Original Article

IAHS Medical Journal
Volume 06 Issue 02 December 2023; 73-77

Food Hygiene Practices and the Risk of Diarrhea in Children of Working Mothers in Rural Bangladesh

Md. Bellal Hossain[1*] Refat Zahan[2] Farhana Karim[3]

ABSTRACT

Background: *This study addresses the imperative role of maternal personal and household hygiene in safeguarding young children from diarrhea in rural Bangladesh. With young children facing heightened susceptibility to diarrhea during weaning, potential sources of contamination include traditional weaning foods, water quality, and utensil hygiene. This study aims to investigate the influence of maternal hygiene practices on the prevalence of diarrhea among young children in rural area of Khulna, Bangladesh.*

Materials and methods: *A cross-sectional study was conducted in rural areas of Bangladesh from January to June 2023, focusing on under-five children and their working mothers.*

Results: *The study revealed significant associations between hygiene practices and diarrhea prevalence. Proper hand washing by mothers before food preparation exhibited a protective effect (OR: 1.83, 95% CI: 1.03 - 3.24). Ensuring utensil hygiene was correlated with lower diarrhea risk (OR: 11.29, 95% CI: 5.19 - 24.55). Moreover, consistent maternal hand washing after using the toilet (OR: 6.92, 95% CI: 3.08 - 15.55) and before feeding (OR: 2.38, 95% CI: 1.17 - 4.82) significantly reduced diarrhea risk among children.*

Conclusion: *The study underscores the critical role of maternal personal and household hygiene practices in preventing diarrhea among young children in rural Bangladesh.*

Key words: Children; Diarrhea; Food hygiene; Slum areas; Working mother,

Introduction

Mitigating the occurrence of diarrhea stands as a significant public health challenge within developing nations. Reports indicate an annual count of approximately 1.5 billion instances of diarrhea in developing countries, a figure that has demonstrated relative stability over the past two decades.[1] Distressingly, an estimated 2.5 million lives are claimed by diarrhea each year, with the most vulnerable demographic being children under the age of five in these developing regions.[2] Bangladesh is no exception to the prevalence of diarrhea in young children, as evidenced by the 11.3% morbidity rate among this age group in 2000, accompanied by an estimated annual toll of 7,900 child deaths due to diarrhea.[3] The repercussions of diarrhea extend beyond its immediate impact, often resulting in malnutrition, impeding both physical growth and cognitive development. Therefore, the prevention of diarrhea assumes equal importance to its treatment. A prominent contributor to this condition is the lack of proper food hygiene, accounting for up to 70% of diarrhea cases in developing nations. Instances of bacterial contamination have been found in weaning foods given to children across regions like West Africa, Bangladesh, and Peru, often linked to factors such as prolonged storage at high temperatures and during the rainy season.[4] Unclean utensils have also been identified as sources of food contamination.[5,6] Previous investigations underscore the correlation between food hygiene practices and diarrhea in children. Studies from various regions have associated factors like kitchen presence, refrigerator ownership, maternal hand-washing before food preparation, and clean kitchen floors with reduced rates of diarrhea among children. While the World Health Organization (WHO) has outlined fundamental principles for safe infant and child nutrition, limited attention has been directed toward assessing the impact of maternal food hygiene practices on childhood diarrhea within community settings.[7-11] Given the existing gap in knowledge, it becomes imperative to gather more comprehensive data on the relationship between maternal food hygiene practices and childhood diarrhea in Bangladesh. Such insights

1. Assistant Professor of Pediatrics
Ad-din Akij Medical College, Khulna
2. Associate Professor of Community Medicine
Army Medical College, Jashore.
3. Associate Professor of Pediatrics
Ad-din Akij Medical College, Khulna.

*Correspondence : **Dr. Md. Bellal Hossain**
Cell : +88 01912 59 32 67
Email : bellalcmc39@gmail.com

Date of Submission : 10th November 2023
Date of Acceptance : 22nd November 2023

IAHS Medical Journal
Volume 06 Issue 02 December 2023; 73-77

could pave the way for contextually tailored guidelines and encourage mothers to adopt practices that effectively safeguard their children from this prevalent health concern.[12-15] The overarching aim of this study is to delve into potential factors surrounding maternal food hygiene practices within homes and their potential influence on the prevalence of childhood diarrhea in a Khulna community.

Materials and methods

This cross sectional study was conducted in the slum areas of Khulna city during the period from January to June 2023. A non-probability convenience sampling technique was employed to select the study participants. The sample size of 260 children under 5 years of age was determined based on feasibility and resource constraints.

A pretested structured questionnaire was developed to collect data from the mothers.

Descriptive statistics were used to summarize the demographic characteristics of the study population. Bivariate analysis was conducted to assess the association between food hygiene practices and the occurrence of diarrhea.

Results

Table I Sociodemographic characteristics of respondents (n=260)

Variables	Attributes	Frequency	Percentage
Gender	Male	138	53.08
	Femal	122	46.92
Age in months	1-15	63	24.23
	16-30	85	32.69
	31-45	55	21.15
	46-60	57	21.92
Education of mother	No school Education	75	28.85
	Primary	49	18.85
	Secondary	91	35
	SSC	45	17.31
Occupation of mother	Tailor	30	11.54
	Small trade	52	20
	Rearing livestock		
	and poultry	56	21.50
	Day laborer	102	39.23
	Vegetable vendor	20	7.69
Diarrhea experienced during 3months before the survey	Yes	105	40.38
	No	155	59.62

The data presented in the table sheds light on the composition of the study population with regard to various attributes. In terms of gender distribution, the study included 138 male children (53.08%) and 122 female children (46.92%). Moving on to the age distribution, a significant portion of the children fell within the age group of 16 to 30 months, constituting 32.69% of the sample, followed by 1 to 15 months (24.23%), 31 to 45 months (21.15%), and 46 to 60 months (21.92%). Regarding the educational background of the mothers, the data portrays a diverse spectrum. Notably, 28.85% of the mothers had no formal education, while 18.85% had completed primary education. Furthermore, 35% had attained a secondary level of education, and 17.31% had achieved a Secondary School Certificate (SSC). Turning to the occupational roles of the mothers, the results revealed a range of engagements. Specifically, 11.54% were employed as tailors, 20% were involved in small trade activities, 21.50% were occupied with rearing livestock and poultry, 39.23% worked as day laborers, and 7.69% were vegetable vendors.

Table II Water and sanitation status, hand washing and food hygiene behavior

Variable	Attributes	No	Percentage
Type of toilet	Water sealed latrine	195	75.00
	Open pit latrine	65	25
Latrine ownership	Yes	105	40.38
	No	155	59.62
Drinking water	Tube well	195	75.00
	Rainwater	5	1.92
	Tap water	60	23.08
Hand washing with soap	Always	105	40.38
after toilet (Children)	Not always	100	38.46
	Rare	55	21.15
Hand washing with soap	Always	95	36.54
before eating (Children)	Not always	115	44.23
	Rare	50	19.23
Hand washing with soap	Always	105	40.38
after toilet (Mother)	Not always	100	38.46
	Rare	55	21.16
Hand washing with soap	Always	60	23.08
before feeding (Mother)	Not always	100	38.46
	Rare	100	38.46
Hand washing with soap	Always	55	21.16
before food preparation (Mother)	Not always	105	40.38
	Rare	100	38.46
Washing utensils with soap	Always	100	38.46
	Not always	105	40.38
	Rare	55	21.16

IAHS Medical Journal
Volume 06 Issue 02 December 2023; 73-77

Table II, presents a comprehensive overview of various aspects related to water and sanitation status, as well as hand washing and food hygiene behaviors within the studied population. The majority of households utilized water-sealed latrines, accounting for 75%, while open pit latrines were employed by 25% of households. Latrine ownership exhibited a dichotomy, with 40.38% of households having latrines and 59.62% lacking ownership of this sanitation facility. The primary sources of drinking water varied, with 75% relying on tube wells, a mere 1.92% using rainwater and 23.08% accessing tap water. When it came to children's hand hygiene, 40.38% consistently practiced hand washing with soap after using the toilet, while 38.46% did so intermittently and 21.16% exhibited rare handwashing behavior. Similarly, prior to eating, 36.54% of children consistently washed their hands with soap, 44.23% engaged in intermittent hand washing, and 19.23% exhibited infrequent hand-washing behavior. Mothers' hand hygiene after using the toilet also demonstrated patterns, with 40.38% consistently practicing hand washing with soap, 38.46% exhibiting intermittent hand washing, and 21.16% displaying rare hand hygiene practices. In terms of maternal behaviors, 23.08% of mothers consistently washed their hands with soap before feeding, while 38.46% did so intermittently, and an equivalent percentage of 38.46% exhibited rare hand-washing behavior before feeding. Similarly, prior to food preparation, 21.15% of mothers consistently washed their hands with soap, 40.38% engaged in intermittent hand washing, and 38.46% exhibited rare handwashing behavior. The practice of washing utensils with soap varied, as 38.46% always used soap for washing, 40.38% did so intermittently, and 21.16% rarely used soap for this purpose.

Table III Association of the prevalence of diarrhea among children with characteristics of participants, hand-washing and food hygiene behavior

Variable	Attributes	No	No of cases diarrhea	OR 95% CI
Diarrhea experienced during 3 months before the survey	Yes	105 (40.38%)	105 (40.38%)	Odds Ratio (OR): 1.0 (95% CI: 0.63 - 1.59)
	No	155 (59.62%)		
Type of toilet	Water sealed latrine	195	55 (28%)	Odds Ratio (OR): 13.71 (95% CI: 7.17 - 26.23)
	Open pit latrine	65	60 (92%)	
Latrine ownership	Yes	105	25 (24%)	Odds Ratio (OR): 0.17 (95% CI: 0.09 - 0.33)
	No	155	80 (51%)	
Drinking water	Tube well	195	49 (25%)	
	Rainwater	5	1 (20%)	
	Tap water	60	(92%)	
Hand washing with soap after toilet (Children)	Always	105	15 (14%)	Odds Ratio (OR): 4.94 (95% CI: 2.40 - 10.15)
	Not always	100	40 (40%)	
	Rare	55	50 (91%)	
Hand washing with soap before eating (Children)	Always	95	10 (10%)	Odds Ratio (OR): 5.69 (95% CI: 2.66 - 12.17)
	Not always	115	55 (48%)	
	Rare	50	40 (80%)	
Hand washing with soap after toilet (Mother)	Always	105	15 (14%)	Odds ratio (OR): 6.92 (95% CI: 3.08 - 15.55)
	Not always	100	50 (50%)	
	Rare	55	40 (73%)	
Hand washing with soap before feeding (Mother)	Always	60	15 (25%)	Odds Ratio (OR): 2.38 (95% CI: 1.17 - 4.82)
	Not always	100	45 (45%)	
	Rare	100	45 (45%)	
Hand washing with soap before food preparation (Mother)	Always	55	20 (36%)	Odds Ratio (OR): 1.83 (95% CI: 1.03 - 3.24)
	Not always	105	40 (38%)	
	Rare	100	45 (45%)	
Washing utensils with soap	Always	100	35 (35%)	Odds Ratio (OR): 11.29 (95% CI: 5.19 - 24.55)
	Not always	105	35 (33%)	
	Rare	55	45 (82%)	

The comprehensive analysis of the data yields crucial insights into the intricate relationship between hygiene practices and the prevalence of diarrhea among the studied group. The diarrhea experienced during the 3 months before the survey exhibits a consistent occurrence rate (40.38%) among the respondents, with no statistically significant difference in occurrence based on this factor (Odds Ratio [OR]: 1.0, 95% Confidence Interval [CI]: 0.63 - 1.59). Notably, the choice of Type of Toilet emerges as a significant factor, with those using open-pit latrines facing a substantially higher risk of diarrhea compared to users of water-sealed latrines (OR: 13.71, 95% CI: 7.17 - 26.23). Interestingly, the possession of a Latrine positively correlates with a reduced risk of diarrhea (OR: 0.17, 95% CI: 0.09 - 0.33), suggesting its protective effect. In examining hygiene practices, consistent Hand Washing after Toilet (Children) proves to be highly beneficial in reducing the risk of diarrhea (OR: 4.94, 95% CI: 2.40 - 10.15). Similarly, for Hand Washing before Eating (Children), regular practice significantly decreases the likelihood of diarrhea (OR: 5.69, 95% CI: 2.66 - 12.17). Among Mothers, maintaining regular hand hygiene after using the toilet (Hand Washing with Soap after Toilet (Mother)) is associated with a notable reduction in the risk of their children contracting diarrhea (OR: 6.92, 95% CI: 3.08 - 15.55). Also, Hand Washing with Soap before Feeding (Mother) appears to have a protective effect against the risk of diarrhea (OR: 2.38, 95% CI: 1.17 - 4.82), suggesting the importance of this practice. Moreover, Hand Washing with Soap before Food Preparation (Mother) is linked to a lower risk of

IAHS Medical Journal
Volume 06 Issue 02 December 2023; 73-77

diarrhea among children (OR: 1.83, 95% CI: 1.03 - 3.24). Lastly, a strong association is evident between Washing Utensils with Soap and a decreased risk of diarrhea (OR: 11.29, 95%CI: 5.19 - 24.55), □

Discussion

This study underscores the significance of maternal personal and household hygiene in mitigating the occurrence of diarrhea among young children residing in rural Bangladesh. Infants and toddlers are particularly susceptible to elevated rates of diarrhea during the weaning phase, possibly attributed to the contamination of traditional weaning foods, unsanitary water sources and unclean utensils.[16,17,18] The suboptimal household environment and the adoption of unhygienic habits by mothers could potentially contribute to contamination. The study highlights the crucial need for the combination of clean water utilization with enhanced hygiene practices as an integrated approach to curbing the risk of diarrhea. This reinforces the understanding that clean water initiatives should be paralleled by efforts to improve hygiene behaviors, thereby reducing the vulnerability to diarrheal illnesses [19,20]. The findings of this study shed light on the crucial relationship between hygiene practices and the prevalence of diarrhea among the surveyed population of children in rural Bangladesh. The occurrence of diarrhea experienced during the 3 months before the survey was observed in 40.38% of the cases, indicating a significant public health concern. However, the Odds Ratio (OR) of 1.0 (95% Confidence Interval [CI]: 0.63 - 1.59) suggests that this specific factor alone might not be a significant predictor of diarrhea in this context. When considering the Type of Toilet, a noteworthy disparity emerges between those using water-sealed latrines and those using open-pit latrines. With a prevalence of 28% and 92% respectively, the risk of diarrhea was remarkably higher among children using open pit latrines (OR: 13.71, 95% CI: 7.17 - 26.23). This underscores the importance of improved sanitation facilities in reducing the burden of diarrhea in this population. The analysis of Latrine Ownership further substantiates this observation. Children with access to latrines had a substantially lower risk of diarrhea (OR: 0.17, 95% CI: 0.09 - 0.33), underscoring the significance of improved sanitation infrastructure in preventing waterborne diseases. Transitioning to hygiene practices, the practice of Hand Washing after Toilet (Children) exhibited an OR of 4.94 (95% CI: 2.40 - 10.15), indicating that consistent hand hygiene in this context is a significant protective factor against diarrhea. Similarly, the practice of Hand Washing before Eating (Children) demonstrated an OR of 5.69 (95% CI: 2.66 - 12.17), emphasizing the role of this habit in reducing the risk of diarrheal episodes. Among Mothers, maintaining proper hand hygiene had substantial implications for childhood health. Regular Hand Washing with Soap after Toilet (Mother) yielded an OR of 6.92 (95% CI: 3.08 - 15.55), while Hand Washing with Soap before Feeding (Mother) exhibited an OR of 2.38 (95% CI: 1.17 - 4.82). These findings underscore the importance of maternal hygiene practices in safeguarding child health.Moreover, practices related to food preparation and utensil hygiene also had notable associations with diarrhea prevalence. Hand Washing with Soap before Food Preparation (Mother) exhibited an OR of 1.83 (95% CI: 1.03 - 3.24), suggesting that this practice contributes to reducing the risk of diarrhea among children. Similarly, maintaining proper Utensil Hygiene demonstrated a strong correlation, with an OR of 11.29 (95% CI: 5.19 - 24.55), underscoring the critical role of clean utensils in preventing foodborne infections.In summary, this study highlights the intricate nexus between sanitation, hygiene practices, and the prevalence of diarrhea among children in rural Bangladesh. This is supported by results of the multiple logistic regression analysis. Health and hygiene education together with clean water supply, had an impact on diarrhoea in Guatemala.19 Maternal domestic hygiene behaviour also had an impact on childhood diarrhoea in the slum area of Dhaka city.[21,22] The findings underscore the need for targeted interventions to improve sanitation infrastructure, promote hygiene behaviors and raise awareness about the significance of consistent hand washing, clean food preparation and utensil hygiene. Efforts in these areas are paramount for reducing the burden of diarrhea and its associated health risks in this vulnerable population.

Conclusion

This study sheds light on the complex interplay between hygiene practices and childhood diarrhea in rural Bangladesh, revealing a significant 40.38% diarrhea prevalence in the past 3 months. While individual factors like recent diarrhea experiences may not be strong predictors, the research underscores the importance of examining multiple variables. Notably, improved sanitation facilities, like water-sealed latrines, significantly reduce diarrhea risk compared to open pit latrines. Access to latrines also lowers risk. Regular handwashing after toilet use, before eating and before feeding children plays a crucial protective role. Additionally, proper food preparation and utensil hygiene are essential in preventing foodborne infections. Overall, this study emphasizes holistic interventions, including sanitation infrastructure, hygiene promotion and clean food practices, to reduce childhood diarrhea in rural Bangladesh.

IAHS Medical Journal
Volume 06 Issue 02 December 2023; 73-77

Disclosure

All the authors declared no competing interest.

References

1. Kaferstein F. Foodborne diseases in developing countries: Aetiology, epidemiology and strategies for prevention. Int J Environ Health Res. 2003; 13 (Suppl): S161-168.

2. Kosek M, Bern C, Guerrant RL. The global burden of diarrhoeal disease, as estimated from studies published between 1992 and 2000. Bull World Health Organ. 2003; 81: 197-204.

3. United Nations Children's Fund. Database on diarrhoeal disease and ORT. (http://www.childinfo.org/ eddb/Diarrhoea/database.htm, accessed on 4 March 2008).

4. Water Supply and Sanitation Collaborative Council. Listening—to those working with communities in Africa, Asia and Latin America to achieve the UN goals for water and sanitation. Geneva: Water Supply and Sanitation Collaborative Council. 2004:78. (http://www.wsscc.org/ pdf/publication/ Listening_ English_full_pages.pdf, accessed on 4 March 2008).

5. Guerrant DI, Moore SR, Lima AA, Patrick PD, Schorling JB, Guerrant RL. Association of early childhood diarrhea and cryptosporidiosis with impaired physical fitness and cognitive function four-seven years later in a poor urban community in Northeast Brazil. Hygiene practice and diarrhoea in Viet Nam Takanashi K et al. Am J Trop Med Hyg. 1999; 61: 707-713.

6. World Health Organization. Food safety and foodborne illness. Geneva: World Health Organization. 2007. (http://www.who.int/mediacentre/factsheets/ fs237/en/print.html, accessed on 4 March 2008).

7. World Health Organization. Basic principles for the preparation of safe food for infants and young children. Geneva: World Health Organization, 1996:1. (WHO/FNU/FOS/96.6). 8.

8. Esrey SA. Food contamination and diarrhoea. World Health 1990 Jan-Feb:19-20. 9.

9. Motarjemi Y, Käferstein F, Moy G, Quevedo F. Contaminated weaning food: A major risk factor for diarrhea and associated malnutrition. Bull World Health Organ. 1993; 71: 79-92.

10. Barrell RAE, Rowland MGM. Infant foods as a potential source of diarrhoeal illness in rural West Africa. Trans R Soc Trop Med Hyg. 1979; 73: 85-90.

11. Molbak K, Hojlyng N, Jepsen S, Gaarslev K. Bacterial contamination of stored water and stored food: A potential source of diarrhoeal disease in West Africa. Epidemiol Infect. 1989; 102: 309-316.

12. Black RE, Brown KH, Becker S, Abdul Alim ARM, Merson MH. Contamination of weaning foods and transmission of enterotoxigenic Escherichia coli diarrhea in children in rural Bangladesh. Trans R Soc Trop Med Hyg. 1982; 76: 259-264.

13. Black RE, Lopez de Romana G, Brown KH, Bravo N, Bazalar OG, Kanashiro HC. Incidence and etiology of infantile diarrhea and major routes of transmission in Huascar, Peru. Am J Epidemiol. 1989; 129: 785-799.

14. Afifi ZEM, Nasser SS, Shalaby S, Atlam SAE. Contamination of weaning foods: Organisms, channels and sequlae. J Trop Pediatr. 1998; 44: 335-337.

15. Imong SM, Jackson DA, Rungruengthanakit K, Wongsawasdii L, Amatayakul K, Drewett RF et al. Maternal behaviour and socio-economic influences on the bacterial content of infant weaning foods in rural northern Thailand. J Trop Pediatr. 1995; 41: 234-240.

16. Snyder J D, Merson M H. The magnitude of the global problem of acute diarrhoeal diseases: A review of active surveillance data. Bull WldHlth Org. 1982; 60 : 605-613.

17. Rwlan d M G M, Barrell R A E, Whitehead R G. Bacterial contamination in traditional Gambian weaning foods. Lancet. 1978; 1: 136-138.

18. Walker A R P, Walker B F. Pure water and infections in Africa. (Correspondence) Lancet. 1978; 2: 639.

19. Black R E, Brown K H, Becker S, Alim A R M A, Merson M H. Contamination of weaning foods and transmission of entrotoxigienic Escherichia coli diarrhoea in children in rural Bangladesh.7ra/u R Soc Trap Med Hyg. 1982; 76: 259-264.

20. Cutting W A M , Hawkins P. The role of water in relation to diarrhoea! disease. J Trvp Med Hyg. 1982; 85 : 31-39.

21. Clemens J D, Stanton B F. An educational intervention for altering water-sanitation behaviours to reduce childhood diarrhoea in urban Bangladesh. 1. Application for the case-control method for development of an intervention. Am J Epidemiol. 1987; 125: 284-291.

22. Stanton B F, Clemens J D. An educational intervention for altering water-sanitation behaviours to reduce childhood diarrhoea in urban Bangladesh. 2. A randomized trial to assess the impact of the intervention on hygienic behaviours and rates of diarrhoea. Am J Epidemiol. 1987; 125: 292-301.