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Norah McKinley

Understanding use characteristics, transitions, and sustainability of child feces management hardware among caretakers and children in a cluster-RCT in rural Odisha, India.

By

Norah McKinley
Master of Public Health

Global Environmental Health

Dr. Thomas Clasen
Committee Chair

Dr. Valerie Bauza
Committee Member

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Norah McKinley

B.A., B.S., The Ohio State University, 2021

Thesis Committee Chair: Thomas Clasen, J.D., PhD

Thesis Committee Member: Valerie Bauza, PhD

A thesis submitted to the Faculty of the
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Abstract

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Safe child feces management (CFM) is an integral avenue in which sanitation can be improved across the world, as increased access to latrines is often not sufficient in facilitating safer feces disposal practices. This is especially true for young children, who may not be able to control where they defecate or are too small to use the latrine. Safe CFM is often neglected and excluded from water, sanitation, and hygiene (WASH) interventions, even though it can reduce exposure to enteric pathogens for both adults and children and facilitate a cleaner environment. This thesis is working with data from a study conducted in rural Odisha, India, that investigated the impact of hardware that was designed and distributed with the intention of improving CFM across 37 intervention villages enrolled in a cluster-randomized controlled trial. The hardware consisted of a wooden latrine mat to manage toddler feces, and a plastic bucket with a lid and a plastic wash basin to manage baby feces. The latrine mat is a novel hardware item and is an elevated wooden board with a small hole for feces to pass through, with handles attached to each side and front for children to hold onto, and a removable tray underneath to enable safe use inside or outside the latrine. This thesis presents analysis and findings on hardware use characteristics that were observed and recorded during the intervention period, and perceptions of both impact and how the hardware was used by different caregivers and children. It also examines the durability and sustainability of the hardware. An analysis on how the hardware helped facilitate transitions between different defecation practices was also included, as one of the main outcomes of interest in this study is whether this hardware could lead to earlier latrine facilitation by children. This thesis worked with both quantitative and qualitative data to investigate how the hardware was used and if it would be feasible to distribute the hardware in other contexts. The results showed positive receptions of the hardware, with most caregivers interviewed stating that it would lead to earlier latrine use. In addition to this, the latrine mat did appear to contribute to increased comfort in transitioning from open defecation to over the latrine mat or latrine directly. This hardware could easily be adapted to other contexts and should be investigated elsewhere as well.

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Introduction

Sanitation interventions are associated with improving health around the world. As of 2020, 3.6 billion people still lacked access to safely managed sanitation services, and two-thirds of people without access to basic services lived in rural areas (WHO, 2022; WHO & UNICEF, 2021). One avenue of improving sanitation practices in places with latrine access is to promote safe child feces management (CFM), which is crucial in reducing exposure to fecal pathogens (Bauza et al., 2020). The data used for this thesis comes from a recent study that was conducted in rural, Odisha, India examining the impact of behavior change and hardware interventions aimed at facilitating safe child feces management practices among caregivers and children. This paper specifically aims to understand how the novel hardware is being used and if it could be beneficial in improving safe CFM within this context, and others in the future.

What Is Child Fecal Management

Safe child feces disposal has been defined as a caregiver or a child disposing of feces in an improved latrine facility (Beardsley et al., 2021). Another source defined safe disposal as discarding of child feces in a latrine, a designated pit or burying of the feces. In contrast, unsafe disposal is defined as leaving feces out in the open or disposing of the feces in a ditch, bush, drain, or garbage heap (Islam et al., 2018). Burying feces and disposal with solid waste have historically sometimes been classified as safe disposal methods, but more recently deemed unsafe (Bain & Luyendlijk, 2015; Rand et al., 2015).

Effective CFM can decrease the risk of fecal exposure for both children and adults in or around a household if not discarded safely (Bauza et al., 2020). Extremely young children cannot choose where they defecate nor control when, therefore, increased access to latrines does not

imply that CFM will improve (Bauza & Guest, 2017). In fact, even with increased access to latrines and improved sanitation, children's feces have been seen to not always be disposed of in the latrine if they are unable to use the latrine at their age (Freeman et al., 2016; Majorin et al., 2017). Many studies found that caretakers around the world were not typically disposing of children's feces in latrines, even if they had access to one (Majorin et al., 2017; Bauza et al., 2020; Sclar et al., 2022b). In addition to this, long-term latrine use in general was only weakly associated with safer feces disposal in one study investigated (Majorin et al., 2014). This exemplifies the need for a CFM intervention that will focus on more than just access to improved sanitation and focuses on adapting one's environment even more to make it accessible to individuals that have not yet learned how to use a latrine.

Children are at an increased risk of contracting fecal-oral diseases. In fact, the incidence of enteric infections is highest among young children, and can lead to different symptoms, such as diarrhea, that is responsible for 1.2 million deaths each year (Abubaker et al., 2015). This can be attributed to multiple causes, such as how children spend more time on the ground and often use their hands to place things in their mouth to explore their surroundings (Majorin et al., 2017). Also, children may defecate in areas where other children are present and likely to be exposed, posing a great risk as they have underdeveloped immune systems and are at a high risk of developing an enteric disease (Ngure et al., 2013). Children will often defecate near their household as well, leading to greater risk of exposure for other family members or individuals that may encounter the feces (Lanata et al., 1998).

Unsafe CFM has also been associated with an increased risk of stunting, environment enteric dysfunction, and soil-transmitted helminth infections, further supporting a need for an improvement in handling and disposal of child feces (Roy et al., 2011; Bauza & Guest, 2017).

Another concern is that diarrheal diseases can contribute to the prevalence of stunting, which impacts 162 million children around the world (de Onis and Branca, 2016; Worley, 2014). Stunting is a serious condition that can lead to several long-term effects as well; reduced physical and cognitive development, an increased risk of different adverse health effects such as obesity and other chronic conditions and reduced economic productivity (de Onis and Branca, 2016; Worley, 2014; Beardsley et al., 2021; Guerrant et al., 2012). Without proper disposal of feces, children may be more susceptible to illness such as diarrhea, environmental enteropathy, and parasitic infection as well (Addis et al., 2022). Diarrheal diseases cause more than 800,000 deaths each year, of which 300,000 are children, further supporting the need for CFM intervention (Prüss-Ustün et al., 2019). Also, it is important to dispose of child feces in a safe way because feces is a cause of environmental contamination that is important to address as well (Caruso et al., 2022).

Another reason why CFM is so crucial to improving health is because child feces can pose a greater risk of exposure to enteric pathogens than that of adult feces. Because children have underdeveloped immune systems, their feces often has a higher pathogen load (Feachem et al., 1983; Fischer Walker et al., 2012) for example, hepatitis A, rotavirus and other pathogens (Bawankule et al., 2017; Lanata et al., 1998). One study stated that child feces was about five times more likely to get someone sick than adult feces (Bawankule et al., 2017), further exemplifying the need to focus on safe CFM within public health WASH (water, sanitation, and hygiene) interventions.

Challenges of Achieving Safe CFM

There is a need to target child feces management as a means to promoting health and better sanitation, however there are certain difficulties in achieving this goal. In the past, most

sanitation and hygiene interventions targeted adult practices or behaviors (Preeti et al., 2016). As mentioned above, increasing access is not enough to facilitating safe CFM, especially if the latrine interventions are geared towards adults, as most previous sanitation intervention have been (Garn et al., 2017). Sometimes, even when CFM hardware have been introduced within different sanitation interventions in the past, child feces is still less likely to be disposed of safely compared to that of adults (Parvez et al., 2018).

Another potential obstacle when trying to promote safe CFM could be a lack of resources in specific areas or regions. For example, many low-income settings do not have easily accessible diapers and clothes available (Preeti et al., 2016). This could pose a challenge in disposing of feces in a safe way because children may be more likely to open defecate if they are unable to use a latrine (Gil et al., 2004). Potties are infrequently used in rural areas, leading to feces being disposed of in ways that could contaminate the environment or expose others to enteric pathogens (Preeti et al., 2016). Another challenge can be linked to the practice of open defecation. Nearly 494 million people still practiced open defecation in 2020, although the number has decreased from 2015 to 2020 with the majority of change occurring in rural regions (WHO & UNICEF, 2021). This can be a challenge in concerns to safe CFM because the likelihood of a child open defecating is higher if even only one other member in household practices open defecation (Beardsley et al., 2021).

Another difficulty revolves around access to water in order to practice safe CFM. One source mentions that one's capacity to practice safe CFM may be influenced by access to piped water or another water source. One study from Preeti et al. (2016) hypothesized that this may be because it is more convenient for mothers to dispose of feces if they are able to easily access a water source, rather than carrying water from a different source to the latrine. Water is crucial to

many aspects of CFM, such as in the washing of cloth and cleaning children after defecating, disposing of feces in a latrine, flushing a pour-flush latrine after feces disposal, or washing other materials that may be contaminated with feces. There could also be a negative feedback loop, as environmental water sources may be used to clean CFM materials, then polluting the water that is meant to be cleaning the items.

In addition to water being important for safe CFM, handwashing is critical to ensuring that people are reducing personal risk to pathogens (Majorin et al., 2017). Handwashing should also be promoted among both the children and the caregivers in a household. Since caregivers are the ones handling the feces in most instances, they face a risk of exposure that other household members may not. Picking up feces from the floor or ground has been seen to increase the incidence of fecal contamination on mothers' hands, even when paper or straw is used. However, when using hardware such as potties or scoops that provide an impermeable barrier to decrease direct interaction with feces, the same study found that there was not an increase presence of E. coli fecal indicators on caregivers' hands after handling their children's feces (Bauza et al., 2020). When looking at India specifically, one study found that there was a lower rate of handwashing after managing child feces than some other countries, including Ethiopia and Zambia, with only 11% of caregivers reporting that they washed their hands after CFM (Beardsley et al., 2021). Another study found that, although most caregivers reported washing their hands after handling their child's feces, they did not have a specific place to do so and soap and water was not guaranteed all the time (Majorin et al., 2017).

As a child ages, the defecation and disposal practices change as well (Bauza et al., 2019). This temporal aspect of child feces management does not, however; extend to seasons, as feces disposal practices appear to be consistent over the course of the year. Additionally, feces that

was most likely to be disposed of in a latrine had originated there, meaning the child defecated directly into the latrine (Bauza et al., 2019). This exemplifies how important it is for latrine use to be taught at a young age. If caregivers are able to begin teaching their children how to use a latrine at an earlier age, the child's feces will automatically be disposed of in the latrine because they defecate there. As a result, a focus on the facilitation of earlier latrine use is essential.

India and Latrine Construction

Another important aspect to consider when planning for an intervention is the context in which a project will be conducted. This project was carried out in India, where there have been substantial improvements in sanitation access over the past decades. India has undergone massive national sanitation campaigns in recent years to increase latrine access and reduce open defecation across the country. The first major attempt to reduce open defecation and increase latrine coverage was the Total Sanitation Campaign that ran from 1999-2011 (Friedrich et al., 2020). This campaign was initiated by the Government of India and was a nation effort designed to provide small subsidies to those living below the poverty line in order facilitate participation in constructing their own household latrine (Government of India, 2012). Through this national effort, an estimated 90 million household latrines were built (Government of India, Ministry, 2012). This large-scale campaign did help to increase sanitation access; however, there was still much to be done by way of eradicating open defecation, and new or revised programs were created with this in mind.

One subsequent multi-year program that took place across the country was the Swachh Bharat Mission (SBM) that began in 2014. During this sanitation intervention, nearly 100 million latrines were constructed throughout India, leading to an additional increase in latrine access over the course of only a few years (Friedrich et al., 2020). However, one shortfall of this

intervention is that it did not seem to lead to any lasting behavioral changes on a large scale (Preeti et al., 2016).

Additionally, although the government measured a reduction in open defecation across the country between 2014-2018, they measured this based on increased access to latrines, rather than evidence measuring open defecation evidence (Exum et al., 2020). This could therefore be an overestimate of the impact that latrine construction had on reducing open defecation as access is often not enough to lead to a change in latrine use or in CFM (Bauza et al., 2019).

Previous Safe Child Feces Management Hardware Interventions

Studies have assessed efforts to improve safe CFM through different hardware interventions. Hussain et al. assessed the feasibility of using potties that were locally available to improve CFM in rural Bangladesh (2017). This was a short intervention that spanned 30 days and aimed to study the acceptability and feasibility of potties that were given to 26 households with children ages between 7-36 months. Similarly, to the intervention hardware that was used in the Odisha study providing data for this thesis, these potties had lids that prevented flies from landing on the feces and spreading pathogens after landing on other things. This was also designed to allow mothers to wait until it was more convenient to dispose of the feces, rather than having to do it immediately. The lids were seen to contain some of the smell associated with defecating outside of a latrine. These potties were also supposed to help reduce discomfort of caregivers because many mothers did not like picking up their child's feces with straw or paper due to stigma surrounding feces. The potty helped to portray and image of a "clean mother" that was more acceptable in the community. In this study, the main factor that influenced feasibility was the division of labor when handling CFM related tasks and the additional tasks that were

introduced along with the potties. This included washing the potty, holding the child over the potty when using it, and disposing of the feces in a latrine (Hussain et al., 2017).

Another study that utilized potties was conducted in Odisha, India where an intervention introduced both potties and scoops to caregivers to facilitate safe CFM with ages of children ranging from <1 to 5, with one child >5 (Williams et al., 2022). There was not high uptake of the scoop among participants in this study, but perceptions of these were positive among those that did use them because women did not have to worry about getting any feces on their hands. Potty use was more common among the participants, and caregivers that had children using the latrine as well said that this provided an outlet for children to defecate in the house if the weather was bad outside. There was also variation in how caregivers both used and cleaned these potties, and practice ranged from safe to unsafe CFM depending on where the feces was later disposed of. There appeared to be a lack of understanding among caregivers concerning where the feces should have then been disposed of and how the children and potties were to be cleaned. Overall, the potties received generally positive reviews from caregivers, but mixed reviews about acceptability among the children and on how useful they would be in everyday settings. One interesting finding from this was that children would sometimes view the potties as toys, and therefore not want to get then dirty (Williams et al., 2022).

Not all interventions of previous studies have attempted to implement such hardware; one study examined the use of a hoe to scoop up feces and piloted the use of a modified tool for feces management (Sultana et al., 2013). This intervention was fairly simple and aimed to assess whether a tool that was already in use could be improved, rather than introducing a new piece of hardware. The results; however, were varied, with women liking the tool because it reduced close contact with odorous feces, yet did not think that it was reasonable to buy a separate hoe

for feces disposal if they did not have one already or had one for agriculture or other uses (Sultana et al., 2013). There are many other interventions that attempted to promote safe CFM through the introduction of hardware or by designing behavioral interventions

Study Objective and Research Aims

This thesis will both analyze and present findings surrounding the feasibility and sustainability of CFM hardware (a novel latrine training mat platform, bucket with lid, and wash basin) that was dispersed as part of a cluster-randomized controlled trial. The overall research question is how do caregivers and children use CFM hardware for latrine training and safe feces disposal and what are enablers and barriers to use? The specific aims are:

Specific aim 1: To understand and characterize use patterns of latrine mats for children <4 years old and baby hardware items for children < 7 months old among caregivers, including enablers and barriers to use.

Specific aim 2: To characterize and explore how hardware practices and usage changes as children age.

Specific aim 3: To characterize the sustainability of the hardware items with respect to durability and whether people would be willing to share items with other households or pay to repair them.

I will be reviewing data from a program conducted in the Ganjam and Gajapti districts of rural Odisha, India, that strived to facilitate earlier latrine use and promote safe CFM among children and caregivers (Sclar et al., 2022b). This intervention was evaluated using a cluster randomized controlled trial that randomly allocated 74 villages to control or intervention arms and took place over a period of twenty-one months. All eligible households had to have a child <5 at the beginning of the intervention period and had to live in a village that previously participated in the Grim Vikas MANTRA program; a community intervention that led to the

construction of household latrines and household piped water. The hardware distributed in this program included a commercially available bucket with a lid and a wash basin. This was made of plastic and intended to be used for children within the age of 0 to 7 months to store and wash soiled nappies and cloths. The bucket with a lid is intended for caregivers to use to store the cloth that a child has defecated on, and the wash basin for washing the cloth. The other piece of hardware distributed was a wooden latrine mat that was designed and constructed locally. The latrine mat was designed for children aged 7 to <48 months to facilitate earlier latrine training. The latrine mat is designed to reduce the size of the hole on the squatting platform and has handles on top of the mat, both on the front and sides, so that children can balance while defecating. The hardware is designed such that it can be used safely over a bedpan tray over the ground and eventually, over the latrine. This is important because it follows a child's natural development as they age, moving from defecating over cloth, to over a latrine (Sclar et al., 2022a).

This project is important because it will provide a deeper understanding of how these hardware interventions were used, and it is the first randomized controlled trial to evaluate latrine mat usage to encourage earlier use of latrines by children as a sanitation intervention. Additionally, it has the potential to provide support for researchers when considering how to adapt this hardware to be used in other locations that face similar barriers to safe CFM. Open defecation on floors or over the ground near the household can lead to an increased risk of fecal contamination, and simply building more latrines is not enough to see improvement in sanitation behaviors (Garn et al., 2017). Also, CFM tools, such as the hardware developed for this intervention, can help to reduce exposure to pathogens through the fecal-oral route for both caretakers and children alike.

Behavior change interventions are also necessary to see an increase in sanitation practices that align with safe CFM. By using the bucket and wash basin, caregivers can practice safe storage and cleaning methods for soiled cloths, leading to less environmental contamination and exposure to enteric pathogens. With the introduction of the latrine mat, children can begin using a latrine at an earlier age, potentially contributing to a reduction in open defecation practices among children. This could also help provide caregivers with safe CFM training that can be used when potentially raising more children in the future. This cluster-RCT was also the first to implement a program that followed children through their normal development and provide messaging for transitioning behaviors and hardware use. This hardware was designed to reduce exposure and direct contact to child feces, and it is essential to understand if the participants were using the hardware, how they were using it, and how usage changed over time as the children aged.

Methods

Study Site

This study took place in rural Odisha, India across 74 villages that were randomly allocated to either an intervention or control arm (Sclar et al., 2022a). The cluster randomized trial took place over the course of twenty-one months. As part of the intervention, hardware items were distributed to the intervention arm and behavior change sessions were conducted by Gram Vikas, the local program's implementer. In order to be included in the study, villages needed to have previously been enrolled in the MANTRA program facilitated by Grim Vikas and required at least 75% of households (25-250 households) to have access to a latrine. Also, an

accessible and functioning community water tank and a community childcare center (*anganwadi)* needed to be present. Of eligible villages, households that had a latrine and at least one child <5 were able to receive the intervention (Sclar et al., 2022a).

Hardware Intervention

The wooden latrine mats (Figure 3) described in the previous section were painted with a waterproof paint and equipped with metal handles on both of the sides and on the front. The handles were designed to help make it easier for children to balance when using the latrine mat. This hardware was distributed to households with children between the ages of 7 months to 48 months. The baby hardware was distributed to households in order to facilitate safe CFM for children under 7 months of age. These included a plastic bucket with a lid (Figure 2) and a plastic wash basin (Figure 1) to help facilitate safer storage, cleaning, and disposal of feces when babies were mostly defecating on cloth or over the ground. Children that are too small to use the latrine will often defecate in the open or over cloth, and this hardware gives caretakers a safe place to both store the soiled cloth and wash it safely. The bucket and wash basin were plastic procured locally, and the latrine mat was designed and built locally. This was to help facilitate community participation and have the hardware be as informed by the community as possible (Sclar et al., 2022a).

Data Collection

This thesis worked with data that was collected and gathered at different time points throughout and following the intervention period. There were multiple methods of data collection that took place during and after the intervention, including household surveys and in-depth interviews with caregivers. Household surveys were conducted at endline, (7-9 months

after the hardware was dispersed to the intervention arm), with additional data on CFM practices during the intervention period collected at two time points.

Household Surveys: The surveys included questions that gathered basic demographic information of the household, the hardware they were given, how they used it, where and how often it was used, etc. The endline survey was given in order to determine whether the hardware intervention was effective in facilitating safe CFM among these study households or led to an improvement in CFM in some way. This thesis used data from the endline household surveys that were facilitated. The household surveys collected at endline were conducted with the caregivers in a household and facilitated by enumerators working in the field (Sclar et al., 2022a).

In-depth Interviews: Interviews were completed 4 months after distribution of hardware with a subset of caregivers in order to better understand how caregivers were using the hardware and their perceptions of its usefulness and feasibility. These interviews are important because they provided an opportunity to understand *why* these caregivers were using the hardware or not using it. A subset of households were selected for interviews and 26 were analyzed in total. The interviews included a variety of households that were only given baby hardware, only given latrine mats, given no hardware, or given all hardware. Ages of children also ranged and use patterns varied across the interviews. There were multiple sections to the interview guide that asked about previous CFM practices, how the new hardware was being used (if at all) how often it was being used, and if any transition was facilitated with the hardware (from ground to over latrine mat, latrine mat over ground to latrine mat over latrine, and latrine mat over latrine to using the latrine directly). It also investigated caregivers' perceptions of the hardware and whether they considered it valuable and durable.

Outcome of Interest

The primary outcome of interest is to understand how caregivers and children use the CFM hardware for latrine training and safe feces disposal and enablers and barriers to use. In order to investigate this question in detail, the analysis has been broken up into separate aims in order to better assess different aspects of the intervention individually and understand how they contribute to facilitating safe CFM.

Aim One

The first aim is to understand and characterize use patterns of latrine mats for children <4 years old and baby hardware items for children <7 months old among caregivers, including enablers and barriers to use. To do this, multiple aspects of hardware behavior were examined, including how many people were using each of the hardware and how they were using it. Some specific behaviors of interest include how often the hardware were used, when they used it and where (for example over the ground or over the latrine for the latrine mat hardware), and whether children needed help to use the latrine mat. Caregiver behaviors were also investigated surrounding the cleaning of hardware, the frequency of use, and how they were used. Other important factors that were analyzed include reasons why a child may have stopped using the latrine mat and times of day when the latrine mat was used. The impact of the latrine mat on contributing to comfort and desire to use the latrine was also examined.

Aim Two

The second aim looks to characterize and explore how hardware practices and usage changes as children age. This looked at hardware questions relating to why children were no longer using the hardware, or reasons why they never used the hardware with respect to their ages. Some households received multiple hardware, and it is important to understand how usage changed

overtime as children aged throughout the study. One of the outcomes of interest of the study was to facilitate earlier latrine use, and this aim could assist in shedding some light on the effectiveness of the latrine mat in aiding children to use the latrine at an earlier age.

Aim Three

The third aim is to characterize the sustainability of the hardware items with respect to durability and whether people would be willing to share items with other households or pay to repair them. The household survey included information about whether participants would be willing to pay to repair or buy a new piece of hardware, and if so, how much they would be willing to pay. Other aspects of sustainability were also examined, such as whether households would be willing to share a piece of hardware or use it after another child had used it already. Additionally, questions that asked about reported or observed damages to the hardware and these were also examined in the analysis. The perceived ease of use of the hardware and whether people found the hardware to be useful were also looked at to understand caregiver's beliefs surrounding the necessity of the hardware. This will help to both assess the effectiveness of the hardware interventions and inform recommendations for future studies that also aim to use CFM hardware to facilitate safe CFM.

Data Analysis

The quantitative data gathered from the household survey conducted at endline was analyzed in Stata 17.0. Descriptive statistics were calculated for hardware use characteristics and durability. Separate variables were also created in Stata to join together hardware and age and hardware and gender. The qualitative data was analyzed in Excel (16.67) and used to supplement the findings from the quantitative analysis. The transcripts from 26 interviews were analyzed and grouped into themes that identified commonalities or significant trends within the data. The

interviews were coded in excel, with questions split up by category, including “Practices before intervention,” “Suggestions for improvement” “Latrine mat,” “Baby Hardware,” and “Transitions.” Questions could be placed into multiple categories if they were relevant to both, and deductive and inductive themes were created depending on the outcome of interest and commonalities that arouse from responses.

Ethical Review Board

This study protocol was approved by the Institutional Review Board (IRB) of Emory University (IRB00115339) in Georgia, USA and the Independent Ethics Committee at Xavier University Bhubaneswar (220519) in Odisha, India. All participants gave informed consent. The surveys and in-depth interviews were facilitated by enumerators that spoke Odia with the participants. In-depth interviews were audio recorded and later translated and transcribed to English from these recordings. The trial is registered at ISRCTN (15831099).

Results

Participant Characteristics

The study took place in the districts of Ganjam and Gajapti, Odisha, India, and 1,314 households completed the survey. There were a total of 1,641 eligible children, of which 555 children received a hardware item (Table 1). 418 caregivers surveyed from the intervention arm received at least one hardware item and had a child under five. Among these households, some caregivers received multiple hardware items depending on the age of their children or how many children were in the household. Endline surveys captured 378 latrine mats, 62 buckets with a lid, and 56 wash basins distributed. The distribution of the children’s ages of those included in the

intervention arm having received hardware are also reported in Table 1, with the greatest number of children being between the ages of 3 and 4.

Among the households that received a hardware item, the respondents were mainly between the ages of 21-40 (91.2%) and the majority of individuals taking the survey were the primary caregiver of their child. Of those that received one of the hardware items, around 16.3% of individuals having received a primary education, 33.6% having received greater than upper primary education and 27.9% having had no formal education at all. In order to be included in the study, the children needed to be under the age of 5 years at the time of intervention delivery. There was an assortment of households from different castes including scheduled castes, scheduled tribes, and backward castes. All 418 households that received hardware had access to a latrine, and only 44 households did not have piped water as their main source of water. A lack of piped water was mentioned in the qualitative interviews as being a barrier to safe CFM, and one caregiver reported washing the baby hardware in a nearby pond as a result.

Defecation Distribution

There was a question included in the survey that inquired about the last place that the children defecated, and the responses are broken down in Table 1. The most commonly reported locations in which the children had previously defecated was inside the latrine (55.5%) and inside the household (13.5%). At the time of the survey, the most frequent disposal location of child feces reported by caregivers was in a latrine (51.4%), but families were still disposing of feces in open areas, including the household garbage pile and into open fields.

Baby hardware use characteristics

Bucket Use

Of the 65 buckets distributed, only 47 (75.8%) were able to be observed by enumerators at endline and 41 of them were visibly clean (Table 2). 22 caregivers reported using the bucket every time their child defecated and about 39 had used the lid in the past week. 26 caregivers said they used the lid every time in the past week, whereas 11 used it sometimes, and 2 never used the lid. Only 11 participants had never used the bucket distributed as part of the program, with 54.6% of respondents saying the reason for this was that they used a different bucket with a lid to store the cloths.

Basin Use

A total of 56 plastic basins were distributed to the intervention arm, with 45 (80.4%) that were able to be observed by enumerators at endline. In the previous week, at the time of the survey, 27 participants (48.2%) said that they had used the wash basin every time the child had defecated, and 9 respondents reported having used it once a day. Also, only 9 participants reported having never used the wash basin in the past, with 55.6% of individuals saying that they washed cloths in a bucket instead.

The baby hardware was also seen to help women caregivers and mothers when it came to time management and convenience, which were two common themes seen in the qualitative data. One quote that exemplifies this well is, “[w]e are women, we always have busy work schedule. Sometimes, when I cook, I get late for other works. So, I used to keep the clothes in the bucket and close it with the lid and after finishing all my domestic work, I take those clothes to latrine to wash them.” (hh 20K). With the introduction of the bucket with a lid, women were able to go about the rest of their day without having to worry about feces lying around in the open, potentially interrupting their day if they needed to clean it right away. It also allowed for cloth to

be able to be stored overnight so that they did not need to get up and tend to it immediately and could wait until it was morning or when they had other items to wash as well.

Latrine Mat

Of the 378 latrine mats distributed, 265 were able to be observed (Table 3). At the time of the survey, about a quarter of respondents with a latrine mat said that their child used the hardware when they had defecated in the past week, with greater than half of respondents saying that their children used the latrine mat every time they defecated. Some caregivers talked about their child being made to use the hardware every morning to make them more comfortable with it and to establish a habit, while other children just used it whenever they felt that they needed to defecate. About 26.5% of households said that they used it a few times a day. Only 4 individuals said that another household member had used the latrine mat in the past.

88 individuals reported that their child had never used the latrine mat provided, and the most reported reason for this was that the child was already using the latrine when they defecated (53.4%). Some children were scared to use it at first, sometimes because of the item in general or because they feared they may fall from it, however caregivers had different tactics to help address this fear; some would give their children incentives by way of toys or promises of chocolate while they were using the latrine to try to make them more comfortable, and others would provide words of encouragement. One caregiver said "[s]ince he is a small child, if I tell him softly he will listen. If I tell him softly, he sits on it." (hh 51) Other parents would simply tell their children to sit there and threaten to go get their father or call the "scary man" to try and convince their child to sit there out of fear. Often times, practice and repetition were the most reported tactics to get the children more comfortable with using the latrine mat. Multiple caregivers interviewed said that their child was scared to go into the latrine, and they might have

to stand with them there at times, but the latrine mat was also seen to facilitate comfort in introducing the children to the latrine in a more gradual way after moving from being used outside to inside.

In addition to this, caregivers also found the latrine mats helpful in that they kept the surrounding areas clean and facilitated a more hygienic environment. One mother said, "[t]he child learnt and the mother is now in hygienic condition, the child is in hygienic condition, as before the mother used to clean the faeces. As the children were sitting outside in unclean places, now it is convenient." (hh 23d). Another benefit was that is helped to make training of children to use the latrine a bit easier. Some caregivers reported that the latrine mat helped to free up more time because their child could use it in the latrine directly. One caregiver reported "[e]arlier it was boring, like you have to wash all the clothes covered with feces and if you go outside you have to wash other things as well. Now this is not boring. We make him sit on the tray and then keep the tray aside. When I go for a bath after doing all the domestic work, I take the tray and throw the feces in the latrine and then wash it. It's being easy now." (hh 26k).

The majority of respondents did not use the latrine mat over the ground, with 28.0% always having used it over the ground. About 43.9% of respondents said that their child always used the latrine mat over the latrine, and about 37.8% said that their child never used the mat over the latrine. Also, the majority of children did not need to be held over the latrine and most were cleaned with water and a soap or detergent. Multiple caregivers reported their children being excited to use the latrine mat and said that they would sometimes view it as a toy. One caregiver said that, "[a]nd he used to make vehicle noise like, "broom, broom" and used to say that, "I want to go there." (hh 102). Other children liked using the latrine mat because they could hold onto the handles and saw it as a toy in that aspect.

Another interesting finding from the surveys was that most participants found the latrine mats easy to use in general. This was also the case when it came to opinions surrounding the ease of cleaning (76.9%), lifting (75.9%), and storing (83.1%) of the latrine mat. There were additional benefits investigated in the qualitative interviews as well presented in Table 4, and the majority of caregivers interviewed said that overall, it was easy to get their child to begin using the latrine mat. Another commonly reported theme from the qualitative interviews was that the latrine mats made practicing safe CFM easier, and that it was safer for their child. Many caregivers also talked about how encouragement and incentivization were especially important when teaching their children how to use the mat, and some mentioned giving their children toys or having promised chocolate to them if they used the latrine mat.

Transitions

In qualitative interviews, the majority of respondents that were asked if use of latrine mats could contribute to earlier child latrine use responded that they believed they would. One parent said that it will help them to feel comfortable before they need to start using the latrine, and the latrine mat contributing to comfort was a main theme that was seen throughout the qualitative data. The qualitative data also found that the latrine mat was helpful in transitioning children from defecating outside to inside the latrine because it was able to gradually be adapted to multiple locations. For example, children were defecating outside, and then could use the latrine mat outside, then inside over the tray, and then inside the latrine, and then use the latrine directly. Additionally, one caregiver mentioned that the child was defecating originally between their legs, and quickly transitioned to using the latrine mat over the ground, imitating a similar process. In another qualitative interview, a caregiver said, “[f]irst they were taught...they sat on the ground. Then they sat on that...then moved to the latrine. So they learnt in this way. It was

beneficial" (hh 105). The child was initially sitting outside with the latrine mat but was then able to transition easily to use it inside the latrine. This caregiver said that the hardware was helpful for learning when it came to using the latrine, and that it would help a child use the latrine earlier. Another parent said "[i]f the child afraid to defecate in the latrine above the mat, then outside we can place it and the child may can sit above mat by playing with the mat and seeing outside environment. And the child will feel encouraged to sit above mat." (hh 3).

Durability and Sustainability of Hardware

All three of the hardware were very durable throughout the length of the study, with 91.0% of latrine mats being neither damaged nor broken, along with 93.6% of buckets and 97.8% of basins (Table 4). The survey data collected at endline had 3 participants report their bucket being cracked or having a hole, and the only damage reported for the wash basin was one that had a broken handle. Some problems were identified by caregivers in the qualitative interviews in concerns to the latrine mat, however only a handful of individuals thought they could be improved, while everyone else interviewed said that they had no suggestions for improvement. The problems reported included that the material of wood for the latrine mat may be too fragile to support a child when they get bigger and another said that because it was made of wood, washing it with water was ruining the quality. There have been steps taken during the design phase to prevent this, such as covering the latrine mat in waterproof paint to make it more durable. Two other mothers interviewed said that it could be better and "more convenient," however, further details were not specified.

The question of whether or not these latrine mats would be able to be used by other families was also investigated, with 59.3% of respondents saying they would be willing to give them to another family after their child had used it (Table 5). Although this is promising, only

27.8% of respondents that received the latrine mat would be willing to use a latrine mat that a different family had previously used. Also, many participants said that they would pay money to get their latrine mat repaired but less than half said that they would buy a new one if something were to happen to the mat they currently had that could not be fixed. There was also a question in the qualitative interview that asked about whether caregivers would buy a new bucket or basin if something were to happen to the current one, and 5 out of 6 participants asked said they would. One caregiver said they would not buy a new one and would just use one that they already had; although they wouldn't replace it, CFM would still be practiced in a safe way. This was also the case for the respondents that said they never used the basin, because they were washing the cloth directly in the bucket. A commonly reported advantage of using this hardware was that it made safe CFM easier at night, because the cloth could be stored in the bucket with the lid overnight and then cleaned in the morning.

Discussion

General Usefulness

Both the latrine mat and the baby hardware (bucket with lid and wash basin) were received positively by the caregivers and children alike in the intervention arm. Hardly any caregivers reported challenges with using the hardware, sometimes citing that it was difficult to have their child use it at first, but with practice they were able to use it. Also, the majority of caregivers said that it was easy to get their children to begin using the latrine mat after it was distributed.

One interesting finding was that multiple caregivers mentioned that their children saw the latrine mat as a toy. A study previously mentioned reported that this phenomenon of children

viewing CFM hardware as a toy was an obstacle to usage because some of the children would refuse to defecate there, as they did not want to get their toy dirty (Williams et al., 2022). This did not seem to be the case in this CFM study and none of the caregivers reported this as something that inhibited use; if anything, it seemed to make the children more comfortable when using the hardware.

With the bucket and lid and the wash basin distributed, there was not a concern of the comfort of the child because they were used by the caregivers. Multiple caregivers reported using the bucket because it contributed to cleanliness of the household and helped to reduce potential health issues, and they would buy another bucket/wash basin if something were to happen to the hardware that they currently had. This made CFM more convenient because the cloth would not need to be cleaned right away, and it could still be stored safely to prevent exposure to fecal pathogens to household members. Another benefit of this hardware is that is that it is useful when dealing with both solid and liquid feces. Other interventions, such as the hoe investigated in Sultana et al., cited caregivers having difficulty scooping liquid feces (2013). This is not a problem that would need to be considered when using the bucket or the latrine mat because the feces should be going directly from the cloth to the bucket or into the bedpan or latrine, and there is no intermediate step.

Transitions

One of the main advantages expressed throughout the interviews was that it helped children that were open defecating to become comfortable first outside with the latrine mat, to then being able to use it inside the latrine. This supports the idea that the latrine mat can help a child to feel more comfortable to use the latrine if they are scared, because they should be able to use the latrine mat outside first or in the household. Once they begin using it in the latrine, it will

be familiar and could help to make the latrine less scary. With about 92% of individuals practicing open defecation living in rural regions, it is important that hardware can be used to reduce this practice, as the latrine mat was seen to do (WHO & UNICEF, 2021).

Facilitate Earlier Latrine Use

The majority of caregivers asked thought the latrine mat would help facilitate earlier latrine use by the children. This was attributed to the children having time to get habituated to the latrine with the mat, before having to use it directly. Another advantage of this hardware in facilitating earlier latrine use is that it can be used in the latrine as a tool that teaches children how to use the latrine itself. It mimics how one would sit over a latrine and can be used in the same space, where feces would go directly into the latrine. This could be more advantageous than having children use a potty at an early age, because that is essentially a different latrine, and they would then have to get used to the actual latrine after using that hardware as well. The latrine mat is designed such that it also promotes squatting practices rather than sitting, which is helpful in ease of defecation. It would be interesting to see if this was the case, and further research should be done to examine this.

Impact on Women and Caregivers

Another major advantage of the hardware in addition to facilitating safe CFM for children, is the benefit that they provide to the caregivers, especially women. The bucket with a lid was more convenient for caregivers than having children defecate on cloth without a place to store it because they would be able to store the cloth in the bucket. This meant that they could wait to wash the cloth until it was convenient for them.

Additionally, the majority of women surveyed reported that it was easy to clean, lift, and store the latrine mat, which is good because it will likely continue to be used if people find it

easy to move and handle. The latrine mats also helped to habituate children in being able to use the latrine on their own. With the introduction of the latrine mat, caregivers no longer have to spend so much time washing cloth that their child defecated on and can instead just wash the feces of the latrine mat if needed when go to the bath.

Mothers also benefitted from the hardware that was distributed because it would reduce their exposure to enteric pathogens from their child's feces. As child feces often contains a higher viral load than an adults, exposure to child feces should be avoided when trying to practice safe CFM, and the hardware distributed helped make this possible (Feachem et al., 1983; Fischer Walker et al., 2012). In the qualitative interviews, mothers mentioned that the hardware was more hygienic for them as well as for their children, similarly to how mothers liked the hoe introduced in the Sultana et al. study because it reduced contact with their child's feces (2013).

Ability to be Adapted

Another important aspect of these hardware is that they are simple in their design and can be adapted to many other places. Fear that small children may fall into latrines is not something unique to this intervention and was also reported among Bangladeshi parents in Hussain et al., so the latrine mat could help to ease fears of parents in many different contexts (2017). If other regions around the world have similar latrine systems where people would be able to place the latrine mat over them, this would be a great hardware to consider. They are simple to make and are adaptable to being used both inside and outside, depending on the child or acceptable practice of that area. A bucket and wash basin are also common household items that would be able to be used in just about any context.

One potential challenge would be availability of piped water, as this was seen to contribute to the feasibility of caregivers to practice safe CFM. Also, as mentioned before, potties that have been introduced in other contexts may be difficult to implement depending on where they are being used as it requires an extra step in teaching children to use the latrine after using the potty. Potties could be equipped with a lid that would make it work effectively as a bucket as well to store the feces; however, this would not allow for children to become habituated to defecating in a latrine as the latrine mat allows children. In addition to this, the bedpan that could be placed under the latrine mat came with a lid as well, meaning the feces could be safely stored and disposed of later.

Another consideration that would need to be taken into account when trying to determine if this is adaptable to other locations would be how mothers normally dispose of their child's feces. In Odisha, many mothers use cloth for their child to defecate on directly or to wrap around the child similar to a diaper. If another area uses different materials such as leaves or straw more often than cloth, than a bucket and wash basin may not be as helpful as other hardware. In the Bangladesh study mentioned previously, mothers also used traditional cloths to capture their children's feces as well, meaning that the hardware introduced in this study could also prove to be advantageous in this context (Hussain et al., 2017). The purpose of the baby hardware distributed in Odisha is to provide caregivers with the means to store soiled cloth that they plan to reuse and give them a safe place to wash them. This may not be applicable to all locations; however, the latrine mat is very adaptable given that a region uses a similar style latrine where the mat can be placed over it.

Limitations of the Study

The interview guide included questions that aimed to inquire about how the hardware helped children transition from one defecation practice to another; over the ground to over the latrine mat over the ground; over the latrine mat to over the latrine mat in the latrine; over the latrine to using the latrine directly. Although the questions were built into the guide, many participants were often confused with the questions or what interviewers were trying to ask about. Even with this obstacle though, it appears that the hardware did in fact help to facilitate transitions.

Public Health Implication

Safe child feces management is something that is often overlooked in sanitation interventions, yet it is integral to preventing disease and improving quality of life for children and caregivers all around the world. There are still 3.6 billion people around the globe that lack access to safely managed sanitation services, consisting of about 54% of the population (WHO, 2022b). Programs that aim to improve the sanitation situation are therefore extremely important, especially when it concerns infant and child feces, which have a higher viral load and can lead to greater exposure to enteric pathogens for both caregivers and the children (Feachem et al., 1983; Fischer Walker et al., 2012). Another important component of this program is where it takes place. On average, urban areas have higher access rates and quality of both water and sanitation services (WHO, 2022b). This program was implemented in a rural area of India, where resources may be limited, demonstrating further how this type of study has the potential to improve both the health and quality of life those that participate in it.

The implementation of this novel hardware is just one example of how CFM can be improved, and there is still research that should be conducted to further assess the best way to

address challenges of feces disposal. Latrine mats and the distribution of the bucket with a lid and basin has shown great success in uptake and feasibility in this setting, with the majority of individuals saying that they would purchase or repair their hardware if something were to happen to the hardware they currently had. Another unique aspect of this program was that it can help to facilitate earlier latrine use of children in a setting where this would be extremely beneficial. Additionally, as children age it is important that the hardware they use can be adapted to different contexts, and this program saw that the hardware distributed helped contribute to transitions from outside to inside the latrine. Safe child feces management has not been a large area of intervention in previous sanitation programs; however, studies such as this one show that there is still a lot of work to be done, and that this hardware can both improve the state of safe CFM and reduce exposure to dangerous pathogens for children and caregivers alike.

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Tables

Table 1. Demographic Table for Households that Received Hardware

	n	%
Household caste	418	
General	41	9.8%
Scheduled caste	9	2.2%
Scheduled Tribe	121	29.0%
Other Backward Caste	81	19.4%
Other / Refused / Don't Know	166	38.0%
Respondent age (yr)	410	
16-20	26	6.3%
21-40	374	91.2%
41-60	8	2.0%
61+	2	0.5%
Child age (yr)	555	
> 1	64	11.5%
1	118	21.3%
2	119	21.4%
3	135	24.3%
4	87	15.7%
5	32	5.8%
Child sex	555	
Female	265	47.7%
Male	290	52.3%
Access to latrine?	418	100.0%
Did not have a private tap as their main water source	111	
Had piped water and was functional	46	41.4%
Had piped water but was broken	21	18.9%
Did not have piped water	44	39.6%
Highest level of education of primary caregiver	423	
Completed primary (1-5)*	69	16.3%
Completed upper primary (6-8)	57	13.5%
Higher**	142	33.6%
Never attended	118	27.9%
Last place child defecated	555	
Inside the household	75	13.5%
Inside household compound	35	6.3%
Just outside the household compound	32	5.8%

Away from the household compound	62	11.2%
In latrine	308	55.5%
In latrine but not over pan	7	1.3%
In latrine using latrine training mat	31	5.6%
Don't know / Refused	5	0.9%
Last place child feces was disposed of	212	
Into latrine	109	51.4%
Buried	1	0.5%
Into backyard of household compound	6	2.8%
Into household garbage pile	16	7.5%
into household compost pile	1	0.5%
Into open field (NOT on household compound)	23	10.8%
Into community garbage pile	9	4.2%
Into community compost pile	1	0.5%
Along roadside	2	0.9%
Into drain/ditch	7	3.3%
In pond/surface water	8	3.8%
Washed directly in bathroom	3	1.4%
Washed directly in body of water	4	1.9%
Left in open	18	8.5%
Other	3	1.4%
Don’t know / Refused	1	0.5%

* ’Primary’ education includes Anganwadi through grade 5
** ’Higher’ education includes grades 9, 10, +2 complete and higher

Table 2. Baby Hardware Characteristics

	Bucket n= 65		Basin n= 56	
	n	%	n	%
Number of hardware able to be observed	47	75.8%	45	80.4%
Of the hardware observed, the hardware was clean	41	89.1%	39	86.7%
In the past week, the hardware was used at least once a day	12	20.7%	9	16.1%
In the past week, the hardware was used every time the child defecated	22	37.9%	27	48.2%
Lid usage in the past week at time of survey	39			
Never	2	5.1%		
Sometimes	11	28.2%		
Always	26	66.7%		
Bucket was never used	11			
Store cloths in a different bucket with lid	6	54.6%		
Store cloths in a different bucket without lid	3	27.3%		
Other	2	18.2%		
Basin was never used			9	
Wash cloths in bucket instead			5	55.6%
Wash cloths in another wash basin			3	33.3%
Other			1	11.1%
Why stopped using hardware?	5		2	
A different bucket is used for this	1	20.0%		
The child does not defecate on cloth	1	20.0%	1	50.0%
Cloth is washed directly in the wash basin	1	20.0%		
Cloth is washed directly in the latrine	1	20.0%		
The child is currently using the bedpan	1	20.0%		
Only the bucket is used			1	50.0%
	n	**Mean (sd)**	**n**	**Mean (sd)**
How long was hardware used of those that had used it in the past but stopped? (mo)	12	2.6 (2.2)	8	3.1 (2.2)

Table 3. Latrine Mat Characteristics

	n	%
Total endline household which received latrine mats	378	28.8%
Latrine mats that were able to be observed	265	67.7%
At the time of survey, the child had used the mat in the past week	98	25.9%
Latrine mat was used by another household member	4	1.1%
How was the mat be used?	98	
Every time the child defecates	56	57.1%
At least once a day	8	8.2%
A few times	26	26.5%
One time	7	7.1%
Other	1	1.0%
When was latrine mat being used over the ground?	98	
Always	28	28.0%
Never	50	51.0%
Early morning	3	3.1%
During the day	8	8.2%
In the night (after sunset)	5	5.1%
When it is raining	1	1.0%
Both in the night and when it rains	2	2.0%
Other	1	1.0%
When was latrine mat being used over the latrine?	98	
Always	37	43.9%
Never	43	37.8%
Early morning and during the day before sunset	1	1.0%
During the day	7	7.1%
In the night	8	8.2%
Other	2	2.0%
Did the child need to be held to use the latrine	33	33.7%
Latrine mat was cleaned every time the child defecated with the latrine mat	96	98.0%
What was latrine mat cleaned with	98	
Water	15	15.3%
Water and soap or detergent	79	80.6%
Water and disinfectant	11	11.2%
Cloth	1	1.0%
Was it used without the tray on the ground?	7	7.1%
Difficulty when using the latrine mat		
General experience when child used mat to defecate	290	
Easy	237	81.7%
Neutral	31	10.7%
Difficult	22	7.6%
Cleaning latrine mat	290	

Easy	223	76.9%
Neutral	34	11.7%
Difficult	33	11.4%
Lifting latrine mat	290	
Easy	220	75.9%
Neutral	37	12.8%
Difficult	33	11.4%
Storing latrine mat	290	
Easy	241	83.1%
Neutral	28	9.7%
Difficult	21	7.2%
Facilitate earlier latrine use? *	8	72.7%
Of those that never used the latrine mat, why?	88	
Child has always used the latrine	47	53.4%
Child is too small	4	4.6%
Child refused to use the latrine mat	22	25.0%
The mat is too difficult to use	1	1.1%
The mat is too difficult to clean	2	2.3%
Other	12	13.6%
	n	**Mean (sd)**
How long was hardware used of those that had used it in the past but stopped? (mo)	189	1.8 (2.5)

* This information was gathered from the qualitative interviews

Table 4. IDI Hardware Questions

Interview Question	Quantitative Results	Qualitative Themes and Descriptions
What do/did you like about the latrine mat? What are the benefits/positives?	N=14 respondents reported a benefit	**Latrine mats made safe CFM easier:** Many caregivers said that it was beneficial to use the latrine mat with their child because it was easier to clean the hardware than constantly be cleaning cloth. Also, the fact that it could be used in the latrine made the process easier because the feces could be disposed of there. This meant that defecation and disposal could be done in the same place. A few parents also mentioned how this was more hygienic and safer for their children.
How did you habituate/train your child to using the mat?	N=13 respondents asked	**Encouragement and incentivization are important in facilitating CFM:** Caregivers encouraged their child to use the mat for the first time or would try to make them more comfortable with it by staying with them while they used it. The respondents said they would make their children sit and use the latrine mat after explaining how to use it and when to sit. Additionally, multiple parents would offer their children toys or chocolate if they were to use the toilet. **Practice is essential to habituating use of latrine mat:** Caregivers frequently talked about how they made their children practice using the latrine mat to get them more comfortable with it. Some would show their child how to use the latrine mat or place their feet and hands on the mat to help them understand how to use it. Also, some caregivers said that they made their child use it every morning, while other children would ask to use it when they needed to defecate.
Where do you use the latrine mat with your child? 1. Over the ground with the tray 2. In the latrine 3. Both locations	N=14 respondents asked 1. n=6 2. n=4 3. n=5	**Latrine mat can be utilized in different contexts:** The latrine mat was being used in different locations depending on the child's size/age or preference. Some children were only using the latrine mat over the ground, over the latrine, or in both locations. Because it is so easy to use in multiple contexts, this hardware could easily be introduced to settings with similar latrine structures or child defecation practices. **Hardware provides opportunity to transition from defecating outside to over latrine:** The latrine mat helps to facilitate comfort when transition from defecating outside to inside a latrine. One child was scared to use it in the latrine but liked using the latrine mat outside. The child, however, is still being made to practice over the latrine at times so they were slowly

		getting exposure to the latrine. Many children also used the latrine mat both outside and inside the latrine, providing an opportunity to ease into the change of location.
What was it like to make this change in how you managed your child's feces? Please describe your experience.	N=23 respondents asked Easy: Baby hardware – 5 Latrine mat – 15	**Easy to have children begin using the hardware:** Most caregivers talked about how it was easy to have the children begin using the latrine mat, or for them to practice safe CFM with the bucket. Both hardware were mentioned in making it easier for the child to defecate at night because they would not need to go outside and the feces could be stored in the bucket. Others said the bucket and basin required less water and were easy to clean. A couple respondents did mention that it was difficult at first to get their child to use the latrine mat, but, overtime, most of the children became comfortable.

Table 5. Sustainability

	Latrine mat n= 378		Bucket n= 65		Basin n= 56	
	n	%	n	%	n	%
The hardware was not damaged or broken	233	91.0%	44	93.6%	44	97.8%
Willing to get mat repaired?	178	47.1%				
Willing to pay for mat repairs?	121	68.0%				
Would you buy a new mat if needed?	152	40.2%				
Would you pay in rupees for a new mat?	102	67.1%				
Willing to give mat to another family after your child no longer needs it?	224	59.3%				
Willing to use a mat another had used before?	105	27.8%				
For children that had not used a latrine, did your child need the latrine mat?	71	87.7%				
Was the hardware used in the past week?*	98	25.9%	39	69.7%	39	69.6%

* This was collected at time of survey

Figures

Figure 1:

Figure 2:

Figure 3: