POLICY BRIEF

Estimating the Potential Impact of Sanitary Child Stool Disposal

Acknowledgements

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Photo (left)

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Summary

The WASH sector has, thus far, greatly overlooked the enormous potential of hygienic child stool disposal to considerably reduce the prevalence of diarrhoeal diseases. Young children are concurrently more susceptible to faecal-oral disease transmission and an important source of infection because their faeces contain high levels of pathogens [2]. Based on a literature review and new research, this policy brief describes the potential impact of unsanitary child stool disposal and presents data on child faeces disposal practices in 38 countries in Sub-Saharan Africa and South Asia. It also highlights how the prevalence of safe disposal of child faeces differs in households with access to different types of sanitation, across rural and urban settings and with the age of the child. Finally, it offers recommendations for the WASH and health sectors on improving child faeces disposal to reduce the presence of child excreta in the household and community environment.

The Big Picture: inadequate water, sanitation, hygiene and health

Although the Millennium Development Goal (MDG) target for water has been surpassed, the MDG for sanitation is drastically off track and unlikely to be met by December 2015 [5]. Currently, an estimated 748 million people lack access to improved water supply and 2.5 billion people are without access to an improved form of sanitation [5].

The health burden associated with inadequate water, sanitation and hygiene (WASH) falls disproportionately on young infants and children. Diarrhoeal diseases caused by inadequate WASH are one of the leading causes of death among children under the age of five globally; of the estimated 6.3 million child deaths in 2013, over 500,000 (8%) were caused by diarrhoea [7-9]. Furthermore, 47% of children in the developing world between the ages of five and nine are estimated to be infected with intestinal worms, which are associated with inadequate sanitation [10]. These infections are associated with impaired learning, stunted growth, malnutrition, increased absences from school, and decreased future economic productivity [11-18].

A growing body of evidence suggests that WASH interventions have a positive impact on reducing the prevalence of childhood disease [12, 19]. It is estimated that improving water supply, excreta disposal, and hygiene practices could prevent 361,000 deaths in children below five [20]. Improving WASH also has the potential to substantially reduce morbidity; recent analysis found that in 2012, 72.4 million disability-adjusted life years (DALYs) were attributable to unsafe WASH practices (33.8 million DALYS due to inadequate water, 18.7 million due to inadequate sanitation and 20 million due to inadequate hand hygiene) [20].

There is also a strong economic case for improving WASH; every year, US$260 billion is lost as a result of poor WASH [21] and it is estimated that for every US$1 invested in water and sanitation, US$4 are returned in increased productivity [21]. Improving WASH not only reduces the burden on health systems, but also decreases days lost at work or at school through reducing time spent collecting water, queuing for sanitation facilities or walking to open defecation sites, being ill and caring for sick relatives [22, 23] .

Hygienic Stool Disposal: an opportunity not to be missed

Children's faeces are thought to pose a greater public health risk than those of adults' because they tend to contain higher concentrations of pathogens as their immune system as not yet fully developed; at the same time, parent's perceptions are that infants' stools are harmless and, as a result, infants are often allowed to practise open defecation in the household yard [24]. In addition, latrines are not designed for, or indeed used by, small children [2]. As such, young children are most at risk of getting exposed to the pathogens as they spend most time in the domestic environment, carrying out exploratory behaviours that include putting fingers and objects in their mouths [25, 26].

Therefore, WASH interventions designed to include hygienic child stool disposal have a vital role to play in improving child health and livelihoods globally. They can, for example, contribute to achieving several of the MDGs, particularly those relating to school attendance and reducing child mortality[1].

Nevertheless, hygienic child stool disposal remains a somewhat overlooked facet of WASH, and of sanitation programmes more specifically [24]. Whilst the definitions of what constitutes improved

[1] Environments free from child excreta should contribute to lowering infection rates in mothers and new-born children, thereby advancing MDG 4 which seeks to reduce child mortality. The improved health outcomes for infants and children should in turn assist in increasing school attendance rates as per MDG 2 which seeks to achieve universal primary education.

sanitation for global monitoring are clear – namely the sanitation 'ladder' formulated by the JMP (see Box 1) – those for assessing child stool disposal are less so (see Box 2) and have not been monitored systematically as has been the case for water and sanitation [5].

Box 1 – The 'Sanitation Ladder' [1]

Since 2008, the WHO/UNICEF Joint Monitoring Programme (JMP) for water supply and sanitation has adopted the concept of a 'ladder' in developing a global monitoring framework for the achievement of the water and sanitation MDGs. It has four "rungs":

1. Open defecation
2. Unimproved (facilities that do not ensure hygienic separation of human excreta from human contact).
3. Shared (facilities that are otherwise acceptable but shared between 2 or more households)
4. Improved (facilities that are likely to ensure the hygienic separation of human excreta from human contact)

Box 2 – Definitions of sanitary child stool disposal

The JMP (2006) classified sanitary disposal of children's faeces as:

1. Disposal of faeces in the toilet/latrine
2. The direct use of toilet/latrine by the child
3. Burial of faeces

Burial was the only form of hygienic disposal that did not necessitate a sanitation facility. However, while it provides an alternative for sanitary disposal when no facility is available, burial as a hygienic form of disposal is not without contest as it does not guarantee that child faeces are sufficiently isolated from the human environment. UNICEF for example has not included burial as a safe method of child stool disposal [3]. Discussions have taken place recently concerning whether burial and disposing of child faeces in rubbish should be considered safe or improved. The results of a 2014 Delphi consultation relating to this are soon to be published (personal communication).

Other definitions

During a WHO/UNICEF JMP-led consultation of experts on post-2015 indicators, which SHARE participated in, it was recommended that *"the percentage of children under 5 whose stools are hygienically disposed of"* is measured as a sub-indicator under the 'eliminating open defecation' target [4]. This reflects an increasing international acknowledgment of the salience of monitoring this practice, however no definition of 'hygiene stool disposal' was provided.

A related issue is whether disposal of child stools in any type of latrine, i.e. regardless of its improved, shared or unimproved status, should be considered sanitary. Recent country WSP and UNICEF reports have, for example, differentiated between 'safe child faeces disposal' and 'improved child faeces disposal' to reflect the status of the latrine in which the child stools are disposed [6].

Importantly, all of these definitions deal only with the disposal site of the child's faeces and does not consider the other stages in child faeces management, such as where the child defecates, how the faeces are collected and disposed of, and what hygienic behaviours the caregiver engages in afterwards.

Existing Evidence

Health Impacts of Child Stool Disposal Practice

The only available epidemiological evidence on the health impacts of child stool disposal is a systematic review and meta-analysis from 2004 which found a 23% increased risk of diarrhoea in children when unhygienic child stool disposal was practised and that behaviours considered safe were borderline protective [27]. A protocol for a systematic review to investigate interventions to improve child faeces disposal to prevent diarrhoea and STH infections has been published [28] and results from this systematic review are expected in 2015.

Psychological and Environmental Factors

While little is known about child stool disposal behaviour, we do know that hygiene behaviour has a number of determinants, including habit, motivation and pre-planning [29]. There is also evidence to suggest that these determinants are themselves influenced by complex networks of psychological and environmental factors. These include for example: perceptions of dirtiness, the desire to conform to societal norms, the type and availability of latrines, the presence of nearby hill or rubbish areas, the availability and affordability of resources such as nappies, wrappers or potties, and the availability of time resources for supervision, disposal and toilet etiquette training [30, 31] . It is perhaps unsurprising then that in resource poor settings, open defecation is often the most practical method as it creates less laundry work for the caregiver and less water utilisation for the household [27, 31].

Evidence Gaps

While the limited evidence clearly suggests that child stool disposal is an important area of WASH and child health, wide evidence gaps remain. The evidence that we do have comes from just 10 epidemiological studies [27] which mostly explore the effect of general latrine ownership on child health outcomes and only consider safe child stool disposal as a secondary outcome.

Plugging the Gap: New evidence on child stool disposal

This policy brief features new evidence from research conducted by the author – Victoria Sykes – on the determinants of child stool disposal[2]. It uses data from five developing countries to ascertain what proportion of caregivers practice sanitary child stool disposal in those five countries, and under what circumstances. In so doing, it offers valuable insights into factors that influence child stool disposal.

Methodology

The research drew on nationally representative household survey data from the USAID Demographic and Health Surveys (DHS) [32] and the UNICEF Multiple Indicator Cluster Surveys (MICS) [33], conducted in partnership with national statistics departments between 2004 and 2011.

Multi-country analysis: Data on nearly 250,000 children under the age of three from 38 countries in sub-Saharan Africa and South Asia [34] were analysed. Specifically, data on how caregivers disposed of their child's last stool were used to estimate the prevalence of sanitary child stool disposal (defined here as child uses toilet, stools thrown/rinsed into toilet/latrine or stools buried) across the two regions.

Five-country analysis: Data on 46,209 children under the age of three in five low-income countries

[2] This work, *Predictive Factors for Unsafe Disposal of Children's Stools*, is due to be published in 2015.

(Bangladesh, Burkina Faso Malawi, Mozambique and Nepal) were used to conduct an investigation of possible relationships between sanitary child stool disposal and possible determinants that had previously been found to be associated with or plausibly associated with child stool disposal (type of sanitation facility, area of residence (urban/rural) and child age). The main selection criterion for the countries was availability of a recent survey dataset. Then countries with the highest and lowest prevalence of safe child stool disposal practices, Malawi and Nepal respectively, were selected along with three countries that ranked somewhere in between: Burkina Faso, Bangladesh and Mozambique (see Table 1).

Table 1: Proportion of children whose stools are disposed of safely by country

Country	Year of survey	Children aged 0-2 years old	Proportion of children whose stools are disposed of safely*
Bangladesh	2006	18228	22.4%
Burkina Faso	2006	3450	19.8%
Malawi	2006	15270	81.8%
Mozambique	2008	7233	61.3%
Nepal	2010	2028	17.7%

Data from MICS conducted between 2004 and 2011 [32, 33]

* Safe disposal – percent distribution of caregivers whose youngest child under three years is living with them and either uses toilet, throws stools into toilet or buried stools [35].

Results: Multi-country findings

Key finding:

48 percent of caregivers in sub-Saharan Africa and South Asia dispose of their children's faeces in an unhygienic manner.

Results from the study show that:

- 48% (113,762) of the households surveyed across the two regions practise unsanitary child stool disposal; this is 45% of households in sub-Saharan Africa and 76% of households in South Asia (see Figures 1 and 2)
- 39% of caregivers dispose of child stools directly into toilets/latrines (see Figure 3)
- Direct use of a toilet/latrine by children for defecating is low at only 8%, as buying stools at only 5% (see Figure 3).

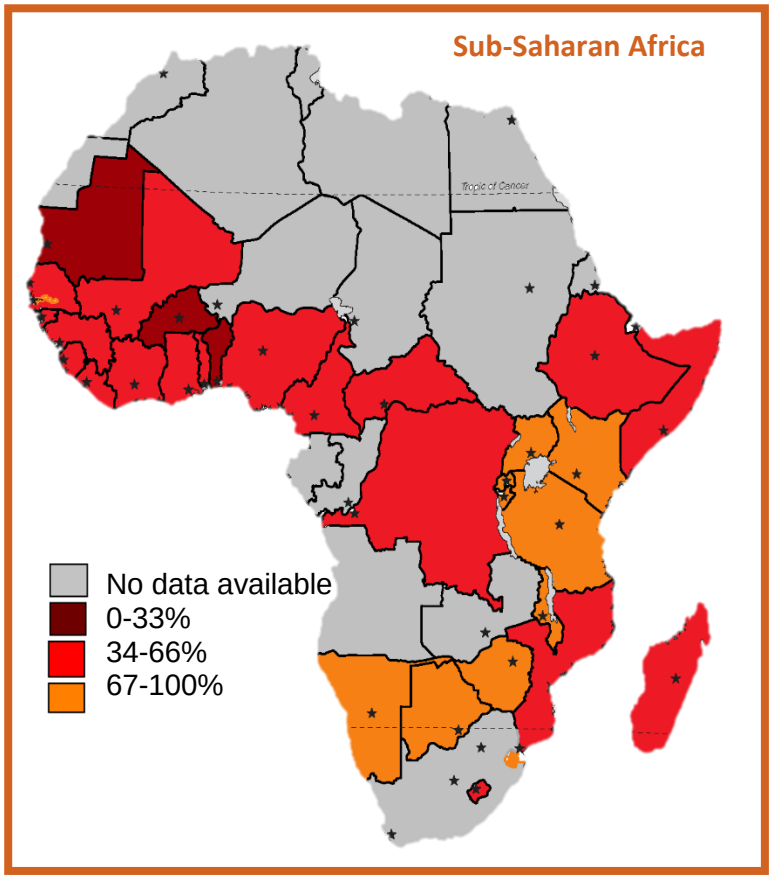


Figure 1: Percentage of sanitary stool disposal in children under the age of three in sub-Saharan Africa

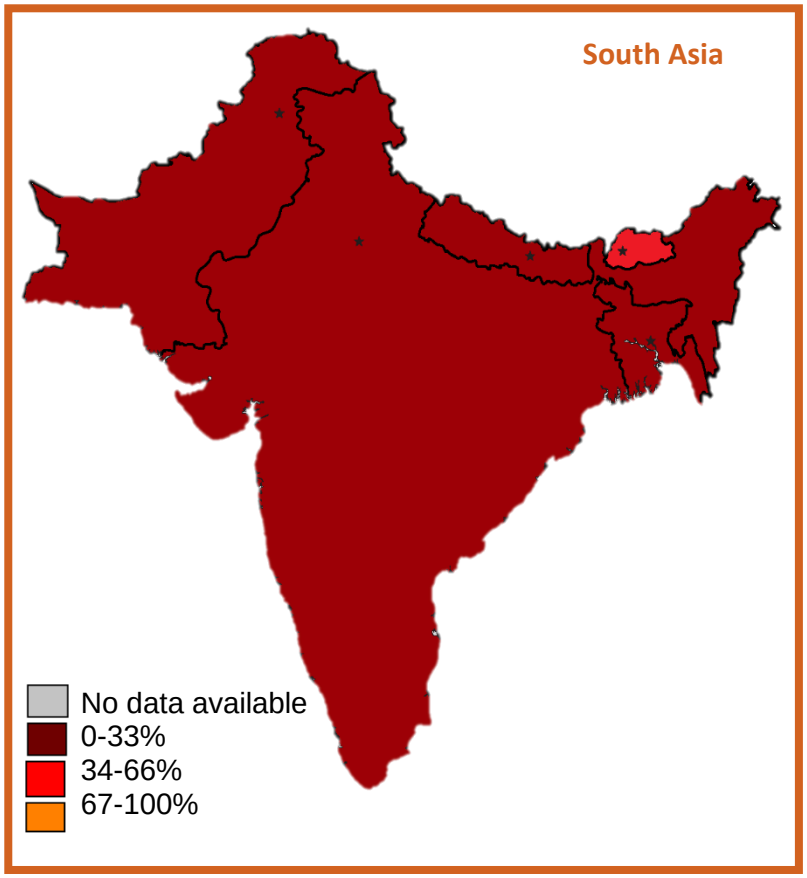
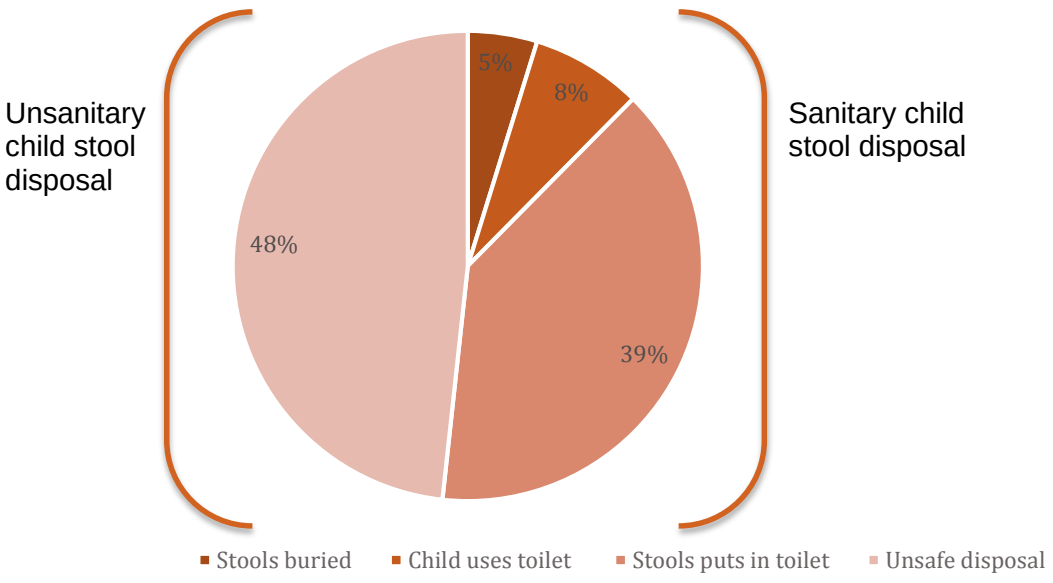


Figure 2: Percentage of sanitary stool disposal in children under the age of three in South Asia

Data Source: DHS & MICS conducted between 2004 and 2011 [32, 33]

Figure 3: Proportion of caregivers practising sanitary and unsanitary stool disposal in sub-Saharan Africa and South Asia combined.



Results and Discussion: Five-country analysis

Key findings:

Improved sanitation facilitates sanitary child stool disposal. In all five countries, sanitary child stool disposal significantly improves in line with the JMP sanitation ladder categories; best disposal practices take place in households using an improved sanitation facility.

Private facilities offered from not sharing a sanitation facility with other households (improved or unimproved) is crucial. Sanitary child stool disposal is more likely to occur in households with access to a private sanitation facility compared to households that share facilities.

Rural/urban disparities exist. Hygienic child stool disposal practice is disproportionately more likely to take place in urban areas compared to rural areas; this is in line with patterns of sanitation coverage seen throughout the regions.

Child age is a key influence on child stool disposal practice. Infants' (those under the age of 1 year) stools are more likely to be left to contaminate domestic environments compared to those of toddlers (those aged 2-3 years).

Sanitation

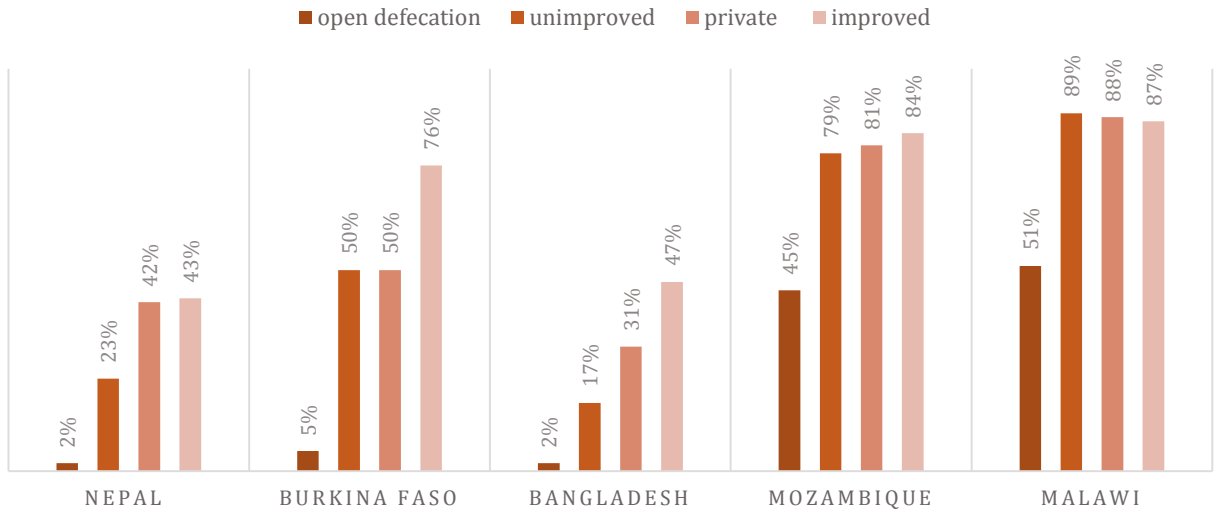
As illustrated by Figure 4, in the countries surveyed sanitary child stool disposal improved as households climbed up the sanitation ladder. Households reporting to use an improved facility[3] were

[3] For the purposes of this brief, the definition 'improved facility' includes facilities that are improved but shared.

much more likely to practise hygienic disposal compared to households that practised open defecation. Likewise, even the more basic forms of unimproved sanitation, such as pit latrines without slabs or hanging latrines, encouraged higher levels of hygienic stool disposal than was present amongst those who practised open defecation.

An interesting paradox was noted in Mozambique and Malawi, where those who practise open defecation had 40 and 46% higher sanitary child stool disposal than those practising open defecation in the other countries surveyed. We posit that this paradox may be explained by the widespread practice of stool burial in Mozambique and Malawi (29.4% and 3.5% of respondents respectively reported burying their child's stool) [36, 37].

Figure 4: Percent of sanitary child stool disposal by JMP sanitation ladder categories



After improved sanitation facilities, a private facility (whether improved or unimproved) is the second most influential factor for safe child stool disposal in all countries with the exception of Malawi (see Figure 4).

Overall, the findings present a strong case for policy makers and practitioners to continue to concentrate efforts on increasing the number of individuals using improved sanitation facilities worldwide. The data suggest that this may in turn provide the additional benefit of increasing hygienic child stool disposal, resulting in a likely reduction in childhood diarrhoeal disease.

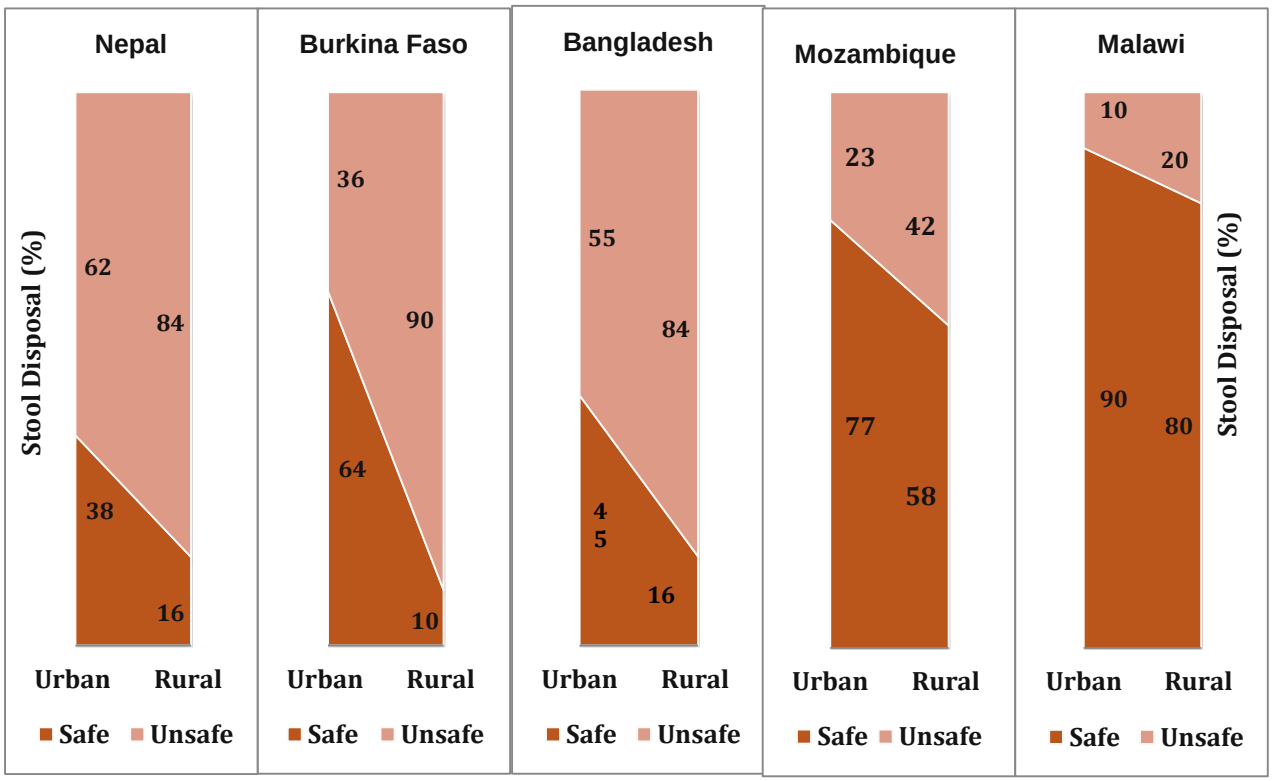
Rural/urban disparities

Results show stark disparities between child stool disposal practices in urban and rural settings in the countries surveyed. Without exception, unsanitary disposal is more prevalent in rural areas (see Figure 5). This is in line with the disparity in sanitation coverage between rural and urban areas, where rural areas are comparatively underserved [5].

The disparities between sanitary stool disposal in urban and rural settings could be further explained by disparities between wealth asset quintiles between urban and rural populations as well as the higher population density and more limited courtyard space present in urban areas. Children's comparatively reduced ability to roam may increase the risk of them defecating in sensitive areas such as cooking or laundry sites, which may in turn encourage greater practice of sanitary stool disposal by caregivers. The desire to conform to specific social norms/expectations

relating to hygiene behaviour may also, in part, explain these urban-rural disparities as studies from Peru and Burkina Faso demonstrate [30, 31] .

Figure 5: Percent of sanitary child stool disposal in urban and rural areas



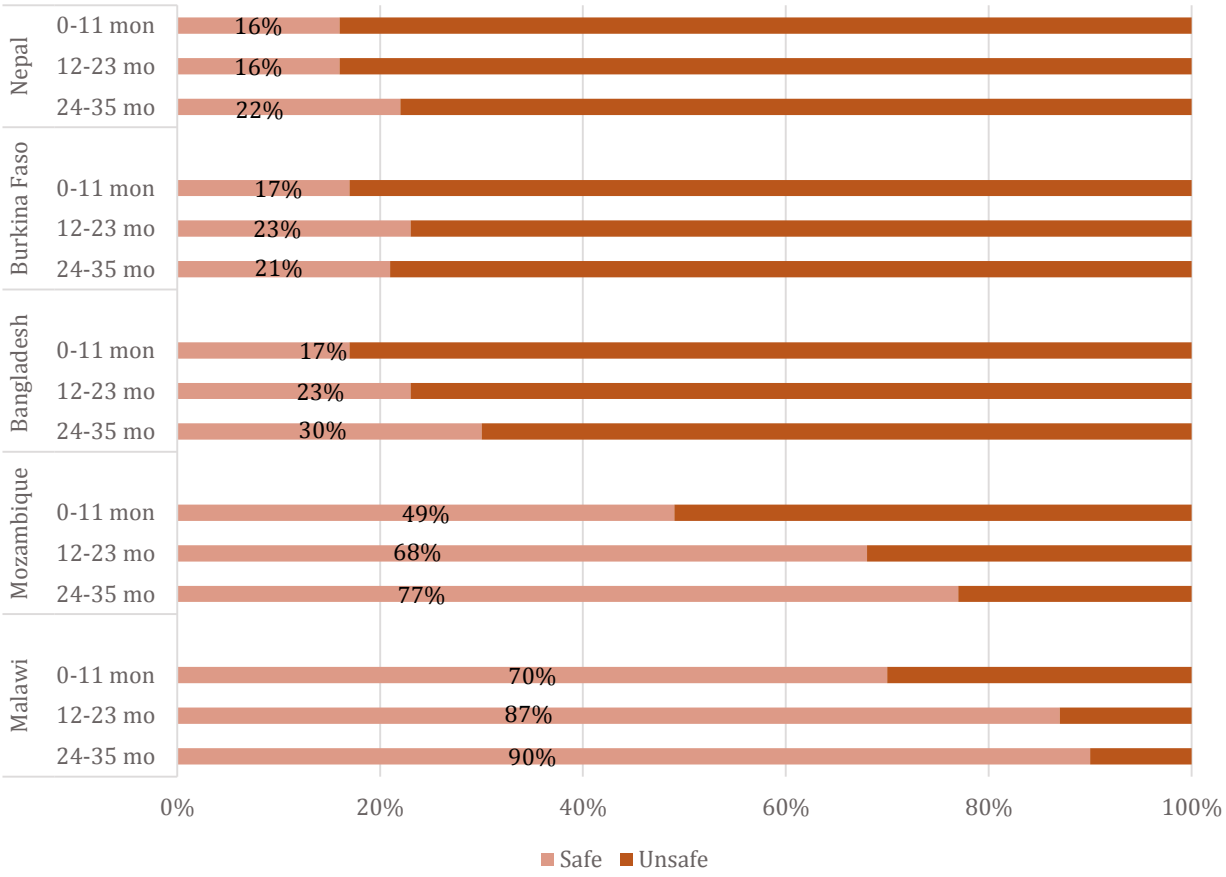
Thus, the results suggest that while access to a toilet facility is in most cases very important for hygienic disposal, environmental factors – e.g. space and norms – are also salient. Policymakers should, therefore, ensure that hygiene and sanitation promotion programmes are appropriately tailored to rural/urban settings and further tailored to specific communities.

Child Age

The increasing age of a child is a constant indicator of sanitary child stool disposal in all of the countries surveyed[4] (see Figure 6). This trend is likely associated with maternal perceptions that infants' stools are less harmful due to them being less likely to contain food residuals and to smell particularly malodorous [27]. Thus many caregivers are less diligent about the disposal of younger children's stools and allow their infants to practise open defecation in the household environment. The observed trend could also be due to increased use of latrines by children as they grow and are able to use them and their caregivers are not scared of their children using the latrine [27].

[4] There is one exception to this observation; a slight decrease in sanitary child stool disposal was recorded in Burkina Faso between the 12-23 months and 24-35 months categories.

Figure 6: Child age and percentage of reported sanitary child stool disposal



Conclusion

The results of the study highlight some disparities in child stool disposal practices. The prevalence of safe child faeces disposal is higher in households that have improved sanitation facilities, facilities that are private, in urban areas and with older children. More specifically, the results of this analysis suggest that:

- Nearly half of all households in Africa and South Asia dispose of children's faeces in a unsanitary manner
- Households with sanitation facilities have higher levels of hygienic child stool disposal resulting in less contamination and less opportunity for infection
- Sanitation has a wider impact on hygienic child stool disposal if the facility is private
- In line with existing rural/urban sanitation disparities, sanitary child stool disposal is more likely to occur in urban populations
- The stools of babies' under the age of 12 months are less likely to be hygienically removed than those of toddlers and therefore more likely to contaminate the household environment.

These results are largely in accordance with new data on 26 countries published by UNICEF/ WSP [38] as well as data under preparation [39].

The use of the MICS/ DHS data to show global trends in child stool disposal is useful for monitoring progress on sanitation and child faeces disposal. However, as with other surveys relying on self-reported behaviour, it is susceptible to courtesy and recall bias [40, 41]. Nonetheless, self-reports are still considered the most efficient way to quantify child faeces disposal practices [42]. Further limitations of the current survey design and monitoring include:

1. Limitations of existing classifications of child stool disposal practice; there is no clear distinction between where a child defecates and the final destination of their stool;

2. Over dependence on traditional classifications of urban and rural categories without reference to more nuanced typologies of settlements such as peri-urban landscapes.

This research has shown that access to sanitation is key to improving child faeces disposal. It has also highlighted that securing sustained sanitary child stool disposal will require a combination of both improved sanitation facilities and hygiene behaviour change promotion. Establishing child stool disposal as a priority area for sanitation and hygiene is likely to require changes in the way current hygiene interventions are designed, delivered and monitored.

Recommendations

1. Further research is required to better understand the determinants of child stool disposal practices and to inform the design and implementation of interventions.

If the potential of sanitary child stool disposal is to be realised, additional research into the determinants of child stool disposal practices and piloting of behaviour change interventions are needed. Interventions may, for example, need to include hardware to facilitate the use of existing sanitation by children under the age of 5 or to improve child faeces disposal such as latrine training mats or potties [43, 44].

2. Further research is required to define what constitutes safe disposal of child faeces

Microbiological and epidemiological studies to understand the actual risks associated with child defecation and disposal practices would help determine what child faeces disposal practices should be considered safe.

3. Governments, donors and practitioners must increase their financing for improving sanitation at the household level.

The existence of a sanitation facility at the household level positively affects the child stool disposal practices of caregivers. Investments in hardware must go hand-in-hand with investments in behaviour change programmes to ensure uptake of these facilities and safer disposal practices.

4. Interventions seeking to improve child stool disposal practices must be appropriately targeted and tailored.

Sanitary child stool disposal is more likely to occur in urban settings, leaving rural communities at greater risk of poor WASH-related diseases. Intervention design and targeting should reflect and address these disparities. Furthermore, as the stools of infants under the age of 12 months are less likely to be hygienically removed than those of toddlers, interventions should also be tailored to the specific beliefs and hardware needs of caregivers to this age-group.

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Research for sanitation and hygiene solutions

The world is seriously off-track in meeting the Millennium Development Goal on sanitation and 2.6 billion people are still without a safe toilet.

SHARE aims to address these challenges by accelerating progress on sanitation and hygiene in developing countries by generating rigorous and relevant research and ensuring new and existing solutions are adopted at scale.

The consortium conducts research across four pillars:

- Health
- Equity
- Urban
- Markets

SHARE's activities primarily take place in its focus countries:

- Bangladesh
- India
- Malawi
- Tanzania

The DFID-funded SHARE consortium is led by the London School of Hygiene and Tropical Medicine. Its other partners are the International Centre for Diarrhoeal Disease Research, Bangladesh, International Institute for Environment and Development, Shack/Slum Dwellers International and WaterAid.

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