactions or using unapproved locations for defecation or urination. Encountering outsiders like men or people of higher castes elevates anxiety and may have repercussions for a woman's entire family.

"When people from the road side peep at us during defecation, at that time a quarrel occur. Approximately everyday, quarrelling and fighting occurs at that tube-well during water collection."

(Adolescent, urban slum)

Finally, caste was mentioned rarely in interviews, although women from Dalit groups reported they were not allowed to bathe with upper-caste women in ponds or rivers or were restricted from using the same facilities. They were expected to respect upper-caste community members or they would face scolding or

punishment.

“The upper-caste people shout at us. If other people are bathing there, or if male people are there; we can't go. If we go very often they shout at us. They tell us to make our own well.”

(Adolescent, rural site)

3.3.3. Sexual violence stressors

Many of the social stressors women encountered during sanitation reflected cultural rules surrounding interactions between men and women. In seeking privacy for sanitation, women left the safety of the household. Despite cultural understandings of propriety—physical intimacy between men and women outside of marriage is proscribed—women faced frequent, unwanted encounters of a sexual nature in the course of routine sanitation practices. Sexual stressors included being watched by men during sanitation activities (peeping), men exposing themselves to women (flashing), and gender-based violence, including sexual assault and rape.

Peeping and flashing were exacerbated by a lack of privacy during sanitation and women described a tension between privacy and vulnerability to attack. Privacy was particularly problematic for newly married women since their new households attempted to protect them from view of other men. Nine respondents described experiences dealing with men peeping during sanitation. Though going out in groups could minimize the sense of isolation, peeping was still a problem. Flashing was entirely an urban phenomenon ($n = 6$) and involved men purposefully taking off their clothes to reveal themselves to women. Women reported that these men were typically strangers.

“(The men) are peeping at us during defecation; how can we defecate at that time? They will sit there; it is very difficult to defecate there ... Sometimes when we have gone to the field; somebody is showing his bare body by opening his clothes. We feel very bad ... so bad, we go to other place and defecate there. After going to that place there also may be some other people, so we have to leave the place immediately after defecation.”

(Adolescent, urban slum)

Sanitation activities also exposed women to the risk of sexual or gender-based violence, and fears related to violence and sexual assault were described by 19 respondents. Women of all ages reported that men or boys in their communities threw stones or teased them as they walked out for sanitation. Women frequently mentioned encountering drunk men when accessing sanitation and reported feeling apprehensive during these encounters because they could not rely on drunk men to act “rationally.” In urban areas these encounters were often linked to fears of sexual misconduct; however, in indigenous areas, women did not explicitly link these encounters to sexual abuse.

“When they are drunk, they don't have sense; they can't recognize who is their daughter, mother or sister-in-law, they misbehave.”

(Established adult, indigenous site)

In contrast to the generalized apprehension of peeping and flashing, rape and sexual assaults linked to sanitation behaviors were powerful events with specific narratives, often repeated throughout the community. Fears about sexual assault were especially common in urban areas where nearly every participant mentioned specific incidents in which women from their

communities were victims. Though the narratives were detailed, the language women used to describe rape relied heavily on euphemism. Phrases used to describe these encounters include “tried to hold me,” “hug the girl,” “roll the woman on the ground,” or “hold her from her backside.” The following anecdote is illustrative of common narratives of sexual violence in urban slums:

“So many incidents have happened in this slum. Here a small girl went to the jungle for defecation, when she has gone she has called her mother; her mother told that she is cooking so I can't go, you go alone. Then one boy called her and did a sexual act with her. Due to that incident there was fighting in the slum.”

(Established adult, urban slum)

For adolescents the impact of sexual violence was particularly severe. Women of all ages said young women had to protect their “prestige” in order to secure a good marriage.

“If a girl gets a bad name, it stays with her forever ... It will affect the future of a girl ... It becomes a great source of worry to her parents also because no good marriage proposals will come in future. And people in the society will tell a number of bad things about the girl child. That creates more unhappiness in girl's mind.”

(Established adult, indigenous site)

3.4. Behavioral regulation

Since most women lacked the ability and/or agency to modify their sanitation environments, they were forced adapt their behavior in response to stressors. Methods employed to minimize sanitation-related psychosocial stress included seeking social support, changing the timing of sanitation activities to minimize confrontation and exposure, and employing physiological regulators such as withholding food or withholding defecation or urination.

Many women described practicing sanitation in groups or accompanied by a friend or relative to minimize fears of darkness, encountering men, or being startled by animals. Accompaniment was a standard practice in all study sites but was especially important for adolescents and newly married women, since both groups were concerned with maintaining their reputations. Older women often used younger children to accompany them. However, many women – particularly newly married women – struggled to find sufficient social support for sanitation. New husbands and in-laws were less likely to escort a woman at night than fathers or friends in their previous homes.

Many women defecated and bathed early in the morning to avoid times when male community members were also using the sites. Newly married women were often obliged to perform their sanitation activities before dawn to maintain privacy, regardless of physical need. As a last resort, some participants defecated in the backyard or into plastic bags to avoid leaving the safety of the house at night. This practice was more common among newly married women in rural settings, since these women expressed reluctance or inability to ask for accompaniment from their husbands or relatives.

Women regulated their biological needs by limiting intake of food and liquids to reduce the frequency of defecation or urination and withholding relief even when they felt the urge. To avoid having to leave the house at night, women frequently withheld relief until morning. During the rainy season, women did not want to defecate in the rain and mud and withheld intake and relief in

response.

Though women made a number of changes and modifications to their behaviors, there was no real sense of achieving a solution with respect to sanitation-related stressors. Many women said access to a latrine could help to solve many of the challenges they encountered during sanitation. However, women rarely expressed a sense of agency to change their sanitation situation, and commonly said things like, “What else can we do?” Rather, their responses to sanitation-related psychosocial stressors suggested attempts to cope with the undesirable realities causing sanitation-related stressors to arise.

3.5. Variations in sanitation-related stress by geographic site

Geographic setting had a strong influence on women's experience of sanitation-related psychosocial stress. Fig. 2 depicts the relative intensity of key stressors by geographic region based on the frequency with which they were mentioned and the importance given in interviews. Among urban residents, stressors related to sexual and gender-based violence, mentioned in 14 of the 20 interviews, were foremost. Almost all women shared stories of sexual violence in their community or personal experiences with peeping or flashing. Three-fourths of urban respondents ($n = 15$) discussed four or more specific environmental stressors. In high-density urban areas, land is at a premium and vacant space for open defecation or latrine construction is rare, and physical barriers to accessing preferred defecation sites (locks, barbed wired fences, etc.), and perceived health risks at the preferred site were more pronounced. Social stressors in urban areas were primarily related to negotiating access to shared water and sanitation resources and finding private locations for sanitation. Few urban women reported restrictions on activity patterns ($n = 6$) and these few restrictions were less stringently enforced than in other geographic settings.

In contrast, social stressors were highly salient in rural areas, particularly as related to restrictions on when a woman can and cannot leave the home and who should and should not be seen with her. Nearly three-quarters of the rural women (14/20) described social restrictions impacting sanitation access. Environmental stressors were the least pronounced among rural respondents – often related to nuisances of negotiating the natural environment, such as walking long distances, traversing muddy fields, or dealing with animals and insects. Only two women from rural areas made any mention of sexual stressors, although this may be the result of under-reporting.

In remote indigenous communities, sanitation-related stressors differed from both urban and other rural sites, some of which had to do with the markedly different role of women in tribal societies. Women in indigenous areas were less governed by social restrictions (social restrictions mentioned by 9 out of 16), but reported more conflict with neighbors than either urban or rural respondents (11 out of 16). Environmental stressors were in line with those of other rural respondents; however, more women in

tribal areas made reference to supernatural risks (13 out of 16). Sexual violence, discussed by 5 of 16 respondents from indigenous communities, was a greater source of anxiety than in rural areas but less pronounced than in urban areas. Women from the indigenous communities typically associated sexual or gender-based violence with men's use or abuse of alcohol (i.e., encountering drunk men at night).

4. Discussion

Sanitation in India is at a critical moment. After fieldwork for this program was completed, the government of India phased out the Total Sanitation Campaign (TSC) and launched the Swachh Bharat Mission (SBM) – a multibillion-dollar commitment by the government to improve sanitation coverage and use and the largest single sanitation-related investment by any government in history (Government of India, 2015). Improving sanitation can reduce sanitation-related psychosocial stress. Gaining access to appropriate facilities for women reduces shame, embarrassment and fear (Fisher, 2006, 2008), risk of sexual violence (Lennon, 2011), and provides greater privacy. As the government considers new strategies under the massive investments promised under SBM, embracing sanitation programming that reflects user needs and preferences will be critical to the program's success and impact.

Discussions of gendered aspects of sanitation-related psychosocial stress have focused primarily on the experience of adolescent girls – particularly challenges associated with managing menstruation (Amiya et al., 2010; Hamal and Susma, 2014; Reed and Coates, 2003; Sommer, 2013; Sommer et al., 2013; Sommer and Sahin, 2013). Sommer et al. (2013) find that exclusionary practices during menstruation, a lack of knowledge about menstrual hygiene management, and inadequate privacy in latrines are common in low-income settings. However, we find that these stressors extend beyond adolescence and are significant throughout the life course. Furthermore, sanitation-related stressors occur across the range of sanitation behaviors and are not unique to the menstrual period, highlighting the need for sanitation facilities that address all sanitation behaviors.

One main finding of our study concerns newly married women in India, who are particularly vulnerable to sanitation-related stress and deserve specific and targeted attention. Newly married women live highly regulated lives, with strict rules making it difficult to manage sanitation with privacy and dignity. A study in India examining marriage and power dynamics found newly married women may be susceptible to violence in the household (Johnson and Johnson, 2001). In northern Egypt, Yount found co-residence with a husband's mother or brothers to significantly reduce a woman's capacity to influence daily and long-term domestic decisions. The relationship between a mother-in-law and a newly married woman may prove to be a source of distress or of intimacy and support (Nichter, 1981), possibly presenting an opportunity for women to navigate safer sanitation. Similarly, some evidence suggests that marriage may present an opportunity for a woman to advocate for a latrine in the household of her prospective husband (Stopnitzky, 2012).

Among respondents, few stressors were as pronounced as the fear of sexual violence among women living in marginalized urban slums. The issue of gender-based violence, in particular sexual violence, has become an increasingly visible and politicized issue in India (Khambati, 2014; Phillips et al., 2015; Sharma et al., 2014). Urban respondents' fears of sexual assault were not abstract – they were grounded in the real experiences of friends and neighbors. Nonetheless we cannot dismiss the possibility that this issue was under-reported among respondents.

This research has implications for how sanitation is defined and

	Urban (n = 20)	Rural (n = 20)	Indigenous (n = 16)
Environmental Stressors	HIGH	MODERATE	MODERATE
Social Stressors	MODERATE	HIGH	MODERATE
Sexual Stressors	HIGH	LOW	MODERATE

Fig. 2. Intensity of sanitation-related psychosocial stress by geographic site.

improvement activities are designed. We identified specific constellations of stressors shaping women's experiences in various geographic settings suggesting that intervention strategies for urban and rural areas need further articulation and differentiation to align with setting-specific needs. More specifically, our data question the extent to which shared sanitation facilities present a viable solution for improving sanitation access in India. A study in Mumbai and Pune found that public latrines may be unclean, crowded, and expensive (Bapat and Agarwal, 2003) and some women fear using shared latrines unless access to facilities is separated by sex (Reed and Coates, 2003). TSC theoretically embraced “complex sanitation” including appropriate toilet seats, bathing cubicles, washing platforms and basins in a place in the village that are acceptable with regards to gender and landless families (Indian Sanitation Portal, 2010). However, the operational emphasis on latrine construction does not fully address the suite of sanitation behaviors that women practice. This may explain why large-scale TSC programs did not achieve anticipated health impacts, likely due to low levels of use and infrastructure that fails to meet the needs of beneficiaries (Boisson et al., 2014; Clasen et al., 2014; Patil et al., 2014).

Lastly, our results demonstrate the need to strengthen gender-sensitive policies and work with women to address barriers to sanitation and reduce sanitation-related psychosocial stress. Though involving women in sanitation design has gained increasing popularity (Khosla et al., 2004; Mazurana et al., 2013; Ray, 2007; Tilley et al., 2013) women rarely exert control over where latrines are placed, their design, and the assurance of continued maintenance. To meet women's needs, it is also clear that a toilet is not enough. The MDG target has led to a focus on presence of an “improved” toilet, in many cases with the tacit assumption that the mere presence of a toilet is sufficient to address many non-infectious health risks. Our findings reveal that the structure is necessary, but not sufficient to address psychosocial stress. While discussion around the post-2015 Sustainable Development Goals have a greater focus on eliminating open defecation practices (WSSCC, 2014) it remains to be seen how this target will be measured and its influence on policy in India and beyond.

4.1. Limitations

Despite efforts to recruit a sample representative of life stage, geographic setting, and differing access to sanitation facilities, most adolescent participants were over the age of 18, perhaps over-representing the views of mature adolescents who may have a greater independence within their households. However, younger girls may be in school and able to access other facilities, whereas older adolescents may better represent women confined to homes. Though we selected an indigenous site, due to increased industry in the area, indigenous people have more contact with “mainstream” Indian society than previous years, which may explain some of the similarities between rural and indigenous participants.

5. Conclusions

Women and girls are disproportionately affected by poor sanitation infrastructure, impacting psychological and physical health. This study illustrates key sanitation-related stressors experienced by women at different life stages in urban slum, rural and indigenous areas in eastern India, detailing a suite of sanitation behaviors that should lead policy-makers to view sanitation as extending beyond the four walls of a latrine. A broader view of sanitation and open defecation are needed, including an understanding of the psychosocial impact of environmental, social and sexual stressors and women's different risk profiles when designing gender-

sensitive sanitation policies and programs.

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