

# **The evaluation of a sanitation intervention on sanitation-related emotional and psychological well-being among women and girls in Bihar**

**Kathleen O'Reilly**, Texas A&M University

**Sneha Bhat**, Society for Promoting Participative Ecosystem Management

**Seema Kulkarni**, Society for Promoting Participative Ecosystem Management

**Abhineety Goel**, FLAME University

**Elise Grover**, University of Colorado, Boulder

**Namratha Rao**, University of Oklahoma

**Oliver Cumming**, London School of Hygiene & Tropical Medicine

**Robert Dreibelbis**, London School of Hygiene & Tropical Medicine

**Grantee Final Report**

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## Note to readers

This final impact evaluation grantee report has been submitted in partial fulfilment of the requirements of grant TW11.1014 awarded under Thematic Window 11. This mixed method impact evaluation aimed to assess the effectiveness of sanitation programming on women's psychosocial stress in two districts of rural Bihar. However, the evaluation could not be completed as per the original study design. It draws on quantitative baseline data, as well as qualitative data collected at baseline and endline. Due to tensions between community members and the survey team in one of the study villages, the endline survey had to be called off. 3ie is making it available to the public in this final report version as it was received.

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The 3ie technical quality assurance team comprises Neeta Goel, Anmol Narain, Radhika Menon, Hugh Waddington, an anonymous external impact evaluation design expert reviewer and an anonymous external sector expert reviewer, with overall technical supervision by Marie Gaarder.

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## Abbreviations

AAM	Aged Adult Married
AG	Adolescent girl
BPL	Below poverty level
CLTS	Community Led Total Sanitation
DIL	Daughter-in-law
EAM	Established Adult Married
ES	Environmental Stressors
Goi	Government of India
GP	Gram Panchayat
GSF	Global Sanitation Fund
HH	Household
IHL	Individual Household Latrine
INR	Indian Rupee
KII	Key Informant Interview
LSAB	Lohiya Swachh Bihar Abhiyan
NM	Newly Married Woman
OBC	Other backward castes
OD	Open defecation
ODF	Open defecation free
PSS	Psycho-social stress
SBM	Swacch Bharat Abhiyan (Clean India Mission)
SC	Scheduled Caste
SHG	Self-help group
SRPS	Sanitation-related psychosocial stress
SS	Social Stressors
ST	Scheduled Tribe
SVS	Sexual Violence Stressors

## Executive Summary

### Background

The impacts of inadequate sanitation on the emotional and psychological well-being of women and girls is an area of increasing concern in the global community, as well as the extent to which existing sanitation interventions can positively relieve sanitation-related psychosocial stress (SRPS). Multiple studies in rural India suggest that there are three dimensions to SRPS experienced by women:

- Environmental stressors related to the natural and built environment that women must navigate in their efforts find adequate sanitation, e.g., flooding during the monsoon season or climbing fences.
- Social stressors related to the social and cultural environment that women live in and must manage in efforts to find adequate sanitation, e.g., needing to be accompanied by a male family member when leaving the house or negotiating access to limited sanitation resources with other community members.
- Sexual violence stressors related to the real or perceived threat of gender-based violence associated with efforts to find adequate sanitation, e.g., sexual assault, harassment, or being watched by men while going for defecation.

Our mixed-methods study aimed to explore experiences with SRPS among women between the ages of 14 to 65 and assess the impact of a community-based sanitation intervention on reported SRPS, using globally recognized measures of emotional and psychological health and subjective well-being, and biomarkers of stress (hair cortisol). Further, we aimed to examine women's experiences and participation in sanitation programming and explore how interventions relieve and/or compound gendered stress experiences.

### Study Design and Methods

Data from this study were drawn from an intended mixed-methods evaluation of Global Sanitation Fund (GSF) – supported sanitation programming in two districts of rural Bihar – Gopalganj and Paschim Champaram. Planned data collection included a baseline and endline survey of a total of 2400 women across 60 communities and a baseline and endline ethnography in 10 neighboring villages with approximately 6 respondents per community. Survey data included a measure of sanitation-related stress (SRPS), standard measures of psychological wellbeing and subjective quality of life, water and sanitation access and use, and household demographics. In addition, hair samples were collected from a sub-sample of half of all survey respondents. Laboratory analysis was used to calculate hair cortisol concentrations – a potential objective biomarker that measures hormones released by the body when experiencing stress.

However, endline survey data were not collected due to security issues (See Section 4 for greater detail). In India, the government had made increasing sanitation access and use a national priority, most notably through the Swachh Bharat Mission (SBM), a national program that aims to eliminate open defecation in India by October 2019. GSF-supported programming, executed in-country by NRMC India, supported the SBM program through a number of activities, including community mobilization, sanitation supply side improvements, sector coordination, and institutional strengthening.

Data presented in this mixed-methods study includes a cross-sectional survey of 1200 women between the ages of 14 and 65 in 60 villages completed in 2016 (original baseline survey). Half of these villages were originally intended to serve as control villages, the other half scheduled to receive the GSF-supported intervention during the 2016 funding cycle. Survey included measures of sanitation access and use, sanitation-related psychosocial stress, globally standard measures of psychological health and well-being, and also included the collection of hair sample. Hair samples were tested for cortisol – a potential biomarker of stress that is deposited in hair samples. Data also include an ethnographic investigation into women’s experiences with sanitation and the GSF-supported intervention from a qualitative perspective. Ethnographic data was collected in villages in a 2016 baseline and a 2018 endline and included a total of 74 in-depth interviews as well as key informant interviews and village observations.

Due to changes in the implementation of the GSF-supported intervention and shifting policies of the Indian Government, study design was adapted at multiple points. Please see Section 4 for greater detail. Baseline data for the intended evaluation were collected in June 2016. In June 2016, the Government of India announced that both study districts included in the evaluation were targeted to be open-defecation free (ODF) by early 2017. Partners' adaptation to this government mandate required that all villages in the study area receive some type of sanitation intervention prior to endline data collection. Through discussions with field partners and on-going engagement with 3ie, the proposed evaluation strategy was modified to reflect a full coverage evaluation with emphasis placed on heterogeneity of expected impacts based on nature and type of intervention strategy pursued. We identified possible intervention variants that served as the basis of the revised evaluation strategy:

- no intervention
- standard GSF-supported intervention
- adapted GSF-supported interventions that included some combination of engagement with local ministers, recruiting and training local ODF champions, and structured engagement with women’s self-help groups.

The GSF-supported program closed in June 2017; however, government lead mobilization had started or was planned in many study areas. Changes to Government of India target ODF dates continued to evolve and identifying a window for final data collection proved to be a challenge. Through discussions with the 3ie, the revised date for the endline data collection was scheduled for May / June 2018.

Endline ethnographic data were collected in 10 villages early June 2018. Endline quantitative survey started soon thereafter. However, in one of the first villages surveyed, tensions with a local community related to hair sample collection resulted in the data collection staff being detained by local law enforcement. Matters became highly politicized among local officials and the endline survey and quantitative analysis were terminated.

### Key findings

The key findings are outlined below that include data from the cross-sectional survey and baseline and endline ethnography – along with a range of key informant interviews with village and district-level stakeholders.

### *Intervention Implementation*

- Intervention implementation was quite different than the expected variants based on discussion with GSF partners. Despite the range of mobilization strategies identified by key informants (and that served as the basis for our *a priori* assumptions about village classification), mobilization at the village-level was inconsistent and short-term.
- Although all respondents were aware of the SBM, only two of 31 interviewed women at endline reported that they had participated in community triggering events. Women reported that they were largely excluded from community-level events and household decision making processes.
- Women's self-help groups provided the most sustained and comprehensive form of engagement at the village-level, providing a source of information, mobilization, and loans for households. However, this engagement was rarely systematic and relied more on the initiative and planning of individual self-help group members.
- In all villages, there were several examples of individuals households that had invested their own money in building an individual household latrine (IHL). Out of 22 women interviewed at endline that had functioning IHLs, 15 reported that their household had self-financed their latrine. IHLs constructed between baseline and endline were

generally high quality and were more likely to include simple amenities that women wanted, such as a bathroom for bathing and changing.

- Based on ethnographic observations and in-depth interviews, villages with significant village-level changes in sanitation coverage were those where local village leaders (Mukhiya) had identified contractors to build toilets for all households in the community (see Section 7 for further details). There was variability in the quality of construction of contractor-built toilets. In 4 out of 10 villages, mukhiyas had appointed contractors to build IHLs. In 2 villages, they were simple but functional facilities. In 2 other villages, they were poorly built and/or not completed.
- Reimbursement to individual households, according to SBM guidelines, were only available when 75% of households in the ward had constructed toilets. This meant that the majority of household-financed latrines had not received government reimbursements at the time of endline data collection. Only households in villages with contractor-lead construction had received payments.
- The contractor-lead construction may have resulted in higher rates of government subsidies being transferred to households (and subsequently back to contractors), but there were noted instances where government processes had been circumvented and/or exploited. This included two villages where verification had occurred but many latrines incomplete and/or poorly built and one village where contractors concentrated construction on select wards while ignoring more marginalised communities.

#### *Sanitation Construction and Use*

- In the quantitative baseline survey, only 132 of 1207 interviewed women had access to a sanitation facility (10.9%); 95% of all women reported defecating in the open at least once in the seven days prior to data collection.
- In the ethnographic baseline, 32 of 41 (78%) interviewed women did not have access to a sanitation facility.
- In the ethnographic endline, 22 of the 33 (67%) interviewed respondents had access to a toilet facility; 17 of which were built since in the period between baseline data collection and endline.
- Respondents who reported access to a sanitation facility at endline reported frequent use of those facilities. Only 4 of the 22 women (18%) reported irregular use of the facilities – 2 women reported that facilities were for younger household members, 1 woman reported that she had concerns about the pit filling quickly, and 1 woman reported going for open defecation when she was working or away from the home.
- Gender-based concerns were the primary driver for IHL construction. This included ensuring that younger women in the household (particularly daughters-in-law) had a

dedicated toilet and protecting women from the environmental stressors they faced accessing traditional open defecation sites (distance, mud, animals, etc.).

- Self-financed units included separate bathrooms for women, who ordinarily bathed outdoors or behind makeshift screens in their homes' courtyards and were restricted from bathing when male family members were present. Women reported a reduction in PSS due to the privacy bathrooms insured and an easing of the need to hurry.
- Availability of reimbursements were another major factor in construction, particularly among those households that self-financed latrine construction. Many households reported spending more than 12000 INR available through SBM policy on new facilities, and several took high interest loans to pre-finance construction.

#### *Sanitation-Related Psychosocial Stress and General Emotional and Mental Well-being*

- At baseline, we measured sanitation-related psychosocial stress (SRPS). Scales were developed through previous research on sanitation and sanitation related stress in areas of northern India with comparable sanitation coverage and caste composition. Scales demonstrated high validity with externally verifiable measures. Scores ranged from 0 to 25, with higher scores reflective of more sanitation-related psychosocial stress. Mean baseline scores were 14.7 out of 25 (standard deviation = 5.3) and median scores were 16. Women with access to a sanitation facility were 70% less likely to score higher on the SRPS scale than women without a sanitation facility. In contrast, women who reported defecating in the open in the previous 7 days were 80% more likely to score higher on the SPRS scale than women who did not defecate in the open. In multivariate analysis controlling for a range of sociodemographic characteristics (life stage, caste, education, and religion) and village-level clustering, access to a sanitation facility was associated with a 42% reduction in mean SRPS scores (Risk Ratio (RR): 0.58, 95% Confidence Interval (CI): 0.49 – 0.70). Women who reported defecating in the open had scores that were on average 82% higher than women who did not defecate in the open (RR: 1.82, 95% CI: 1.36 – 2.45).
- At baseline, there were robust and significant correlations between women's SRPS scores and standard measures of psychological health (Perceived Stress Scale) and subjective well-being (WHO5) that were also included in the study, suggesting that our measure was valid.
- In contrast, there was no relationship between SRPS scores and measures of hair cortisol, nor were there significant associations between standard measures of psychosocial health and well-being and hair cortisol measures. The high degree of internal consistency among our sanitation-specific and globally recognized measures of psychological well-being, challenges with sample collection, and delays in hair

sample processing suggest that there may have been significant measurement error in baseline hair samples and analyses. Sampling and analysis procedures were streamline for endline, unfortunately we were unable to collect necessary data or samples. This is discussed in greater detail in Appendix 2.

- Both baseline and endline ethnographic data was consistent with quantitative findings – women who had a latrine, both at baseline and endline, were less likely to report specific sanitation-related stressors. At endline in particular, women reported that their IHLs had largely alleviated the stressors they previously faced when defecating in the open. Women no longer had to walk long distances to relieve themselves and had adequate privacy for bathing and defecation. Further, women reported that they no longer had to restrict their food or water intake in order to avoid needing to defecate or urinate during the day.
- There were issues of harassment that were not alleviated with that IHLs – particularly harassment of younger girls from men. Younger women in particular reported missing educational opportunities or confining themselves to the home in order to avoid harassment in their community. These limited examples demonstrate how sanitation may relieve certain forms of gender-based violence, however, it will only have limited impact on stress related to harassment in the absence of larger societal changes.
- The intervention did result in new stressors in women's lives – these were primarily defined by the type of programme implementation in their village and if they had self-financed their IHL. Among those that self-financed, new economic stressors were introduced when households were required to wait until an uncertain point in the future to receive government subsidies for latrines that had already been constructed. Women had little agency in improving coverage among their neighbours and reported feeling powerless. In villages with contractor-lead construction, women reported instances of harassment from contractors.

Our finding suggests that the GSF-supported intervention and subsequent government-led implementation were successful at improving the emotional and psychological health of women when the intervention resulted in adequate, well-built facilities that met women's needs. As discussed above, reducing women's exposures to environmental stressors was one of the main reasons cited for building IHL. These findings stand in contrast to numerous studies throughout India that suggest preferences for OD among women in rural areas and disgust related to IHLs. Women in our study were quick to describe the benefits and quality of life improvements they had experienced after building a household latrine. This may reflect

large-scale societal changes in attitudes towards defecation and toilets in recent years through the attention given to sanitation at the national-level.

Despite improvements among some households, consistent and uncoordinated implementation has limited progress on sanitation adoption and use. While greater gains were realised in villages where contractors managed village-wide construction, we note that this was pursued at the expense of women's sanitation preferences. Facilities were built to specification but did not include additional amenities that women require. Further, contractor-lead construction presented opportunities for corruption and exploitation of SBM systems. Models that bring together the best of both approaches – such as ensuring contractors provide households with a range of sanitation options – could accelerate progress and ensure consistent use; however, necessary oversight and monitoring is needed.

In sum, our findings suggest that the GSF-supported intervention, when successful, had an effect on sanitation coverage and use and women's well-being and stress. In general, women reported an IHL reduced all environmental, social and sexual violence stressors. This is in line with baseline quantitative findings which saw a 48% reduction in SRPS scores among women with access to a sanitation facility and previous applications of the SRPS scale. Some gendered stressors are not relieved by access to sanitation and will likely require addressing gender-biased social norms. The dominance of household-led construction over contractor-led construction in many villages also opened new areas of stress for women.

## **Recommendation for Policy and Practice**

### *Demand generation and supply improvements:*

- Widely disseminate technical information and building specifications prior to construction of latrines that will be eligible for government incentives.
- Community leadership must include all social groups, especially women and the most vulnerable, throughout the process leading to ODF verification. Time and funds should be made available to implement this outreach.
- Organizations that work at the village level should systematically increase their efforts to educate and facilitate latrine-building lending, especially among marginal groups that may not be participating in the organizations' activities at the time of intervention.
- Discuss with male HH members the availability of latrine costs, financing, and incentives.

*Use of new facilities:*

- Involve women in pre-construction design planning so that facilities meet women's needs and address the drivers of SRPS, and enable sanitation hygiene behaviors such as MHM.
- Provide information to all HHs on pit-emptying and latrine repair. Arrange these services as necessary.
- Tailor promotion approaches to women's needs, particularly surrounding SRPS, bathing, and MHM.
- Address HH concerns regarding the designation of latrines as 'for women only.'

*Improving women and girls' SRPS:*

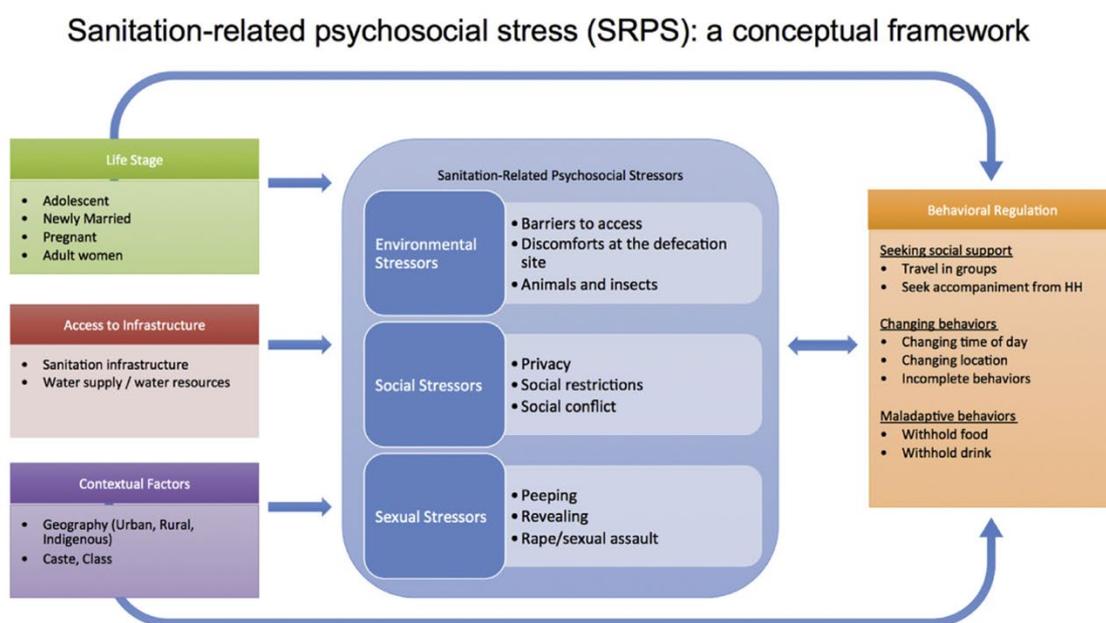
- IHLs have been shown to reduce women and girls' psychosocial stress. Promotion of a low-cost additional space for bathing and MHM would increase women's security and further reduce SRPS.
- Monitoring and evaluation of sanitation programs need to include women and girls' SRPS across the lifecourse. SRPS could be measured at baseline and endline using methods applied in this research. Additional methods are also available, including new measures focused on sanitation insecurity (See Caruso et al, 2017) or globally standard measures of subjective well-being (i.e. the WHO 5).

## 1. Introduction

While gains in global access to improving drinking water met Millennium Development Goal targets, progress against sanitation targets was not achieved[1]. In 2015, approximately 2.4 billion people still lacked access to improved sanitation facilities and 949 million practiced open defecation [1]. In 2014, approximately two thirds of the Indian population lacked access to improved sanitation and an estimated 600 million people defecate outdoors [2]. Despite massive government-led efforts to improve sanitation coverage in India over the last several decades, recent research indicates that latrine programs are insufficient for latrine adoption and will achieve limited health impacts [3, 4].

The deficits in sanitation infrastructure in India are of particular significance to the health and wellbeing of women and girls. In addition to urination and defecation, sanitation facilities are instrumental in menstrual hygiene, cleaning and bathing. Not only has the lack of access or inadequate access to a sanitation facility been tied to negative impacts on a women's health [5, 6], but research has also suggested that inadequate sanitation can also impact women and girls' physical safety [7, 8] as well as mental health and psychosocial stress [9-12]. Psychosocial stressors encompass the environmental, sexual and social factors that negatively impact a woman's emotional health and perceived well-being as it relates to defecation, urination, menstrual management, post-defecation cleaning, and post-defecation bathing [7, 10, 11]. We operationalize these stressors as Sanitation-Related Psychosocial Stress – the negative psychological experiences that are due to inadequate or insufficient sanitation facilities. These can include 1) physical stressors – stressors related to the natural or build environment – such as stress due to dealing with physical barriers or concerns about infectious disease exposures; 2) social stressors that result from social restrictions on individual activities and lack of social support; and 3) gender-based violence stressors such as harassment or voyeurism. This conceptual model – based on qualitative work in Odisha and Uttar Pradesh [7, 10, 11]– is presented graphically in Figure 1.

Figure 1: Conceptual Model of Sanitation-Related Psychosocial Stress



In response to the large gaps in sanitation access and uptake, The Government of India (GOI) launched the Swachh Bharat Mission (SBM). Under the SBM, the government aims to end open defecation in India. The Global Sanitation Fund (GSF) program in India is a designated partner for the SBM and works to support the GoI's SBM ambitions. The GSF, in collaboration with Programme Coordinating Mechanisms (PCMs), appoints Executing Agencies (EAs) to implement GSF-supported programmes. PCMs are sub-sections of existing national WASH sector coordination mechanisms. The PCM sets the vision and strategy of GSF-supported programmes, leads the development of Country Programme Proposals and ensure that the work supported by the GSF is consistent with national policies and activities of National WASH Coalitions. PCMs include representatives from government, civil society and international organisations from across the WASH and related sectors. The EAs are directly contracted by UNOPS. EAs may be a government entity, international NGO, United Nations agency or from the private sector. The EA conducts national advocacy on sanitation and hygiene. They also work at a subnational level through sub-grantees or implementing partners that, whom they select, supervise, and support to implement collective behaviour change interventions or sanitation marketing approaches within communities. The GSF EA in India was NRMC India. For the purposes of this report, we refer to this GSF modality as "GSF-supported implementation" or "GSF-supported programming". In India, GSF-supported programming is concentrated in selected blocks in 16 districts in Assam, Bihar, and Jharkhand.

Our study –the Sukhshanti Study - was original designed as a mixed-methods, quasi-experimental study aimed to evaluate the extent to which the GSF-supported sanitation

program in Bihar – working in parallel with the GoI’s SBM program – improves health, well-being and sanitation related-stress among women and girls. The name of our study – sukshanti(Hindi: सुखशांतिअध्ययन) – is the Hindi word for happiness and peace. During preliminary site scoping and informal discussion with GSF-supported program beneficiaries, “sukshanti” was repeatedly stated as the feeling women had after their sanitation facilities were improved at home. The term was chosen as it reflects the potential for sanitation improvements to make large and meaningful improvements on women’s lives that go well beyond traditional infectious disease outcomes.

Our evaluation focused on two GSF-supported objectives: demand generation and supply improvements; and we sought to assess how GSF-supported interventions increased demand and use of new facilities, afforded improved access to the supplies and materials for sanitation programs, and how those two activities impacted the behaviours, health, and well-being of women in participating areas. The primary outcome for this evaluation was self-reported sanitation-related psychosocial stress (SRPS). Secondary outcome measures included globally validated measures of psychosocial stress (PSS) and quality of life (including hair cortisol), sanitation utilization, and sanitation construction.

Methods and focus of the evaluation evolved considerably during the study period. Please see Chapter 4 for additional details. In brief, originally designed as a one-year controlled before-and-after study, changes to national and state-level implementation required that the study be reframed as a two-year evaluation of a full-coverage intervention where changes in outcomes would be compared based on heterogeneity in intervention activities. Baseline survey and ethnography were completed in May and June of 2016. Endline ethnographic data was completed in June 2018. However, a misunderstanding between the survey team and community members related to the purpose and nature of hair sample collection quickly escalated. Ultimately, this resulted in local authorities detaining the field detention of the field data collection staff and the involvement of the local magistrates. In order to ensure the safety of the field staff and upon the recommendation of the local police commissioner, the final project survey was cancelled. As such, the evaluation now entails a before and after ethnographic assessment of the GSF-supported intervention in 10 villages with a focus on women’s experiences with sanitation before, during, and after the intervention period.

Full details on the ethnographic data collection are provided in Chapter 5. In brief 41 women from 10 villages were interviewed at baseline and 33 women interviewed at endline. Individual interviews were supported by 18 key Informant interviews (KII). At baseline, villages were sampled evenly from control and intervention GPs included in the quantitative survey. Villages were selected on size and caste composition and were the same at both baseline and

endline. Also, at both baseline and endline, participants were selected based on age and caste. We purposefully sampled a greater proportion of women with individual household latrines (IHL) at endline in order to collect data on village-level interventions and these women's experiences of SRPS and general PSS after they had access to an IHL.

Although a mixed-methods study since inception, research questions outlined in the pre-analysis plan focused on the quantitative differences in outcomes in intervention and control communities. Specific research questions informing our evaluation were:

- What is the effect of the GSF-supported intervention on SRPS, generalized PSS, perceived quality of life, hair cortisol, and urogenital health among women between the ages of 14 and 60?
- What is the effect of the GSF-supported intervention on sanitation adoption (e.g.: sanitation access and exclusive use) among individuals / households receiving the GSF intervention?
- What are the individual and community experiences with sanitation, intervention participation, and latrine construction and adoption?

Because endline data collection included only the ethnographic study, pre-specified research questions could not be assessed. Findings reported here focus on the baseline and endline ethnography supported by quantitative results from baseline data collection.

## 2. Intervention, theory of change and research hypotheses

The Global Sanitation Fund (GSF) Program in India operates in concert with and in close partnership with the Government of India (GoI's) Swachh Bharat Mission. See Section 1 for a full description of the GSF modality in India.

Under the SBM, officially launched in 2014, households are eligible to receive up to 12,000 INR in incentives after construction of household latrines have been completed. Under the SBM, these funds are available to all households compared to earlier initiatives that were targeted exclusively at "below poverty line" (BPL) households. Starting in the 2016 SBM cycle, the SBM also announced that limited pre-construction subsidies available to households, thus reducing the financial strain of building a new latrine.

The GSF program started in Bihar in 2013 and was active in six districts (3<sup>rd</sup> level administrative divisions). In two districts –Gopalganj and Paschim Champaran – GSF was the SBM implementing partner for the entire district. As the implementing partner for the entire district, GSF was responsible for coordinating all sanitation and/or SBM related activities in these two districts. This level of coordination by the implementing partner, along with the demonstrated high need in Bihar, led to the selection of these two districts as the study site.

There were four primary objectives of the GSF program in India:

1. Demand generation through community mobilization and interpersonal communication activities;
2. Supply-side improvements through training and mobilization of masons and technicians for latrine construction;
3. Supporting institutional strengthening and capacity building; and
4. Promoting multi-stakeholder engagement and learning through support for research and advocacy.

For the purposes of our evaluation, components 1 and 2 are the most relevant. Community mobilization and IPC activities were completed in multiple phases. The majority of these were the traditional community mobilization activities associated with CLTS interventions: transect walks, faecal material calculation, puppet shows, etc. These were supplemented with individual discussions with community mobilisers. After the mobilisation sessions, GSF and local partners worked with the village to develop an Open Defecation Elimination Plan. All members of the community agreed to this action plan that ensures all households have a private sanitation facility and agree to use newly constructed facilities. Community mobilization and triggering events also served a venue for identifying natural leaders in the community, either private citizens or members of existing civil society organisations, such as Jeevika –

women's self-help and microfinance organisations that are active in the study area. Once construction was completed, GSF and local partners continued to work with communities to ensure that facilities are in use. This included continued interpersonal communication and the development of "vigilance committees" that monitor the village during mornings and evenings to identify individuals that persist with open defecation.

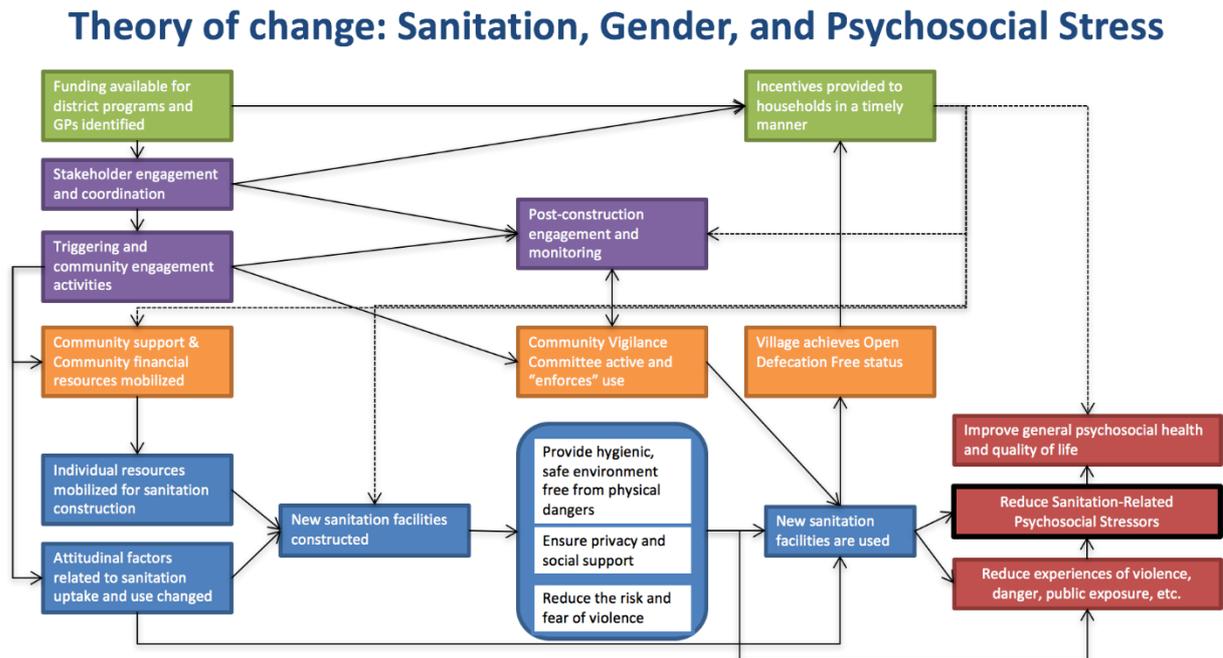
The Open Defecation Elimination Plan was also the basis for resource and financial mobilization in the community. The number of toilets included in the Open Defecation Elimination Plan determined state and national funding levels that are transferred from the Public Health Engineering Department through three primary intermediaries: the Block Development Committee, the Gram Panchayat, or local self-help groups. Pre-construction subsidies were available to all households, typically mobilised through local micro-finance groups – a vast simplification of previous programs that limited or did not include preconstruction financing. This money was used for construction support within the GP. Parallel to this activity, the GSF-supported program focused on local supply-side improvement in the intervention, namely the creation of sanitation business. These businesses developed the materials needed for toilet construction and train the laborers involved in construction. Pre-construction subsidies could be transferred directly to local sanitation business to pay for materials and supplies or to households to support labour costs. In order for households to receive their full allocation for sanitation construction from the government, verification with the SBM program of sanitation construction is required. GSF and its partners worked with local residents through this final verification process, providing additional opportunities for interpersonal communication and behaviour change messages.

At the beginning of the 2016 SBM cycle, GSF identified 30 – 45 Gram Panchayats (5<sup>th</sup> level administrative divisions) in each of the state's districts for targeted activities. In a typical cycle, households are eligible to receive incentives once government officials have verified construction of an improved household sanitation facility. In a typical annual cycle, funds are available in April of the selected year. Intervention activities typically commence in May or June. Households have until the next funding cycle begins in April to finish latrine construction.

The Theory of Change, underlying our proposed evaluation, is outlined below (Figure 2). Focusing on the blue squares – we hypothesize that individuals will mobilise resources and change attitudes towards sanitation as a direct result of intervention activities. This will result in the construction of new sanitation facilities at the household-level. These facilities will 1) provide a hygienic and safe environment free from danger, 2) ensure privacy, and 3) reduce the real and/or perceived risk of violence for women. Because of these benefits, we hypothesize that new facilities will be used by women, leading to a reduced experience with violence, physical, or social danger; reduced sanitation-related psychosocial stress, and improved

psychological well-being. This cascade of outcomes is determined and supported by a range of intervention activities. These include state- and district-level policy engagement (green); activities directed by GSF and local partners (stakeholder engagement, triggering, monitoring) (purple); and new organisations and systems in place to foster intervention sustainability (orange).

Figure 2: Theory of Change



### 3. Context

Bihar is home to 103 million people – the third most populous state in India. Over 88% of the population lives in rural areas, second only to the sparsely populated, mountainous state of Himachal Pradesh. Sanitation coverage in Bihar was less than 18% in 2011 – only a 4%-point increase in estimated coverage since 2001, making Bihar one of the lowest performing states in India in improving sanitation coverage. Bihar, with 65% coverage, ranked second to last in rural IHL coverage, behind Odisha (SMB website access date: 30 August 2018). Since the launch of the SBM program, only one district, Sitamarhi, has been declared open defecation free (ODF)[13].

Multiple administrative divisions are present in Bihar, similar to other parts of India. Because of the shifting nature of actors and intervention activities, an overview of these structures is provided in Table 1. According 2011 GOI Census, Bihar has 38 districts, 534 blocks, 8,463 Gram Panchayats (GPs), and 44,874 villages. In Bihar, GPs are headed by a Mukhiya – an elected official who serves as the administrative leader for the GP.

*Table 1: Administrative Divisions in India and Bihar*

<b>Administrative Divisions of India</b>	
1 <sup>st</sup> Level	Government of India
2 <sup>nd</sup> Level	State of Bihar
3 <sup>rd</sup> Level	Districts
4 <sup>th</sup> Level	Block
5 <sup>th</sup> Level	Gram Panchayat
6 <sup>th</sup> Level	Village
7 <sup>th</sup> Level	Ward

In Bihar, caste and class divisions are very pronounced and Dalit groups are particularly marginalized [14]. Low sanitation coverage and large, dense rural population have made Bihar a focal point for efforts to improve sanitation coverage in India. Although modern India encompasses a multitude of cultural and social groups, the nexus of social marginalisation, gender and sanitation in rural Bihar is similar to neighbouring states – it is expected that findings from the evaluation will be readily transferable across the region [10, 15-17].

The study focused on two districts of Bihar – Gopalganj and Paschim Champaran, located in the northwest corner of the state. As of the 2011 census, Gopalganj had a population of 2.6 million and Paschim Champaran had a population of 3.9 million.

Villages in the ethnography study area had varying spatial arrangement of clusters of housing – referred to as habitations – ranging from densely packed to significantly dispersed over a large area. One village in our sample had seven habitations with substantial distance between them. One village in our sample was a peculiar case - the village was situated very close to

the Gandak River and did not have proper road connections. Houses here were very scattered – clusters of 2-3 houses built in the fields themselves – indicative of the practice of a few family members of each household occupying these dwellings during the agricultural season. The rest of the family members resided in second, primary dwellings in a nearby larger village.

All the villages were multi-caste villages, although in some villages certain socially marginal castes/religions were the dominant caste – Scheduled Tribes<sup>1</sup> in one, Muslims in one, Scheduled Castes<sup>2</sup> in two. As elsewhere in rural India, where marginal castes/religions are in the majority, these groups exercised some power in villages. In some villages, tensions between specific groups within communities – such as tensions between castes or religions - were reported.

Agriculture was the main occupation in the villages, followed by remittances. In one village was there wage labour in a nearby sugar factory, and many people from the village worked there. Male outmigration in the study area was high. Many married and unmarried young men lived and worked in large cities, or overseas, e.g. Dubai. Bihar is known for its high rates of outmigration of menial labourers.

Amenities in all the villages were meagre; women talked about lack of educational and medical facilities in their vicinity. All the villages had Anganwadis (kindergarten) and primary schools. None of the villages had health care services inside the village, meaning that there was no Auxiliary Nurse Midwife/Female Health Worker or Male Health Worker in these villages. The distance to primary health centres varied, but no village had access to the centres through public transport, meaning costs to travel for medical care could be high.

Transportation in general was a problem in all villages – especially those that were cut off from the main road. There were no reported piped water schemes. For households that had invested in installing their own handpumps, water availability was not stated as an issue. Poor families that could not afford a private handpump shared one with other families or used the public handpump in the village. Respondents who relied on public hand pumps reported that these shared sources were often insufficient to meet daily household requirements. Electricity was sporadic in most blocks, and there was no electricity infrastructure at all in villages from Madhubani block. Women there were using small solar panels to charge batteries for basic lights needed in the household, but powering other electric appliances was not an option.

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<sup>1</sup>A GOI category indicating native peoples or *advasis*. Considered the most marginal in Indian society.

<sup>2</sup>A GOI category indicating former untouchable castes. These castes remain on the social and economic margins.

## 4. Intervention and Study Timeline

Study activities were originally designed to work in concert with the annual SBM funding cycle. However, multiple revisions to the study protocol and study timeline were required based on changes in the GoI / SBM policy changes and adaptations in the GSF-supported interventions in response to these changes.

Study site selection and original study design was finalized in early 2016. GPs selected to receive the GSF-supported intervention were first identified in April 2016. These were matched with GPs that were scheduled to receive GSF-supported interventions in 2017 or later (see Section 5 for further details) and baseline data collection was completed in May 2016.

In June 2016, the GoI announced that both Gopalganj and Paschim Champaran were selected by the central government to be “Open Defecation Free”<sup>3</sup> by early 2017 and that partners – including GSF and local implementing organisations – should ensure that districts had full coverage of sanitation facilities and use within a year. In theory, this meant that all villages sampled as part of the baseline study would now be receiving the GSF-supported intervention before planned endline in June 2017.

Two interim evaluation strategies were proposed in summer 2016 to accommodate what was now viewed as a full-coverage intervention. The first option required enrolling a new matched control group from other blocks where GSF-supported SBM activities. These blocks would have been far from the study area but provided an opportunity to identify GPs that would not receive active interventions prior to endline data collection. The second option included pursuing a “full coverage evaluation” of the current study site where outcomes were compared against estimated dose and fidelity of implementation. Through discussions with 3ie and WSSCC through the second half of 2016, the second option was agreed upon.

Key informant interviews in March 2017, in preparation for endline data collection, provided new information about changes to the GSF-supported interventions in the study area and information about changes to implementation timelines. Key learnings included:

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<sup>3</sup>The Swachh Bharat Mission (Gramin) (SBM-G) entails freedom from open defecation and management of solid and liquid waste. Open Defecation Free (ODF) has been defined as: “ODF is the termination of faecal-oral transmission, defined by:

- 1) no visible faeces found in the environment/village; and
- 2) every household as well as public/community institutions using safe technology option for disposal of faeces

- While all villages in the study area were scheduled to receive the intervention, implementation had not started in many GPs.
- Among those villages where the intervention has started, there was significant heterogeneity in the implementation and partners utilized a range of implementation approaches.
- Changes to verification process had shifted from the village to the ward level (6<sup>th</sup> level to 7<sup>th</sup> level administrative division) and many intervention activities were focused on specific wards rather than on entire villages.
- The ODF deadline for the study area – set by the GoI - changed multiple times. In Spring 2017, the ODF deadline had been extended to June 2017. This meant that endline data collection would occur at the height of project activities. ODF deadlines were further extended to October and then December 2017.

The multiple implementation strategies involved engaging with local stakeholders in various ways, providing additional training to community members on community mobilization, and engaging civil society actors. Key informant interviews suggested the following general typology of interventions implemented in the study areas:

- No intervention: These are villages included in the study area that were scheduled to receive the GSF-supported interventions, but where no intervention activities had occurred. There had been no community mobilization and no supply-side components of the intervention (sanitation markets, etc.) had been established.
- Standard intervention: Some GPs received the original GSF-supported intervention as planned, which included: community mobilization activities (similar to CLTS), provision of government subsidies and incentives, and supply side improvements – typically the establishment of a sanitation-market servicing a defined number of villages. In these communities, intervention communities had proceeded sequentially, meaning that intervention activities started in one GP and continued until the GP was declared ODF.
- Modified intervention: Modified interventions included a range of strategies:
  - Variant 1: Engagement of a broad range of government officials from a range of local and regional post to coordinate and manage intervention activities.
  - Variant 2: Involvement of women's self-help groups in community mobilizations and providing household loans for latrine construction
  - Variant 3: Recruiting a local "champion" – a paid community member responsible for promoting behavior change, organizing on-going community events, and increasing sanitation coverage and use in the community.

Secondary data sources were insufficient to determine how many villages had received which variant of the modified intervention. By June 2017, the following breakdown of intervention activities among the 60 GPs included in the study survey sample was estimated based on discussion with GSF local partners:

*Table 2: Estimated Intervention Status, June 2017*

No intervention	19
Standard Intervention	18
Modified intervention	19
Unknown	4

It is important to note that the modified intervention strategies did not alter the underlying theory of change behind the GSF-supported intervention. Rather, they reflected a change in intervention delivery, utilizing alternative methods for community engagement, distributing funds to households and communities, and different strategies for post-intervention engagement. In general, variants pursued involved less direct engagement from GSF and implementing partners and increased reliance on local government or civil society stakeholder.

In light of these changes to the intervention strategy, a modified evaluation approach was developed that focused on how different intervention models impacted primary and secondary outcomes. This approach, modelled after full coverage evaluation methods, would compare outcomes between communities where interventions had occurred and where they had not occurred (comparative before-and-after) as well as between communities receiving specific variants of the interventions. Village-level key informant interviews, collected at the time of the endline survey, were used to define the specific intervention strategy implemented in each study village.

The alternative evaluation strategy was agreed to in early fall 2017. However, the timing of endline data collection had not been determined. The study team provided two options: collect endline data in the fall of 2017 or collect data in the spring of 2018. Each option had specific benefits and limitations. Earlier data collection would reduce the time between when the GSF-supported programs closed (June 2017) and data collection, increasingly the ability to identify which specific intervention variant was pursued in study villages. However, this would result in endline data collection scheduled in the post-monsoon period compared to baseline data collection that occurred in the immediate pre-monsoon season. Data collection in spring 2018 would coincide with the same calendar period as the baseline – thus eliminating any potential

seasonality effects in the outcomes. However, later data collection would result in increased challenges identifying information about program implementation. At the request of the funding organisation, endline data collection was postponed until spring 2018 in order to address concerns regarding seasonality of outcomes.

The final endline analysis required additional statistical support. This was costed in fall of 2017. Resources for additional analytic support were made available in April 2018. All relevant IRB approvals were obtained in May 2018 and endline data collection started in June of that year. While survey teams were mobilised and trained, ethnographic data collection was completed in selected villages.

Endline survey data collection began in June 2018. Timing for the endline data collection coincided with the rise of a broad social phenomenon in India related to the spread of misinformation and rumours through social media and messaging applications. International news organisations have reported on killings of innocent people related to the spread of rumours about kidnapping (see: [this New York Times article](#)). In a similar manner, stories about gangs stealing women's hair had virally spread through north India. In one of the first villages surveyed at endline, the study team obtained full permission from local authorities to conduct the research and to collect hair samples included in the study protocol (see Section 5). However, a group of men arrived in the village after initial community mobilization had finished. Unaware of the research protocol and study procedures, the men claimed that the study team was collecting data to help gangs in their efforts to steal women's hair. The situation rapidly escalated and the study team was detained by local police and local authorities became involved. Data collection was halted while the study team was detained by local law enforcement and required to appear before the judicial authorities. While the study team was released from custody, tensions remained between the survey team and local communities. In light of these tensions, and out of concerns for enumerator safety, the endline survey data collection was terminated.

## 5. Evaluation: Design, methods and implementation

Ethical approval was provided by the University of Oklahoma Institutional Review Board and the Suraksha Independent Ethics Committee. Endline data collection was also approved by the London School of Hygiene and Tropical Medicine.

### Study Location

Our study focused on two districts in northwest Bihar – Gopalganj and PaschimChamparan. These districts were selected because, at the time of baseline data collection, GSF was the designated partner for SBM implementation in these districts, and thus provided more oversight and familiarity with field activities in each place. See Section 4 for more details on the study area.

### Study population

The study population was women between the ages of 14 and 65. In particular, our evaluation was informed by a life stage approach, in which respondents were classified based on a range of social and physical milestones rather than just age. Life stages of interest are defined in Table 3.

*Table 3: Life stages of interest to our evaluation*

Life Stage	Inclusion Criteria
<b>Adolescent (AD)</b>	Between the ages of 14 and 25 Reached menarche Not married Not currently pregnant
<b>Newly Married (NM)</b>	Married within the past two years Not currently pregnant
<b>Pregnant (PR)</b>	Currently pregnant
<b>Established adults, currently married (EAM)</b>	Less than 45 Married for at least 2 years Not currently pregnant Husband alive
<b>Established adult, single (EAS)</b>	Between the ages of 25 and 45 Married for at least 2 years Not currently pregnant Divorced, separated, or widowed

<b>Aged adults, currently married (AAM)</b>	Between the ages of 45 and 65 Married for at least 2 years Husband alive
<b>Aged adults, single (AAS)</b>	Between the ages of 45 and 65 Married for at least 2 years Divorced, separated or widowed

The following women were excluded from data collection: females younger than aged 14; females older than aged 65; females younger than aged 25 that have not reached menarche; and females over the age of 25 that have never been married. Exclusion criteria are based on physical and social vulnerabilities in younger girls, older women, and unmarried adult women. These represent populations that warrant particular attention. However, due to sample size restrictions we are not able to stratify our analysis to assess the effect of the intervention on these groups.

**Primary and Secondary Outcome measures (Quantitative):**

Full details on primary and secondary outcome measures for the planned quantitative evaluation are provided in the Pre-Analysis Plan and the Baseline Report. A brief summary is provided below:

**Primary Outcome: Sanitation-Related Psychosocial Stress (SRPS) Scale:** The SRPS scale consists of 25 yes/no questions related to experiences and concerns related to sanitation behaviours (defecation, urination, bathing, and menstrual hygiene management) in the past 30 days. Respondents are assigned one point for every question answered in a manner indicative of more stress, resulting in scores ranging from 0 to 25. Questions are further divided into three subscales reflecting theoretically informed aspects of SRPS: environmental stressors, social stressors, and gender- or sexual violence-based stressors. Higher scores are associated with more sanitation-related stress [7, 10, 11].

Secondary outcome measures included:

- **Perceived Stress Scale (PSS10):** a non-specific perceived stress scale [18]. The PSS10 [19] consists of 10 items rated on a 5-point Likert scale (0 to 4), with summed scores ranging from 0 to 40, with higher scores indicative of higher perceived stress.

- **Kessler Psychological Distress Scale (K10):** The K10 provides a measure of non-specific psychological distress and consists of 10 items rated on a 5-point Likert scale (1 to 5) [20], with higher scores indicative of higher perceived distress.
- **The WHO5 Well-Being Index (WHO5):** The WHO5 consist of 5 items rated on a 6-point Likert scale (0 to 5) related to subjective well-being, vitality, and mood [21]. Scores are calculated by summing responses across each item and multiplied by 4 to result in a final scale of 0 – 100, with high scores reflective of a higher subjective quality of life.
- **Hair cortisol:** Social, psychological, and environmental stressors activate the hypothalamus-pituitary-adrenal (HPA) axis, resulting in elevated levels of a number of glucocorticoids, including cortisol [22]. Cortisol measured from hair samples is considered an accurate and low-cost approach to assessing chronic stress and HPA axis activation. For the purposes of this report, we report on hair cortisol concentrations estimated for the 6 months prior to data collection.

Additional secondary outcome measures not included in the final report but discussed at length in the baseline report include: measures of attitudes towards sanitation construction and use, self-reported urogenital infections, menstrual hygiene management practices, and use and construction of sanitation facilities.

Validity in the context of Bihar was assessed during preliminary field visits used to assess and modify the conceptual framework underlying both the primary outcome measure (SRPS) and the Theory of Change for the intervention. Field visits confirmed with *a priori* theory. All survey instruments were pilot tested prior to data collection and responses found to align with expected ranges. Further, baseline data has demonstrated that all measures fell within expected ranges and expected variability and that all primary and secondary outcome measures – with the exception of hair cortisol – demonstrated expected correlations, both in terms of directions and magnitude.

### **Sample size determination:**

#### *Quantitative sample size*

For the quantitative study, 30 intervention GPs and 30 control GPs were prespecified as a logistically feasible number of study clusters that would allow for adequate statistical comparisons between groups. Estimates for sample size were based on an average of 20 respondents randomly selected per community. Full details on sample size calculation are provided in Appendix 3. In brief, expected sample size of 1200 at baseline and 1200 women at endline divided evenly between intervention and control villages would have provided a

minimum detectable effect (MDE) of either 1.7 points on the SRPS scale or a 12% difference in the proportion of women reporting any sanitation-related psychosocial stress between intervention and control groups. Further considerations included cluster-level attrition prior to endline (resulting in an MDE of 2.0 points on the SRPS scale between intervention and control assuming a loss of half of study communities) and estimated reductions in SRPS based on low rates of sanitation adoption in target communities (MDE of 3.4 based on only 50% adoption in intervention communities).

### *Qualitative Sample Size*

Qualitative sample size was estimated at a maximum of 60 individual across 10 GPs at baseline and again at endline. The number of 6 interviews per GP was chosen as the number likely needed to reach saturation, i.e., when interviews no longer produce new information. However, we left this number flexible in both baseline and endline—the goal being to reach saturation, not to take a set number of interviews. For baseline, (May 2016) a total of 41 interviews were completed before reaching data saturation. For the endline (May 2018), a total of 33 women were interviewed before reaching data saturation.

Between 2016-2018, a total of 18 Key Informant Interviews (KII) were completed. The number of interviews reflects the availability and willingness of local officials, NGO staff, and government workers to speak with the qualitative team. This number was not determined at the beginning of the study; instead, new information about the roll-out process of the SBM or village scale activities prompted additional KII interviews for purposes of triangulation. At endline, at least one person per study village was interviewed to triangulate women's information on GSF-supported implementation that was gained in interviews.

## **Sampling**

Sampling occurred at two levels: Village selection and individual selection.

### *Quantitative Village selection:*

We randomly selected 30 GPs that were scheduled to receive GSF-supported intervention during the 2016 intervention cycle propensity score matched to GPs selected from a list of potential control GPs was selected from all geographically contiguous blocks (4<sup>th</sup> level administrative units) where GSF and its partners had not implemented sanitation programs in the past three years. All GPs within selected blocks were pooled for sampling purposes – block was only considered in defining the set of potential GPs for selection. Within each selected GP, we identified one village for quantitative data collection. Villages were selected at random for a list of all villages in the selected GP with more than 85 households. In matched GPs, a village was identified in two stages. First, villages with a population +/- 25% of the

randomly selected intervention GP's village were identified and one selected at random. If no village had a population within +/-25%, the village with a population closest to the selected village in the intervention GP was selected.

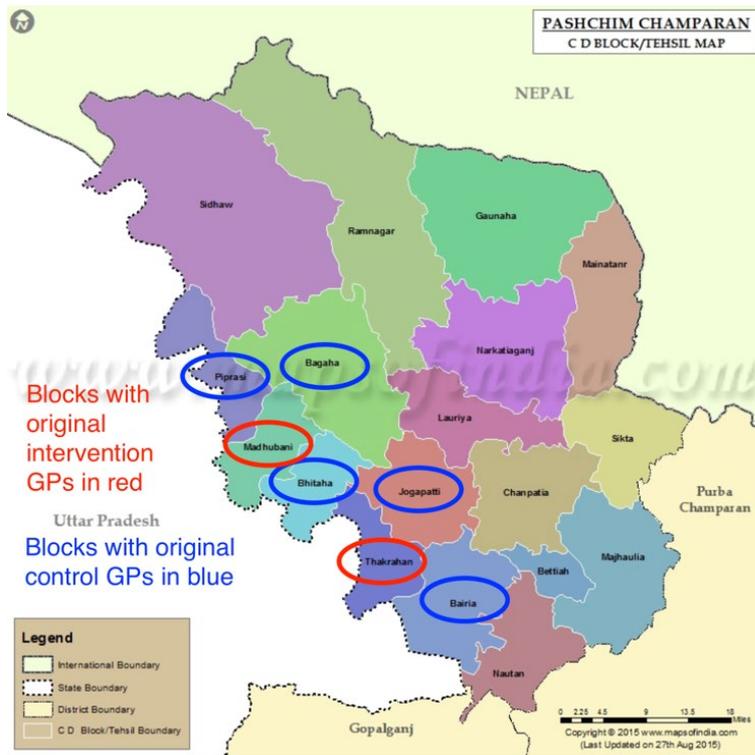


Figure 3: Block map of Paschim Champaram

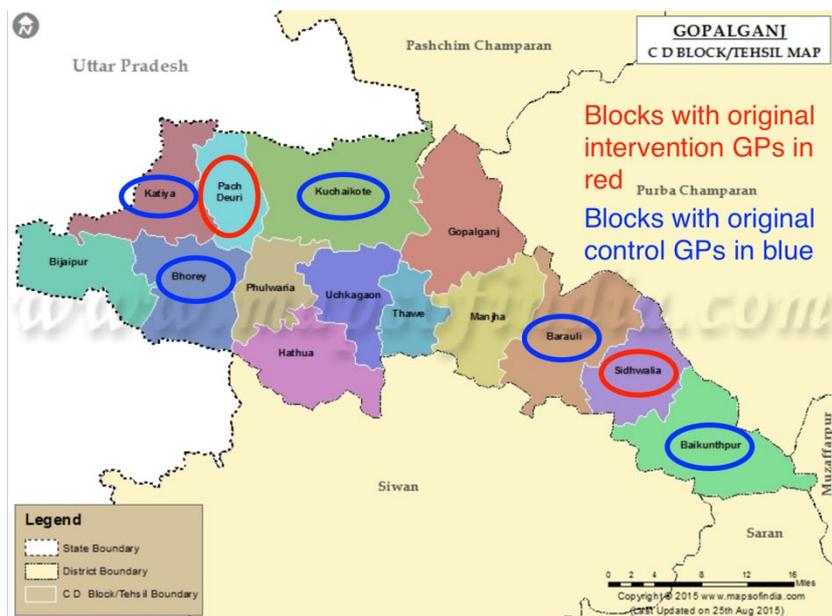


Figure 4: Block map of Gopalganj

### *Qualitative Village Selection*

A total of 10 villages were selected for ethnographic data collection. Villages were sampled from the same GPs included in the quantitative study, with a sample drawn evenly from control and intervention GPs as they were defined at baseline. In each selected GP, we identified a village that was not participating in the quantitative data collection. Villages were selected based on size and caste composition. We were interested in villages that varied in size according to the GOI 2011 census: small (<200 households); medium (200-500 HHs) and large (>500 households). We purposefully selected three villages that had large scheduled caste (SC) populations and two that had a substantial scheduled tribe (ST) population, so that we could explore their effect on sanitation-related stress and experiences in GSF-supported intervention implementation. There were no villages in the study GPs that had both a large SC *and* ST population. Because the spatial configuration of housing in these villages also reflected underlying social stratifications (e.g. SC households occupying a specific, segregated neighbourhood, interviews were distributed across the villages' geographic areas to ensure adequate representation. Demographic profiles of selected villages based on the 2011 Census of India is provided in Table 4.

*Table 4: Demographic profiles of selected villages<sup>4</sup>*

<b>Village</b>	<b>Households</b>	<b>Population</b>	<b>% SC</b>	<b>% ST</b>
<b>Gopalganj District</b>				
Durgapur	216	1331	35	1
Komalpur	115	725	13	49
Mayaganv	276	1761	1	0
Sadalpur	153	1008	20	4
Sirsabad	323	1754	13	0
<b>Paschim Champarim District</b>				
Hawabad	252	1263	41	0
Kaveri	117	650	7	15
Mansooriya	172	883	4	1
Paharganj	802	4945	13	3
Tarawa	1180	6666	17	2

Source: Census of India, 2011

## **Participant selection and Data Collection**

### *Quantitative Selection*

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<sup>4</sup>All village names are pseudonyms to protect participant anonymity.

A total of 20 women were selected for participation in the survey from each selected village. Upon arrival, field teams created a map of each selected village with a focus on the geographic distribution of the population. In discussion with village leaders, estimated populations in each geographic cluster were identified. Because the spatial configuration of housing in these villages can also reflect underlying social stratifications (i.e.: all Dalit households within a community isolated to a specific corner of the village), sampling starting points were distributed across geographic areas to ensure adequate representation. Data collection teams sampled households along a pre-specific interval based on total population of the village. At each household, all eligible women were identified. Data collectors then sampled one woman at random for data collection.

### *Qualitative Selection*

Households were selected by walking caste-based neighborhoods over consecutive days, and speaking with girls and women from 14-60 years of age, who were out in their courtyards—an indicator that the prospective participant was usually free to talk, and continue her work, if necessary. The team purposefully selected girls and women across the lifecourse, but all adult women and aged women were married. We did not encounter any widows or divorcees. All participants gave their verbal informed consent. Up to 6 women were recruited per village. Details on sample per village, by religion/caste, and life stage are presented in Table 5.

*Table 5: Total sample and participants characteristics for ethnographic data collection, baseline and endline*

	<b>Baseline</b>	<b>Endline</b>
<b>Village</b>		
Durgapur	6	3
Hawabad	4	2
Kaveri	3	1
Komalpur	4	4
Mayaganv	4	4
Paharganj	4	4
Pathkaulia	3	4
Sadalpur	4	3
Sirsabad	6	4
Tarawa	2	4
<b>Caste / Religion</b>		
General	7	5
OBC	16	16
SC	11	7
ST	1	1
Muslim	6	3
No response	0	1

<b>Life stage</b>		
Adolescent	13	5
Newly married	4	1
Pregnant	0	1
Established adult, married	19	19
Aged adult, married	5	7
<b>Total</b>	<b>41</b>	<b>33</b>

Interviews were conducted in Hindi by the authors and were recorded by hand, including notes on the interview itself and observations on amenities and conditions of each village and household. The interviews of *aged adults* were taken in Bihari through a local female translator, as they typically did not speak Hindi. Interviews were intended for individuals, but they often occurred in groups of women. Only the words of the interviewee were recorded as answers to the interview checklist; all other responses were noted as separate from the participant interview. Questions covered experiences of open defecation and latrine usage, emotions surrounding sanitation and hygiene practices, social norms, livelihoods, habits, and local politics that influenced the building and usage of latrines. The researchers asked women and girls about household sanitation conditions, their sanitation habits, if they used latrines, and the reasons behind constructing latrines in their houses. They were also asked about the sanitation schemes they knew of, and in which ways they participated (if they did) in acquiring a latrine. See Appendix 6 for the baseline and endline qualitative interview checklists.

Data were summarised in an iterative process, based on the themes and objectives of the study. A mixed approach of deductive and inductive (line-by-line) coding of notes and recorded observations was used for generating themes, codes, and sub-codes of the data summaries. Detailed code memos were written for each code and sub-code. The codes and code memos were mutually agreed upon and validated by the study team by all qualitative team members. These codes were then used to code text segments from the summaries of the data. The coded segments were further analysed along themes.

## 6. Programme: Design, methods and implementation

### Intervention

Details on intervention roll out and evolution are provided in Section 4. Details on the SBM programme in Bihar are included in Appendix 1. Here, we provide details on the experiences of the GSF-supported intervention as experienced in the villages included in the ethnographic data collection.

### Mobilization activities

In May 2016, GSF partners working in the districts – *NavJagriti* in Gopalganj and *Adithi* in Paschim Champaran – began mobilisation activities. Their strategy was to concentrate efforts in one block at time, and when that block was ODF, move to the next. As described earlier, because of a shift in government policy to declare both districts ODF by early 2017, the two organisations had to rapidly adjust strategies. In Gopalganj, a cadre of trained GP level officials, and later, trained village level volunteers were created. Training was intended to enable officials and volunteers to carry out mobilisation activities in their respective GPs. NavJagriti supervised the work of these GP officials and volunteers, and did mobilisation work themselves in certain blocks. In Paschim Champaran, Adithi continued the original block-wise work approach, and concentrated mobilisation work in Madhubani block. The two GSF partners ceased operations in the study area in June 2017. Since June 2017, there have been no NGOs involved in mobilisation work.

Mobilisation activities, if any, were only done by government institutions or workers since GSF partners stopped work in June 2017. Mobilization activities mentioned by key informants and interviewees included: triggering meetings; OD mapping; and vigilance activities. Mobilization activities occurred at all administrative levels, but evidence indicates that there was a barrier between activities occurring at the District and Block scales, and the building of latrines and mobilization activities at the GP scale. The District Magistrate oversaw SBM activities in his/her district, including trainings that were happening daily during our endline ethnography fieldwork. These trainings were for various stakeholders. *Jeevika*—aka Bihar Rural Livelihoods Promotion Society (BRLPS)— developed under the National Rural Livelihood Mission was also expected to motivate its SHGs' women members to build IHLs. Mobilisation strategies were also been developed by *Jeevika* to achieve that objective.

In actuality, the endline ethnography data collection revealed that the GSF-supported intervention rolled out in the ten study villages very differently from the strategy suggested by partner interviews in 2017. In general, the intervention was rarely systematic or sustained. Three villages had had no mobilisation activities by the time of endline data collection. In the

remaining seven villages, there were no continuous activities. Instead there were only 1 or 2 mobilization events, and there was no follow-up. In most villages, mobilization activities happened after GSF partners ceased their operation in June 2017. Since that time, two strategies adopted by the District government in Gopalganj (as reflected in assumed intervention typologies) included: 1) training of GP officials and 2) the training of village-level volunteers had no obvious impact in selected villages. As reported by interviewees and triangulated by the field team, neither officials nor volunteers conducted any mobilisation activities.

The role of Jeevika depended on the individual motivation of Jeevika workers in their respective villages. In three villages, Jeevika workers were very active, and made conscious efforts toward promoting latrine use, providing loans, and filing verification documents. These efforts did not occur in the other seven villages, and in this way, the influence of Jeevika workers was also not systematic, but opportunistic.

## **Toilet construction**

There were only three villages with large scale village-level construction of toilets between baseline and endline. In all of these villages, construction was Mukhiya-contractor led process whereby Mukhiyas would initiate IHL construction through local contractors, who would then build IHLs on the promise that they would be later reimbursed through a transfer of the SBM subsidy. Corruption in terms of incomplete or poorly-constructed toilets was observed and reported during endline ethnography. Unusable toilets (see Figures 6 and 7) were verified to facilitate the payment of contractors. There was a noted absence of documentation regarding the role of contractors or their payment and the relationship between Mukhiyas and contractors.

Of note, mobilisation activities did not always lead to toilet construction as expected. As above, toilet construction scenarios varied across the ethnography villages—evidence of an inconsistent and uncoordinated process. One of the study villages was recently declared ODF at the time of endline ethnography. Its toilets were constructed by a contractor and were functioning at the time of interviews. In one village, toilet construction was happening at the time of interviews. Villagers reported that toilet-conditions were mixed—in one ward they were left half constructed, but in the rest of the village they were done well and were usable. In another village, the contractor only built toilets for 10-15 households of one particular community, and rest of the households were waiting for construction to continue. When this would happen was unclear. One village where the contractor had built toilets were all defunct

by the time of interviews. In the remaining six villages there was no movement by Mukhiyas to construct toilets.

Most villages had at least a few households who had built toilets on their own, however IHL remained a minority. The Bihar government has a specific policy that households will receive reimbursement only after their entire ward is verified ODF. Only wards in study villages where the Mukhiya and contractors managed construction had been declared ODF. In these wards, households - whether they self-built or had contractor-built IHLs- had received reimbursements. But in the cases where wards were not yet ODF, respondents that self-built IHLs had not yet received reimbursements.

### Revised Intervention Classification

Prior to endline data collection, we anticipated that we would classify villages based on the specific variant of the intervention they received – no intervention, standard intervention, or one of three variants. These classifications were primarily a reflection of *mobilization* activities. However, ethnographic field work suggests that there was little variability in mobilization activities. In all villages, mobilization activities were sporadic and inconsistent. Instead, the greatest differences were seen between villages where there had been village-wide toilet construction organised by the Mukhiya and local contractors had occurred. A revised classification is provided below:

1. No intervention
2. Limited mobilisation and village-scale construction
3. Limited mobilisation but no village-scale construction

Category 2 includes villages where contractor-built toilets were now defunct. Self-financed IHL were observed in all categories, although – as noted above – they were infrequent. The ten ethnography villages classified into these categories are presented in Table 6. Further village-specific information is presented in Appendix 4.

*Table 6: Revised classification of study villages*

Category	No. of villages	Names of villages
No intervention	3	Mayaganv (Gopalganj) Kaveri, Hawabad (Paschim Champaran)
Limited mobilisation and village-scale construction	3	Durgapur, Sirsabad (Gopalganj) Tarawa (Paschim Champaran)

Limited mobilisation and village-scale construction	4	Komalpur, Sadalpur (Gopalganj) Paharganj, Mansooriya (Paschim Champaran)
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## 7. Impact analysis and results of the key evaluation questions

### Summary results from quantitative baseline

#### *Water and Sanitation Access and Use*

A total of 1207 women from 60 selected villages were interviewed at baseline. Baseline water and sanitation access and use data is presented in Table 7. Across all study villages, access to water was high. Almost all respondents (99.6%) reported access to an improved water source. Approximately 79% had their primary water source on site and reported time to fetch water of less than 1 minute; 3% reported time to fetch water for their household below five minutes, 16% reported a time between 5 to 14 minutes, and 3.5% reported times greater than 15 minutes. At baseline, 11% of baseline respondents reported access to a sanitation facility although only 7% had access to a sanitation facility that was fully constructed. In total, 9% of respondents reported access to a sanitation facility that was not shared other households. Over 95% of respondents reported defecating in the open (OD) at least once in the 7 days prior to data collection.

*Table 7: Water and Sanitation Access and Use at baseline*

	%	N
<b>Water Access</b>		
Access to an improved water source	99.6%	1202/1207
Time to fetch water from primary water source (in minutes)		
< 1 minute	78.4%	946/1207
1 – 4 minutes	2.2%	26/1207
5 – 14 minutes	16.0%	193/1207
15+ minutes	3.5%	42/1207
<b>Sanitation Access and Use</b>		
Has access to a toilet facility	10.9%	132/1207
Has access to a fully constructed toilet facility	6.9%	83/1207
Has access to a toilet that is not shared with other households	9.0%	108/1207
Defecated in the open in the past 7 days	95.4%	1152/1207

In multi-level logistic regression models accounting for village-level clustering, individuals with access to a private sanitation facility had 92% lower odds of reporting OD in the past seven days compared to women without a private sanitation facility (OR: 0.08, 95% CI: 0.04 – 0.13) and 98% lower odds of reporting OD with access to a fully constructed facility (OR: 0.02; 95% CI: 0.01 – 0.04). Baseline data did not collect data on contractor vs. household constructed toilets. However, data were available on if the household had received materials, cash, or labour support for toilet construction. Among those respondents with a toilet who reported

receiving external support for construction, odds of defecating the open in the past seven days were 3.8 times higher than those individuals who did not receive external support for construction (OR: 3.78, 95% CI: 1.49 – 9.61).

### *Sanitation-Related Psychosocial Stress*

The sanitation-related psychosocial stress (SRPS) scale was the primary outcome measure for the quantitative analysis. Respondents were scored one point for each answer in the affirmative related to specific stressors experienced in the 30 days prior to data collection. Scores ranged from 0 to 25 with a median score of 16 (meaning that women answered in the affirmative to 16 of the 25 questions related to specific sanitation-related stressors in the last 30 days). Mean scores were 14.7, with a standard deviation of 5.3. The 25 point scale consisted of three sub-scales: a 7 point scale related to sexual or gender-based violence experiences, fears or anxieties; a 10 point scale related to social stressors, and an 8 point scale related to environmental stressors. Of the three SRPS sub-scales, sexual violence was the lowest scoring, with only 33.14% (400/1207) of all women answering yes to more than 50% of the survey items. Scores on the sexual violence SRPS sub-scale ranged from 0-7 with a mean of 2.6(SD: 1.6) and a median of 3. The social SRPS sub-scale generally reflected higher scores than the sexual-violence sub-scale, with 77.8% (939/1207) of all women responding yes to 50% or more of the survey items. Scores ranged from 0-10 with a mean of 6.5 (SD=2.7) and a median of 7. The Environmental SRPS sub-scale was the highest scoring of the three sub-scales, with 87.8% (1060/1207) of women answering yes to 50% or more of the survey items. The range of the environmental scale was 0-8 with a mean of 5.6 (SD: 1.8) and a median of 6. See Table 8.

*Table 8: Sanitation-related psychosocial stress scores from baseline data collection, May 2016*

<b>Scale</b>	<b>Range</b>	<b>Mean (SD)</b>	<b>Median</b>
SRPS (Full scale)	0 – 25	14.7 (5.3)	16
<i>Sexual violence SRPS scale</i>	0 – 7	2.6(1.6)	3
<i>Social SRPS scale</i>	0 – 10	6.5(2.7)	7
<i>Environmental SRPS scale</i>	0 – 8	5.6 (1.8)	6

Because outcomes were scales and we could not assume normal distribution, Somer’s D was used to assess statistically significant univariate associations with variables of interest. Somer’s D is interpreted as changes in the probability that a respondent would score higher or lower on the SRPS scale based on the variable of interest. The SRPS scale was found to be significantly associated with several factors related to water and sanitation access. Reporting access to any toilet facility corresponded to being 61-80% less likely to report a

higher SRPS score than a lower one (Somers' D -0.70, CI -0.80 – -0.61), while those reporting access to a *fully constructed* toilet facility were 68-88% less likely to report a higher SRPS score than a lower one (Somers' D -0.78, CI -0.88 – -0.68), and those reporting access to a private, unshared toilet facility were 60-80% less likely to report a higher SRPS score than a lower one (Somers' D -0.73, CI -0.83 - -0.60). Reporting that their primary source of water was an improved source was not found to be correlated with a higher or lower SRPS score. SRPS scores were more likely to increase as time it takes to fetch water from the primary source increased. Individuals reporting 15+ minutes to fetch water had a 15-46% increase in the likelihood of a higher SRPS score as compared to a lower one (Somers' D 0.31, CI 0.15 – 0.46). Women with access to a sanitation facility who still reported defecating in the open in the past seven days (n = 55) were 17-59% more likely to report higher SRPS scores than those with access to a toilet facility that did not go for open defecation in the past 7 days (n = 77) (Somers' D . 0.38, CI 0.17 – 0.59). See Table 9.

*Table 9: Univariate association between water and sanitation access indicators and SRPS scores, adjusting for village-level clustering*

Variable	SRPS Median	Somers' D	95% CI	P-value
Has access to a sanitation facility	5	-0.70	-0.80 --0.61	<0.001*
Has access to a fully constructed toilet facility	4	-0.78	-0.88 - -0.68	<0.001*
Has access to a private toilet facility	5	-0.73	-0.83 - -0.60	<0.001*
Defecated in the open in the past 7 days	16	0.84	0.75 – 0.92	<0.001*
Primary source of water is improved	16	-0.01	-0.37 – 0.34	0.936
Time to fetch water from primary water source				
<i>0 mins (source on site)</i>	16	<i>Ref</i>		
<i>&lt; 5 mins, but not on site</i>	14	-0.15	-0.37 – 0.06	0.175
<i>5 – 14 mins</i>	16	0.11	-0.01 – 0.22	0.073
<i>15+ mins</i>	18	0.31	0.15 – 0.46	<0.001*

Somer's D is only applicable for univariate analyses. For multivariable analyses, SRPS scores were analyzed using log-Poisson regression, providing Risk Ratios (RR) that estimate changes in SRPS scores associated with covariates of interest. Based on a number of model parameters, we identified three water and sanitation variables that explained the greatest variability in SRPS scores: does the respondent have access to a toilet facility, has the respondent defecated in the open in the past 7 days, and distance to primary water source. Women with access to a toilet facility scored – on average – 42% lower on the SRPS scale than women without access to a sanitation facility (RR: 0.58, 95% CI: 0.49 – 0.70). Women who defecated in the open in the last seven days had scores 82% higher than women who

used a sanitation facility for defecation (RR: 1.92, 95% CI: 1.36 – 2.45). Women who traveled more than 15 minutes to reach their primary water source scored 12% higher on the SRPS scores than women who had taps on site (RR: 1.12, 95% CI: 1.05 – 1.19). See Table 10. All analyses adjusted for village-level clustering and controlled for religion, schedule caste / tribe, level of education, and life stage.

*Table 10: Multivariate log-Poisson regression of SRPS scores, controlling for socio-demographic variables and village-level clustering*

Variable	RR	95% CI	P-value
Access to a toilet facility	0.58	0.49 – 0.70	< 0.000
Open defecation in the last 7 days	1.82	1.36 – 2.45	< 0.000
Time to water source			
<i>On site</i>	<i>Ref</i>		
< 5 min	0.93	0.83 – 1.07	0.352
5 – 14 min	1.03	0.97 – 1.09	0.228
15 minutes or more	1.12	1.05 – 1.19	0.001

The Sanitation-related Psychosocial Stress Scale (SRPS) was found to be significantly correlated with the Perceived Stress Scale (PSS), the Kessler Psychological Distress Scale (K10), the WHO Well Being Index (WHO5). We found that it is 10-20% more likely that a higher scoring individual on the SRPS scale would score higher on the K10 scale compared to someone who scored lower on the SRPS scale (Somers D' 0.15, CI 0.10 – 0.20). Similarly, it is 7-16% more likely that a higher scoring individual on the SRPS scale would score higher on the PSS scale than lower (Somers D:' 0.12, CI 0.07 – 0.16), and 28-38% more likely that a higher scoring individual on the SRPS scale. In contrast, it was 2-13% less likely that an individual scoring higher on the SRPS scale would score higher on the WHO5 scale compared to lower (Somers' D -0.08, CI -0.13 - -0.02). As higher K10 and PSS10 scores are indicative of higher stress and higher scores on the WHO5 are indicative of higher subjective quality of life, all changes were in the anticipated direction. There was no association between SRPS score and hair cortisol measures.

*Table 11: The association between SRPS scores and standard measures of mental health and hair cortisol using Somers' D, adjusting for village level clustering*

Measure	Somers' D	Lower CI	P-value
SRPS-->K10	0.15	0.10– 0.20	<0.001
SRPS-->PSS10	0.12	0.07 – 0.16	<0.001
SRPS--> WHO5	-0.08	-0.13 - -0.02	0.005
SRPS →6 month hair cortisol measure	0.00	-0.06 – 0.06	0.941

We used multivariate log-Poisson regression to estimate the association between the same water and sanitation variables that were found to predict SRPS scores and the other primary and secondary outcomes of interest. All analyzes are adjusted for village-level clustering and controlled for religion, scheduled caste / tribe, level of education, and life stage. Beyond the SRPS scale, water and sanitation variables only had a small association with the PSS10 – women who reported defecating in the open scored 9% higher on the PSS10 scores than women who didn't. There were also significant differences based on distance to water source (Table 12).

*Table 12: Water and sanitation access and secondary and primary outcomes, adjusting for village-level clustering and sociodemographic*

	SRPS	PSS10	K10	WHO5	6 month hair cortisol
Access to a toilet facility	0.58***	0.99	0.96	1.01	0.98
Open defecation in the last 7 days	1.82***	1.09*	1.02	0.94	0.96
Time to water source					
<i>On site (ref)</i>					
< 5 min	0.93	1.09*	0.98	1.00	0.93
5 – 14 min	1.03	1.04*	1.03	1.04	0.99
15 minutes or more	1.12**	1.06*	1.03	1.04	1.05

\* *p-value < 0.05*

\*\* *p-value < 0.01*

\*\*\* *p-value < 0.005*

### *Hair cortisol findings*

We found no association between measured hair cortisol and any of the following variables: SRPS scores, K10 Scores, PSS10 Scores, WHO5 Scores, and a Behavioural Modification Index. Not only were association not significant, measures of association were typically close to 0. In Appendix 2 we describe the challenges related to hair sample collection, interpretation, and the longer than anticipated delay between collection and processing. Given the strong internal consistency of all other measures included in this study, the study team has limited confidence in our measures of hair cortisol. Had endline data collection continued, we would have explored this in greater detail by analyzing endline hair cortisol measures only.

## **Ethnography findings**

### *OD Habits, Times and Places*

At baseline, most women interviewed were practicing OD. At endline, most women interviewed had latrines and were using them. This difference partially reflects the decision to

purposefully select women with latrines for the endline interviews as part of the study objective to understand pre- and post-intervention SRPS.

Places women used for OD depended on the agriculture cycle. Since we conducted our interviews in month of May and June – when the agriculture year was over, and crops had been harvested – the primary location for OD was “open fields”. Most of these fields were completely open spaces, although there was ground cover in some instances. Less frequently women said that they went to riversides, canal sides, open community lands and roadsides. A young married girl explained that she and her family walked far to the river rather than using fields nearby because

*“...when the farmers sow the crops, like vegetables, then we have to go even further. We can't sit in those fields, right?”* – NM, Durgapur, Gopalganj, 2016

Once sowing was done, women did not use fields for OD anymore, favouring roadsides and sugarcane fields, and occasionally open village commons, instead. (Sugarcane fields were acceptable OD grounds since sugarcane is processed before consumption.)

Since many of the places women used were without any ground cover, they went in the dark to avoid being seen, usually before dawn between 4 to 6 am, and again in the evening between 5 to 7 pm. Newly married women (NM) reported never going at any other time out of concerns for being seen. Some women reported going after 7 pm when it was completely dark:

*“This is not a city, where every house has a latrine, where we can go any time when we wish. So, this is how it is.”* – AG, Komalpur, Gopalganj, 2016

Some respondents resisted the idea of going in the early morning hours, i.e., before sunrise:

*“I go after 6 am. Why would I go at four in the morning? Who would wake up that early [if she doesn't have to]?”* – AG, Komalpur, Gopalganj, 2016

Nevertheless, women mostly avoided going during the day if they could, restricting their eating and drinking if necessary. If they did have to relieve themselves in the daytime, they might have to walk very far or search for nearby ground cover so as not to be seen. In dark or light, commuting time to and from OD places varied from 10 minutes to an hour. A woman who had to walk an hour to her OD place told us:

*“Not having latrine at home is a waste of time. If I had one, I would have saved enough time to study more, work in fields, and finish household chores.”* – AG, Durgapur, Gopalganj, 2016

While her commute time was longer than other respondents, her view that OD took time away from other things she cared about represents other comments we heard about wasted time due to OD.

In some cases, women's early morning timing prevented women and men from using the same OD places at the same time. However, women mostly reported that OD places were separated by gender. Even when they went in same direction, men walked to a location further ahead than women. A few women pointed out that it doesn't make much difference for men, they can go to any place at any time, but women need to exercise more caution:

*"So, you know, ladies don't go anywhere in the day time. They won't go until they absolutely have to go. The men, they can go anytime and sit in the open. They don't really have any shame, right?"* – AG, Komalpur, Gopalganj, 2016

The double-standard for freedom between genders, and its connections to shame and *izzat* (honour) was not lost on women, nor its implications for where and when they went for OD.

The assignation of different castes to separate OD places appeared in three study villages, although this segregation was normalized with the logic that people simply used the OD ground closest to their neighbourhood (which are caste-based):

*"All this open space around these houses belongs to our caste. So we use this place. The main village is ahead, and people from there go to the other side. They don't come to this side."* – General caste, AAM, Sadalpur, Gopalganj, 2016

Evident in dominant caste's women's remarks from these three villages is the connection that they make between their safety and their caste status.

*"Lower castes sit at a distance from higher castes. No one tells them to sit separately, they know about it. I don't feel scared. I know nobody will do anything to my daughter. This is a Yadav village. This is our village."* – OBC, EAM, Komalpur, Gopalganj, 2016

In villages where interviews and observations revealed tensions between castes, EAMs from the dominant caste in their village commented, as quoted above, that they did not experience fear and anxiety because of that dominance. Women outside of this lifecourse category did not comment on a relationship between caste and stress that they experienced, if any.

### *Latrine access*

*Table 13: Sanitation Access, 2016 and 2018*

<b>Availability of latrine</b>	<b>2016</b>	<b>2018</b>
No	32	8

Yes	6	22
Defunct	3	3
<b>Total</b>	<b>41</b>	<b>33</b>

During baseline, most women interviewed did not have access to latrine and were practicing OD. Six women reported having built a latrine at home. Three had only had a functioning latrine at home temporarily. These three latrines—built through an earlier sanitation scheme—were considered useless by their owners due to poor construction and shallow pits:

*“They only dug a pit of 2.5-3 feet. If it were 12-13 feet deep, then the dirt [faeces] goes in. But in this one, the dirt is right there on the top. So we don’t use it at all.” – SC, EAM, Sadalpur, Gopalganj, 2016*

Having decided their latrine was inadequate, they resumed OD. This situation changed appreciably, however, in the intervening two years.

By endline, 22 of the 33 women interviewed had access to a functioning latrine. One of these latrines was built in 2011, four were built between 2014 and 2016, and 17 were constructed after 2016. Latrine coverage increased in all study villages. The majority of the interviewed HHs had self-financed solid, sanitary latrines. Fifteen women said that their HHs built their own latrines, investing their own money through loans, sale of land, and remittances. All HHs that self-financed expected to be reimbursed for their expenditures, although some HHs were uninformed about SBM building specifications and were not eligible for future reimbursement because their latrines did not meet them. Others were not aware that their ward had to be declared ODF before reimbursement and were wondering when they would be paid back.

*Figure 5: Toilet constructed per SBM guidelines, no reimbursement received, Paschim Champaram*



We found eight HHs whose units were built by a Mukhiya-appointed contractor. They were built to SBM specifications and HHs paid the contractor after they received their INR 12,000 reimbursement. Though simple, these latrines were sanitary, and regarded as adequate sanitation, and women used them.

Three women reported that their latrines had been built by the Mukhiya-appointed contractor, but they were not functional due to an unsealed pit, collapsed walls, or they were incomplete. There were two study villages (out of 10) where Mukhiya-appointed contractors had built latrines that were unusable. Based on triangulation within the ten study villages, it is reasonable to expect similar shoddy workmanship by contractors in other villages in the two districts. In this way, the cases covered in the ethnography study are representative; however, the research does not support scaling up these findings to the state level. Nevertheless, the evidence from this study raises an alarm as to the extent of corrupt practices related to the SBM throughout Bihar, and perhaps, India-wide.

Corrupt Mukhiya-appointed contractor activities extended beyond the building of non-functioning latrines to include the neglect of certain wards or villages under the Mukhiya's control. As the Mukhiya was responsible for directing the contractor where and when to build, he exercised the power to bypass geographic sections and/or communities under his

leadership. We noted this selective implementation in three cases. In one, quality of construction varied considerably between wards. In another a village, where all the latrines in village had either become defunct or were not completed in the first place.

*Figure 6: Contractor built defunct latrine, Gopalganj*



*Figure 7: Contractor-built, incomplete latrine, Paschim Champaran*



### *Latrine use*

At baseline, six of the 41 women interviewed had access to a functioning latrine, out of them three used their units and three went for OD. One woman said that the latrine was built by her brother-in-law for the convenience of his wife when they visit from the city. She did not use the latrine herself, as she did not want the pit filled quickly. Instead, she and her adolescent daughters went for OD. In another case, an adolescent girl said that she used the latrine since it was built a couple of years ago, especially during daytime and rainy days, but she also sometimes preferred to go for OD in order to spend time her friends.

Atendline, all 22 women who had access to functioning latrine, whether it household- financed or contractor- built, were using it. Only in 4 cases was their evidence that latrine usage continued to be selective. Two EAMs said the toilet was for younger women of the HH (AGs and daughter-in-laws (DILs),) and one had the additional concern that the pit would fill quickly if used continuously. An AG told us that she sometimes prefers to go for OD—the toilet cabin is too confining to use all the time. The fourth 'selective user', an EAM, said that while she used the IHL daily, she will go for OD if she is working the fields or far from home. All participants mentioned that they used the toilet in monsoon.

Some HHs constructed two toilets in the household, one for each gender.

*“While we were building them, we got two built. The one in courtyard is used by men, and the other which can be accessed from inside the house is used by women.”—OBC, AG, Durgapur, Gopalganj, 2018*

This gendering of latrine usage was evident in four HHs that built separate latrines for men and women. It also appeared in an interview in baseline where a woman said that her HH's latrine was used only by women –men went for OD because they cannot use the latrine that the young DILs of the house were using. Age and gender combined to influence those who went for OD and those who did not.

### *Reasons for building*

At baseline, gender figured foremost among reasons given for building an IHL; women answered "convenience of women" in the few HHs that had latrines. In one case it was built for a new DIL, in another, for the convenience of a DIL who had lived in a city and was not accustomed to OD.

*“Women have more difficulty in going for OD. Men of the household felt bad that we had to go out for OD. People can see them [women]. They have to go out in the rain. That’s why the men of the household built one for us.” – Muslim, EAM, Mansooria, PaschimChampan, 2016*

At endline, convenience remained the dominant reason for building a latrine, coupled with the reputation of daughters and DILs. Women reported that they and their parents asked for a toilet to be built in the groom's home by the time of the wedding.

*“My parents’ house in the village didn’t have toilet. But I always stayed with my uncle, and there was one at his house. So whenever I visited my parents it used to be difficult. So they insisted that my in-laws build one before the wedding, and they did.” – OBC, EAM, Sadalpur, Gopalganj, 2018*

*“Men see, boys also see and when [our] DIL comes, her father-in-law will notice when she will go for OD, which is not good. Now [we have a latrine] and she will use that.” – EAM, Durgapur, Gopalganj*

Environmental stressors, such as having to walk to the OD place in the rain or hot sun or fear of snakes and scorpions, was another key reason women reported for building a latrine. Access to the scheme was also a major factor for building.

Women reported that even though they wanted to build a toilet in the past, they did not have enough funds. Now, knowing that they will receive INR 12,000 through the scheme after building, they constructed IHLs:

*“We thought that going out was inconvenient. It was a problem going out. Men are working in the fields when we go for OD. It’s embarrassing. Then there is the problem of flood. Therefore, we wanted to build toilet. Then Jeevika told us about the scheme, that we can take a loan for now, and we will get reimbursed afterwards. So we decided to build”* – EAM, Mayaganv, Gopalganj, 2018

The SBM reimbursement also motivated some HHs to spend their own money, in addition to the reimbursement, to improve on the SBM design in ways that suited their family's needs:

*“We took a loan of INR 20000 from local money lender at 5% per month rate. Later I took a loan from SHG at 1% per month rate to pay off that loan. I have paid INR 10000 back to SHG. The total for construction of twin-pit, pour flush latrine and large attached bathroom totalled INR 80000. We knew we will get INR 12000 reimbursed. But since we were going to make it only once, we decided that we will build a good one.”* – EAM, Mayaganv, Gopalganj, 2018

#### *Other sanitation related behaviours: bathing and MHM*

Bathrooms were a common addition to standard toilet designs - privacy during bathing was hard to come by. At baseline, most women bathed in a makeshift, 3-sided structure known as ‘tatti’ or ‘basvar’ or ‘gali’ or ‘khidki’ that was positioned in the courtyard. Privacy was maintained through a complex set of practices that included waiting until men of the household went out; locking the doors of the house; creating some enclosure by placing a cot near the handpump or using a saree or curtain; asking someone to keep a watch; and shouting now and then so no one would enter the courtyard while they were bathing. One SC woman in Paschim Champaran who did not have a handpump at home, and no space where she could bathe, had to use a communal handpump for bathing. Her bathing was limited to pouring water over herself while fully clothed.

At baseline, four women reported having constructed bathroom at their house. One of them was a newly married young woman, who prior to being married bathed at her household's handpump, but now had access to a constructed bathroom in her marital home.

*“It feels better in my marital house. You can take your time (Apnimarji se nahao). In my parents’ house I have to hurry, afraid that someone will come”* – NM, Komalpur, Gopalganj, 2016

At endline, nine women from the households that had built self-financed latrines reported that they also had access to a bathroom. One woman reported that since there was no constructed bathroom, the toilet cabin was also used for bathing. The rest continued to bathe in the *tatti*, or in the open near the household handpump.

*Tatti* were also used for urination and menstrual hygiene management (MHM) during the day by women who did not have access to an IHL, at both baseline and endline. A few women who did not have these private spaces said they urinated in the open near their house and/or changed their absorption materials at OD places.

Most women managed their periods using cloth as absorption material that was disposed of by burying it. A few women talked about just throwing it away in bushes, a garbage pile, or in one case, the river. Women in Paschim Champaran reported washing and reusing clothes while respondents in Gopalganj threw the cloth away after one use. We were not able to discover the reasons behind these geographically distinct behaviours. In both locations, use of pads differed by age and ability to pay for them; AGs were more prone to use pads than older women.

*“We use pads. We don’t use cloth. My daughters are well-educated. They wear pads.”*  
– OBC, EAM, Durgapur, Gopalganj

At endline, whether they used pads or cloth, most women and girls who now had a functioning latrine at their house used it for defecation, urination, and for MHM.

### *Women’s participation in intervention*

At endline, all women were aware of the SBM. This was a striking change from baseline, where almost all women said that they did not know anything about SBM. Jeevika workers were a major source for women to get information - women who were SHG members reported that issues regarding sanitation, toilet construction, and sanitation schemes were regularly discussed in their meetings. However, as stated above, the use of Jeevika SHGs and Jeevika workers to support behaviour change and latrine construction was not systematic but opportunistic, relying on the initiative of individual Jeevika workers.

Women were also aware of mobilisation activities that happened in their village; however few participated in those activities. Only two respondents attending mobilisation events in their village. Of the two, one reported hiding nearby and listened to larger community meeting, because she believed she should not appear in front of male government officials.

“There was meeting in the school two months ago. I hid in a corner and listened. You have to respect government representatives.”– SC, EAM, Isar Patti, Gopalganj

At the household level women rarely participated in the decision making around building latrines. Some women expressed helplessness – at both baseline and endline – about not being able to have a latrine at the house.

“My husband doesn’t listen to me. When I talk about building a latrine he says that it will require 20-25 thousand rupees.”–EAM,Mayaganv, Gopalganj, 2016

“When I ask my husband about building a toilet, he tells me about his (financial) problems. Nobody asks me [what my problems are]. – EAM, Mayaganv, Gopalganj, 2018

At endline, EAMs and AAMs who had latrines built at their house rarely said they had participated in the decision making about construction. In the cases when the latrine was built by contractors, women said that they gave their opinion about the location of the toilet, but they were not consulted about anything else. The situation was similar when the HH self-financed the toilet, i.e., male members made the decisions without consulting women. Only three women responded that they played a more active role. One of them was an AAM, and said that she and her son made the decisions together about latrine construction. Two women reported that they oversaw the construction of latrines by the contractor because their husbands outmigrated.

### *Women’s Psychosocial Stress*

#### Environmental stressors

At baseline, finding a suitable OD place was a constant stress for women, and was reported by women across life stage, caste and village.

*“Sometimes you have to go in the day as well. If you get the urge, what can you do? You can’t wait until evening. So we will go nearby in the bushes.” – SC, EAM, Durgapur, Gopalganj, 2016*

Women looked for places covered with bushes, bamboo fields, sugarcane fields *nearby* their house when they had to go for OD during the day. A few women said that they had to walk *further* away than their usual places during the day.

*“If I go in later morning/ early afternoon, then I have to walk further since it’s likely that there is someone working in the fields.” – AG, Sirsabad, Gopalganj, 2016*

The study area is one of high rainfall and some villages were flood-prone. Most women said that they had difficulties finding a usable space during the monsoon because there was water everywhere. They often walked far in search for higher ground. During monsoons, the ground was slippery and women had additional fears of snakes, scorpions and other insects.

*“During the monsoon sometimes, there is water up to our knees, and it is slippery, but we still have to go for OD. We will have to search for a place where there is no water.”*  
– EAM, Mayaganv, Gopalganj, 2016

*“There’s a lot of water and trash to walk through. We have to walk through water, finding a dry spot. We try to find higher ground.”* – EAM, Sadalpur, Gopalganj, 2016

Experiences of women who did not have access to functioning latrine at endline were similar to those practicing OD at baseline. However, during endline women who had access to IHLs overwhelmingly reported elimination of environmental stressors:

*“It was very inconvenient to go out, especially in the monsoon. There was fear of snakes and scorpions. It has been really convenient since the toilet has been built. I don’t have to walk through knee high water.”* – EAM, Mayaganv, Gopalganj, 2018

*“Having a toilet is so convenient. I could not go during the day if I wanted. Going in the dark was scary. In the monsoon it was difficult walking through water, and my clothes always got dirty.”* – AAM, Durgapur, Gopalganj, 2018

*“Now I don’t have to go out, don’t have to search for a place in the afternoon, don’t have to suffer in the monsoon, don’t have to go in the bushes. To stay inside is better.”*  
– EAM, Mansooria, PaschimChampan, 2018

## Social stressors

Most women interviewed at baseline talked about being embarrassed and ashamed about being seen by men during OD. Some women talked about specific embarrassments like going for OD during the day, being seen carrying water, or being seen while changing cloth during menstruation. A NM said that she wasn’t ashamed of going for OD when she lived with her parents, but in her new marital home, she is embarrassed about going for OD:

*“If someone comes, we move somewhere down the road. And turn our backs to the road. So that nobody recognizes me. I don’t like it.”* – SC, AG, Sirsabad, Gopalganj, 2016

Most women and girls across the lifecycle and across castes felt embarrassed to be seen defecating, however, some NMs that followed the practice of *ghunghat* (veiling), had to wear

a long veil when leaving the home and going for OD. This was a major hindrance while going for OD, and dangerous because of how it blinded them:

*“When I was new DIL I used to hold my mother-in-law’s hand while walking, because I couldn’t see anything through my ghunghat.”* – AAM, Tarawa, PaschimChamparan, 2016

While some EAMs reported similar experiences when they were young, NM were not always inclined to follow the rules because of the difficulty they created. As a NM exasperatedly said when revealing that she does not wear her ghunghat far over her face as she is supposed to:

*“How much can we do while walking through mud? If we cover the entire face, won’t we slip and fall down? What if that happens?”* – NM, Hawabad, Paschim Champaran, 2016

The practice of standing up during the act of defecation when men passed by was repeated by women across the life course as a key social stressor. Women also recognized that the standard for men was freer than the one applied to them:

*“When the men are squatting, we will turn our heads away. When women are squatting, do men turn their heads when they walk up and down? No.”* – AG, Komalpur, Gopalganj, 2016

Some women and girls across the life course reported that standing up during defecation led to stomach aches later. To cope, some EAM said that they just returned home when that happens:

*“When men pass by women get scared and immediately come back home. No one harasses, but we have to maintain our reputation.”* – EAM, Mansooria, PaschimChamparan, 2016

But one EAM reported that she did not follow this social norm because worrying all day was a worse choice than being seen by men:

*“I take as long as I need. If I got up and went home, I would be worried all day.”* – General caste, EAM, Mayaganv, Gopalganj, 2016

As an EAM, she had more options than other life stage groups, although most women across the life course articulated the unpleasantness of a lack of privacy:

*“I don’t like it that where I sit, someone else might also sit there. I want to sit alone in a covered private spot.”* – SC, NM, Sirsabad, Gopalganj, 2016

Privacy was also infringed on with regard to carrying water for post-defecation cleaning. Many women said that they carried water and cleaned themselves at OD site, but there were few who said that they washed after returning home. Some clearly said that they only carried water during their regular timings of early morning and evening – when it is dark. In the daytime, they did not carry water because of extreme embarrassment:

*“In the day, we come back without washing. What else can we do? I can't take my water pot with me in the day, right? It's only when it's dark that I take it.”* – EAM, Durgapur, Gopalganj, 2016

The social stricture applied to women after marriage, living in her husband's house. A NM noted that she used to carry water when she was not married and living at home, but she was forbidden to do so by elder women of her marital household, and she was helpless to change it.

*“If I carry water with me, they will tell me this is embarrassing, what will people say if they see you, that you are carrying water like men? So what can I do? I have to listen to my jethani [older sister-in-law]. What can I do when there are elder people in the house?”* – NM, Hawabad, Paschim Champaran, 2016

Here again it becomes clear how sanitation is gendered—in this case that carrying water is a male practice, therefore women are forbidden to do it. And for NMs not used to the practice, it added to their stress.

Less tangible than carrying water pots was the stressor related to ghosts. Some women believed that women could be caught or influenced by spirit or ghost while going for OD. They reported incidences of women falling ill because of this. For them being caught by a spirit was a genuine fear:

*“It is dark, and so we are scared of ghosts and spirits. I don't really believe in it. But when I see some of the women behaving strangely when they catch it [a ghost], I feel scared. That's why I always go with someone”*– AG, Durgapur, Gopalganj, 2016

Although the above quote comes from an AG, girls were one among all age groups that were worried about ghosts. AGs were also not immune to feeling the time pressure that adult women of any age felt with regard to OD:

*“The men folk, what do they have to do? They come back and eat. We have to do a lot more things and we come back faster. It's up to them, their choice, when and where they go.”* – AG, Sirsabad, Gopalganj, 2016

As above, women and girls across the lifecourse recognized clearly the gendered differences in social stressors and felt their unfairness.

General, respondents who had gotten access to IHLs by the time of endline reported the elimination of social stressors. Not being seen while defecating was important to women, and they talked about relief from embarrassment, and using toilet as being more respectful. Nearly every EAM referred to respect or honour as re-established due to latrine access:

*“Now we get respect (izzat). I used to feel really bad, if somebody saw me defecating.”*  
– EAM, Komalpur, Gopalganj, 2018

*“Sometimes field owners scolded for using their fields, in that case I used to come back home. What could we do? We have to keep our honour (izzat). So we would come back quietly (chupke se nikalao).”* – EAM, Komalpur, Gopalganj, 2018

*“While using the roadside, men always passed by, and it was embarrassing (izzat ka sawalhain). And it was stressful to get up and sit down every time someone passed by.”* – EAM, Mayaganv, Gopalganj

The advantage of using a latrine with a door was the simple relief women and girls felt from being seen, and looked at, by men. For mothers/EAMs with young daughters and DILs, they reported no longer worrying about their safety with latrine at home.

#### New social stressors associated with the SBM

Unexpectedly, the SBM intervention introduced new social stressors for some women due to the latrine construction and reimbursement-through-subsidy process. First, there was reported harassment by the builder/contractor of households that refused to pay due to unfinished latrine construction. Women were the objects of harassment because they were home when the contractor came to demand payment while male members of the household were often away or had outmigrated. Second, some women expressed worry and anxiety in households that had self-financed or taken a loan from a money-lender at usurious rates in expectation of the SBM subsidy that had yet to come. Third, some women expressed anger and helplessness that contractor-built IHLs were unusable due to shoddy construction, and yet the SBM subsidy had been spent. Finally, some women expressed impatience and worry that village leadership would not get around to facilitating construction in their area and they would not get a toilet through the scheme.

#### Sexual violence stressors

At baseline, even though IHL coverage was low, few women and girls said that they had experienced sexual harassment and that it did not happen in their village. The kinds of harassment women reported included teasing, verbal harassment, men passing comments, men coming and sitting near women when they go for OD, and men walking around women's OD site:

“No, nothing like that happens. Who has the courage to do that here? I am from the village and so will be perpetrator. They would be as scared as I would. It's not like they would tease and get away. I'm not going to sit quietly. Who is that brave, in the village, to tease someone here?” – General caste, AG, Sirsabad, Gopalganj, 2016

Women and girls regardless of caste, spoke similarly. Women who talked about personally experiencing harassment while they went for OD were few:

“You will be shocked if you see what happens here. We are squatting, and men keep walking up and down. I don't get up all the time. I just continue to squat” – SC, EAM, Sadalpur, Gopalganj, 2016

AGs talked about rumors of harassment happening in their village, and experiences of girls they knew:

“Sometimes we hear that some girl went in the morning, and some guy harassed her (chedchad ki hain). We have heard these stories, but it has never happened with me.” – OBC, AG, Durgapur, Gopalganj, 2016

Several EAM were more worried about their daughter's safety than their own. They often said that they did not let daughters go for OD alone:

“There are fields around. What if some boy is hiding, and he attacks? So we accompany them (daughters) ourselves” – EAM, Mayaganv, Gopalganj, 2016

EAMs talked about stories where girls/women were kidnapped and raped when they went for OD. Mostly, EAMs said that even though men did not bother them when they went for OD, other cases of harassment happened often. This was a major problem adult women faced in many villages; it is not clear at what age harassment ceased. AGs especially were more vulnerable to this harassment. They often talked about boys harassing them when they went to their school/college, out in their village, or at the local market:

“It (harassment) also happens here. Where doesn't it happen? But here women stay inside house. They keep a close watch on their daughters. Girls go to school, come back, and then stay in the house.” – EAM, Mayaganv, Gopalganj, 2016

Harassment and fear of harassment went far beyond just sanitation. Some women said that young girls were simply not allowed to go out of house on their own. This meant that often after certain age girls were not able to continue with their education. Most girls said that even though they been admitted to college courses, they never attend classes. Instead they studied at home, and just sat for exams. In a few villages the issue of harassment was so severe that

they had to conduct separate classes for boys and girls in schools. Because they did not have enough resources to run the school in two shifts per day, boys and girls each went to school for three days a week. Women and girls said that even though they did not get harassed when they go for OD, because of this overall context, there was always a fear, and they had to take necessary precautions.

While some women reported that this happened as much in their village as it happened outside the village, some denied boys/men from their village/their community were involved in harassment. In such instances they said that those who harassed were either from another village, or other caste or community.

"As if the boys from our village who we know will try to do this!" – OBC, AG, Mayaganv, Gopalganj, 2016

"Boys of the village are good; they look down as they pass girls." – OBC, AGM, Tarawa, Paschim Champaran, 2016

Responses casting blame elsewhere were fairly common, but for those who spoke more openly, reactions to incidences of harassment included feelings of helplessness:

"Girls go for OD, or even somewhere else and boys come, and bother them, harass them, and dishonour (bezzat) them. Girls have to be careful. They are helpless." – OBC, NM, Hawabad, Paschim Champaran, 2016

"Police take bribes and keep their mouths shut. Nothing happens. Then that business starts again" – SC, AG, Durgapur, Gopalganj, 2016

It was not in their power to address harassment nor were women able to spur the authorities to act appropriately. Perhaps in response to this, some EAMs blamed the victims, expressing that women will not get harassed if they behave properly.

"If women don't behave properly, then men get the opportunity to say anything to the women. Women should not instigate men's bad behavior. If a girl has a good character, then nothing bad will happen to her. The women from the village have to live carefully." – General caste, EAM, Tarawa, Paschim Champaran, 2016

But some AGs said that they did not always remain passive, and verbally retaliated, despite instructions to the contrary:

"If someone says something to us, we answer back. There is no other option but to handle it. We are told that girls should not answer back. But sometimes when it becomes too much, you

have to answer back. (Jab had se badhjaye to jwabdena hi padega)” – OBC, AG, Sirsabad, Gopalganj, 2016

At endline, women and girls who talked about harassment were fewer compared to baseline. In a few cases, women reiterated that even though men did not bother them when they went for OD, other cases of harassment happened often.

“Wherever there are four boys gathered, they will bother a girl. – AAM, Paharganj, Paschim Champaran, 2018

General harassment continued, but having a latrine at home relieved this stressor for women.

### Physical stress

Emotional stress was not the only way that women and girls were negatively impacted by lack of adequate sanitation. During baseline, OD practices like having to stand up when men passed by or having to hold the urge to go during day led to physical stress for women across the life course. Women and girls reported suffering from constipation, not feeling hungry, and urinary tract infections:

*“After 2-3 hours I feel like I have to go and defecate again. I can’t defecate properly because of it [repeatedly standing and squatting].”* – AG, Durgapur, Gopalganj, 2016

In addition to direct effects of having to stand up during defecation, indirectly, many women did not get enough sleep. This was especially true of NM and EAW who also had more household work responsibilities:

*“But even if we can’t get enough sleep, we have to wake up early to go for OD. If we don’t go early in the morning, what will we do later?”* – Hawabad, Paschim Champaran, 2016

*“Even if we have not got enough sleep, we have to wake up while it is dark and go for OD. Mengan go even later.”* – EAM, Mayaganv, Gopalganj, 2016

At endline, only few women reported that they no longer woke up early to go to OD. Most women reported that they were habituated to waking up early, and that they still got up at the same time, suggesting a lasting impact from OD habits.

Going for OD was especially difficult for NMs and EAMs during pregnancy, and to avoid further stress, women had to use a place close by:

*“After coming home from the hospital, we don't go to roam around. We don't go far. We go to the latrine close by, or the fields right behind the house. We don't walk far. Walking too much at this time can cause stomach pains. For about 10-15 days, we go right here.”* – EAM, Sadalpur, Gopalganj, 2016

Pregnant women, and EAMs recalling post-partum difficulties, told us at endline that they were relieved of additional physical stressors surrounding defecation during pregnancy because they had access to a latrine. AAMs especially mentioned that having a latrine at home relieved the physical stress of walking long distances:

*“My legs ache, and it was difficult going for OD, especially during bad weather. This is so much easier.”* – AAM, Sadalpur, Gopalganj, 2018

As with the lifestage of being newly married, nearly all women would pass into their senior years and face physical limitations on their ability to go for OD, making an IHL attractive to have and to use.

### *Behaviour Modification*

Behaviour modification was the norm for women practicing OD. Most EAMs talked about always taking someone with them when they went for OD – mother, mother-in-law, other women of the household, friends, and women from their neighbourhood. In two cases women reported that sometimes their husbands accompanied them at night. As noted above, AGs and NMs seldom, if ever, went alone:

*“A newly married woman will go with her mother-in-law or sister-in-law. Or, the older DIL in the house. In the village, no one will go out by themselves; it's always in groups.”*  
– EAM, Durgapur, Gopalganj, 2016

Those who reported that they always went in a group said that they did so out of fear of harassment. Even those who have never experienced harassment themselves, feared that something might happen, and to be safe, they went in groups. Not all women and girls felt that way though:

*“Everyone usually goes in the evening, so we just go together. But there is no problem in going alone.”* – AG, Sirsabad, Gopalganj, 2016

At all stages of life, women and girls reported that they either regularly or sometimes went alone, however, women who went alone were mostly EAM and AAM. Just a couple of AGs and NMs also said that they went on their own for OD, despite warnings:

*“Girls do not go alone, if someone comes and holds your hand, then it would be slanderous (beizzat)”* – EAM, Mayaganv, Gopalganj, 2018

There were a few select cases where women reported eating less in order to avoid defecation. This was most pronounced among selected NM, particularly those that were veiled:

*“When I was in my parents’ house, I never did that. I could go even during the day. But now that I am in my marital home I eat less. There I have to wear a ghunghat. It is really inconvenient to go during the day while managing the ghunghat.”* – NM, Komalpur, Gopalganj, 2016

At endline, among women and girls who had access to an IHL, behaviour modifications associated with defecation and the need to go out were eliminated.

## 8. Discussion

At endline, all 22 women interviewed with access to a functioning latrine used it at least some of the time. Every woman that did not have a functioning latrine spoke about wanting to have one and planning to use it. Not only did women and girls across the lifecourse want a latrine, they wanted to use it, and they did if it functioned.

### **SBM Implementation and Toilet Construction:**

The SBM implementation in Bihar suffered from slow, geographically uneven implementation, as illustrated by the ethnography study. There was little consistency across the study villages with regard to the 'package' of intervention and construction. The devolution of responsibility to increasingly local stakeholders has resulted in an intervention that is growing more fragmented and uncoordinated. This is consistent with other field evaluations of government-lead sanitation initiatives in India [23]. Nevertheless, the SBM's financial incentives have been a major driver for people to adopt sanitation, as the expense of a latrine previously prohibited building. Incentives have been a contentious issue in India's previous national sanitation schemes [23], but our findings suggest that the current level of reimbursement is sufficient to leverage change.

The high sanitation coverage rates in our sample are primarily a reflection of our sampling methods that favoured women with constructed toilets over women who did not have toilets at endline. In general, coverage rates remain low across the ethnography study villages, as triangulated through interviews and observations. We noted self-financed toilet construction in all villages, however in select villages construction had been centrally managed by local Mukhiya. In general, household construction was a net positive: contractor-built toilets were typically lower quality and more likely to be non-functioning and therefore unused. The finding that latrine usage is lower in HHs with government-built latrines, in comparison with HH-financed latrines, is supported by research on rural latrine usage in Uttar Pradesh [16], Odisha [24], north India as a whole [25] and the quantitative baseline survey. Household-financed construction has allowed families to customize and improve upon the SBM design by adding amenities such as bathrooms. However, household-financed construction has been insufficient to achieve ODF at the ward level; only wards that had Mukhiya/contractor-led construction became ODF.

The rise in household-led construction has had additional complications linked to the chaotic and sporadic nature of the intervention. Two issues in particular were evident. First, households were not always aware that subsidies were only available once their ward was declared ODF. Households were dependent on their neighbours to build but had no way to

influence or incentivize them. Second, households did not always build to SBM guidelines because they were not aware of them at the time of construction. Such households will not be reimbursed when their ward becomes ODF.

Mobilisation activities in each village were limited to one or two events. Many women were aware of them, but rarely participated, and some actively avoided them. Other studies in India have identified challenges with field-level organisations' capacity to effectively engage with the complex social heterogeneity found in rural villages [23]. Women in SHGs had the most information about the SBM scheme, awareness of health-related reasons to build, and access to credit – and provide a valuable resource for ensuring effective and consistent engagement with villages on sanitation issues but require focused efforts on the part of government to ensure that this is more than just opportunistic.

### **Sanitation Behaviours and Gendered Inequalities**

Gender inequality at the HH scale did not appear to play a role in women's use of latrines, i.e., men did not control or pressure women directly [10] to use or not use latrines after they were built. No such incidences were reported in interviews at baseline or endline. However, gendered social- and sexual violence stressors are different than direct social pressure borne of gender inequality, i.e., direct pressure did not appear to influence women's decisions to change their behaviour in the same ways that gendered psychosocial stressors did. Gendered SS and SVS, a less direct form of social pressure due to gender inequality at the village scale was a consistent factor for women's latrine usage. Gender inequality is not particular to Bihar; attitudes that women should not defecate in the open exist across India should be considered [16, 26].

In the case of SBM, latrine *coverage* was not low because of gender inequality except in cases where male decision makers refused to build despite an ability to do so. Two women indicated that they were thwarted in their desire for a latrine by male HH members who made decisions, i.e., prior to an IHL construction. While these refusals did occur, it goes beyond the evidence of this research to argue that they were a major factor in latrine coverage.

Gender inequality as a reason for behaviour change did not weigh more heavily than the role of environmental stressors in driving women's latrine adoption. The endline ethnography study shows that *all* environmental stressors were relieved when women had access to an IHL, and usage was also certainly influenced by gendered SS and SVS.

Women in this study changed their behaviours because they could, not because of exposure to promotional messages or attendance at community mobilization events. Relief from sanitation-related stressors was the primary incentive for women to change their behaviours,

with or without specific behaviour change activities. Key to behaviour change was that latrines be 'adequate' as defined by women and girl users. Inadequate sanitation - sanitation that was considered unsafe and/or that did not relieve gendered SRPS - was not adopted by women despite women's desire to quit defecating in the open.

Our findings stand in contrast to the qualitative work of Routray et al. [27] who found that a desire to use IHLs was not universal among women in rural Puri, Odisha. That IHLs will limit women's ability to socialize, leave their HH compound, and enjoy fresh air and exercise is supported by other research [17], and yet, these elements were not mentioned in rural Bihar as barriers to latrine use. More compelling to women was the relief of specific stressors associated with access to an improved sanitation facility. In addition, disgust at defecating in an IHL or the burden of carrying water to the IHL [10, 25, 27, 28] were not reported at baseline or endline. While it is possible that our queries about stress biased women from talking about the advantages of OD or disgust at using an IHL, it is important to note that this research was carried out *after* the start of the national SBM with all its associated publicity. By endline, all respondents had heard of SBM and were aware of its purpose. Large scale societal changes are impossible to measure, regardless of study design, but it is possible that the increased visibility and awareness of sanitation throughout India has impacted individual views on sanitation use. Other studies have also identified the additional labour associated with carrying water to the latrine as a barrier to use [10]. This concern was dismissed by respondents in this study, likely a reflection of robust access to water and sanitation in the study area. The finding across research on rural women's use of latrines is that when latrines are well-built, and therefore relieve SRPS, women will use them.

### **IHL and Psychosocial stress:**

Our qualitative findings suggest that the GSF-supported intervention, when successful (i.e., it resulted in latrines women considered adequate) had a large impact on sanitation coverage and use, and women's well-being and stress. In general, women reported that SRPS was the reason their HH built a latrine, and access to an IHL reduced all environmental, social and sexual violence stressors. This is in-line with baseline quantitative findings which saw a 48% reduction in SRPS scores among women with access to a sanitation facility and previous applications of the SRPS scale [7].

Women remained aware that some social stressors and all sexual violence stressors were directly related to unequal gender relationships – and that these stressors would likely require more than a sanitation intervention to relieve [26]. The dominance of household-led construction over contractor-led construction in many villages also opened new areas of stress

for women—particularly waiting for subsidies that may never come because SBM requirements were not fully articulated to households.

## **Sustainability**

Given the significant investment and high profile of the SBM, all eyes are on India to meet its goals, as well as maintain national scale ODF status. The future will tell if latrine usage is sustainable in rural Bihar over the long term. For the present, research suggests that latrine usage will be sustained in HHs that have built well-constructed latrines [24]. Since decisions to use a latrine may depend on out-competing OD as the behaviour that is most convenient and comfortable, or even possible [10], proximity to markets for labour and repair materials can enable sustainable, functioning toilets. For the project study area, those who self-financed their latrines built not only the latrines that they wanted, but construction quality that met their demands. Coffey et al. [25] found that household members were concerned about the latrine pit filling, thus the ability to empty latrine pits or dig new ones matters for sustainable usage [28]. Among our respondents, very few expressed concerns about pit filling – perhaps based on the use of twin pits intended for composting.

There is some risk that the accelerated progress towards sanitation coverage may stall without more attention given to ensuring that sufficient community members build latrines. Many individuals that self-financed their latrines were still waiting on reimbursements from the government and were paying high interest rates on loans. Contractor-lead construction was more likely to have been reimbursed; however, these toilets were less desirable than household-financed toilets and were more likely to be incomplete or unused. Expanding the range of options available to households through contractor-lead processes may provide a solution that allows households to design and construct their own toilet while still allowing for large-scale village level construction.

## **Future Research**

While this research reinforces the connection between women's PSS and access to adequate sanitation, other gendered questions arise. For instance, many of the ES that women discussed (e.g., flooding) were also ES that men would face, i.e., they are not gender-biased in the way that SS and SVS are. How do men respond to ES, and what is their influence on habits of OD and public urination? Is their influence more or less pronounced in HHs that have a functioning latrine? The SS of farmers scolding women who defecate in their fields ought to apply to men, as the reason for the scolding is not that women are defecating, but that anyone is defecating in the fields. Are men immune to this kind of social censure? How does it impact

their PSS, and their behaviour? The focus on funding and policy has been on women, but with regard to sanitation adoption, research is needed on the PSS that men face, as some of these, if significant, might be leveraged to increase male latrine usage.

Furthermore, is there a danger that a present-day understanding in rural villages that latrines are for women—as appears to be the case in Bihar—a barrier to latrine adoption for boys and men? Some HHs in our study area built separate toilets for men. Until then, toilets in those HHs were for women—built for them due to specific gender needs and social constraints. So does the gendered association of latrines with women, combined with women's subordinate position in a patriarchal, patrilineal society, stop men and boys from using latrines? Does there come a time when boys stop using latrines because to use one is 'womanly' and calls their masculinity into question? Does the gendered association of femininity and latrines keep men going for OD when there is a latrine at home? Does a man feel stressed because he cannot use his HH's latrine? If the answers to these questions are yes, then the follow-on question becomes: how does a latrine become disassociated with a subordinate gender and associated with all genders such that social norms do not prohibit men and boys from using them, lest their masculinity be called into question.

## **9. Specific findings for policy and practice**

The purpose of this research was to evaluate the extent to which the GSF sanitation program in Bihar – working in parallel with the Gol's SBM program – improves health, well-being and sanitation related-stress among women and girls. Our evaluation focused on the two GSF-supported objectives: demand generation and supply improvements; and we sought to assess how GSF-supported interventions increased demand and use of new facilities, afforded improved access to the supplies and materials for sanitation programs, and how those two activities impacted the behaviours, health, and well-being of women in participating areas. The subsections below provide policy recommendations for the delivery of sanitation programs.

### **Demand generation and supply improvements**

There is a need for more complete outreach and dissemination of information about sanitation and hygiene and criteria for government-supplied latrine building incentives to all rural communities. In particular, HHs require more information on the technical requirements for building government-approved latrines and the minimum community-coverage necessary before ODF declarations and subsequent reimbursements. Financial allocations need to be made so that the necessary time and training can be given to those responsible for program outreach, administration and latrine construction. Time and funds should be made available for total community outreach.

Informational meetings with male HH members should include discussion of women's SRPS, latrine costs, and the availability of latrine financing and incentives.

A contractors-led model shows some promise for eliminating OD and acquiring ODF status. Local leadership should be incentivized to reach all social groups throughout the processes leading to ODF verification, most especially to reach vulnerable communities, who have the least access to information and materials.

The work of NGOs engaged at the village level should be built upon to increase demand for sanitation. They are uniquely positioned to disseminate information and facilitate loans to women for IHLs through their respective SHGs. Jeevika and other such programs require the systematizing and standardizing of their efforts.

We note, however, the on-going tensions between the efficiency and reach of contractor-lead construction and the satisfaction and use of facilities associated with household-level construction. Contractors should include a range of latrine and bathroom options that households can select. HHs, in full knowledge of actual costs, should be allowed to design the latrine that meets their needs and matches government specifications.

### **Use of new facilities**

There is a need for sanitation facilities that meet women's needs, including MHM, as they define them, and to recalibrate the meaning of adequate sanitation to include reductions in sanitation-related stress. Involving women in design and planning should be encouraged. High quality construction and preferred design should be enabled, as these units were used.

While use of adequate facilities was generally high, we do note specific instances where women elected to continue with OD. We recommend increased information dissemination to all HHs on pit-emptying and latrine repair, including arranging these services if necessary. Our findings suggest that there remain technology and service gaps related to pit emptying in rural areas that require additional attention.

[Our research suggests that latrine usage will be sustained in HHs that have built well-constructed latrines. Access to markets for labour and repair materials can enable sustainable, functioning toilets.](#)

Time and effort must be given to learning what aged women consider adequate sanitation for the following reasons: ES is their greatest cause of stress compared to other life stage groups; they tend to exercise considerable influence in their HHs; and they are most habituated to OD. Life course-focused sanitation programming is necessary. Tailor promotion approaches to women's needs, particularly surrounding SRPS, bathing, and MHM. The targeting of women

as latrines users should continue, guarding against gender-blind and gender-neutral approaches.

Attention should be directed at men and their sanitation behaviour that can have an overall negative impact on sanitation programming. Messages and the messaging styles of current programs should address gender stereotypes, including male HH members' concerns regarding the designation of latrines as 'for women only.'

### **Improving women and girls' SRPS**

IHLs have been shown to reduce women and girls' stress in the areas of ES, SS, and SVS. The addition of a bathroom could considerably increase women's security and reduce sanitation-related stress. Financial incentives for small improvements like lighting or a sturdy lock inside an IHL will further reduce women's SRPS.

Monitoring and evaluation of programs need to include women and girls' psychosocial stress and could be measured at baseline and endline. ODF verification questionnaires be modified to include specific questions that enable an assessment of psychosocial well-being of women and other vulnerable groups. Not only should individuals and organisations be sensitized to issues of gender, SRSP, and social-vulnerabilities before program implementation, those responsible for monitoring and evaluation should be included in these same capacity-building activities. It is imperative to combat women and girls' SRPS by addressing unequal gendered social norms that lead to women and girls' SRPS.

There is a need for a strengthened gender policy in sanitation. The current national gender policy specifies a significant set of issues, which if operationalised by State governments, can address some of the gender concerns raised in this report.

## **Appendix 1: SBM Programme in Bihar**

Lohiya Swachh Bihar Abhiyan (LSBA) is a programme implemented by the Rural Development Department of Bihar government. LSBA comprises the SBM(G) (which is sponsored by the central government) and the Lohiya Swachhta Yojna (LSY), which is sponsored by the Bihar State Government). The objective of the programme is to ensure universal sanitation coverage in Bihar. The 2016 LSBA guidelines include: organisational structures at various administrative levels; year wise expected targets; procedures for verification; processes towards achieving ODF status; availability of material supply chain, and appropriate toilet technology. LSBA guidelines also call for development partners in the implementation of the SBM. In the study area, this partner was the Global Sanitation Fund (GSF).

The LSBA organisational structure includes, in descending administrative order: State Project Monitoring Unit; District Water Sanitation Committee; and the Block Project Monitoring Unit. The Mukhiya (GP head) works as the head of a committee that also includes ward members, Jeevika representative, and GP level government officials, including: Panchayat Employment Worker; Indira Awas Assistant, farmer advisor; and others. At the ward level there is a committee which is headed by ward members and includes: Anganwadi worker; ASHA worker; Vikas Mitra; and community representatives like teachers; and disabled persons.

Rural Development Department also hosts Bihar Rural Livelihoods Promotion Society (BRLPS) or Jeevika which has been set up under National Rural Livelihood Mission. Jeevika has wide outreach among rural women through self help groups (SHGs). Jeevika began, between 2016-2018, a programme titled 'Swachh Jeevika – Swachh Bihar', which aimed at building IHLs for their members. Jeevika developed state, district, block and GP level strategies towards that end. Their GP level strategies included creating awareness through mobilisation activities.

According to the SBM guidelines, if toilets are: 1. built after the scheme was announced; and 2. built per the SBM prescribed design, then upon verification the household will be reimbursed INR 12,000 via bank transfer. The Bihar government has a specific policy that households will receive reimbursement only after their entire ward is verified ODF.

## **Appendix 2: Briefing Note: Hair Cortisol and Psychosocial Health**

The health impacts of WASH interventions have traditionally focused on the relationship between access to WASH services, use of WASH facilities, or adherence to key WASH behaviours and child health outcomes. For example, there are multiple meta-analyses and systematic reviews assessing the links between child diarrhoea and point-of-use water treatment, sanitation, and/or hygiene behaviours. Newer impact analyses have shifted focus away from diarrheal disease alone, due to the potential subjectivity and error associated with diarrheal measurement, to more objective child health indicators such as anthropometric outcomes (primarily height for age (HAZ) or stunting), cognitive development, an asymptomatic pathogen carriage. The primary outcomes for these health impact evaluations, however, remain focused on impacts on child health.

Increasingly, the impacts of inadequate WASH on adult health have received increased attention from the international community. This renewed attention to adult and older child health has taken an explicit gender focus based on the reality that WASH in the domestic context is highly gendered – a focus that has been codified in Sustainable Development Goal targets that make explicit that sanitation and hygiene improvements should respond to the “specific needs of women and girls” (SDG Target 6.2). In response, recent research has attempted to provide new data on the relationship between WASH and muscular-skeletal injuries, time and resource allocation, and gender-based violence.

Psychological health – particularly psychosocial stress and quality of life – has emerged as a key outcome of interest in discussions regarding the links between WASH and adult / gendered health outcomes. Multiple observational studies have identified links between WASH conditions and measures of stress, depression, and anxiety among women. This has often focused on issues of water or sanitation insecurity [9, 29-31] or stress related to constrained access to WASH services [10, 11, 32]. However, significant data gaps exist. Many of these studies are qualitative, focusing on describing relationships between access to services and psychological health, thus making efforts to quantify and measure impact difficult. Those studies that have directly measured psychological health outcomes have largely focused on developing new WASH-specific measures of insecurity or stress or subjective measures of psychological health that have been applied in multiple settings. While considerable effort has been given to ensure that measures are reliable, replicable, and valid; these measures are often discounted because of their subjectivity.

Cortisol measures have been suggested as a generally objective measure for psychological health – particularly in relation to the stress experience. However, there are still a number of misconceptions and challenges to its widespread application in health impact evaluations.

## **What is cortisol?**

Social, psychological, and environmental stressors activate the hypothalamus-pituitary-adrenal (HPA) axis, resulting in elevated levels of a number of glucocorticoids, including cortisol[22]. Cortisol affects virtually all body systems and long-term production of excess cortisol is the theorized mechanism through which chronic stress results in negative physiological outcomes, such as elevated blood sugar, weight gain and obesity, immune system suppression, gastrointestinal problems, cardiovascular disease, and fertility complications[33].

Unlike many traditional biomarkers, cortisol does not have a threshold value that are indicative of health status nor does cortisol serve as an indicator of a defined biological health outcome. Populations and groups can demonstrate large differences in cortisol concentrations independent of any HPA axis activation. Therefore, the value of cortisol from an epidemiological perspective is primarily comparative – how much individuals or groups within a given population differ based on specific defined exposures.

## **How is cortisol measured?**

Although it effects virtually all biological systems, cortisol is rapidly metabolized by the body. Aside from direct blood test, there are two primary methods for measuring cortisol in the body: salivary cortisol and hair cortisol. Salivary cortisol is measured by taking a saliva sample from and quantifying the amount of cortisol in the saliva. Challenges related to salivary cortisol include:

- Cortisol is rapidly metabolized in saliva – measures are only a short-term indicator of HPS axis activation.
- The body naturally exhibits a daily cortisol cycle where cortisol level rise and fall. Because of this diurnal cycle, multiple sample points are needed of the same individual in order to accurately reflect cortisol levels.
- Saliva samples can be difficult to work with and require proper laboratory storage and transport. Further, saliva samples are known for their incredibly foul smell when held at room temperature for sustained periods. This can make saliva samples difficult and unpleasant to work with without proper laboratory equipment.

As the body produces cortisol, it is also deposited in hair follicles. Hair samples, then, provide another non-invasive way to measure individual cortisol. This non-invasive procedure involves

cutting a small strand of hair from an individual as close to the scalp as possible. Hair samples offer a variety of benefits over salivary measures of cortisol.

- Hair cortisol is not subject to the same diurnal pattern as salivary cortisol, so multiple sample points are not needed.
- Hair samples are not biologically active tissues, so are not subject to the same levels decay or complex storage requirements as saliva samples. However, the exact nature of decay of cortisol or other hormones in hair tissues remains underexplored.
- Hair samples are not considered biological materials many not be subject to the same complex ethical and legal regulations involving the collection and analysis of blood or saliva, although material data transfer agreements may be required if transporting internationally.
- As hair grows, it is possible to use hair cortisol measures to explore historical cortisol levels. Typically, 1 cm of hair is considered to reflect cortisol levels from the past month. Thus, hair samples can be used to estimate long-term stress.

Regulations on hair sample data collection and transfer of materials will be dictated by local law and regulations, and these may change depending on location of the study and how data will be processed.

### **Remaining challenges with hair cortisol**

Hair samples are often collected in controlled, clinical settings. However, the nature of sampling and the low resource needs for transport and storage suggest that hair sample collection is ideal for field data collection. Despite its benefits over salivary cortisol, there are a number of limitations and challenges that limit the widespread application of hair cortisol assessments into large scale population health studies. These include:

- Sampling can be difficult. Guidance for sample collection recommends cutting hair as close to the scalp as possible. Integrating this procedure into routine data collection can be difficult – based on experiences in India, many enumerators were concerned about cutting hair too close to the scalp and the potential to cut study participants. Further, field data collection often requires teams spread over a large geographical area – providing adequate supervision to sample collection may be difficult.
- Many people are hesitant to provide hair samples. Experience in India suggest that up to 50% of participants were unwilling to provide hair samples. This introduces significant risk of selection bias, the impact of which is difficult to estimate.

- Cortisol measures themselves are difficult to interpret. Unlike other biomarkers used in WASH studies, for example presence of a specific pathogen, cortisol measures alone do not have a simple relationship with health outcomes. The absolute value of cortisol measures offers little information – they are most useful as a point of comparison. The comparative nature of the outcome is often difficult for policy makers and funding organisations to interpret.

### **Hair cortisol in our study**

We included hair cortisol measures in our study as a potential biomarker of stress among women in Bihar, with a specific focus on measuring response to sanitation. In particular, we planned to compare measures of hair cortisol between women receiving the GSF-supported intervention and women in control communities. Stress can be due to several factors; however, our study assumed, at baseline, that exogenous sources of stress would be more or less equal between people receiving the intervention and those not – and that any differences between the two groups could be attributed to changes in sanitation and sanitation-related stressors. Final interpretation of one measure cannot be made in isolation and we would have examined larger consistency within study outcomes. However, we were not able to collect endline samples.

In our study, we saw no relationship between measured hair cortisol and any indicator of sanitation- or generalized psychosocial stress. There are several potential explanations for this. Our SRPS scale may not be an adequate reflection of stress in this context. However, given the high correlation between SRPS scores and several globally recognized measures of stress and well-being and the high degree of internal consistency among all measures included in this study, the plausibility of this explanation is low. Second, the validity of laboratory measured cortisol used in our study may be low. This final explanation is the most plausible explanation for lack of relationship between measured hair cortisol and any of the psychosocial outcomes included in our study. As discussed, training field data collection staff on how to collect samples was difficult. Samples were collected in May / June 2016, but we were unable to get final approval for the budget needed to process hair samples for 6 to 8 months after collection. Once delivered to the laboratory, complications with invoicing partners lead to additional delays before samples were process – almost a year after original collection. While there is limited guidance on the “shelf life” of stored hair samples, it is plausible that this delay could have resulted in a decay in stored cortisol levels. Collectively, these issues suggest that there was potential for measurement error in our sample. For endline, we had streamlined both the data collection, transport, analysis, and invoicing process – however, we were unable to complete data collection.

## **Recommendations**

The appeal of cortisol is based on the fact that it is a non-subjective measure that can be used to assess stress. However, the information value of cortisol is more complex than other biomarkers and measures do not directly translate into health status or DALY indicators. While cortisol itself is an objective outcome, there is considerable risk of sampling and selection bias introduced when integrated into large scale field data collection studies such as ours. Studies that do include hair cortisol should ensure that adequate supervision and training are provided to field staff and that sufficient time and attention is given to sensitising research participants to hair sample collection.

For our study, hair sample data collection was the driving force behind cancelling final endline data collection, particularly in light of commonly circulating rumours regarding gangs stealing women's hair. We included ample engagement with households and village leaders during recruitment; however, this community-level engagement included only those individuals present at the time of arrival in the village. Ultimately, tensions arose when older men not present at the start of data collection returned to the community. We followed the same protocols for data collection at baseline and endline, and we did not encounter local resistance in 2016. Bringing government or NGO partners along to villages may have mitigated some local concerns about hair sample data collection, although this would likely significantly biased survey results.

### **Appendix 3: Sample size considerations**

Sample size calculations were based on the Minimum Detectable Effect and based on Sanitation-Related Psychosocial Stress Scales as the primary impact measures. Data for all parameters used in sample size calculations were drawn from an earlier study where the scale was both developed and validated. Specific data not presented here are available on request. The SRPS scale score had a range of 0 – 25, with high scores indicative of higher stress. It consists of three separate sub-scales related to environmental stressors, social stressors, and gender-based or sexual-violence related stressors. Sample size calculations were based on the full scale. Based on application in Odisha, we estimated a mean baseline value on the SRPS 10.3 (SD: 8.3) out of a possible 25. In the Odisha study, mean SRPS values for women without a latrine were 14.5 (SD: 6.5) and mean values for women with a latrine were 7.2 (SD: 5.8). This corresponds to an effect size of 0.51. The pooled standard deviation for women with and without a latrine was 6.1. The intra-cluster correlation coefficient of the SRPS score was 0.051. Access to a sanitation facility at home explained approximately 20% of the variance in the SRPS score, although this measure was based on access to *any* sanitation facility – not necessarily the improved facilities expected with the GSF intervention.

For the MDE calculation, we assumed a two-tailed test with a significance level of 0.05 and a power of 0.8. We assumed a similar pooled total standard deviation of 6.1 for the estimated effect of the intervention on the outcome variable. We assumed an intra-cluster coefficient of 0.051. Including a total of 60 clusters (villages) (30 intervention, 30 comparison) with 20 individuals per cluster – for **a total sample size of 1,200 women at endline – resulted in a minimum detectable effect of 1.7**, or an average difference of 1.7 responses on the sanitation-related stress scale between intervention and control.

Adequate sanitation facilities that fully meet the needs of women and girls could, in fact, result in no sanitation-related stress after receiving the intervention, thus we also assessed sample size based on a binary indicator of women having zero compared to women have any sanitation-related psychosocial stress. Assuming a coefficient of variation of 0.38 (based on ICC value of 0.05) and that 25% of women in the comparison group experience no sanitation-related psychosocial stress (SRPS scores of 0), the same sampling strategy described above would result in a minimum detectable proportion of women with 0 SRPS scores of 37% - **a difference of 12% between control and intervention.**

Compliance and attrition were not explicitly incorporated into the sample size calculation. Discussions with GSF partners suggest that village-specific adoption rates (both having and using an improved sanitation facility) could range from 50% to 100%. The social and interpersonal stressors included in the SRPS scale suggest the possibility that the roughly

linear relationship between individual-level SRPS and community-level sanitation coverage could be complicated by heteroskedasticity. However, assuming a simple linear relationship between sanitation adoption and individual SRPS, an adoption rate of only 50% would result in an MDE of approximately 3.4. Because baseline and endline were different random samples, individual attrition was not an issue.

Cluster attrition, however, was anticipated as a larger risk due to the complex and ever-evolving policies, programs, and activities targeting sanitation in India. With a loss of half of study clusters – or roughly an analysis that involves a comparison between two groups of 15 clusters each, our MDE was 2.0 (Effect size: 0.14). This was within the expected range of no intervention, standard intervention, and expanded intervention distribution described above, and thus served as statistical justification to continue with a planned endline although the originally defined control and intervention GPs were no longer valid.

## Appendix 4: Village Specific Intervention Information

Village	Construction of toilets	Reimbursement	Mobilisation activities	Role of Jeevika
<b>District:</b> Gopalganj				
Komalpur	<ul style="list-style-type: none"> <li>10-15 households of the village had built toilets on their own.</li> <li>In another village of the GP – Machuva – toilet construction had started. There Mukhiya had hired a contractor to build toilets.</li> <li>People in Komalpur believe that once work gets complete in Machuva, it will begin in Komalpur.</li> </ul>	<ul style="list-style-type: none"> <li>The households that had built toilets with their funds, had not been reimbursed yet.</li> </ul>	<ul style="list-style-type: none"> <li>Mobilisation activities were conducted in 2016.</li> <li>They included: a village level meeting with triggering exercises, OD mapping activities, an additional separate meeting for women with same activities.</li> <li>It was unclear who conducted the activities.</li> </ul>	<ul style="list-style-type: none"> <li>There were 9 SHGs in the village. No active engagement of Jeevika worker in sanitation programme</li> </ul>
Sadalpur	<ul style="list-style-type: none"> <li>There were only 4-5 toilets built in the village, and they had been there for few years.</li> <li>Another village of the same GP had been declared ODF, where Mukhiya took initiative to build toilets.</li> <li>No initiative in this village yet</li> </ul>	<ul style="list-style-type: none"> <li>No households had received reimbursements yet.</li> </ul>	<ul style="list-style-type: none"> <li>Mobilisation activities were conducted in February 2018</li> <li>It is unclear who conducted the activities.</li> <li>Volunteers from the village received training in 2017, and conducted couple of meetings in the village, but nothing after that.</li> </ul>	<ul style="list-style-type: none"> <li>There were 10 SHGs in the village</li> <li>Jeevika worker is trying to make awareness through SHG meetings, but it had not had an impact yet.</li> </ul>
Durgapur	<ul style="list-style-type: none"> <li>Almost all the households had got a toilet. The village was declared and verified ODF. It was verified on 8 April 2018.</li> <li>Mukhiya took initiative to build toilets for the household. Toilets were functioning well.</li> </ul>	<ul style="list-style-type: none"> <li>The toilets had been verified and people had received reimbursement. They had paid it back to the contractor.</li> </ul>	<ul style="list-style-type: none"> <li>Mobilisation activities were conducted in November – December 2017.</li> <li>It was unclear who conducted the activities.</li> <li>They included: ward level meetings, OD mapping activities, household visits</li> <li>GP level officials and volunteers were trained but neither conducted any mobilisation activities</li> </ul>	<ul style="list-style-type: none"> <li>There were 10 SHGs in the village</li> <li>No active engagement of Jeevika worker in sanitation programme</li> </ul>
Mayaganv	<ul style="list-style-type: none"> <li>30-40 households of the village had built toilets on their own. No initiative by the Mukhiya for rest of the village yet.</li> </ul>	<ul style="list-style-type: none"> <li>The households that had built toilets with their funds, had not been reimbursed yet.</li> </ul>	<ul style="list-style-type: none"> <li>No mobilisation activities in the village so far.</li> <li>2 meetings had been organised to plan sanitation intervention – 1 at block level, 1 at GP level – the meeting were attended only by key personnel</li> </ul>	<ul style="list-style-type: none"> <li>There were 7 SHGs in the village.</li> <li>Jeevika worker was actively involved in creating awareness and encouraging women to take loan to build toilet. They were also taking lead in verification process.</li> </ul>

Sirsabad	<ul style="list-style-type: none"> <li>Toilet construction had been completed in ward 6, and it had been declared ODF. In ward 7 approximately 70% toilets had been constructed, but it is not declared ODF yet.</li> <li>The toilets were built by the Mukhiya appointed contractor and were defunct. Only 8-10 households had built their own toilets before that.</li> </ul>	<ul style="list-style-type: none"> <li>In ward 6 toilets had been verified and people had received reimbursement. They had paid that back to the contractor.</li> <li>In ward 7 people were yet to get reimbursement.</li> </ul>	<ul style="list-style-type: none"> <li>Mobilisation activities were conducted in 2017. It was 3-4 day event which included: triggering activities, community meetings, OD mapping, rally, vigilance activities</li> <li>It was unclear who conducted the activities.</li> <li>Recently there had been meetings organised by Block administration to plan sanitation intervention in the villages</li> </ul>	<ul style="list-style-type: none"> <li>There were 12 SHGs in the village.</li> <li>No active engagement of Jeevika worker in sanitation programme</li> </ul>
Hawabad	<ul style="list-style-type: none"> <li>No new toilets had been built in the village in last two years</li> <li>No initiative by Mukhiya to build toilets</li> </ul>	<ul style="list-style-type: none"> <li>No reimbursements yet</li> </ul>	<ul style="list-style-type: none"> <li>There had been no mobilisation activities</li> </ul>	<ul style="list-style-type: none"> <li>There were 10 SHGs in the village</li> <li>Jeevika worker is trying to make awareness through SHG meetings, but it had not had an impact yet.</li> </ul>
<b>District:</b> W. Champaran				
Paharganj	<ul style="list-style-type: none"> <li>Few households had built toilets with their own funds</li> <li>Mukhiya had not taken initiative for construction in the village yet</li> <li>He had taken initiative in other villages of GP, and there construction had been completed</li> </ul>	<ul style="list-style-type: none"> <li>The households that had built toilets with their funds, had not been reimbursed yet.</li> </ul>	<ul style="list-style-type: none"> <li>Mobilisation activities were conducted by district administration in October – November 2017</li> </ul>	<ul style="list-style-type: none"> <li>There were 4 SHGs in the vililage</li> <li>Jeevika worker was actively involved in creating awareness and encouraging women to take loan to build toilet. She was also taking lead in verification process.</li> </ul>
Tarawa	<ul style="list-style-type: none"> <li>Tarawa had 7 habitations</li> <li>In one of them Mukhiya appointed contractor had built the toilets, but work had been left incomplete</li> <li>In one of them construction was going on at the time of visit</li> <li>One had no toilets yet</li> <li>In two of them construction had been completed by the contractor, and toilets were functioning</li> <li>People reported that in other two the toilets had been completed, but they</li> </ul>	<ul style="list-style-type: none"> <li>The toilets in one habitation that were incomplete had been verified and reimbursed. People were harassed by contractor to get paid</li> <li>The ones that were complete and functioning had also received reimbursement, and people had paid to the contractor</li> </ul>	<ul style="list-style-type: none"> <li>Mobilisation activities conducted in 2017. It was a two-day event and included triggering activities, and vigilance activities</li> <li>It was not clear who conducted the activities</li> </ul>	<ul style="list-style-type: none"> <li>No information about Jeevika</li> </ul>

	were no visited during field work.			
Kaveri	<ul style="list-style-type: none"> <li>No toilets constructed in the village yet</li> <li>The construction had started in another village of GP</li> </ul>	<ul style="list-style-type: none"> <li>No reimbursements yet</li> </ul>	<ul style="list-style-type: none"> <li>There had been no mobilisation activities</li> </ul>	<ul style="list-style-type: none"> <li>No information (This is a village where most households migrate out after agriculture season, so it was not possible to gather much information)</li> </ul>
Mansooria	<ul style="list-style-type: none"> <li>10-15 households had built toilets with their own funds</li> <li>Mukhiya had taken initiative to build toilets for households belonging to Musahar community, and they were built through a contractor</li> <li>No toilets in the rest of the village yet</li> </ul>	<ul style="list-style-type: none"> <li>The households that had built toilets with their funds, had not been reimbursed yet.</li> <li>The ones built by Mukhiya/ Contractor were reimbursed, and people had paid the contractor</li> </ul>	<ul style="list-style-type: none"> <li>Mobilisation activities were conducted in April 2018. They included triggering activities and a play</li> </ul>	<ul style="list-style-type: none"> <li>There were 20 SHGs in the village</li> <li>Jeevika worker was actively involved in creating awareness and encouraging women to take loan to build toilet. She was also taking lead in verification process.</li> </ul>

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## Appendix 6: Study Instruments

### Baseline Ethnography Checklist

## **A. Observations**

1. House
2. Electricity
3. Households
4. Latrine
5. Bathroom

## **B. Socio-economic details of the family of the woman being interviewed**

1. Age
2. Caste / Religion
3. Occupation—self / family
4. Land ownership – Landed / Landless
5. Education
6. History – how long have you lived here?

## **C. Questions for open defecators (in general, what is life like without toilet)**

### **1. Open defecation site**

- Where is the site that you use for defecation? And urination?
- How far is it from your home?
- Describe the open defecation space? What is it like?
- Is it communal/ gacahr or private land?
- Is this space available all year through? Are there difficulties during specific months/ periods of the year?

### **2. Timings**

- Do you have fixed timings to go?
- How does that affect your sleep/ health/ eating habits/ work?
- Can you go to defecate whenever you feel the urge? What about at night?

### **3. OD and bathing habits**

- Do you go to defecate alone or do you go with someone?
- What do other women do for defecation? (young girls/ daughter/ DIL)
- Where do you take bath?
- What are the differences between the experiences of men and women practicing OD? (In terms of space and time, workload and childcare, any other differences)
- Monthly menstrual cycle and practices
- New mothers and post-childbirth habits (wherever applicable)

### **4. Psychological stress, safety, and quality of life**

- Experience of any violence/ harassment/ inappropriate behaviour while going for OD? Describe.
  - How you handled the situation
  - Did/could you talk about it to anybody?
  - What has been their reaction?

- If no experience, has anything like that happened to any other person you know? Describe.
  - Has that had any impact on you?
  - If no such experience, does the possibility of any such occurrence still remain with you? (Fear?)
- Family dynamics impacting stress
  - If you get delayed coming from home from OD (either because of housework gets delayed or because it leads to further suspicion)
- Physical stress
- Mental stress (fear, anxiety, shame, guilt, embarrassment, trauma, irritation, tension, anger, helplessness)

### **5. Building a toilet**

- Would you ever build a toilet? Why?
- What do you want in a toilet?
- How would you build it? (water, land, financial stress, political barriers)

### **6. Water**

- Drinking water situation
- Stress to collect
- Seasonality

### **7. Community**

- Are there tensions in the village that impact your OD practices? (Caste location in village)
- Are there toilets in school? Do you use it? (When applicable)
- Have you heard about any sanitation scheme?
- Have any activities happened in the village? Describe.

### **D. For women having their own toilet**

1. Describe your toilet
2. When was it built?
3. Why did you decide to build?
4. How much did it cost you? How did you arrange for the money? Did you have to cut out on any other expenses to be able to meet the cost of construction? Stress because of that?
5. Who cleans the toilet?
6. How much water is required? Who gets water and from where?
7. Have you got your pit emptied yet? If not how will you do it?
8. Has there been any reduction in the stress that you faced earlier? Describe in what ways
9. Do you still face any other kinds of stresses that may be related to owning a private toilet? (financial or otherwise)
10. Advantages/ disadvantages of having toilet

## Endline Ethnography Checklist

### Sukhshanti Study: Checklist for in-depth interviews

**May 2018**

#### A. Demographic profile

1. District
2. Block
3. GP
4. Village
5. Caste
6. Age
7. Marital status
8. Education
9. Family size
10. Family occupation
11. Own occupation
12. Male migration
13. Family's seasonal migration
14. Land ownership
15. Poverty status

#### B. Sanitation infrastructure

Type of facility	Access (Yes/No)	Location	Condition	Use for (defecation/urination/menstruation)
Toilet				
Urination place				
Bathing space				

#### C. For those who have a functioning toilet and are using it

##### 1. Building and using the toilet

- When was the toilet built? Why did you decide to build it?
- What do you use the toilet for? (Defecation/ urination/ menstruation) If not, then reasons for not using for defecation/urination/ menstruation.
- Do you use it regularly? Do you still go for OD? When? (particular time/ season)? Why?
- Do all members (men/ women/ children) use the toilet? If not, who doesn't use it? Why?
- How did you manage the expense for building the toilet? How much monetary help did you get? (subsidy, loan etc)
- 

##### 2. Situation prior to building toilet

- What were your defecation practices before you built toilet?
  - OD places – regular and seasonal,
  - Timings – regular, day time practices, night time practices
  - Companions
  - Anal cleansing practices
- Did you face any problems while practicing OD? Probe for:
  - Places: finding usable places, snakes/insects at the OD place, distance, no separate places for women
  - Timing: not being able to go in afternoon,

- Being scolded by farm owners for using their place
- Catching of spirits
- Social norms: not carrying water, ghunghat
- Physical health: lack of sleep, UTI, stomach ache, constipation

### **3. Menstrual practices**

- Absorption material and reuse
- Changing practices – where, when
- Disposal
- Did you face any problems during menstruation due to having no toilet? Probe for: inconvenience, lack of privacy, physical distress
- Have you had any problems post child-birth? How did you manage during that time?

### **4. Bathing**

- What are your bathing practices? (Where, when)
- Do you have any problems due to not having bathing place? Probe for: inconvenience, lack of privacy, Problems living in nuclear vs joint families with sharing bathroom/ toilet spaces, time constraint

### **5. Harassment**

- Did you experience harassment/ violence while practicing OD? Describe in detail.
- Have you had any other experiences of harassment/ violence? How do you see going for OD in that context? If harassed, how does it make you feel going for OD daily?

### **6. Mental Stress**

- Did you feel any stress when you did not have a toilet? Probe for:
  - Fear
  - Embarrassment/ Shame
  - Concern for daughter's safety
  - Stress due to lack of privacy
  - Stress due to experience of violence

### **7. Changes since toilet is built**

- Has there been a change in that since you have built toilet? How so? Describe in detail. (Probe for points mentioned earlier)
- Who is responsible of maintaining the toilet? Who fetches the required water? How often? From where? How far is the source?
- Is this an additional expense? How do you manage it?
- What do you think about this additional chore?
- How do you feel about abandoning OD and using toilet? (Whether they are using it because of the social pressure, or because they want to)

## **D. For those who don't have a toilet**

### **1. Building toilet**

- Why haven't you built a toilet yet? What are the constraints?
- How many of your neighbours have built toilets? What do you feel about that? Do you feel ostracised by your neighbours?
- Is there social pressure on you for building toilet from them?
- Is there a vigilance committee in the village? What is your experience with them? If you were made a part of that committee, how would you handle people going for OD?

### **2. Defecation, urination and menstruation practices**

- These questions will remain same as the above

## **E. For those who have a toilet but are not using it**

### **1. Building toilet**

- When was the toilet built?
- Why are you not using it? What are the constraints?

- How many of your neighbours have built/and are using toilets? What do you feel about that?
  - Is there social pressure on you for building toilet from them?
  - Is there a vigilance committee in the village? What is your experience with them? Do you feel pressured to use the toilets?
- 2. Defecation, urination and menstruation practices**
- These questions will remain same as the above
- 3. About the intervention**
- What do you know about the sanitation programme that was implemented in your village? Who implemented it?
  - How many households from your village/ your neighbourhood have built toilets in the past two years? Were they forced (where lot of convincing took place) or was it voluntary?
  - Have there been any community mobilisation activities regarding sanitation, need to build toilets, in the village? What kind of activities? Who conducted them? What did you think about them? Describe in detail.
- F. Participation in the intervention**
- Did you attend any community mobilisation activities? What did you think about them? Did it help you make a decision about building toilet? Describe in detail?
  - Are you a member of SHG group? Was your group involved in conducting mobilisation activities? Describe in details that experience.
  - Describe in detail the process of your toilet construction. Did you build it yourself or did the contractor built it? Did you select the contractor, or was one appointed by GP?
  - Tell us about the decision making process at the household level. Who took the lead in decisions regarding construction – where to build, the structure etc?
  - Are you satisfied with your toilet? What changes would you like to do? In terms of physical location, materials used and money spent
  - Did you receive funds for constructing toilets? Was it before or after the construction? How did you receive the money – cheque/ direct benefit transfer? How did you make the payment to the contractor? Funds paid or still pending? If pending, how long has it been?
  - Are you a member of vigilance committee or village level sanitation committee, or any other sanitation committee? What is your role and responsibility? Do you actively participate in the committee functioning? How?

## Key Informant Interview Checklist

Village:

Respondent:

### A. Community mobilisation activities:

1. Have there been any community-mobilization or triggering events in this villages?
2. When was the last community-mobilization event?
3. Was this the first community mobilization events in this community?
4. When did these community mobilization activities begin?
5. When did these events or activities end?
6. Can you give a description of these activities? (E.g. Community gatherings (one example is ratrichaupal), Transect walks, Resource / fecesmapping, Demonstrations (presentations, puppet shows, plays, exhibitions), Door to door visits, Group discussions, Women's meetings, Activities in school)
7. Do you know the name of the organisations that hosted or organized these events?
8. Were any panchayat level government officials trained and involved in sanitation intervention?
9. Do you know which offices or departments these GP level officials are from?
10. What activities were carried out by these government officials?
11. Were Jeevika officials involved directly in the sanitation intervention?
12. What activities were Jeevika officials involved in?
13. Have any Self-Help Groups been formed in this village through the Jeevika program?
14. Were these SHGs involved in the sanitation intervention?
15. What activities were carried out by these SHGs?
16. Were local volunteers recruited to be part of the sanitation intervention?
17. Did these champions receive any CLTS training?
18. What activities were carried out by them?
19. Did they get paid when the toilets were built?

### B. Toilet construction

1. Has this village been declared ODF?
2. What date was it declared ODF?
3. Has this village been certified ODF?
4. What dates was it certified ODF?
5. Who took the lead in the process of verification and certification?
6. What percentage of households have built a toilet?
7. Was a vigilance committee established in this village?
8. Was a sanitation market established near this community since 2016?
9. Approximately how far from this village is the sanitation market located?
10. Were there any contractors that built latrines for households in this village?
11. Were any masons in this village trained in toilet / sanitation construction?

### C. Refunds

1. Were funds made available in this village BEFORE latrines had been constructed?
2. Were funds given directly to households or to another individual, government office, or group?
3. Were funds made available in this village AFTER latrines had been constructed?
4. Were funds given directly to households or to another organization or group?
5. Did the households later transfer it to any other individual/ organization/ contractor?
6. Who or what organization took the lead in disbursement of funds in this villages?