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Sociocultural barriers to water security among women in rural Odisha, India

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An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health in
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2018

Abstract

The field of water, sanitation, and hygiene research, has increasingly acknowledged sociocultural barriers as significant contributors to water insecurity among women in developing countries. However, much research on water insecurity has been conducted in settings that experience water scarcity or have low coverage of improved water sources, and therefore focus on the physical or financial barriers to accessing water. Furthermore, few studies have addressed specific water needs of women in varying life stages. The purpose of this study is to assess the relationship between presence of water sources and access to sources, and to identify the sociocultural barriers to water use faced by women at different life stages. A grounded theory approach was used to analyze data from in-depth interviews and focus group discussions with women of four life stages from adolescence to post-menopause in rural Odisha, India. Results showed that behavioral expectations of women, menstruation taboos, and individual threats all resulted in barriers to safe and private access to water sources, leading to experiences of water insecurity even when water sources were available. The identification of these constraints in the context of water availability demonstrates the importance of considering of sociocultural barriers to water when designing interventions in areas with both high and low coverage to improved water sources to ensure access by women of all ages.

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Acknowledgements Page

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Without the women of Odisha, India, this paper would not have been possible. They provided their time to share their personal stories, and I hope this work does justice to their time and experience.

Finally, I would like to thank my friends and family for their love and support.

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Chapter 1: Introduction

Problem Statement

There has been a growing recognition in research on water insecurity that barriers to water access extend beyond financial resources and the physical environment. However, most research on how women experience water insecurity has focused on health-related and financial causes and effects for women of child-bearing age. There is also limited research on how challenges to water access change from adolescence to post-menopause life stages, and research on socio-cultural causes and effects of water insecurity must be done in a variety of contexts as results vary widely depending on geographic region and local cultural traditions and realities.

Research Objective

This study seeks to understand the sociocultural contributors to water insecurity among women across four life stages in rural Odisha, India. This study uses qualitative data collected from in-depth interviews and focus group discussions conducted in Puri district. The women who participated were categorized into four life stages: 1) unmarried women (UMW) living with their parents, 2) women married in the past 3 years, or recently married women (RMW), 3) women married over 3 years (MW), and 4) women older than 49 years of age (OW). Study participants provided descriptions of the challenges they faced related to water use for drinking, cooking, and hygienic purposes such as bathing and laundry. These data have been analyzed to:

1. Assess whether barriers to water still persist for women despite the presence of improved and unimproved water sources
2. Understand social influences that prevent women from accessing water sources across different life stages

3. Develop a conceptual framework demonstrating the interlinkages between social barriers to water access for women in Odisha

Significance Statement

This study may contribute to research in the water sector by identifying barriers to water access across life stage that can be addressed in future interventions. Interventions in both areas with high and low coverage of improved water sources can be improved in order to circumvent, reduce, or eliminate sociocultural barriers that prevent water access. By incorporating knowledge of sociocultural barriers into intervention planning, the water sector can reduce water insecurity and the negative impacts thereof.

Chapter 2: Literature Review

Global importance of water

In September of 2000, all 191 member states of the United Nations committed to achieving the Millennium Development Goals, the seventh of which included among its targets the goal of halving the proportion of people worldwide without access to improved water sources by the year 2015 (WHO and UNICEF, 2012). Though not every individual country met its set goals, the global goal was achieved early, and then expanded in the Sustainable Development Goals; the current goal is to "achieve universal and equitable access to safe and affordable drinking water for all," in which "access" is defined as a water source within one kilometer of the home and from which water collection takes no more than half an hour (Sustainable Development Knowledge Platform, n.d). For water to qualify as "safely managed," it must be "from an improved water source that is located on premises, available when needed and free from faecal and priority chemical contamination" (Figure 1). This sets a high bar for 'safely managed' drinking water; water may be available on the premises, but if unavailable during certain times of day or subject to seasonal variability that impacts quality or availability, cannot be considered "safely managed". When a constant supply cannot be relied upon, households may store water, which can introduce contamination into their water supply, members of the household may

SERVICE LEVEL	DEFINITION
SAFELY MANAGED	Drinking water from an improved water source that is located on premises, available when needed and free from faecal and priority chemical contamination
BASIC	Drinking water from an improved source, provided collection time is not more than 30 minutes for a round trip, including queuing
LIMITED	Drinking water from an improved source for which collection time exceeds 30 minutes for a round trip, including queuing
UNIMPROVED	Drinking water from an unprotected dug well or unprotected spring
SURFACE WATER	Drinking water directly from a river, dam, lake, pond, stream, canal or irrigation canal
Note: Improved sources include: piped water, boreholes or tubewells, protected dug wells, protected springs, and packaged or delivered water.	

Figure 1: WHO and UNICEF, 2017

purchase water (Subbaraman, 2013), or they may travel to collect it from alternate sources (Pearson, 2016).

Access to safe and sufficient drinking water is of international priority because of its vast implications for health and quality of life. Water is necessary not only for drinking, but for cooking, bathing, washing clothing, pots and pans, andhandwashing, and in some contexts, may also be used for irrigation and anal rinsing. Water, sanitation, and hygiene (or WASH) interventions can decrease the disease burden of waterborne, water-washed, and water-related diseases. Diarrhea, frequently caused by contaminated water, is the second-leading cause of death among children under the age of five (WHO Diarrhoeal Disease Fact Sheet 2017). Improving water quality leads to decreases in cases of diarrhea, and is far more cost-effective on a population scale than treating diarrhea (Clasen 2008). The first-leading cause of death, respiratory infections, are also shown to decrease in areas with in-house water services (Hennessy 2008). In addition to diarrhea and respiratory infections, WASH interventions can lead to decreases in diseases such as schistosomiasis and a variety of vectorborne disease whose vectors may breed in household water containers (WHO Drinking Water Fact Sheet 2017).

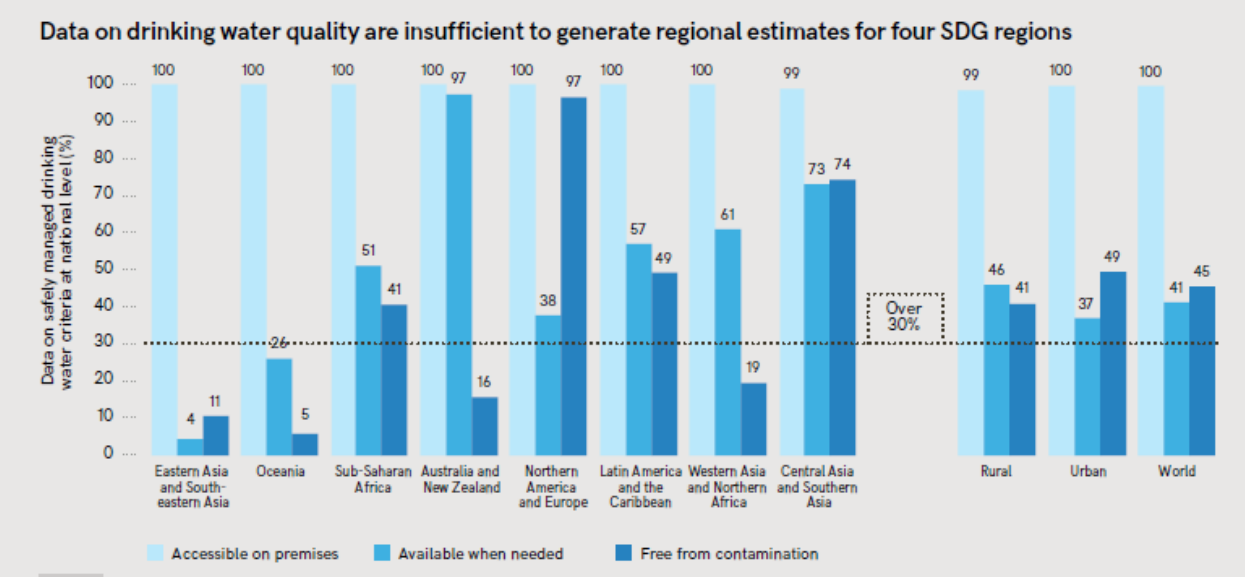

Figure 2: WHO and UNICEF, 2017

WASH interventions are economically sound as well. Effectively managed interventions reduce disease burdens, disability-adjusted life years (DALYs), and stunting, and they can free money and time for economic participation (UNICEF 2015). UNICEF estimates that for every one dollar invested in WASH interventions, there is a $4 return (UNICEF 2015). Alternatively, in areas without access to safely managed water, water acquisition in sufficient volume can lead to negative impacts on physiological health, economic welfare, and mental health, as elaborated on below.

The relationship between gender and water

While water is vital for the life of all people, different groups experience different relationships with this essential resource. Water use needs vary across and within cultures. Because water is necessary not only for drinking, but also for cooking, irrigation, personal hygiene, and washing pots and pans, water needs frequently fall disproportionately high on parties responsible for domestic work. Domestic work in many countries, particularly lower-

resource countries, tends to fall disproportionately on women. A gender disparity in water use, water management and experiences with water shortages therefore exists between men and women.

To understand the impact of water on gender requires first an understanding of what gender connotes. Gender differs from biological sex. The United Nations Development Program defines gender as "a concept that refers to the social differences between women and men that have been learned, are changeable over time and have wide variations both within and between cultures." Therefore, biological differences between males and females result in women's responsibility for bearing, birthing, and breastfeeding children; cultural differences between men and women result in women's frequently assigned and expected responsibility for the bulk of other tasks associated with childrearing and caregiving, which includes daily domestic tasks such as cooking and cleaning (Razavi, 2015). As water is a prerequisite for cooking, cleaning, laundering, bathing (of self and of others), and cleaning pots and pans, the task of fetching water and water management falls disproportionately on women as well (Inter-agency Task Force on Gender and Water, 2006).

The perception that these responsibilities fall to women is shaped by "deep-seated social norms and gender stereotypes," which take women's responsibility for granted "as an unquestioned part of daily living" (Razavi, 2015). This division of labor begins early, as girls are expected to help their mother with domestic tasks, while boys are not (Baliyan, 2017). However, this responsibility also varies between and across countries, and the burden of work shifts based on coverage of infrastructure and "public services such as water and sanitation, energy, healthcare and childcare" (Razavi, 2015). In societies without easy access to sufficient quantities of water, women have developed knowledge and strategies pertaining to the management of

water resources, “including location, quality and storage method” (Inter-agency Task Force, 2006). As the members of the household with primary responsibility for water use and collection, women therefore experience the physical and emotional distress created by water insecurity differently, and often more severely, than men. Among these disparate experiences include risks faced by women as a result of water collection such as threats to their safety and health, limited opportunities for economic and possibly social empowerment, and greater impacts to their mental health, especially in times of water shortage, all of which are elaborated on in later sections. Water insecurity relates to access and sufficient quantity of water, but also of the concerns and behaviors that contribute to a lived experience with implications for health and well-being of individuals and their social contexts (Wutich, 2009).

2.1 Water and women’s physiological health and safety

Drinking contaminated water from unimproved sources can cause illness for all ages and sexes. However, water quality and access have unique implications for women that are either different or more severe than what men experience, given the common role of women as both collectors of water and caretakers of ill family members (Inter-agency Task Force on Gender and Water, 2006). The distance of the water source from the household also has implications for health. While “safely managed water sources” in the eyes of the Joint Monitoring Programme are located on the premises, the reality is that many households are far enough away from water sources that travel is required to fetch the water. Using data on 44 countries from Monitoring the Situation of Children and Women data published by UNICEF, one study found that women are the most common water fetchers in 59% of the countries (Sorenson 2011). Sorenson found a positive association between unimproved sources and women as primary fetchers, and an even higher association between unimproved sources off of the premises and women as primary

fetchers; essentially, the worse the water situation is for a household, the more likely the woman is to bear the responsibility of water collection. The water fetchers may then suffer a variety of health problems, from back injuries to nutrient deficiencies related to caloric expenditure (Sorenson 2011). If multiple trips are required to the water source, there may be health impacts when hygiene is sacrificed in attempts to economize water use, especially if members of the household are not washing their hands after defecating, changing a diaper, or before cooking (Mara 2010).

Additionally, women at times risk their safety by fetching water from distant sources. Instances of assault or rape can occur when women are vulnerable, such as on their way to collect water or firewood or to use a latrine (Kirchner 2007, Lennon 2011). Environmental degradation can increase the distance women must travel to find clean water or other household resources, consequently increasing their vulnerability to assault, rape, and physical injury (Blackden and Woden 2006). Sorenson has also proposed that water fetchers might face a risk of being hit by vehicles over the course of traveling to water sources; however, there is no data available to support or refute this hypothesis.

Beyond physical damage to the body that may be sustained while water fetching, women have distinct disease burdens as well. Higher maternal mortality is associated with poor water and sanitation, whereas improved water and sanitation leads to lower rates of maternal and infant mortality (Cheng 2012). Reproductive health associated with sanitation and menstrual hygiene management improves with improved WASH (Sievers, 2016). Furthermore, as women frequently deprive themselves in times of scarcity, they damage their bodies by depriving themselves of nutrients and necessary hydration (Stevenson, 2012).

2.2 Water and women's empowerment

In addition to the physiological impacts of water fetching when water sources are not located on the premises, there is also a substantial time component that means women who collect water sacrifice other behaviors for lack of time. Lack of infrastructure causes women to spend time collecting water or firewood for households or defecating. This time has an opportunity cost: women frequently sacrifice sleep, leisure activities, and possibly income-producing activities. Lack of infrastructure therefore leads to time-poverty (Blackden and Woden 2006), impacting both the leisure activities of economic empowerment of women.

Even when women have access to on-site or stored water, accessible without traveling to collect it, if the water is stored and not treated before use (Joshi 2013) women still sacrifice their time, and sometimes their money to address the resulting problems. When contaminated water makes their children ill, it is the women of the family who typically must find the time to take the children to a health center and finance the trip out of the household budget (Andajani-Sutjahjo, 2015). As the primary caretakers of children, they also might spend additional time caring for sick children that might have otherwise been used for necessary household tasks or income-generating behaviors.

Economic empowerment for women has frequently and unfortunately been conflated with empowerment within the household as well, despite a lack of convincing evidence supporting that theory (Ivens 2008). Increased water availability does not by default result in increased negotiating power within a household or increased time for income generating behaviors or sleep and leisure activities (Ivens 2008). Furthermore, elevating women in the community through their inclusion in collective water management does not necessarily ensure gender equity when patriarchal forces prioritize male voices over female experiences of water

use or intimidate women from speaking altogether (Andajani-Sutjahjo 2015). Increasing water access does not appear to be enough to increase women's economic or social empowerment. However, dual interventions, such as installing piped water in addition to creating microloan program, have been found to benefit women economically and socially through freeing time and creating opportunity (James 2002).

2.3 Water and women's mental health

Past research has focused on the impact of water on physiological health, safety, and economic empowerment. However, there is a growing body of research exploring the impact of water insecurity on mental health and emotional distress, as well as the gender disparities underlying those impacts. Research has shown that women and men experience stress differently, and they react and respond to stressors differently as well (Siddiqui & Pandey 2003).

Water insecurity, whether as a constant fact of life or as an occasional issue in times of shortage, can have great impacts on mental health and peace within the household. Studies have shown that women are much more likely to perceive frequent and severe water shortages than men (Tsai 2016 & Wutich 2009), at least in part because women are primarily responsible for economizing the household's water use and are also more likely to go thirsty to stretch the household's supply (Coelho 2004). Women frequently bear not only the greater burden of water collection, but also of distress associated with water insecurity. While as a whole, individuals may be more likely to display anxiety in drought conditions, as producers and providers, women find their activities to be more severely disrupted, creating higher levels of anxiety than men (Coelho 2004). This anxiety may increase when water scarcity requires negotiation for water (Wutich, 2008).

Water insecurity can contribute to conflict within the home. One study in the urban area of Cochabamba, Bolivia, found that water shortages led to household conflict over water use and responsibilities between male and female heads of households (Wutich, 2009). However, those conflicts may be mitigated in times of extreme scarcity; that same study found that extreme resource pressure sometimes leads to more fluid, less gender-dependent divisions of labor in water acquisition in Cochabamba, as both male and female parental units work together to ensure the survival of the family (Wutich, 2009). Wutich warned that these results may not be generalizable, given the urban setting and the active involvement of male heads of households in child-rearing.

In addition to stress created by water shortages, the time spent collecting water can also be a source of conflict. When women spend significant portions of their time walking to fetch water, they may be unable to attend to their expected chores or cooking, causing household strife (Stevenson, Greene, et. al 2012). If there is a water shortage, or if a woman lacks the time to make enough trips to collect water, she might also feel distress at being unable to meet social norms because of water economization. For example, she may feel shame at being perceived as dirty, or if she does not have enough water for bathing, she may not be able to attend church because of a lack of time (Stevenson, Greene, et al 2012). Stevenson distinguished three interrelated dimensions of access, adequacy, and lifestyle for considering a scale of psychosocial distress created by water insecurity; in a later study, he found that water insecurity is predictive of psychological distress, "independent of household food security," in a tool that added a fourth dimension of safety to his water insecurity scale (Stevenson, 2016). Water insecurity has clear impacts on mental health, whether because of the stress of the potential inability to provide for a family, internal conflicts as a result of insufficient quantities of water, failures to adhere to social

norms because of lack of water, or the simple emotional distress caused by physical discomfort when deliberately denying oneself an essential drink to preserve water.

Conclusion

There is a strong body of literature contributing to knowledge of the impacts of water insecurity on the lives of women. Their physical health, social and financial empowerment, and mental health all suffer as a result of water scarcity. Given the enhanced impact of water insecurity on the lives of women, there is a need for more research on the causes of water insecurity that are specific to women. While men and women both suffer for lack of water if the water is not present in the environment, women face many limitations that further restrict their access regardless of the presence of water. There is a need for research that investigates social influences of water insecurity, so that interventions can be designed to ameliorate the proven effects of that insecurity. Most of the body of literature concerning women and water focuses on adult women and mothers of young children. There is a further need for literature that addresses the shifting contributors to water insecurity from adolescence to old age, as access may shift across the course of a woman's life.

Chapter 3: Manuscript

Title: Sociocultural barriers to water security among women in rural Odisha, India

Journal for First Submission: Journal of Water Insecurity

Contribution of the Student: Bethany Caruso designed the study, developed the instruments, and supervised the data collection by a field team in Odisha. Madeleine Patrick developed a research question for this analysis, created a relevant codebook, analyzed the data, wrote the manuscript, and created Figure 1. Bethany Caruso developed much of Table 1 and provided insights on the topic area. Bethany Caruso and Monique Hennink provided guidance on data preparation and analysis and edited earlier versions of the manuscript and Figures.

Abstract

The field of water, sanitation, and hygiene research, has increasingly acknowledged sociocultural barriers as significant contributors to water insecurity among women in developing countries. However, much research on water insecurity has been conducted in settings that experience water scarcity or have low coverage of improved water sources, and therefore focus on the physical or financial barriers to accessing water. Furthermore, few studies have addressed specific water needs of women in varying life stages. The purpose of this study is to assess the relationship between presence of water sources and access to sources, and to identify the sociocultural barriers to water use faced by women at different life stages. A grounded theory approach was used to analyze data from in-depth interviews and focus group discussions with women of four life stages from adolescence to post-menopause in rural Odisha, India. Results showed that behavioral expectations of women, menstruation taboos, and individual threats all resulted in barriers to safe and private access to water sources, leading to experiences of water insecurity even when water sources were available. The identification of these constraints in the context of water availability demonstrates the importance of considering of sociocultural barriers to water when designing interventions in areas with both high and low coverage to improved water sources to ensure access by women of all ages.

Introduction

Worldwide, 2.1 billion people lack access to safely managed drinking water, and 1.8 billion drink water that is not protected against fecal contamination (WHO and UNICEF, 2017). The United Nations' Sustainable Development Goals aim to "achieve universal and equitable access to safe and affordable drinking water for all," setting access to water as a high priority target for the global community (Sustainable Development Knowledge Platform, n.d). Access to

safe and sufficient drinking water is of international priority because of its vast implications for health and quality of life. Water is necessary not only for drinking, but also for cooking, bathing, washing clothing, handwashing, and in some contexts, may also be used for irrigation and anal rinsing.

Expanding access to safe water for households can decrease the disease burden of waterborne, and water-related diseases. As an example, diarrhea, frequently caused by contaminated water, is the second-leading cause of death among children under the age of five (WHO Diarrhoeal Disease Fact Sheet 2017). Improving water quality not only leads to decreases in cases of diarrhea but is also far more cost-effective on a population scale than treating diarrhea (Clasen 2008). In a 2008 study of household infrastructure and hospitalization rates, Hennessy found a higher risk of respiratory infections in communities without in-home water supplies, and in 2016, Thomas found that after an intervention to install water, those hospitalization rates declined (Hennessy, 2008 and Thomas, 2016). In addition to diarrhea and respiratory infections, water interventions can lead to decreases in a variety of vector-borne disease whose vectors may breed in household water containers (WHO Drinking Water Fact Sheet 2017). An analysis of global databases for 193 countries found that on a global scale, water and sanitation interventions also reduced infant mortality rate, under-five mortality rates, and maternal mortality rates (Cheng, 2012).

Water access also has implications beyond reductions in waterborne diseases, especially for women. An assessment of data from 44 countries has found that when the water source is distantly located, women are significantly more likely to be the ones responsible to fetch water for the household, bearing the burdens on their physiological, mental, economic and social wellbeing driven by that task (Sorenson, 2011). Qualitative and quantitative research conducted

in Ethiopia has found that managing household water needs contribute to women's experience of psychosocial distress (Stevenson, 2012; Stevenson, 2016). In 2018, Wutich found that women perceived water insecurity to be much more severe than men did in a Bolivian squatter settlement (Wutich, 2008); in 2016, Tsai used a Household Water Insecurity Access Scale in rural Uganda and found a similar result (Tsai, 2016). In the same community, Wutich found that women were significantly more likely to report wasting time because of water collection, economizing water use in the house for bathing, cleaning and cooking, and losing income and time because of water collection (Wutich, 2009). Researchers have found the loss of income and time to negatively impact women's economic and social empowerment. Blackden and Woden delineated several ways in which fetching water can contribute to time poverty, especially among women, and impede national development (2006).

In India in 2015, 88% of the population had "access" to an improved water source within a half hour round trip to collect water (WHO and UNICEF, 2017), and yet despite the existence of these water sources, stressors and barriers preventing easy access may persist. India still suffers on a population level from illnesses tied to unsafe water, but there also remain other cultural and psychological stressors related to water that are often specific to women. In western Uttar Pradesh, women and girls have greater domestic responsibilities and are primarily responsible for water collection in the gendered division of labor (Baliyan, 2017). In focus group discussions in Delhi, women reported that they perceived a greater likelihood of assault during the periods in the day that they spent collecting water (Lennon, 2011). Water collection in Gujarat has also been found to carry an opportunity cost for women, as it takes time during the day that cannot be used for income-generating activities to support their families (James, 2002).

James found that the women of Gujarat benefited both economically and socially from a piped water supply scheme intervention.

No research has been conducted in rural Odisha to identify women's perspectives on water issues and how their concerns may impact their lives and influence their behaviors. A growing body of research has found it is no longer sufficient to describe water security as the existence of a water source that provides a high quality and sufficient quantities of water (Wutich, 2008 and 2009, Stevenson, 2012 and Andajani-Sutjahjo, 2015). In this study, we use the definition of water security used in the Household Water Insecurity Experiences (HWISE) Scale which defines household water security as, "the safe and reliable physical, economical, political, and social access to adequate quantities and quality of water for consumption, household production, and cleanliness by all household members at all times (HWISE Scale, n.d.). This study aimed to document women's concerns about water in Puri district, Odisha, India, to explore experiences and social contributors to water insecurity in an area with reportedly high access to clean water sources.

Methods

Study Setting

This study was conducted in rural villages in Puri district in Odisha, India that had previously engaged in a large-scale cluster randomized control trial. The trial aimed to assess health impacts related to a sanitation intervention but did not include any interventions directly related to water improvement (Clasen, 2014). Because the installations of latrines can lead to additional or altered uses of water in the home, and therefore create new needs that can contribute to water insecurity (Routray, 2015), research into water usage is also relevant to sanitation. Data collection over the course of the RCT therefore covered not only topics such as latrine use and health, but also water access and barriers.

Prior qualitative research on water insecurity has largely taken place in regions without widespread access to improved water sources. Puri district is not water scarce, and 94% of households have access to an improved source of drinking water (International Institute of Population Sciences, 2016). The selection of Puri district allows for the assessment of issues of water insecurity in a region with a high coverage of improved water sources, and is therefore a suitable setting to examine how social issues can contribute to the experience of water insecurity in water security areas.

Puri district covers 3,479 square kilometers. Of the 1.7 million people who live in the Puri district, 70% live in rural areas (International Institute of Population Sciences, 2016). In rural Puri, most of the residents are Hindu (97%), with a small minority of Muslims in the region (2.7%) (Puri Religion Census, 2011). Thirty-seven percent of households have an improved sanitation facility. Eighty-three percent of women are literate, and 8% of 20-24 year olds reported being married before age 18 (International Institute of Population Sciences, 2016).

Data Collection

Data were collected from March 2014 to April 2014 in twelve rural communities of Puri district, Odisha, India. Data were collected in the local language of Oriya, by research assistants associated with the sanitation trial in Odisha, experienced in qualitative methods and fluent in both the local language and English. Prior to interviews and focus groups, research assistants recorded demographic information of study participates that included their level of education, age, marital status, number of children, and basic information related to water, sanitation, and menstruation (Appendix D). Research assistants were all female and from Odisha, in deference to local cultural norms and to facilitate participation in the study and enable participants to freely discuss issues. Field team were trained and piloted the study instrument before data collection began. Data were collected through qualitative in-depth interviews and focus group discussions.

In-depth Interviews

In-depth interviews were developed following procedures used in the free-listing technique. In free-listing, a data generating technique used frequently in anthropology, participants are asked to list their understandings of or experiences of a particular topic in order to gain an understand of community impression and understandings, or "cultural domains" (Borgatti, 1998). This technique was adapted into an interview form, which allowed for interviewers to probe the responses of participants. The oral format of the interview also meant that there were no barriers due to illiteracy or lack of comfort with writing. Women were asked to describe or list their concerns related to water, and then they were asked to describe or list their concerns related to water in specific contexts, including at night, during monsoon season, while caring for dependents, and during pregnancy. Women were then asked to list their concerns related to urination, defecation, menstruation, and hygiene, with the same follow-up questions related to nighttime, monsoon season, caring for dependents, and pregnancy. Their

responses frequently took the form of stories or narratives, deviating from the traditional free-listing methodology to provide rich context and detail.

Borgatti recommends collecting thirty free-lists in order to assess a cultural domain, with additional data collection recommended if needed for consensus (1998). In this study, the goal was to collect 64 interviews, due to the great variability of the sample that occurred because of differences in geography, water sources, sanitation access, and life stages of participants. Participants lived in villages with geographic differences including proximity to jungles or shorelines. There was variability related to whether they had access to a private improved water source, a community improved water source, or no water source at all. There were also differences in whether participants had access to latrines, if their latrines were in use, and where they went to urinate or defecate whether or not they had access. Eight villages were visited, with the goal of interviewing eight women per village, for a total of 16 participants in each life stage. However, if two women per each of the four life stages, described below, could not be reached, the research team still sought eight women per village. Occasionally, a participant was able to direct them toward another interviewee, which resulted in a total of 69 interviews, 5 interviews above the goal.

Participants for the in-depth interviews were purposively, or nonrandomly, selected from each community from each of the four life stages. Participants were recruited by the research assistants approaching households in each village until they found someone willing to participate in the interview and continued until sufficient participants from all four life stages were recruited. They occasionally relied on a community contact or a study participant to point out where someone within another category lived. Inclusion criteria included gender and age, as all participants were required to be women of at least 18 years of old. Women were excluded if they

were physically or mentally unable to communicate. Some women were not given permission to participate by the household decision-maker, resulting in a degree of selection bias. Only one woman per household was selected to participate. Interviews lasted 30-90 minutes, and they took place in the home of the participant. The translations of the first interviews, memos from the field after each interview, and debriefings with the research assistants after every day of data collection, allowed preliminary analysis to inform the creation of a discussion guide used for focus groups.

Focus Group Discussions

In addition to the 69 in-depth interviews, 8 focus group discussions were held in 4 communities, or 2 focus group discussions per village. Focus groups comprised 5-7 individuals. The focus group instruments were developed iteratively, initially using issues raised in the interviews as discussed above. FGDs were aimed at validating interview responses and identifying if concerns and behaviors mentioned in interviews were also normative at the community level, and they served the additional purpose of eliciting more details. Participants were asked to describe their experiences or concerns related to urination, defecation, and menstruation. Information about water was not specifically and deliberately elicited; instead, careful attention was paid during analysis for any issues of water use or insecurity that arose spontaneously during the discussion. FGDs were held in private spaces, such as schools, temple spaces, and unoccupied homes. FGDs lasted 1-2 hours.

In each village, one focus group was held with unmarried women, and one was held with all married women, regardless of age or duration of marriage. Focus groups were held in different communities from the interviews so that participants did not have prior knowledge of the study that could potentially influence their responses. Participants were recruited through gatekeepers previously identified by the research assistants who were familiar with these

communities. The gatekeepers were female *angwadi* workers, or child-care providers, who recruited participants directly and ensured that participants within one focus group were not related to other participants. To reduce selection bias, women were permitted to bring babies, rather than be excluded due to lack of child care, reducing the chance that women with young children would be excluded from the study. Each focus group discussion had 5-7 participants. Before the FGD began, demographic information was collected from each participant in private. Both research assistants attended every focus group discussion; one served as the moderator and the other as the notetaker.

Data Management and Analysis

Study data comprised 69 verbatim interview transcripts and 8 verbatim focus group discussion transcripts. Data were translated from digital recordings into English by a transcriber not associated with the project. To check the accuracy of transcriptions, ten percent (i.e. 6 minutes of a 60-minute interview) of each interview and focus group was re-transcribed by one team member who had not collected the data, and a separate team member translated the transcription. These translations were compared with the full direct translation to check the quality of the transcriptions and translations.

All transcripts were uploaded into MAXQDA 2018, a qualitative data analysis program. The textual data were analyzed using grounded theory as the guiding methodological approach. Codes were developed to capture specific concerns, behaviors, and issues raised by participants. A preliminary codebook was created *a priori,* with codes based on specific questions in the study instruments. Several close readings of the data generated further inductive codes from the data itself, which were added to the codebook. All data were then coded using codes from the codebook. The coding process allowed the data to be presented in a reduced form and for it to be

grouped into meaningful categories. Themes could then be examined across the entire dataset. Codes were compared across type of water access, life stage, and size of household, generating analytic memos over the course of the analysis to identify patterns. Categories of issues were defined so that each category was distinct from the others, though some codes crossed multiple categories. Links between categories were explored and conceptualized into an explanatory framework. This conceptualization of the data, represented by a conceptual diagram, provides the foundation for a theory based on the data itself. Three researchers familiar with the data collaborated on a weekly basis in order to validate the data analysis.

Ethics

The Emory University Institutional Review Board in Atlanta, Georgia, USA, and the KIIT University ethics Review Committee in Bhubaneswar, India approved study protocols. Women provided oral consent prior to participation in interviews or focus group discussions.

Results

Participant characteristics

Characteristics of the participants are shown in Table 1. A total of 69 women aged 18-75 years participated in the in-depth interviews. Participants comprised 16 unmarried women (UW), 12 recently married women (RMW), 22 women married more than three years (MW), and 19 women over the age of 49 (OW). The 8 focus group discussions comprised a total of 46 women 18-70 years of age, comprising 23 unmarried and 23 married women, but included no recently married women, as none were given permission by family members to participate. All in-depth interview participants and 98% of FGD participants were Hindu. Of the interview participants, 26% had received some primary education, 66% were general caste, and 62% had children. Of the FGD participants, 28% had some primary education, 65% were general caste, and 50% had children. Seventy percent of in-depth interview participants and 63% of focus group participants reported having a water source available on the compound where they live.

Table 1. Demographic information for participants in in-depth interviews (n=69) and focus group discussions (n=46).

	IDI Participants					FGD Participants				
	All	**1. Unmarried Women (UMW)**	**2. Recently Married Women (RMW)**	**3. Married Women (MW)**	**4. Women older than 49 years (OW)**	**All**	**1. Unmarried Women (UMW)**	**2. Recently Married Women (RMW)**	**3. Married Women (MW)**	**4. Women older than 49 years (OW)**
	69	**16 (23%)**	**12 (17%)**	**22 (32%)**	**19 (28%)**	**46**	**23 (50%)**	**0 (0%)**	**16 (35%)**	**7 (15%)**
Age[1]	36.6 (18-75)	20.7 (18-28)	23.2 (20-27)	34.0 (24-47)	61. 3 (50-75)	30.7 (18-70)	19.2 (18-23)	-	34.8 (20-48)	59.7 (51-70)
Education										
None	16 (23%)	0 (0%)	0 (0%)	4 (18%)	12 (63%)	1 (2%)	0 (0%)	-	0 (0%)	1 (14%)
Some primary	18 (26%)	1 (6%)	3 (25%)	7 (32%)	7 (37%)	13 (28%)	0 (0%)	-	8 (50%)	5 (72%)
Some secondary	28 (41%)	10 (63%)	9 (75%)	9 (41%)	0 (0%)	12 (26%)	5 (22%)	-	6 (38%)	1 (14%)
Some tertiary	7 (10%)	5 (31%)	0 (0%)	2 (9%)	0 (0%)	20 (44%)	18 (78%)	-	2 (12%)	0 (0%)
Below poverty line card[2]	55 (85%)	14 (88%)	11 (100%)	15 (75%)	15 (83%)	29 (67%)	16 (70%)	-	10 (63%)	3 (43%)
Hindu	69 (100%)	16 (100%)	12 (100%)	22 (100%)-	19 (100%)	45 (98%)	22 (96%)	-	16 (100%)	7 (100%)
Caste[3]										
Brahmin	4 (6%)	1 (7%)	0 (0%)	2 (9%)	1 (5%)	1 (2%)	1 (4%)	-	0 (0%)	0 (0%)
General caste	44 (66%)	12 (80%)	8 (73%)	12 (55%)	12 (63%)	30 (65%)	12 (52%)	-	11 (69%)	7 (100%)
Scheduled caste	5 (7%)	0 (0%)	0 (0%)	3 (14%)	2 (11%)	8 (17%)	5 (22%)	-	3 (19%)	0 (0%)
Backwards unscheduled caste (OBC)	12 (18%)	2 (13%)	3 (37%)	4 (18%)	3 (16%)	7 (15%)	5 (22%)	-	2 (13%)	0 (0%)
Scheduled tribe	2 (3%)	0 (0%)	0 (0%)	1 (4%)	1 (5%)	0 (0%)	0 (0%)	-	0 (0%)	0 (0%)
Children	43 (62%)	0 (0%)	4 (33%)	20 (91%)	19 (100%)	23 (50%)	0 (0%)	-	16 (100%)	7 (100%)
Water source within compound	43 (62%)	12 (75%)	7 (58%)	13 (59%)	11 (61%)	32 (70%)	16 (70%)	-	11 (69%)	6 (86%)
Tubewell	31 (45%)	5 (42%)	6 (86%)	10 (77%)	8 (73%)	31 (97%)	16 (100%)	-	11 (100%)	5 (83%)
Well	2 (3%)	1 (8%)	1 (14%)	0 (0%)	0 (0%)	1 (3%)	0 (0%)	-	0 (0%)	1 (17%)
Tubewell with motor	1 (1%)	0 (0%)	0 (0%)	1 (8%)	0 (0%)	0 (0%)	0 (0%)	-	0 (0%)	0 (0%)
Pond	7 (10%)	3 (25%)	0 (0%)	2 (15%)	2 (18%)	0 (0%)	0 (0%)	-	0 (0%)	0 (0%)
Missing/Other	2 (3%)	3 (25%)	0 (0%)	0 (0%)	1 (9%)	0 (0%)	0 (0%)	-	0 (0%)	0 (0%)
Toilet within compound	37 (54%)	10 (63%)	9 (75%)	9 (41%)	9 (47%)	27 (59%)	14 (61%)	-	8 (50%)	5 (71%)

[1] Not all women knew their age; some of them guessed.

[2] Missing data for 4 IDI and 3 FGD participants.

[3] Missing data for 2 IDI participants

Influences on water insecurity

Participants reported both social and physical barriers that had to be overcome in order to effectively access water sources. Three features of the sociocultural context were identified that create barriers to women's access to water, privacy in water use, and safety in collecting water, all of which contributed to their water insecurity. The results described below are visually summarized in Figure 1, which shows the sociocultural context influencing water insecurity in this context. The three identified sociocultural features are gendered behavioral requirements, menstruation taboos, and external, unsystematic threats to water sources by individuals. The sociocultural context creates barriers by preventing women from accessing water, creating additional privacy concerns, and deterring women from using water sources for fear of safety, all of which contribute to an experience of water insecurity.

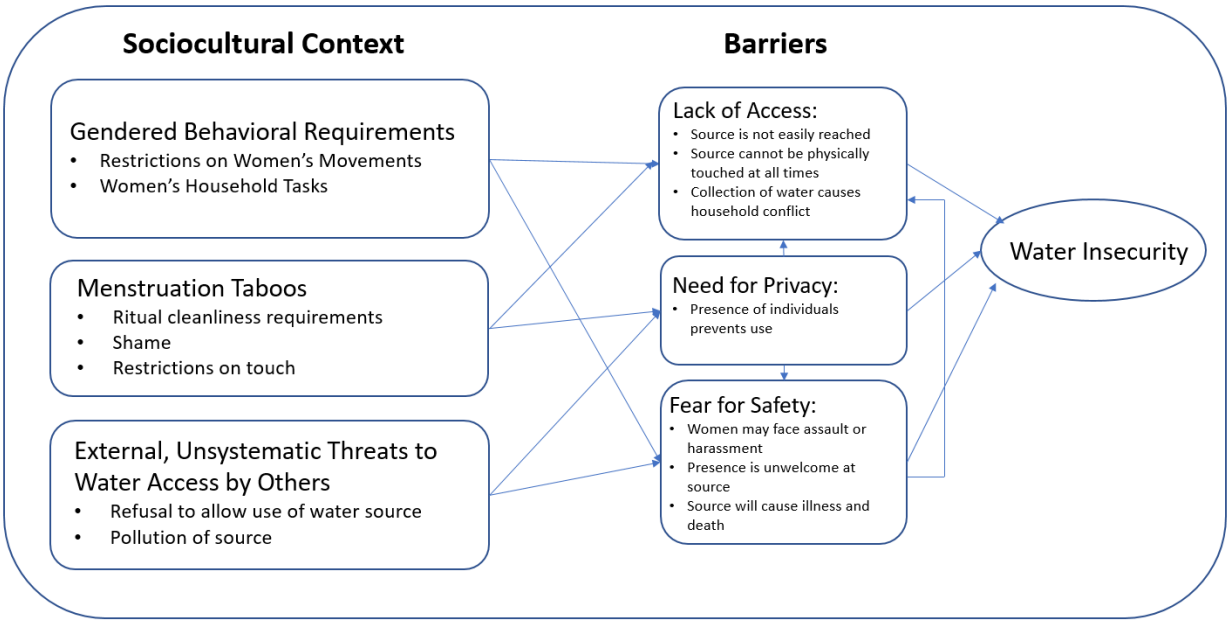

Figure 3: Sociocultural Contributors to Water Insecurity Among Women in Odisha, India

Because of sociocultural factors depicted in the figure prevented women from being able to privately, safely, and reliably access water at all times, they did not experience household water security as defined in the introduction. Women usually reported facing more than one of these barriers to access. Women's descriptions of these contributors to water insecurity also reveal the important mitigating influences of a social support network within the house, and participants who lacked those networks reported higher degrees of water insecurity. Concerns also varied by life stage.

Gendered Behavioral Requirements

Women reported cultural restrictions on their behavior as a core barrier to accessing water. Behavioral expectations of women impacted their freedom of movement outside of their homes as well as the types of tasks they were required to do within the home. These expectations, and the degree to which they impacted water insecurity, varied across life stage as discussed below.

Restrictions on movement

The presence of a water source did not guarantee access to the source if the participant had no freedom of movement outside their home. Recently married women faced the most stringent limitations on their movements outside the house of their husbands' families. Newly married daughters-in-law reported that they were expected to remain inside the home and were not free to leave except in the case of bathing and defecation. One participant reported this restriction would last for 8-10 years in the villages (IDI, RMW, Private Tubewell). These limitations often extended to preclude using a water source, even among participants with tubewells in their compound that were not shared with other households. RMW and MW were

often obliged to rely upon their in-laws, most often their mothers-in-law or sisters-in-law, to provide the water they needed for drinking, bathing, and household chores.

Many participants reported dissatisfaction with being unable to leave the home, as they were bored, or felt time passed slowly. Unmarried women who looked forward to marriage also were concerned about not being able to leave the home and see their friends. Those participants often wanted to collect water so that they could leave the house.

"My wish is to do something, so that I can go outside…that's just a wish" (IDI, RMW, Private Tubewell).

However, other participants were more content to remain inside. One participant expressed a desire to have a water source directly in her house, so that she did not even need to go to the front yard to pump water. She was afraid of anybody seeing her or talking to her when she went to collect water.

"We are daughter-in-laws of Odiya families, we are shy." (IDI, MW, Private Tubewell)

Regardless of their personal desires, women adhered to this cultural tradition restricting their movements and avoided any action that might engender gossip or damage their own or their in-laws' reputations. There was only one exception among the participants: one woman lived in an urban environment with her husband, and only occasionally visited her rural in-laws. She described leaving the home of her in-laws with her husband when they visited, regardless of the disapproval of her mother- and father-in-law. This case exemplifies aa woman working full-time and living in a city where she has more independence and is therefore was less influenced by rural norms of the village.

Participants who were mothers-in-law usually those in the OW category, expressed a dedication to maintaining the tradition of keeping daughters-in-law confined to the house. Several OW who did not have latrines or private tubewells reported that they would build or install them after their sons were married, so that their daughters-in-law would not have to leave the compound. Installing a tubewell would make water collection easier for the OW as well, but until a daughter-in-law was present, that was not a sufficient incentive to spend the money.

Relying on others for water created tensions in the household, especially given the limited power of the daughters-in-law of the household. One participant, who usually had no complaints about her living situation, and whose mother-in-law promptly brings water whenever necessary, struggled to access water when her mother-in-law was away:

> *"Yes it was inconvenient once when my mother-in-law went to attend a marriage, no one was at home, brother-in-law was also not there. I had a sister-in-law in the colony whom I asked to fetch. It was late, it was inconvenient." (IDI, RMW, Private Tubewell)*

Most participants dependent on others to fetch water reported that their in-laws typically provided water with no problems. However, when in-laws are not in the house, or if they do not have a favorable relationship with their in-laws, participants occasionally used less water in order to avoid leaving the house or making demands on others.

This cultural tradition also impacts mothers-in-law and aunts in the household because the responsibility for fetching water for the daughter-in law falls on them, but they are also older and frequently less fit and able to carry water comfortably. Fetching and carrying water, even from private, convenient tubewells, can still exacerbate physical infirmities or cause pain. In these situations, participants did frequently have their daughters-in-law fetch for them because they

were physically unable. Unmarried, adolescent women occasionally reported collecting water for the household, as their movements were less limited than young married women's, but they often were nervous of collecting water if the water source was not private and at the house. They expressed concerns that if they had to travel into the village to access a central and shared water source, or if they were seen out and about, their reputation and their marriageability would suffer.

Women's household tasks

As shown in Figure 1, household responsibilities also served to limit water insecurity, both by creating demand for water in excess of the ability to easily fetch it, and by creating time constraints in a woman's day. Participants reported that women have the responsibility for the majority of all household work, even for women involved in income-generating activities. The exceptions were a few adolescents who were still completing school and who reported that as their primary tasks were to study. Those participants did not have household chores, but those tasks were still completed women in the household.

Women reported that fetching water was among their household responsibilities. Fetching water for the household was important not only for hygiene and drinking, but also to successfully complete other household chores or activities, such as cooking, cleaning, laundry, and caring for young children and elderly dependents. The number of tasks that women were expected to complete severely limited their time; a few participants reported that if they spent too long traveling to the water source or bathing, they might face conflict or reprisals at home if chores were not completed. Husbands would be unhappy if dinner was not ready, and RMW and MW faced shame and reprimands if they were seen by outsiders while collecting water. Under these circumstances, participants reported facing consequences within the home due to water

collection, even when sufficient quantities of water were collected. They also worried about leaving young children unaccompanied while they were out of the house bathing or collecting water. These concerns were exacerbated if women did not have support within the home. A woman's experience of water insecurity often depended on whether or not she had other women within the household to help her carry out her tasks. Social support ameliorated the contributors to insecurity, while a lack of support exacerbated them. The presence of other women was therefore an adaptive response to sociocultural barriers to water security. Women without supportive in-laws expressed greater distress over water collection competing with household tasks.

> *"My children would be crying while I am taking bath, and so I somehow take bath quickly and come back…Because of the children, I take bath quickly. And once I am back, I will feed them, I will give them to eat, and I will have to serve food to my husband. Many responsibilities…I have to manage many things, as I am alone." IDI, MW, Private Tubewell*

One recently married women expressed a desire for her to brother-in-law to marry, because a sister-in-law would make her life easier. She would have another woman in the house to keep her company and to share the workload.

> *"I will have a younger sister-in-law…We will live together, we will together work." (IDI, RMW, Private Source, Unknown Type.*

Other women present in the household can help complete all of the chores expected of women and are able to watch children during bathing or water fetching..

The problems of water insecurity, especially in households without multiple women to support each other, were exacerbated for participants who did not have a private water source at

their home or compound Those participants required additional time in the day to walk to the water source, whether that source was a river nearby or a shared tubewell in the village, and to wait in line to pump water. In these situations, participants spent more time collecting water and had to carry heavy loads of water back to their homes. They reported that this took a significant amount of time and made it very hard to complete household tasks.

Menstruation taboos

Another contributor to water insecurity shown in Figure 1 was the religious beliefs concerning menstruation that both created a need for water and inhibited the ability to access water. Upon the start of each menstrual cycle, participants reported having to take an immediate purifying bath before they were permitted to touch anything in the household, including food, their husbands, their children, and most water sources. Traditions concerning menstruation therefore directly contributed to the sociocultural experience of water insecurity for women in the region.

The need for immediate bathing created challenges for participants regardless of their reported water source. Participants who had tubewells at their homes were not permitted to touch the tubewell during menstruation until after they had bathed, so they had to ask another woman in the house to accompany them, pump the water, and then hand them the clean clothes which they were not permitted to touch until after their bath. Participants who used ponds for bathing similarly had to request another woman to accompany them to bathe so that they could carry their clean clothes. If the pond was not private and others were using the source, the women had to wait for them to depart the area before bathing, especially if they were men..

These difficulties worsened at night. Because women were not permitted to touch their husbands until the completion of their ritual bath, women had to leave their shared beds and

either bathe immediately, requiring them to wake someone else in the household to help them, or they had to sleep on a mat until someone woke to help them in the morning. Some married women reported social considerations and consequences of beginning menstruation at night: one married woman reported that her husband became annoyed with her if she began her cycle at night. Several women reported that their decision-making on whether or not they woke up an in-law to help them frequently depended on whether or not they felt their mother- or sister-in-law would be annoyed. Unmarried women reported less tension over this decision, as they lived in the house of their mother as opposed to their mother-in-law. Those whose primary water source was a pond reported waiting until morning more often, as they did not want to leave their homes to go to the pond during the night. These concerns were shared across all life stages; OW who no longer menstruated reported having experienced the same inconveniences before menopause.

Participants reported embarrassment and shame if people knew that they were menstruating, but ritual baths presented difficulties in disguising menstruation. One participant was embarrassed for her father-in-law to know that she was menstruating; to hide her menses, she felt the need to lie.

> *"Father-in-law would be concerned why I took bath at night, I could catch a cold. So I lie to him that I had been to the backyard and I stepped on dog shit, hence bathed." (IDI, MW, Private Tubewell)*

In addition to the technical difficulties of the ritual bath, menstruation presented additional privacy concerns as a result of the taboo and shame associated with it. Not only did women need to bathe in private and away from men, but they needed privacy in order to wash menstrual cloths. Menstrual taboos contribute to a feeling of shame while menstruating, and many participants did not want others to see their stained menstrual cloths while they were being

washed or dried, as they felt others would feel disgust, especially if they were near a source of drinking water. After the ritual bath had taken place, participants did not report further restrictions on touching the water source, except in one village where the water source was located in the temple itself. Women were not permitted to enter the temple at any time during their menses, presenting an insurmountable cultural barrier that precluded physical access. However, even after ritual baths had occurred, women still felt greater needs for privacy at water source when bathing or cleaning menstrual cloths. Aa lack of privacy at the water source meant that women were frequently unwilling to take care of their hygienic needs. The lack of social access was generated by privacy concerns that ultimately prohibited women from having physical access. The water source was present and available, but the shame of menstruation trumped the need for hygienic care if the source was not sufficiently private.

External, unsystematic threats to water access by others

In addition to the socio-cultural traditions shown in figure 1 that create water insecurity for women, participants also reported how individual behaviors affected their ability to safely access water of sufficient quality. Members of communities exhibited individual behaviors rather than culturally mandated traditions that affected the quality of water at the source and the ability of women to experience physical safety and comfort at the source. These complaints were expressed largely by participants who did not collect their water from private sources, either because they did not have private sources, or because the private source was polluted and the quality was perceived to be insufficient.

One concern was that if the water source was not near the house, danger could befall a woman on her way there. These fears increased at night; women feared leaving their homes at night because they might be attacked by a person or an animal, or they might encounter a ghost.

Because of these fears, many women refused to collect water at night. Instead, they stored water at home before dusk so that should water be needed during the night, it would be available without leaving the house. However, while women reported that fetching water at night was a concern, they did not consider having to store water as a concern, but rather as an obvious choice. These fears and behaviors did depend on life stage and geographic context. OW were less likely to be afraid of robbers for themselves, but were concerned for their daughters and daughters-in-laws. Participants in jungle environments were more likely to be afraid of animal attacks. The few participants who were not afraid to collect water at night had private water sources, with clear, lighted paths from their doors. Fear of going out during the night also manifested when discussing the need to urinate; participants reported depriving themselves of water at night, even if it were available in their homes, to avoid having the urge to urinate at night. A lack of access to a safe space to urinate at night also contributed to the experience of water insecurity, regardless of distance to a water source.

Some women told stories of facing harassment at the water source. One participant reported that she did not collect drinking water from the source near her home because boys from the village would sit by the water tank, drink liquor, and spit and urinate in the tank. She had concerns for the water quality because the boys were polluting the supply, and she did not want to go near the boys to collect water. She briefly collected water from the school in her village, but it did not taste good. Instead, she traveled to another village to collect drinking water from the tubewell there, but she faced social repercussion from hostile villagers. She faced water insecurity on two fronts; the quality of the water she had nearby was not acceptable, but she faced a lack of social access when collecting a better quality of water elsewhere. She therefore had compounding issues when it came to accessing water. Had the water quality easily available

to her been better, and if boys did not loiter near her water source, she would not have had to travel to another village, and she would not have faced harassment from a hostile population.

> *"The villagers are getting angry. They are getting angry even when we are fetching water. If we are shaking the tube well, they are getting angry. They say it is our village tube well, it will get damaged, why you are taking water from here. And they say you will damage the tube well and we will be in trouble. They are saying like that." IDI, UMW, Unknown Private Source (prefers other sources)*

Women of all life stages expressed frustration with the behavior of other individuals who acted in ways that polluted their water sources. Participants who relied on rivers or ponds as their primary source were concerned with the quality because people defecated or bathed in the body of water, disposed of garbage in the water, or they brought their animals to bathe there. While they were usually willing to do laundry or bathe in the polluted water, they registered concern that they would catch diseases if they drank it. One participant expressed disgust over the quality of water in the pond but had no alternative. She had no choice but to use the water for washing, bathing, cooking, and drinking.

> *"We do the washing near the pond. So many dirt, urine, water garbage and dead animals are going to the water. People are dying and we are consuming also that water." IDI, MW, Pond*

In addition to people defecating and bathing in water sources and bringing their animals to bathe there, they also reported that people actively contribute garbage to their water sources. One woman has access to a pond at her home, but reported using a tubewell shared with the entire village instead, despite the lines. However, she still remained concerned that the filthy pond was contaminating the water in the tubewell.

"I mean wastes. Even after, telling them so many times, they put their garbage there. Whatever waste, they collect, they put it there." IDI, MW, Shared Tubewell

Participants reported a feeling of disgust for water sources after others had polluted them through garbage disposal, defecation, urination, and laundry, and several said that their water was no longer safe to drink and was making them sick. They expressed frustration especially if these behaviors caused them to seek out a less convenient source, or if there were no other sources available. The actions of others therefore caused some participants to perceive a lack of safety in the quality of their water, and some participants to perceive a lack of safety in the collection of their water.

Discussion

This study investigated the sociocultural influences on water insecurity among women in Orisha, India. Study results show that even participants who live in households with privately-owned, improved water sources and perceive their water to be high quality experienced water insecurity. Numerous social limitations were reported that restricted women's access to water, in addition to traditionally defined barriers to water, such as water quality, the type of water source, and the distance of water sources from the home. Women described multiple and compounding sociocultural barriers.

Research on water insecurity is increasingly recognizing the sociocultural processes and power dynamics that contribute to water insecurity and the psychological and relational impacts resulting from that water insecurity. Qualitative research has contributed to the development and improvement of quantitative tools to measure water insecurity that incorporate these social components of water insecurity (Wutich, 2008, 2009, and 2017; Tsai, 2016). Qualitative work is crucial not only to the creation of quantitative tools to measure water insecurity at the household level, including social conditions in addition to quantity and quality, but also for understanding the influences that contribute to it.

A main contributor to water insecurity among women in Orisha were gender norms surrounding their behavior. Women married less than ten years were expected to stay within the households of their in-laws and lacked freedom of movement in their communities, forcing them to rely on others for water collection. This lack of freedom of movement is a cultural expectation that is not unique to this study population. However, household chores and responsibility for domestic tasks, the other expectation of women's behavior, has been found in the literature to contribute to water insecurity in numerous other regions and countries (Blackden and Woden,

2006, Razavi, 2015, and Balivan, 2017). Domestic work and childcare, usually assigned to women, makes women responsible for both water fetching and the domestic tasks that require water use. Women therefore have the responsibility of physically collecting water, a task made more onerous if water sources are not close to the home or not private, and they bear the consequences if insufficient quantities can be collected when needed. This study indicates that water interventions should either be sensitive to the realities of women in communities, drawing on their experience and recommendations in planning, or should incorporate transformative approaches that seek to engage men in domestic work. One example is work being done for the project *Indashyikirwa* by CARE Rwanda, the Rwanda Women's Network, and Rwanda Men's Resource Center, which challenges gender roles and how tasks are allotted both at the level of the community and the household (Stern, 2017). Through the inclusion of men in household chores and water collection, the burden of household water insecurity can alleviated for women and reduced for the entire household. Mothers-in-law within households should also be included in interventions that encourage cultural changes, as gender roles and limitations on women in this context are enforced by men and by older women of the households.

Menstrual taboos similarly were found to limit access to water and to place additional demands on the degree of privacy demanded for women to be comfortable at the water source. Upon beginning menstruation, women were not permitted to touch food, their husbands, their beds, or their water source before taking a ritual bath. Their paradoxical position of one taboo both preventing them from touching water sources and requiring them to use water from those sources created significant difficulties for women. If menstruation began at night, it also deprived them of sleep, as many women would have to leave their beds and wait until members of the household woke to fetch them water. Menstruation taboos exist in many forms in different

cultures, and should also be incorporated in intervention design, whether through engineering or through efforts to destigmatize menstruation (Kumar, 2011, Sommer, 2013 and 2015).

The third contributor to water insecurity was that women frequently found themselves unable to access water because of actions by individuals that were not informed by community norms or standards of behavior. Members of communities deterred women from accessing water by harassing them when they collected water and making them feel unwelcome or unsafe at the water source. While this harassment may not have posed a physical danger to women, it still affected their perception of the safety of the water source and their willingness to go to the water source, impacting their water security. Community members also polluted water supplies through urination, defecation, and garbage disposal. Many of these contributors were described by participants without access to water at their homes, and therefore installation of private sources could help solve the problem. New water sources can also be sensitively engineered in ways that ameliorate some of the external threats to water supplies. Participants commonly revealed a fear of the dark, and the human and animal predators that reside in the dark when probed on issues related to urination and defecation. They did not report as many of these concerns or fears when discussing water because they preempted the need for nighttime water collection through storing water in their homes. However, researchers have found for decades that storing water in the home introduces considerable contamination into water supplies (Mølbak, 1989; Clasen, 2003; Baker, 2013; Shields, 2015). Reported behaviors in this study are consistent with behaviors that have created microbiological contamination in other studies. Women might therefore be sacrificing their water quality and potentially harming the health of their families to meet their immediate needs for physical safety when collecting water. Future interventions and construction of improved water sources at the household level should, based

upon this data, conduct formative research to see if additional interventions such as installing light sources or distinct pathways to water sources might lead to higher usage rates.

These barriers and the subsequent experiences of water created anxiety and stress in the lives of participants. Research in Bolivia has found that women experiencing similar anxieties also use less than the recommended daily requirement of water (Wutich, 2008). However, Wutich found that inadequate water available was not the cause of these anxieties as much as distress over the social and economic inequality related to water access. This was not found in Orisha, where notably, the only economic barriers to water access were whether or not families could pay for improvements to or installations of private water sources; participants were not charged fees for water collection or use and therefore did not need to budget for water expenditures.

For all sociocultural contributors to water insecurity found in these data, social support was found to ameliorate many of these negative experiences and improve women's access to water. In detailing concerns about water, women revealed concerns over the lack of autonomy and social support they had within their households. Participants without social support, particularly that of other women, reported experiencing more challenges to water security. Relying on other women was essentially an adaptive behavior that mitigates both causes and effects of water insecurity. Women reliant on others for water access may have adequate access to water in the form of stored water or water collected for them but are still unable to access the water source in the event that their family members are out of town or are unable to fetch water for them. Barriers that prevent women from accessing water sources required the help of others in water collection for household use. Good relationships with other members of the household are therefore crucial to a woman's experience of water security in this context. Women without

the help they need discussed adaptive behaviors such as depriving themselves of the water they need; previous studies have argued that this behavior indicates a lack of adequacy in the water supply and is a dimension of water insecurity (Stevenson, 2016). Stevenson's research took place in a water scarce region of Ethiopia, and yet women in both Ethiopia and Orisha described similar behaviors. Water use is restricted even when physically available.

Conclusion

Women in Orisha revealed experiencing water insecurity despite the high coverage of improved water sources throughout the region. The specific ways in which sociocultural factors, of which gender is an important part, affect the ability to safely access water sources must be considered in future water interventions. Additional research should be undertaken to explore this issue in other sociocultural contexts, and future measurements of water access should incorporate the growing finding in research that water insecurity cannot be measured by the physical presence of water sources.

Future water interventions should consider the sociocultural limitations of women of all ages and life stages, as the reported concerns related to water differed between them. The needs of a woman in Orisha evolve not only over the course of her life and her status in her family and the family of her in-laws, but they also shift over the course of one month if she is menstruating, and these frequently shifting needs should be reflected in intervention design. Interventions must not focus only on the availability of water, as availability does not guarantee access.Interventions furthermore should either be transformative, seeking to make cultural changes that either allow women greater freedom or reduced demands on their behavior, or they must attempt to mitigate sociocultural barriers where possible through better engineering of water sources in ways sensitive to existing cultural requirements. It is possible that understanding contributors to

water insecurity in areas with sufficient water in the environment might help when creating culturally sensitive water interventions in areas with water scarcity. This study has shown that in the context of Orisha, installing a private water source at a household compound is insufficient for guaranteeing access to all members of the household. In a region with widespread water resources that users do not have to pay for, women still report barriers to use and access. By acknowledging and accommodating sociocultural barriers, interventions can be designed more effectively to successfully improve access. Research in the future should extend beyond focusing on water-scarce regions; by deliberately choosing populations with high coverage of improved water sources, researchers can more effectively isolate and identify what sociocultural barriers may exist. Greater knowledge of those barriers may help future programming in all facets of water security..

Study Strengths and Limitations

The inclusion of various methodologies allowed for the validation of data. Interviews were followed by focus group discussions, which allowed focus group participants to verify or refute findings from in-depth interviews. Participants were asked about experiences or challenges mentioned in interviews to solicit feedback and ensure that the prior responses had not been misinterpreted and were indicative of community normative behaviors. The quantity of data collected as a result of the number of interviews conducted from a variety of contexts enabled data triangulation. The qualitative approach facilitated “rich” data; participants gave narratives around concerns that allow a complete view of their experiences (Maxwell, 2013). Including women from different life stages, different geographic contexts, and with variable access to water sources and latrines allowed the comparison of data across different groups and increased the external validity pertaining to women in the region.

Recruitment for focus groups was done by a gatekeeper, which could have introduced selection bias into the study. Unfortunately, no recently married women participated in focus group discussions; however, their experiences were captured in interviews, so it is unlikely that their lack of participation in the focus groups altered the results.

Men and children were excluded from the data collection, as were urban residents, which is a limitation of this study as these perspectives were not captured. The region is largely Hindu, so cultural traditions may vary in other areas with populations that observe different religions. Additional research should be undertaken among these other populations to investigate if the challenges described by the rural women of Odisha are representative of other water-abundant regions.

Chapter 4: Public Health Implications

Access to safe water is a public health issue of vast importance, given its impact on quality of life and disease prevention. The United Nations has identified water as a crucial human need, and Sustainable Development Goal (SDG) 6 has identified achieving "availability and sustainable management of water and sanitation for all" as a global goal to be achieved by 2030 (Sustainable Development Goals, n.d.). SDG-6, target 6.1, which specifically addresses drinking water is to "achieve universal and equitable access to safe and affordable drinking water for all" by 2030 (Sustainable Development Goals, n.d.). The 2030 Agenda provides "normative interpretations" of the terms contained within the goal. The results of this study have implications for how those terms should be interpreted to fully understand "access" to drinking water (WASH in the 2030 Agenda, 2017).

WASH in the 2030 agenda states that access "implies sufficient water to meet domestic needs is reliably available close to home" (2017). However, it neglects to include the possibility of barriers to collecting that water, such as the inability to leave the household or to touch the water source, both of which are shown in Odisha to restrict access. The word safe is used in target 6.1 only to define the quality of the water and the absence of pathogens and chemicals, with no regard for the possibility that the journey to the water source may be unsafe. However, in this study, safety was not only an issue because of the reported pollutants in the water source, but also because of harassment of others and fear of animals.

To fully address the issue of safety in Odisha, a variety of strategies are needed to improve both the safety of the water and the safety of the journey to the water source. For the former, community members could be trained on how to effectively treat their water. They could also be educated on the fact that the water from their improved water sources is still healthier

than water from ponds and richer, even if the water is red and less appealing to taste. Adequate garbage disposal measures could be implemented to discourage people from disposing of garbage in water sources such as rivers or ponds, and wells could be covered to provide a barrier to those who would urinate, spit, or put garbage in them. Sanitation interventions such as latrine building might also reduce the pollution of the water. These interventions might lead not only to greater progress toward SDG 6.1, but a positive health impact in the community.

Safety issues concerning the journey to the water source may be more difficult to address. Protection from animals at night could be increased through fencing, but that could have not only cultural implications for the community as a whole, but also economic consequences for agrarian people who raise animals at their home. Installing lighting and distinct paths may improve the issue, as the fear of animals stemmed largely from fear of the dark. However, before addressing this issue, considerable formative research specific to this resource limited settings is needed. One of the other concerns, harassment from community members, could be addressed in a variety of methods. Installing more community water points that are regularly checked for quality would mean that members of the community that had to travel to another village for water would have a source more locally available, and thus avoid antagonism from people in other villages who do not want them using their sources. Putting private water sources behind houses instead of in front of them could eliminate the opportunity for local boys to harass the girls collecting water, and educational programming might encourage boys to treat girls with more respect. These also would require formative research and community involvement before implementing any a possible solution. Addressing these issues will probably not impact SDG progress, as these issues are not outlined in SDG indicators, but they will improve the experience of the women who bear responsibility for water collection.

Though barriers to water access include sociocultural barriers, as shown in this research, the WHO/UNICEF Joint Monitoring Programme (JMP), which is responsible for the management of global water data, uses indicators to measure access that do not include these barriers. Based on these findings from Odisha, current indicators therefore may overestimate water access, leading to incorrect conclusions drawn when measuring progress toward SDG-6. As shown in Figure 2, JMP water indicators 1-5 show the proportion of the population that use improved, piped improved, non-piped improved, unimproved, and surface water sources. Indicators 6-7, which cover the time taken to collect water pertain to the distance to water sources or time spent waiting to collect at shared water sources. Indicators 8-10 come closest to incorporating barriers to water access found in this study, but they fail to provide suitable language to encapsulate the sociocultural context. For example, "Water sources which are available when needed" could be interpreted a function of the climate and weather patterns, instead of a result of menstruation taboos; unless there are questions specifically targeting menstruation, this issue will not come up on routine data collection. Water users also may not realize that storing water for the night time means they are not actually accessing their water source during substantial hours of the day. Indicators that could be added to reflect these issues might include, "The proportion of the population that uses improved water sources improved water sources which are safe and available at all hours," or "The proportion of the population that uses water sources for hygienic purposes not exceeding 30 minutes wait time for privacy."

Water	The proportion of the population that uses…
W_1	improved drinking water sources
W_2	piped improved drinking water sources
W_3	non-piped improved drinking water sources
W_4	unimproved drinking water sources
W_5	no drinking water facility (surface water)
W_6	improved water sources exceeding 30 minutes collection time (limited drinking water services)
W_7	improved water sources not exceeding 30 minutes collection time (basic drinking water services[2])
W_8	improved water sources which are accessible on premises
W_9	improved water sources which are available when needed
W_{10}	improved water sources which are free from contamination
W_{11}	safely managed drinking water services[3]

Figure 2: Joint Monitoring Programme, 2017

SDG target 6.2, which addresses mostly sanitation and hygiene, more specifically address concerns of women, as it calls for the global WASH community to pay "special attention to the needs of women and girls," which "implies reducing the burden of water collection and enabling women and girls to manage sanitation and hygiene needs with dignity" (JMP, 2017). This aligns with SDG-5, "To achieve gender equality and empower all women and girls" which, as a part of gender equality calls for "the promotion of shared responsibility within the household" (Sustainable Development Knowledge Platform, n.d). However, the sanitation and hygiene indicators used by JMP do not mention gender or culture, nor do they mention the need for menstrual hygiene management (WASH in the 2030 Agenda, 2017). This research clearly demonstrates that when assessing water security, privacy, which is not a consideration in global indicators of water access, is a crucial component to women's experiences of water use with implications for their hygienic behaviors. Privacy when needed to accommodate social constraints therefore should be incorporated into indicators for SDG 6.2. However, private sources for women may not be feasible given additional costs, so there must also be behavioral components on a community level to support the destigmatization of menstruation; reducing the shame of menstruation could possibly result in fewer additional privacy needs during menses.

One of the main public health implications is therefore that JMP indicators, which are used on a global scale to measure progress toward universal water and sanitation, may not reflect the reality of access on the ground in multiple geographic contexts. The existence of an improved, nearby water source does not automatically result in the use of that source. This study showed that many participants use different water sources for different purposes, and data collected may not demonstrate that. Study results show that women often described having a private borehole in their home, but also described using a variety of other water sources for various tasks; this demonstrates the importance of the use of qualitative research for a full understanding of the context of water access issues. The degree to which the data are reflective of the realities of water access is further complicated by collecting data from community members not primarily responsible for household water collection. To adequately judge global progress toward the SDGs, indicators incorporating sociocultural barriers should be developed and used, and data should be collected from men and women of various castes, educational levels, and economic strata to limit the bias that might result from surveys in which one person from a household, who may not understand the full scope of issues surrounding wash, is the only person surveyed.

In addition to identifying sociocultural barriers to water access and the importance of including different perspectives in data collection, this study has also shown how important it is to include participants of all age groups in data collection, as concerns vary greatly across life stages. In Odisha, for example, young women who are physically stronger and healthier are less likely to be the people most responsible for water collection. Instead, that arduous burden falls upon women who have been married for many years and have borne several children. The physical burden therefore falls upon women that may already have physical limitations. Research

done into the physical distress caused by water collection has not focused on older women, which is a gap in research in this field. Older women with previously existing physical limitations or health problems may find those problems exacerbated by water collection, and yet the data do not exist to confirm or deny that hypothesis.

Older women may suffer from the physical stress associated with water collection, but they are also partly responsible for perpetuating the traditions that result in their responsibility for water collection. Mothers-in-law have more power within their families than younger women, with considerable influence over their daughters-in-law. In Odisha, older women help enforce the very traditions which cause mental distress for younger women and are possibly physical damaging to themselves. To eliminate the tradition, the stigma of young married women being seen outside the house would have to be addressed at a community and household level. This could have positive results for the family as a whole, as young women would have additional freedoms and suffer less from boredom and loneliness, and older women could have support in arduous tasks that require leaving the home. It would also enable younger women to potentially involve themselves in income-generating activities, increasing their household income. To address this stigma, educational programming would need to target all segments of the population, including mothers-in-law, younger women, men, girls, and boys.

Water access and gender were both deemed to be of global significance, as shown by their inclusion in the SDGs. However, they are not mutually exclusive issues, and measurement of water access should be sensitive to gender issues. Any investigation into water security should incorporate the idea that barriers to water security may be related to the sociocultural context. As actors in the water sector working to expand access design interventions or measure water

access. In order to achieve the Sustainable Development Goals, an integrated approach to gender and water should be implemented in intervention design.

References

Andajani-Sutjahjo, Sari, Siriporn Chirawatkul, & Erico Saito. (2015). Gender and Water in Northeast Thailand: Inequalities and Women's Realities. *Journal of International Women's Studies* 16 (2): 200–212

Baliyan, K (2017). Unequal Sharing of Domestic Work: A Time Use Study of Farm Households in Western Uttar Pradesh. Indian Journal of Gender Studies 24(3), 341-359

Blackden, CM and Woden, Q. (2006). Gender, Time Use, and Poverty in Sub-Saharan Africa. World Bank. http://siteresources.worldbank.org/INTAFRREGTOPGENDER/Resources/gender_time_use_pov.pdf

Borgatti, S (1998). Elicitation techniques for cultural domain analysis. The Ethnographer's Toolkit, Vol 3. J. Schensul and M LeCompte. Walnut Cree, CA: Altimira Press.

Cairncross, J. Cuff, L. (1987) Water use and health in Mueda, Mozambique. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 81(1) 51-54 https://doi.org/10.1016/0035-9203(87)90280-X

Cheng, J, Schuster-Wallace, C. et al. (2012). An ecological quantification of the relationships between water, sanitation and infant, child, and maternal mortality. *Environmental Health* 11(4). https://doi.org/10.1186/1476-069X-11-4

Clasen, T., Boisson, S., Routray, P., Torondel, Belen., Bell, Melissa., Cumming, Oliver., Ensink, Jeroen., Freeman, Matthew., Jenkins, Marion., Odagiri, Mitsunori., Ray, Subhajyoti., Sinha, Antara., Suar, Mrutyunjay., Schmidt., Wolf-Peter. (2014). Effectiveness of a rural sanitation programme on diarrhoea, soil-transmitted helminth infection, and child malnutrition in Odisha, India: a cluster-randomised trial. *The Lancet*. 2(11) e645-3653. doi: https://doi.org/10.1016/S2214-109X(14)70307-9

Clasen, T, and Haller, L. (2008) Water quality interventions to prevent diarrhoea: cost and cost-effectiveness. World Health Organization. Retrieved from http://www.who.int/water_sanitation_health/economic/prevent_diarrhoea.pdf

Coelho, A., Adair, J., & Mocellin, J. (2004). Psychological responses to drought in northeastern Brazil. Revista Interamericana de Psicologia, 38(1), 95–103.

Hennessy, T. W., Ritter, T. et al. (2008). The Relationship Between In-Home Water Service and the Risk of Respiratory Tract, Skin, and Gastrointestinal Tract Infections Among Rural Alaska Natives. *American Journal of Public Health*, *98*(11), 2072–2078. http://doi.org/10.2105/AJPH.2007.115618

Inter-agency Task Force on Gender and Water (2006). Gender, water and sanitation: A policy brief. *Water for Life.* Retrieved from http://www.un.org/waterforlifedecade/pdf/un_water_policy_brief_2_gender.pdf

International Institute of Population Sciences. National Family Health Survey-4 (2016). District Fact Sheet: Puri Odisha. International Institute of Population Sciences; Mumbai, India.

Ivens, S. (2008). Does increased water access empower women? Development 51 (1) 63-67. https://doi.org/10.1057/palgrave.development.1100458

James, A.J., Verhagen, J., Van Wijk, C., Nanavaty, R., Parikh, M. and Bhatt, M. (2002), Transforming time into money using water: A participatory study of economics and gender in rural India. Natural Resources Forum, 26: 205–217. doi:10.1111/0165-0203.00022

Joint Monitoring Programme (2018). JMP Methodology: 2017 Update & SDG Baselines. Retrieved from washdata.org.

Joshi, A., Prasad, S., Kasav, J. B., Segan, M., & Singh, A. K. (2014). Water and Sanitation Hygiene Knowledge Attitude Practice in Urban Slum Settings. *Global Journal of Health Science*, *6*(2), 23–34. http://doi.org/10.5539/gjhs.v6n2p23

Kirchner, S. (August 2007). Hell on earth: Systematic rape in Eastern Congo. *Journal of Humanitarian Assistance* . http://jha.ac/2007/08/06/hell-on-earthsystematic-rape-in-eastern-congo/

Kumar, A., and Srivastava, K. (2011). Cultural and Social Practices Regarding Menstruation Among Adolescent Girls. *Social Work in Public Health. 26(6),* 594-604. https://doi.org/10.1080/19371918.2010.525144

Lakshminarayanan, S., & Jayalakshmy, R. (2015). Diarrheal diseases among children in India: Current scenario and future perspectives. *Journal of Natural Science, Biology, and Medicine*, *6*(1), 24–28. http://doi.org/10.4103/0976-9668.149073

Lennon, S (2011). Fear and Anger: Perceptions of risk related to sexual violence against women linked to water and sanitation in in Delhi, India. Sanitation and Hygiene Applied Research for Equity (SHARE). http://violence-wash.lboro.ac.uk/vgw/Supporting-documents/VGW-1-Case-studies-Violence-and-WASH/Lennon-Fear-anger-India-WaterAid-2011.pdf

Mara, D., Lane, J., Scott, B., & Trouba, D. (2010). Sanitation and Health. *PLoS Medicine*, *7*(11), e1000363. http://doi.org/10.1371/journal.pmed.1000363

Pearson, A., Zwickle, A., Namanya, J., Rzotkiewicz, A., and Mwita, Emiliana. (2016). Seasonal shifts in primary water source type: a comparison of largely pastoral communities in Uganda and Tanzania. *International Journal of Environmental Research and Public Health*. 13(2) 169. doi: 10.3390/ijerph13020169

Puri Religion Census. Available online: http://www.census2011.co.in/data/religion/district/411-puri.html.

Razavi, Shahra. (2015). Policy Brief No. 5: Redistributing Care Unpaid Care and Sustaining Quality Care Services: A Prerequisite for Gender Equality. UN Women. Located in http://www.unwomen.org/-/media/headquarters/attachments/sections/library/publications/2016/unwomen-policybrief05-redistributingunpaidcareandsustainingqualitycareservices-en.pdf?la=en&vs=1254

Routray, P., Schmidt, W.-P., Boisson, S., Clasen, T., & Jenkins, M. W. (2015). Socio-cultural and behavioural factors constraining latrine adoption in rural coastal Odisha: an exploratory qualitative study. *BMC Public Health*, *15*, 880. http://doi.org/10.1186/s12889-015-2206-3

Shah, A. (2002). Women, water, irrigation: respecting women's priorities. Economic and Political Weekly, 37, 4413e4420.

Siddiqui, Roomana, and Janak Pandey (2003). Coping with Environmental Stressors by Urban Slum Dwellers. *Environment and Behavior* 35(5):589–604.

Sievers, D., Kelly, G., and Balasubramanian, S. (2016) Evidence Series: Menstrual Hygiene Management. Washington, D.C.: Population Services International.

Sommer, M., & Sahin, M. (2013). Overcoming the Taboo: Advancing the Global Agenda for Menstrual Hygiene Management for Schoolgirls. *American Journal of Public Health*, *103*(9), 1556–1559. http://doi.org/10.2105/AJPH.2013.301374

Sommer, M., Hirsch, J. S., Nathanson, C., & Parker, R. G. (2015). Comfortably, Safely, and Without Shame: Defining Menstrual Hygiene Management as a Public Health Issue. *American Journal of Public Health*, *105*(7), 1302–1311. http://doi.org/10.2105/AJPH.2014.302525

Sorenson, S, Morssink, C, Campos, PA. (2011) Safe access to water in low income countries: Water fetching in current times. *Social Science and Medicine*. 72(9) 1522-1526. doi: https://doi.org/10.1016/j.socscimed.2011.03.010

Steinmann, P., Keiser, J., Bos, R., Tanner, M., & Utzinger, J. (2006). Schistosomiasis and water resources development: systematic review, meta-analysis, and estimates of people at risk. The Lancet Infectious Diseases, 6, 411e425.

Stevenson EGJ, Ambelu A, Caruso BA, Tesfaye Y, Freeman MC (2016) Community Water Improvement, Household Water Insecurity, and Women's Psychological Distress: An Intervention and Control Study in Ethiopia. PLoS ONE 11(4): e0153432. https://doi.org/10.1371/journal.pone.0153432

Stevenson, EGJ, Greene, L, Maes, K, Ambelu, A, Tesfaye,Y.A., Rheingans, R, Hadley, C. (2012). Water insecurity in 3 dimensions: An anthropological perspective on water and women's psychosocial distress in Ethiopia. *Social Science and Medicine*. 75(2) 392-400 https://doi.org/10.1016/j.socscimed.2012.03.022

Subbaraman R., Shitole, S., Shitole, T., Sawant, K., O'Brien, J., Bloom, D.E., and Patil-Deshmukh, A. (2013). The social ecology of water in a Mumbai slum: failures in water quality, quantity, and reliability. *BMC Public Health*. 13:173. doi: 10.1186/1471-2458-13-173.

Sustainable Development Knowledge Platform (n.d.) Sustainable Development Goal 6. https://sustainabledevelopment.un.org/sdg6

Thomas, T. K., Ritter, T., Bruden, D., Bruce, M., Byrd, K., Goldberger, R., … Hennessy, T. (2016). Impact of providing in-home water service on the rates of infectious diseases: results from four communities in Western Alaska. *Journal of Water and Health, 14*(1), 132–141. http://doi.org/10.2166/wh.2015.110

Tsai, A. C., Kakuhikire, B., Mushavi, R., Vořechovská, D., Perkins, J. M., McDonough, A. Q., & Bangsberg, D. R. (2016). Population-Based Study of Intra-Household Gender Differences in Water Insecurity: Reliability and Validity of a Survey Instrument for Use in Rural Uganda. *Journal of Water and Health, 14*(2), 280–292. http://doi.org/10.2166/wh.2015.165

UNICEF (2015) Water, sanitation, and hygiene: The case for support. Retrieved from https://www.unicef.org/publicpartnerships/files/WASHTheCaseForSupport.pdf

World Health Organization (WHO) and the United Nations Children's Fund (UNICEF). (2012). Progress on Drinking Water, Sanitation and Hygiene: 2012 Update and SDG Baselines. Geneva. Licence. https://www.unicef.org/media/files/JMPreport2012.pdf

World Health Organization (WHO) and the United Nations Children's Fund (UNICEF). (2017). Progress on Drinking Water, Sanitation and Hygiene: 2017 Update and SDG Baselines. Geneva. Licence: http://www.who.int/mediacentre/news/releases/2017/launch-version-report-jmp-water-sanitation-hygiene.pdf

World Health Organization (WHO) and the United Nation's Children's Fund (UNICEF). (2017). WASH in the 2030 Agenda: New global indicators for drinking water, sanitation and hygiene). Retrieved from washdata.org

World Health Organization (2017). Diarrhoeal Disease Fact Sheet. Retrieved from http://www.who.int/mediacentre/factsheets/fs330/en/

World Health Organization (2017). Drinking Water Fact Sheet. Retrieved from http://www.who.int/mediacentre/factsheets/fs391/en/

Wutich, A, Ragsdale, K. (2008). Water insecurity and emotional distress: coping with supply, access, and seasonable variability of water in a Bolivian squatter settlement. *Social Science and Medicine* 67 (12): 2116-25. doi: 10.1016/j.socscimed.2008.09.042.

Wutich, A. (2009), Intrahousehold Disparities in Women and Men's Experiences of Water Insecurity and Emotional Distress in Urban Bolivia. Medical Anthropology Quarterly, 23: 436–454. doi:10.1111/j.1548-1387.2009.01

Wutich, A., Budds, J., Eichelberger, L., Geere, J., Harris, LM., Horney, JA., Jepson, W., Norman, E., O'Reilly, K., Pearson, AL., Shah, SH., Shinn, J., Simpson, K., Staddon, C., Stoler, J., Teodorom, MP., Young, SL (2017) Advancing methods for research on household water insecurity: Studying entitlements and capabilities, socio-cultural dynamics, and political processes, institutions and governance. *Journal of Water Insecurity Vol 2*. doi: 10.1016/j.wasec.2017.09.001

Appendices

Appendix A: Interview Guide

PART A. To Be filled out by RA at start of Activity					
A010.	Community Name: _____	A015.	Community ID#: _____	A017.	Hamlet?: ☐ 1. Yes ☐ 2. No
A020.	Activity Start time: __ __ : __ __ pm / am	A025.	Activity End time: __ __ : __ __ pm / am		
A030.	RA Initials: _____	A040.	Consent Provided: ☐ 1. Yes ☐ 2. No		
A045.	Recorder ID:_____	A046.	Recording #_____		
A050.	HH ID#: _____ (from list)	A055.	Date: (y/d/m) __ __ __ __ / __ __ /__ __		
A060.	Participant Type: ☐ 1. Over 18, unmarried, living with parents ☐ 2. Recently married (three years or less) ☐ 3. Married over 3 years with children ☐ 4. Older woman (older than 49 years)				

PART B. To be asked of and answered by participant			
B010.	Age: _____ →B010_1: RA: Explain if participant's age seems erroneously reported: _____		
B011.	Education: ☐ 1. None ☐ 5. Secondary Completed ☐ 2. Some Primary School ☐ 6. Some Tertiary / University ☐ 3. Primary Completed ☐ 7. Tertiary / University Completed ☐ 4. Some Secondary		
B020.	Number of years living in community: _____	B021.	Religion: _____
B022.	Caste: _____	B023.	Has BPL Card: ☐ 1. Yes ☐ 2. No
B030.	Marital Status (check one): ☐ 1. Unmarried ☐ 2. Married → B030_2. If Married, number of years married: _____ → B031. If Married, do you live with your husband ☐ 1. Yes, live with husband ☐ 2. No, husband works outside the home ☐ 3. No, Divorced →B030_3. If Divorced, # of years divorced: _____ ☐ 4. No, Separated →B030_4. If Separated, # of years separated: ____ ☐ 5. No, Widowed →B030_5. If Widowed, # of years widowed: _____		
B035.	Number of People in the HH: _____	B036.	Is it a joint family? ☐ 1. Yes ☐ 2. No
B040.	Who do you live with:		
	B040_11. Mother ☐ 1. Yes ☐ 2. No		
	B040_12. Father ☐ 1. Yes ☐ 2. No		
	B040_13. Brother / Cousin ☐ 1. Yes ☐ 2. No → If YES, how many BROTHERS live with you ____? COUSINS ____?		

	B040_14. Sister / Cousin ☐ 1. Yes ☐ 2. No → **If YES,** how many SISITERS live with you ____? COUSINS____?
	B040_21. Mother In-Law ☐ 1. Yes ☐ 2. No
	B040_22. Father in Law ☐ 1. Yes ☐ 2. No
	B040_23. Brother in-law ☐ 1. Yes ☐ 2. No → **If YES,** how many brothers-in-law live with you _____
	B040_24. Co-Sister in-law (married to brother in law) ☐ 1. Yes ☐ 2. No → **If YES,** how many sisters-in-law live with you _____
	B040_24. Sister in-law (Husband's sister) ☐ 1. Yes ☐ 2. No → **If YES,** how many sisters-in-law live with you _____
	B040_33. Daughter in Law ☐ 1. Yes ☐ 2. No → **If YES,** how many daughters-in-law live with you _____
	B040_88. Other ☐ 1. Yes ☐ 2. No → **B040_51 If yes,** please explain who and number _____ _____
B050.	Do you have any children? ☐ 1. Yes ☐ 2. No → **If No, SKIP to B070**

B060.	→ **If the participant has children**				
	1	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	2	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	3	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	4	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	5	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	6	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	7	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	8	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	9	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
B070.	Pregnancy Status: ☐ 1. Pregnant ☐ 2. NOT Pregnant. → **B070_01.** If Pregnant, Number of Months: _____				

PART C. Free listing, page 1	
1.	HOUSEHOLD CHORES
	1.
	2.

	3.
	4.
	5.
	6.
	7.
	8.
	9.
	10.
	11.
	12.
	13.
	14.
	15.

2.	Please list the CONCERNS / DIFFICULTIES do you or women like you in this community face?	
	Concerns/ Difficulties	Positive Reflections
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	8.	8.
	9.	9.
	10.	10.
	11.	11.
	12.	12.
	13.	13.
	14.	14.
	15.	15.

PART C. Free listing, page 2		
3.	Please list the concerns or difficulties do you or women like you in this community face related to <u>WATER</u>:	
	Concerns/ Difficulties	Positive Reflections
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	8.	8.
	9.	9.
	10.	10.
	11.	11.
	12.	12.
	13.	13.

	14.	14.
	15.	15.
	PROBE: Please list the concerns or difficulties related to WATER AT NIGHT.	
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	PROBE: Please list the concerns or difficulties related to WATER DURING MONSOON.	
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	PROBE: Please list the concerns or difficulties related to WATER WHEN PREGNANT.	
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	PROBE: Please list the concerns or difficulties related to WATER WHEN CARING FOR OTHERS (Babies, children, elders, ill in the family).	
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.

PART C. Free listing, page 3		
4.	Please list the concerns or difficulties do you or women like you in this community face related to URINATION:	
	Concerns/ Difficulties	Positive Reflections
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	8.	8.

	9.	9.
	10.	10.
	11.	11.
	12.	12.
	13.	13.
	14.	14.
	15.	15.
	PROBE: Please list the concerns or difficulties related to URINATION AT NIGHT.	
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	PROBE: Please list the concerns or difficulties related to URINATION DURING MONSOON.	
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	PROBE: Please list the concerns or difficulties related to URINATION WHEN PREGNANT.	
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	PROBE: Please list the concerns or difficulties related to the URINATION NEEDS OF THOSE YOU CARE FOR (Babies, children, elders, ill in the family)	
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.

PART C. Free listing, page 4		
5.	Please list the concerns or difficulties do you or women like you in this community face related to DEFECATION:	
	Concerns/ Difficulties	Positive Reflections
	1.	1.
	2.	2.
	3.	3.

	4.	4.
	5.	5.
	6.	6.
	7.	7.
	8.	8.
	9.	9.
	10.	10.
	11.	11.
	12.	12.
	13.	13.
	14.	14.
	15.	15.
	PROBE: Please list the concerns or difficulties related to DEFECATION AT NIGHT.	
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	PROBE: Please list the concerns or difficulties related to DEFECATION DURING MONSOON.	
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	PROBE: Please list the concerns or difficulties related to DEFECATION WHEN PREGNANT.	
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	PROBE: Please list the concerns or difficulties related to the DEFECATION NEEDS OF THOSE YOU CARE FOR (Babies, children, elders, ill in the family)	
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.

PART C. Free listing, page 5		
6.	Please list the concerns or difficulties do you or women like you in this community face related to MENSTRUATION:	
	Concerns/ Difficulties	Positive Reflections
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	8.	8.
	9.	9.
	10.	10.
	11.	11.
	12.	12.
	13.	13.
	14.	14.
	15.	15.
	PROBE: Please list the concerns or difficulties related to MENSTRUATION AT NIGHT.	
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	8.	8.
	9.	9.
	PROBE: Please list the concerns or difficulties related to MENSTRUATION DURING MONSOON.	
	1.	1.
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	8.	8.
	9.	9.
	10.	10.

Appendix B: Focus Group Discussion Guide (Unmarried Women)

Focus Group Discussion Guide			
A010.	Community Name: _____	A015.	Community ID#: _____
A020.	Activity Start time: __ __ : __ __ pm / am	A025.	Activity End time: __ __ : __ __ pm / am
A055.	Date: (y/d/m) __ __ __ __ / __ __ /__ __	A040.	Consent Provided by All: ☐ 1. Yes ☐ 2. No
A045.	Recorder ID:_____	A046.	Recording #_____
A030.	Facilitator: _____	A035.	Note Taker: _____

Introduction

We are gathering today because we are interested in learning more about concerns women like you have. We are specifically interested in learning about concerns that women have related to urination, defecation, and menstruation. We are going to talk about each of these topics. To make you more comfortable, you do not need to share what you experience specifically. You can discuss what you know may be concerns for other women like you.

GROUND RULES / GUIDELINES

1. Please respect what others say. Everyone deserves a chance to speak. Please do not interrupt when someone else is talking. If people speak over each other, we will have an interference in recording.
2. If you begin talking when another is speaking, I will ask you to wait or I may hold up my hand to tell you to stop. But, I will get back to you when the person is finished.
3. Please do not carry on private conversations with those next to you as it will interfere with the recording.
4. This is a discussion, so please listen to what others are saying so that you can add your thoughts.

Warm-up

This question is designed to get everyone talking right at the beginning. If you feel people are still shy, we can have them go around and share something more.

1. WARM UP

First, we would like to start by having everyone share something about yourself. You do not need to say your name. Please go around and share. You can tell us who is in your family, what village you come from, or anything you like.

Key Questions
Thank you all for sharing. We will now start talking about urination…

1. URINATION

SHARE ANY CONCERNS you think women like you may have when there is an urge to URINATE.

1. *ASK ABOUT CONCERNS.*
2. *PROBE: Night, Monsoon, Pregnancy, and Dependents.*
3. *ASK TO EXPLAIN LISTED CONCERNS. Ask WHY these are concerns. Get to the root.*
4. *Ask about any concerns NOT YET MENTIONED.*

Said by Participants	Explained by Participants	CONCERN	Brought Up by Facilitator
		1. People Around	
		2. ***Have to Hold It / Wait***	
		3. Have No Proper Space	
		4. ***Infection***	
		5. Feel Unclean	
		6. Have to Go Far	
		7. Need to Stop and Stand If Others Come	
		8. ***Stop Drinking / Withhold Water***	
		9. ***Need Company***	
		10. Fear Darkness/ Ghost/ Animals/Insects	
		11. ***Fear People/ Men***	
		12. Hold At Night	
		13. Have Trouble Finding Space in Rains	
		14. Get Muddy	
		15. Get Wet	
		16. ***Caring for Others when there is an Urge***	
		17. Care for Others' Urination Needs	
		18.	
		19.	
		20.	
		21.	
		22.	
		23.	
		24.	

Thank you all for sharing. We will now start talking about DEFECATION…

2. DEFECATION			
SHARE ANY CONCERNS you think women like you may have when there is an urge to DEFECATE. 1. *ASK ABOUT CONCERNS.* 2. *PROBE: Night, Monsoon, Pregnancy, and Dependents.* 3. *ASK TO EXPLAIN LISTED CONCERNS. Ask WHY these are concerns. Get to the root.* 4. *Ask about any concerns NOT YET MENTIONED.*			
Said by Participants	**Explained by Participants**	**CONCERN**	**Brought Up by Facilitator**
		1. People Around	
		2. ***Have to Hold It / Wait***	
		3. Have No Proper Space	
		4. ***Infection***	
		5. Feel Unclean	
		6. Have to Go Far	
		7. Need to Stop and Stand If Others Come	
		8. ***Avoid Food to Not Have Urge***	
		9. ***Consumes More Time***	
		10. ***Need to Fetch / Carry Water***	
		11. ***Need to Go at Specific Time***	
		12. ***No Place to go if Sudden Urge/Emergency***	
		13. ***Need Company***	
		14. Fear Darkness/ Ghost/ Animals/Insects	
		15. ***Fear People/ Men***	
		16. Hold At Night/ Avoid Going At Night	
		17. Have Trouble Finding Space in Rains	
		18. Get Muddy	
		19. Get Wet	
		20. ***Caring for Others when There is an Urge***	
		21. Care for Others' Defecation Needs	
		22.	
		23.	
		24.	
		25.	
		26.	
		27.	
		28.	
		29.	
		30.	

Thank you all for sharing. We will now start talking about MENSTRUATION…

3. MENSTRUATION			
SHARE ANY CONCERNS you think women like you may have during MENSTRUATION. 1. *ASK ABOUT CONCERNS.* 2. *PROBE: Night, Monsoon* 3. *ASK TO EXPLAIN LISTED CONCERNS. Ask WHY these are concerns. Get to the root.* 4. *Ask about any concerns NOT YET MENTIONED.*			
Said by Participants	**Explained by Participants**	**CONCERN**	**Brought Up by Facilitator**
		1. Pain / Weakness	
		2. Need Privacy	
		3. ***Infection***	
		4. ***Scratches / Rashes***	
		5. Wearing Cloth / Pad	
		6. Changing Cloth / Pad	
		7. ***Washing Cloth / Pad***	
		8. ***Drying Cloth***	
		9. ***Disposing Cloth/Pad***	
		10. Work Related to Menstruation	
		11. Need More Water	
		12. Have Restrictions	
		13. Depend on Others	
		14. Bathing	
		15. Feel Unclean	
		16. Concern When Not Home	
		17. ***Urination More Difficult***	
		18. ***Defecation More Difficult***	
		19. ***Harm from Men***	
		20.	
		21.	
		22.	
		23.	
		24.	
		25.	

Final Questions
1. COMPARED TO BOYS: How do you think boys' concerns compare to those of women during: ☐ Urination? ☐ Defecation? 2. HOUSEHOLD WHEN MARRIED: How would you feel if the house you went to when married: ☐ Did NOT have a latrine? ☐ DID HAVE a latrine? *Only if girls do not want to use a latrine:* ☐ How would you feel if you were FORCED TO USE? 3. PRIORITY: *Ask each person individually.* Given what we have discussed, what CONCERN is the most important to address? 4. QUESTIONS: Do you have any questions for us?
Thank You for your time

Appendix C: Focus Group Discussion Guide (Married Women)

Focus Group Discussion Guide			
A010.	Community Name: _____	A015.	Community ID#: _____
A020.	Activity Start time: __ __ : __ __ pm / am	A025.	Activity End time: __ __ : __ __ pm / am
A055.	Date: (y/d/m) __ __ __ __ / __ __ /__ __	A040.	Consent Provided by All: ☐ 1. Yes ☐ 2. No
A045.	Recorder ID:_____	A046.	Recording #_____
A030.	Facilitator: _____	A035.	Note Taker: _____

Introduction

We are gathering today because we are interested in learning more about concerns women like you have. We are specifically interested in learning about concerns that women have related to urination, defecation, and menstruation. We are going to talk about each of these topics. To make you more comfortable, you do not need to share what you experience specifically. You can discuss what you know may be concerns for other women like you.

GROUND RULES / GUIDELINES

1. Please respect what others say. Everyone deserves a chance to speak. Please do not interrupt when someone else is talking. If people speak over each other, we will have an interference in recording.
2. If you begin talking when another is speaking, I will ask you to wait or I may hold up my hand to tell you to stop. But, I will get back to you when the person is finished.
3. Please do not carry on private conversations with those next to you as it will interfere with the recording.
4. This is a discussion, so please listen to what others are saying so that you can add your thoughts.

Warm-up

This question is designed to get everyone talking right at the beginning. If you feel people are still shy, we can have them go around and share something more.

1. WARM UP

First, we would like to start by having everyone share something about yourself. You do not need to say your name. Please go around and share. You can tell us who is in your family, what village you come from, or anything you like.

Key Questions
Thank you all for sharing. We will now start talking about urination…
1. URINATION
SHARE ANY CONCERNS you think women like you may have when there is an urge to URINATE. 1. ASK ABOUT CONCERNS. 2. PROBE: Night, Monsoon, Pregnancy, and Dependents. 3. ASK TO EXPLAIN LISTED CONCERNS. Ask WHY these are concerns. Get to the root. 4. Ask about any concerns NOT YET MENTIONED.

Said by Participants	**Explained by Participants**	**CONCERN**	**Brought Up by Facilitator**
		25. People Around	
		26. Have to Hold It / Wait	
		27. Have No Proper Space	
		28. Infection	
		29. Feel Unclean	
		30. Have to Go Far	
		31. Need to Stop and Stand If Others Come	
		32. Stop Drinking / Withhold Water	
		33. Need Company	
		34. Fear Darkness/ Ghost/ Animals/Insects	
		35. Fear People/ Men	
		36. Hold At Night	
		37. Have Trouble Finding Space in Rains	
		38. Get Muddy	
		39. Get Wet	
		40. Difficult Squatting When Pregnant	
		41. Difficult Walking / Moving When Pregnant	
		42. Caring for Others when there is an Urge	
		43. Care for Others' Urination Needs	
		44.	
		45.	
		46.	
		47.	
		48.	

Thank you all for sharing. We will now start talking about DEFECATION…

2. DEFECATION			
SHARE ANY CONCERNS you think women like you may have when there is an urge to DEFECATE. 1. *ASK ABOUT CONCERNS.* 2. *PROBE: Night, Monsoon, Pregnancy, and Dependents.* 3. *ASK TO EXPLAIN LISTED CONCERNS. Ask WHY these are concerns. Get to the root.* 4. *Ask about any concerns NOT YET MENTIONED.*			
Said by Participants	**Explained by Participants**	**CONCERN**	**Brought Up by Facilitator**
		31. People Around	
		32. *Have to Hold It / Wait*	
		33. Have No Proper Space	
		34. ***Infection***	
		35. Feel Unclean	
		36. Have to Go Far	
		37. Need to Stop and Stand If Others Come	
		38. Avoid Food to Not Have Urge	
		39. Consumes More Time	
		40. Need to Fetch / Carry Water	
		41. Need to Go at Specific Time	
		42. No Place to go if Sudden Urge/Emergency	
		43. Need Company	
		44. Fear Darkness/ Ghost/ Animals/Insects	
		45. Fear People/ Men	
		46. Hold At Night/ Avoid Going At Night	
		47. Have Trouble Finding Space in Rains	
		48. Get Muddy	
		49. Get Wet	
		50. Difficult Squatting When Pregnant	
		51. Difficult Walking / Moving When Pregnant	
		52. Caring for Others when There is an Urge	
		53. Care for Others' Defecation Needs	
		54.	
		55.	
		56.	
		57.	
		58.	
		59.	
		60.	

Thank you all for sharing. We will now start talking about MENSTRUATION…

3. MENSTRUATION			
SHARE ANY CONCERNS you think women like you may have during MENSTRUATION. 1. *ASK ABOUT CONCERNS.* 2. *PROBE: Night, Monsoon* 3. *ASK TO EXPLAIN LISTED CONCERNS. Ask WHY these are concerns. Get to the root.* 4. *Ask about any concerns NOT YET MENTIONED.*			
Said by Participants	**Explained by Participants**	**CONCERN**	**Brought Up by Facilitator**
		5. Pain / Weakness	
		6. Need Privacy	
		7. Infection	
		8. Scratches / Rashes	
		9. Wearing Cloth / Pad	
		10. Changing Cloth / Pad	
		11. Washing Cloth / Pad	
		12. Drying Cloth	
		13. Disposing Cloth/Pad	
		14. Work Related to Menstruation	
		15. Need More Water	
		16. Have Restrictions	
		17. Depend on Others	
		18. Bathing	
		19. Feel Unclean	
		20. Concern When Not Home	
		21. Urination More Difficult	
		22. Defecation More Difficult	
		23. ***Harm from Men***	
		24.	
		25.	
		26.	
		27.	
		28.	
		29.	

Final Questions
1. COMPARED TO MEN: How do you think Mens' concerns compare to those of women during: ☐ Urination? ☐ Defecation? 2. LATRINE WORK: Who is responsible for: ☐ Bringing water to the latrine? ☐ Cleaning latrine? ☐ Do women have concerns about this work? 3. PRIORITY: *Ask each person individually.* Given what we have discussed, what CONCERN is the most important to you? 4. QUESTIONS: Do you have any questions for us?
Thank You for your time

Appendix D: Demographic Tool

PART A. To Be filled out by RA at start of Activity					
A010.	Community Name: _____	A015.	Community ID#: _____	A017.	Hamlet?: ☐ 1. Yes ☐ 2. No
A030.	RA Initials: _____	A055.	Date: (y/d/m) __ __ __ __ / __ __ / __ __		
A051.	Participant ID#: _____ (Assigned: Give number card.)				
A060.	Participant Type: ☐ 1. Over 18, unmarried, living with parents ☐ 2. Recently married (three years or less) ☐ 3. Married over 3 years with children ☐ 4. Older woman (older than 49 years)				

PART B. To be asked of and answered by participant			
B010.	Age: _____ →B010_1: RA: Explain if participant's age seems erroneously reported: _____		
B011.	Education: ☐ 1. None ☐ 5. Secondary Completed ☐ 2. Some Primary School ☐ 6. Some Tertiary / University ☐ 3. Primary Completed ☐ 7. Tertiary / University Completed ☐ 4. Some Secondary		
B020.	Number of years living in community: _____	B021.	Religion: _____
B022.	Caste: _____	B023.	Has BPL Card: ☐ 1. Yes ☐ 2. No
B030.	Marital Status (check one): ☐ 1. Unmarried ☐ 2. Married → B030_2. If Married, number of years married: _____ → B031. If Married, do you live with your husband ☐ 1. Yes, live with husband ☐ 2. No, husband works outside the home ☐ 3. No, Divorced →B030_3. If Divorced, # of years divorced: _____ ☐ 4. No, Separated →B030_4. If Separated, # of years separated: ____ ☐ 5. No, Widowed →B030_5. If Widowed, # of years widowed: _____		
B035.	Number of People in the HH: _____	B036.	Is it a joint family? ☐ 1. Yes ☐ 2. No
B040.	Who do you live with:		
	B040_11. Mother ☐ 1. Yes ☐ 2. No		
	B040_12. Father ☐ 1. Yes ☐ 2. No		
	B040_13. Brother / Cousin ☐ 1. Yes ☐ 2. No → If YES, how many BROTHERS live with you ____? COUSINS ____?		
	B040_14. Sister / Cousin ☐ 1. Yes ☐ 2. No → If YES, how many SISITERS live with you ____? COUSINS____?		
	B040_21. Mother In-Law ☐ 1. Yes ☐ 2. No		
	B040_22. Father in Law ☐ 1. Yes ☐ 2. No		
	B040_23. Brother in-law ☐ 1. Yes ☐ 2. No → If YES, how many brothers-in-law live with you _____		

	B040_24. Co-Sister in-law (married to brother in law) ☐ 1. Yes ☐ 2. No → **If YES,** how many sisters-in-law live with you _____
	B040_24. Sister in-law (Husband's sister) ☐ 1. Yes ☐ 2. No → **If YES,** how many sisters-in-law live with you _____
	B040_33. Daughter in Law ☐ 1. Yes ☐ 2. No → **If YES,** how many daughters-in-law live with you _____
	B040_88. Other ☐ 1. Yes ☐ 2. No → **B040_51 If yes,** please explain who and number _____ _____
B050.	Do you have any children? ☐ 1. Yes ☐ 2. No → **If No, SKIP to B070**

B060.	→ **If the participant has children**				
	1	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	2	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	3	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	4	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	5	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	6	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	7	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	8	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
	9	Age: ___	☐ 1. M ☐ 2. F	Alive? ☐ 1. Y ☐ 2. N	Living w/participant? ☐ 1. Y ☐ 2. N
B070.	Pregnancy Status: ☐ 1. Pregnant ☐ 2. NOT Pregnant. → **B070_01.** If Pregnant, Number of Months: _____				

D080.	How old were you when you had your first period? _____ years
D081.	Do you continue to experience monthly periods? ☐ 1. Yes ☐ 2. No → **B081_1. IF NO, how long ago did you stop?** _____
D085.	What do you use to manage your menstruation? ☐ 1. Cloth ☐ 2. Pad ☐ 3. Both cloth and pad ☐ 88. Other → **B085_1. If OTHER,** Please explain _____
D090.	Do you have electricity within your household compound? ☐ 1. Yes ☐ 2. No
D091.	Do you have a water source within your household compound? ☐ 1. Yes ☐ 2. No → **B091_1. If yes, what kind of water source?** _____ → **B091_2. If no, where do you get your water?** _____

D092.	Do you have an enclosed bathing area within your home compound? ☐ 1. Yes ☐ 2. No
D093.	Do you have a latrine within your home compound? ☐ 1. Yes ☐ 2. No **[IF NO→ END]**
D093_1.	If you have a latrine, is it functional? ☐ 1. Yes ☐ 2. No → B093_2. If no, how long has it been broken? _____
D094.	If you have a latrine, how long have you had it? _____ Years
D095_1.	If you have a latrine, do you use it for urination? ☐ 1. Always ☐ 2. Sometimes ☐ 2. Never
D096.	If you have a latrine, do you use it for defecation? ☐ 1. Always ☐ 2. Sometimes ☐ 2. Never
D097.	If you have a latrine, do you use it during menstruation: **D097_1.** For Urination ☐ 1. Always ☐ 2. Sometimes ☐ 3. Never ☐ 99. N/A **D097_2.** For Defecation ☐ 1. Always ☐ 2. Sometimes ☐ 3. Never ☐ 99. N/A **D097_3.** For Bathing ☐ 1. Always ☐ 2. Sometimes ☐ 3. Never ☐ 99. N/A **D097_4.** For Cleaning Cloth ☐ 1. Always ☐ 2. Sometimes ☐ 3. Never ☐ 99. N/A **D097_5.** For Changing Cloth/Pad ☐ 1. Always ☐ 2. Sometimes ☐ 3. Never ☐ 99. N/A **D097_6.** For Disposing Cloth/Pad ☐ 1. Always ☐ 2. Sometimes ☐ 3. Never ☐ 99. N/A
ASK if Participant has any questions OR any thing else to ADD	
THANK PARTICPANT	