

# Unsafe Disposal of Child Faeces: A Community-based Study in a Rural Block in West Bengal, India

Preeti PS, Sanjaya Kumar Sahoo, Dhiraj Biswas, Aparajita Dasgupta

Department of Preventive and Social Medicine, All India Institute of Hygiene and Public Health, West Bengal, India

**Objectives:** A clean India is the responsibility of all Indians. One of the objectives of the Swachh Bharat Abhiyan (Clean India Initiative) is to bring about behavioural changes regarding healthy sanitation practices. While large-scale programs in India have increased latrine coverage, they have to some extent failed to bring behavioural changes ensuring optimal latrine use, including the safe disposal of child faeces, which is a significant source of exposure to faecal pathogens. Hence, this study was done to explore child faeces disposal practices in rural West Bengal and to elicit the determinants of unhygienic faeces disposal.

**Methods:** Data collection was done using an interview method among the mothers of 502 under-5 children, following a pre-designed, semi-structured schedule during house-to-house visits in a set of villages in the Hooghly district of West Bengal.

**Results:** The prevalence of unsafe disposal of child faeces was 72.4%, and maternal education, per capita income, and water source were found to be significantly associated with unsafe child faeces disposal.

**Conclusions:** This study draws attention to the unsafe disposal of child faeces in this area of India and raises questions about the efficiency of sanitation campaigns in rural India that focus on expanding coverage rather than emphasizing behavioural changes, which are crucial to ensure the safe disposal of child faeces. Thus, it is urgently necessary to strengthen efforts focusing on behavioural changes regarding the safe disposal of child faeces in order to minimise adverse health outcomes.

**Key words:** Child, Sanitation, Prevalence, Rural health

## INTRODUCTION

One of the targets included in the 2015 Sustainable Development Goals is “By 2025, no one practices open defecation”

Received: February 20, 2016 Accepted: September 8, 2016

**Corresponding author:** Preeti PS, MD  
110 Chittaranjan Avenue, Kolkata-700073, West Bengal, India

Tel/Fax: +91-9051185752

E-mail: [drpreeti186@gmail.com](mailto:drpreeti186@gmail.com)

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

[1]. As defined by the Joint Monitoring Programme (JMP), an improved sanitation facility is one that hygienically removes human excreta from human contact [2]. The latest JMP report stated that 64% of the global population had access to improved sanitation in 2012 [2], which means that 2.5 billion individuals still lacked improved sanitation; of these, one billion practiced open defecation [2].

In India, improved sanitation is a huge challenge, as 50% of the population still practices open defecation and only 35% of the population uses improved sanitation [2]. This gap has led to large-scale interventions to increase sanitation coverage, the latest of which is the Swachh Bharat Abhiyan (Clean India Initiative), the brainchild of the Prime Minister of India [3]. One

of its objectives is to bring about behavioural changes regarding healthy sanitation practices [3]. While large-scale programs in India have increased latrine coverage, they have to some extent failed to bring changes in behaviour ensuring optimal latrine use.

Although the impacts of poor sanitation and hygiene are often measured by their effects on children, most sanitation and hygiene interventions target adults. The effective disposal of child faeces is an essential indicator for an open defecation-free certification under the Swachh Bharat Abhiyan [4]. The unsafe disposal of child faeces is a common practice in India, and is a significant source of exposure to faecal pathogens. In fact, the unsanitary disposal of child faeces may have substantial impacts on the health of children, including a higher prevalence of diarrheal disease [5]. In a questionnaire administered by the National Family Health Survey (NFHS), West Bengal was found to have low percentage of safe child stool disposal, with only 18% of stools being disposed of safely [6]. According to the World Health Organization, most diarrheal deaths in the world (88%) are caused by unsafe water, sanitation, or hygiene. More than 99% of these deaths are in developing countries, and approximately eight of every 10 deaths are children [7].

In many low-income settings, diapers, clothes, and potties are rarely available or rarely used, making the hygienic collection of young children's faeces difficult; if collected, such faeces are often disposed of in a manner that does not prevent further exposure of household members or the contamination of water sources. Even in households that have access to latrines, children's faeces are often not collected or disposed of safely in latrines.

Very few studies are available addressing this issue globally, and even fewer studies have addressed India, where the unsafe disposal of child faeces is a common sanitation problem that contributes to adverse health outcomes. Most studies have only focused on the problems of open defecation and other issues related to sanitation

Hence, this study was performed with the objective of exploring child faeces disposal practices in rural West Bengal and to elicit the determinants of such practices.

## METHODS

The study was cross-sectional, community-based, and was conducted in a rural block of West Bengal over a period of two months, from December 2014 to January 2015.

The necessary sample size was calculated based on an estimated prevalence of unsafe child faeces disposal in India of 79% (NFHS-3) [8]. Based on this prevalence figure, the necessary sample size was calculated to be 509, but only 502 subjects were included in the study, as households were excluded if no adult member of the family was present at the time of the interview. Household visits and face-to-face interviews with adult family members were performed.

In order to collect the necessary information, a predesigned structured questionnaire was prepared by the researchers after a meticulous literature review and consultation with experts in this field; the questionnaire was again rechecked by the experts in order to ascertain its reliability and to remove any ambiguity. The face validity of each item and the content validity of each domain of the questionnaire was also determined [9]. The questionnaire was expected to reveal the necessary information according to its stated objectives. The questionnaire was drawn up in English, translated into Bengali, keeping semantic equivalence, and back-translated into English by two language experts to check the translation. The questionnaire was pre-tested and modified accordingly, and was again translated into Bengali and back-translated into English by the language experts. The survey items included assessments of demographic, socioeconomic, and household characteristics.

A 2-stage random sampling procedure was followed to select the study participants. In the first stage, two gram panchayats were selected randomly from a sample of six gram panchayats (each gram panchayat consists of 8 to 9 villages). In the second stage, three villages were randomly selected from each gram panchayat. The required sample was randomly selected from six villages using the proportionate probability sampling technique. Line listing of all under-5 children was done, and 509 children were selected by simple random sampling. A total of 502 children were ultimately enrolled in this study.

## Statistical Analysis

Statistical analysis was carried out using SPSS version 20.0 (IBM Corp., Armonk, NY, USA). Standard descriptive analysis was carried out, followed by bivariate analysis and multivariate analysis using binomial logistic regression, adjusting for covariates considered to influence the outcome. Unsafe disposal of child faeces was defined as the disposal of faeces in any site other than a sanitary latrine.

**Table 1.** Socioeconomic, demographic, and household characteristics of the study participants (n=502)

Characteristics	n (%)
Children	
Pre-ambulatory	184 (36.6)
Ambulatory	318 (63.3)
Age of mother (y)	
18-23	157 (31.3)
24-29	224 (44.6)
30-35	121 (24.1)
Age of father (y)	
20-29	130 (25.9)
30-39	177 (35.3)
40-49	195 (38.8)
Level of education of the mother	
Illiterate	62 (12.4)
Primary school	95 (18.9)
Middle school	140 (27.8)
Secondary school	87 (17.4)
Higher secondary school	70 (13.9)
Graduated secondary school or above	48 (9.6)
Level of education of father	
Illiterate	2 (0.4)
Primary school	49 (9.7)
Middle school	159 (31.7)
Secondary school	154 (30.7)
Higher secondary school	86 (17.1)
Graduated secondary school or above	52 (10.4)
Per capita income (Rs, modified BG Prasad scale 2014)	
2786-5570 (41.4-82.9 USD)	166 (33.1)
1671-2785 (24.8- 41.4 USD)	170 (33.9)
836-1670 (12.4-24.8 USD)	112 (22.3)
< 836 (12.4 USD)	54 (10.8)
Sanitary latrine	
Present	379 (75.5)
Absent	123 (24.5)
Source of water	
On the premises of the residence	223 (44.4)
Outside the premises of the residence	279 (55.5)

Rs, Indian rupee.

## RESULTS

Of the 502 children who were enrolled in the study, 36.6% were pre-ambulatory and 63.3% were ambulatory. Of their mothers, 12.4% were illiterate, while 27.8% had completed middle school, and 33.9% belonged to class III in terms of their socioeconomic status (BG Prasad scale 2014) (Table 1).

**Table 2.** Distribution of defecation and disposal sites

	Pre-ambulatory (n=184)	Ambulatory (n=318)
Defecation site		
Potty	50 (27.2)	41 (12.9)
Nappy	33 (17.9)	12 (3.8)
Ground (in compound)	69 (37.5)	132 (41.5)
Ground (in household)	32 (17.4)	85 (26.7)
Latrine (ambulatory children)	-	48 (15.1)
Disposal site		
Latrine	50 (27.1)	82 (25.8)
Garbage	85 (46.1)	151 (47.5)
Field	27 (14.7)	71 (22.3)
Pond	18 (9.9)	14 (4.4)
Washed (pre-ambulatory children)	4 (2.2)	-

Values are presented as number (%).

We found the prevalence of unsafe disposal of child faeces to be 72.4%. The defecation and disposal sites reported for the last time the children defecated are listed in Table 2. Most children were reported to defecate on the ground, either inside the home (17.4%) or compound (37.5%) for pre-ambulatory children, or inside the compound for ambulatory children (41.5%). Only 15.1% of ambulatory children defecated in a latrine.

The faeces of most children were ultimately disposed of in the household's solid waste disposal site, typically located outside the house at the rear of the compound, both for pre-ambulatory (46.1%) and ambulatory (47.5%) children. Overall, the faeces of only 27.5% of children were reported to have been safely disposed of, which was defined as either directly defecating in a latrine or faeces being transferred into a latrine. Safe disposal of child faeces only occurred in households that owned latrines (n = 449). However, latrine ownership was no guarantee of safe disposal of child faeces; the faeces of only 27.6% of children from the 89.4% of households with latrines were reported to be safely disposed of.

In the regression analysis, the mother's education (odds ratio [OR], 3.8; 95% confidence interval [CI], 2.5 to 5.8), per capita income (OR, 5.6; 95% CI, 3.4 to 9.0), and water source (OR, 6.2; 95% CI, 4.0 to 9.8) were found to be significantly associated with unsafe child faeces disposal (Table 3).

## DISCUSSION

This study reported the defecation and disposal practices of 502 children under five years of age in rural West Bengal, to-

**Table 3.** Bivariate analysis assessing the associations of socio-economic, demographic, and household characteristics with the unsafe disposal of child faeces<sup>1</sup>

Variables	n (%)	OR (95% CI)	Adjusted OR (95% CI) <sup>2</sup>
Children			
Pre-ambulatory	184 (36.6)	2.2 (0.8, 2.9)	1.6 (0.5, 2.2)
Ambulatory	318 (63.3)	1.0 (reference)	1.0 (reference)
Education of mother			
Middle school and below	297 (59.1)	3.8 (2.5, 5.8)	1.4 (1.1, 2.9)
Above middle school	205 (40.8)	1.0 (reference)	1.0 (reference)
Education of father			
Middle school and below	209 (41.6)	1.5 (1.0, 2.3)	1.3 (0.8, 1.7)
Above middle school	293 (58.3)	1.0 (reference)	1.0 (reference)
Per capita income (Rs, modified BG Prasad scale 2014)			
≤1600 (≤23.9 USD)	270 (53.7)	5.6 (3.4, 9.0)	4.7 (2.9, 7.6)
>1600 (>23.9 USD)	232 (46.2)	1.0 (reference)	1.0 (reference)
Latrine			
Absent	53 (10.5)	1.7 (0.8, 3.5)	0.6 (0.4, 1.7)
Present	449 (89.4)	1.0 (reference)	1.0 (reference)
Source of water			
Outside the premises	279 (55.5)	6.2 (4.0, 9.8)	5.6 (2.9, 8.3)
Inside the premises	223 (44.4)	1.0 (reference)	1.0 (reference)

OR, odds ratio; CI, confidence interval; Rs, Indian rupee.

<sup>1</sup>Unsafe disposal of child faeces was defined as disposal of faeces in any site other than a sanitary latrine.

<sup>2</sup>Adjusted model included all variables in the tables as covariates.

gether with the factors associated with these practices. We found that most child faeces were disposed of unsafely, even in households with latrines.

The prevalence of safe child faeces disposal found in this study is reasonably similar to the prevalence reported in the latest NFHS-3 (2005-2006), which reported that throughout India, 79.0% percent of child faeces were disposed of unsafely [8]. Additionally, in the NFHS-3 survey, West Bengal was found to have a low percentage of safe child stool disposal, with only 18% of stools being disposed of safely [8]. Another such study done in rural Orissa, India reported a very high prevalence (81.4%) of unsafe child faeces disposal [10]. The unsafe disposal of child faeces in latrines was found to be common in studies reporting on practices in Madagascar, Nepal, and Ethiopia [11-13].

However, the prevalence of safe child faeces disposal was found to be 67% in Zambia [14], 70% in Kenya [15], 75% in Uganda [16], and 79% in Malawi [17] which are higher values

than those obtained in this study. A study conducted in 24 countries revealed that over 50% of households in 14 of the 24 countries did not dispose the faeces of the child into any kind of toilet or latrine; that is, the faeces were unsafely disposed of [18].

Our study revealed that most child faeces ended up in the household waste disposal site. The waste materials therefore accumulate for many days, and when little space is left, they are burnt, giving off thick black fumes and resulting in air pollution. Additionally, the proximity of the site to the households may increase the risk in comparison to open defecation sites, which are typically more distant. The findings of our study corroborate those of the NFHS-3 (2005-2006) survey in West Bengal where the main disposal methods were found to be leaving the faeces in an open field (14.7%) and disposing of them in the garbage (32.1%) for pre-ambulatory children, whereas among ambulatory children, 16.9% had faeces disposed of in open fields and 37.7% in the garbage [8].

Another study reported that 42% of children's stools were left in the open or not disposed of, while 14.08% were thrown into the garbage, and only a very small proportion (1.11%) were buried [13]. A study conducted in rural Orissa, India similarly reported that the faeces of most children were ultimately disposed of in the household's solid waste disposal site [10].

In a multivariate regression model after adjusting for other variables, the current study showed an inverse association of the unsafe disposal of child faeces with access to water within the compound, which is similar to findings reported from Burkina Faso [19]. In that study, it was hypothesized that such an association could be due to mothers in households with improved water sources wanting to conform to better standards of hygienic behaviour or having more time to carry out safer behaviours [19]. A possible explanation for this would be that accessibility of water within the premises of the household makes safe waste disposal more convenient for the mothers, who generally have to carry the water from the water source to the toilets. A study revealed that a piped water supply and improved latrines had a significant association with safe child faeces disposal practices [20]. The findings of our study contradict those of another study showing that the availability of an improved water supply was not significantly associated with safe child faeces disposal [13].

The mother's education was found to be inversely associated with unsafe child faeces disposal, in agreement with the findings of the NFHS-3 (2005-2006), in which it was reported that stools were disposed of safely for 61% of the children of moth-

ers with 12 or more years of education, compared with only 9% of the children of mothers with no education [8]. A study in Ethiopia similarly reported that the odds of practicing safe disposal of child faeces increased with the level of mothers' education; for mothers who had not obtained any formal education, the prevalence of safe child faeces disposal was 28.34%, whereas it was 78.14% among mothers who had obtained higher education [13]. A Kenyan study also showed that higher levels of maternal education were associated with greater levels of safety in the disposal of children's stools [15]. This association can be satisfactorily explained by the fact that educated mothers are clearly aware of the deleterious effects of unsafe faeces disposal and therefore practice safe disposal [21].

According to the NFHS-3 report [8], stools were safely disposed of for 65% of children living in households with higher socioeconomic status, compared with only 4% of children living in lower socioeconomic status households; our study likewise found an association between the unsafe disposal of child faeces and low socioeconomic status of the family. Similarly, an Ethiopian study found that households from higher wealth quintiles were more likely to practice safe disposal of child faeces than households from the poorest wealth quintile [13]. More affluent households were more likely to have improved sanitation and a better standard of living that might motivate them to dispose of child faeces safely [22].

In this study, even among households with improved toilets or latrines, unsafe child faeces disposal behaviour was reported. This finding is consistent with other studies that have similarly reported unsafe faeces disposal among households with latrines [12,14,15,17]. This clearly indicates that the focus of interventions must shift from coverage to behavioural changes. However, a study in Ethiopia and South Africa found that households with an improved latrine had a higher likelihood of practicing safe disposal of child faeces [13,22].

This study has some limitations. First, it has all the disadvantages of any cross-sectional study; namely, the temporal relationship between the outcome and independent variables could not be established. Mothers' knowledge of the consequences of unsafe disposal of child faeces was not evaluated in this study. Moreover, the study may be susceptible to courtesy and recall bias, as the data dealt with reported practices rather than direct observation [23,24].

In conclusion, the practice of unsafe child faeces disposal was found to be common. This study draws attention to the unsafe disposal of child faeces in this area of India and raises

questions about the efficiency of sanitation campaigns in rural India that focus on expanding coverage rather than emphasizing behavioural changes, which are crucial in ensuring the safe disposal of child faeces. Thus, it is urgently necessary to strengthen efforts focusing on behavioural changes regarding the safe disposal of child faeces in order to minimise adverse health outcomes. Nevertheless, it is vital to explore possible ways of incorporating child sanitation into existing interventions that target the caregivers of young children and to conduct basic research to understand the behavioural drivers and hurdles in safe child faeces disposal.

## CONFLICT OF INTEREST

The authors have no conflicts of interest associated with the material presented in this paper.

## ORCID

Preeti PS <http://orcid.org/0000-0003-0393-3626>

## REFERENCES

1. United Nations. Sustainable development knowledge platform: goal 6; 2015 [cited 2016 Sep 26]. Available from: <https://sustainabledevelopment.un.org/sdg6>.
2. World Health Organization. Progress on and drinking water and sanitation; 2014 [cited 2016 Sep 15]. Available from: [http://apps.who.int/iris/bitstream/10665/112727/1/9789241507240\\_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/112727/1/9789241507240_eng.pdf?ua=1).
3. Ministry of Urban Development (India). Guidelines for Swachh Bharat Mission (Gramin); 2014 [cited 2016 Sep 26]. Available from: <http://phed.bih.nic.in/Docs/Guidelines-Swachh-Bharat-Abhyan.pdf>.
4. Government of India Ministry of Urban Development. Draft guidelines for Swachh Bharat Mission (SBM); 2014 [cited 2016 Sep 26]. Available from: <http://nswaienvi.nic.in/PDF/Guidelines%20for%20Swaccha%20Bharat%20Mission.pdf>.
5. Fischer Walker CL, Perin J, Aryee MJ, Boschi-Pinto C, Black RE. Diarrhea incidence in low- and middle-income countries in 1990 and 2010: a systematic review. *BMC Public Health* 2012; 12:220.
6. United Nations Children's Fund. Child feces disposal in India; 2015 [cited 2016 Sep 9]. Available from: <https://www.wsp.org/sites/wsp.org/files/publications/WSP-India-CFD-Profile.pdf>.



7. World Health Organization. Global health risks: mortality and burden of disease attributable to selected major risks; 2009 [cited 2016 Sep 9]. Available from: [http://www.who.int/healthinfo/global\\_burden\\_disease/GlobalHealthRisks\\_report\\_full.pdf](http://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf).
8. International Institute for Population Sciences. National family health survey (NFHS-3), 2005-06: India; 2007 [cited 2016 Sep 9]. Available from: <http://dhsprogram.com/pubs/pdf/FRIND3/FRIND3-Vol1andVol2.pdf>.
9. Fitzner K. Reliability and validity: a quick review. *Diabetes Educ* 2007;33(5):775-780.
10. Majorin F, Freeman MC, Barnard S, Routray P, Boisson S, Clasen T. Child feces disposal practices in rural Orissa: a cross sectional study. *PLoS One* 2014;9(2):e89551.
11. United Nations Children's Fund. Child feces disposal in Madagascar; 2014 [cited 2016 Sep 9]. Available from: <http://www.wsp.org/sites/wsp.org/files/publications/WSP-Madagascar-CFD-Profile.pdf>.
12. United Nations Children's Fund. Child feces disposal in Nepal; 2015 [cited 2016 Sep 9]. Available from: <http://www.wsp.org/sites/wsp.org/files/publications/WSP-Nepal-CFD-Profile.pdf>.
13. Azage M, Haile D. Factors associated with safe child feces disposal practices in Ethiopia: evidence from demographic and health survey. *Arch Public Health* 2015;73:40.
14. United Nations Children's Fund. Child feces disposal in Zambia; 2014 [cited 2016 Sep 9]. Available from: <http://www.wsp.org/sites/wsp.org/files/publications/WSP-Zambia-CFD-Profile.pdf>.
15. United Nations Children's Fund. Child feces disposal in Kenya; 2014 [cited 2016 Sep 9]. Available from: <http://wsp.org/sites/wsp.org/files/publications/WSP-Kenya-CFD-Profile.pdf>.
16. United Nations Children's Fund. Child feces disposal in Uganda; 2014 [cited 2016 Sep 9]. Available from: <http://www.wsp.org/sites/wsp.org/files/publications/WSP-Uganda-CFD-Profile.pdf>.
17. United Nations Children's Fund. Child feces disposal in Malawi; 2014 [cited 2016 Sep 9]. Available from: <https://www.wsp.org/sites/wsp.org/files/publications/WSP-Malawi-CFD-Profile.pdf>.
18. Loughnan L, Rand E, Reese H, Maule L, Dooley T. Child feces disposal practices in 24 countries [cited 2016 Sep 9]. Available from: <http://whconference.unc.edu/files/2014/10/rand.pdf>.
19. Traoré E, Cousens S, Curtis V, Mertens T, Tall F, Traoré A, et al. Child defecation behaviour, stool disposal practices, and childhood diarrhoea in Burkina Faso: results from a case-control study. *J Epidemiol Community Health* 1994;48(3):270-275.
20. Curtis V, Schmidt W, Luby S, Florez R, Touré O, Biran A. Hygiene: new hopes, new horizons. *Lancet Infect Dis* 2011;11(4):312-321.
21. Mwambete KD, Joseph R. Knowledge and perception of mothers and caregivers on childhood diarrhoea and its management in Temeke municipality, Tanzania. *Tanzan J Health Res* 2010;12(1):47-54.
22. Phaswana-Mafuya N, Shukla N. Factors that could motivate people to adopt safe hygienic practices in the Eastern Cape Province, South Africa. *Afr Health Sci* 2005;5(1):21-28.
23. Manun'Ebo M, Cousens S, Haggerty P, Kalengaie M, Ashworth A, Kirkwood B. Measuring hygiene practices: a comparison of questionnaires with direct observations in rural Zaire. *Trop Med Int Health* 1997;2(11):1015-1021.
24. Curtis V, Cousens S, Mertens T, Traore E, Kanki B, Diallo I. Structured observations of hygiene behaviours in Burkina Faso: validity, variability, and utility. *Bull World Health Organ* 1993;71(1):23-32.