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Socio-economic dimensions of handwashing knowledge in student populations at Ukhiya subdistrict of Cox's Bazar, Bangladesh

Sujit Kumar Banik, Sinthia Shahreen Bristy, Tanveer Akik Ibne Alam, Momo Das & Abu Ansar Md Rizwan

Abstract

The critical role of handwashing in preventing infectious disease transmission, particularly highlighted during the COVID-19 pandemic, underscores the importance of understanding and enhancing hand hygiene practices in developing countries like Bangladesh. This research aims to identify the socio-economic factors affecting handwashing knowledge among students, thereby informing targeted public health interventions to improve hygiene practices and reduce disease spread. A cross-sectional study was conducted across ten government primary schools in Ukhiya between March and April 2022. The sample comprised 400 students, selected using systematic sampling techniques, excluding those with learning disabilities or unwilling to participate. Data were collected via interviewer-administered questionnaires. Data analysis was performed using SPSS and Stata, with handwashing knowledge scores categorized as 'poor' or 'good' based on responses to 16 questions. The results revealed a high level of handwashing knowledge among students, with 90.5% categorized as having 'good' knowledge. No significant gender differences were observed in handwashing knowledge. However, a strong correlation was found between the educational levels of the students' mothers and handwashing knowledge, highlighting the influence of maternal education on health behaviors. Additionally, the occupational background of students' fathers and hygiene and sanitation clubs in the community were significantly associated with handwashing knowledge. The findings underscore the pivotal role of family and community resources in shaping hand hygiene practices among students. This study concludes that handwashing knowledge among students in Ukhiya is generally high, reflecting effective public health education. However, the influence of socio-economic factors, such as parental education and community resources, suggests that targeted interventions could further enhance hand hygiene practices. Future efforts should aim to translate this high level of handwashing knowledge into consistent practice across diverse socio-economic contexts, contributing to the community's overall well-being.

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About Author (s)

Sujit Kumar Banik, Society for Health Extension and Development (SHED), Cox's Bazar, Bangladesh.
Sinthia Shahreen Bristy, Noakhali Science and Technology University, Noakhali, Bangladesh.
Tanveer Akik Ibne Alam, Noakhali Science and Technology University, Noakhali, Bangladesh
Momo Das, Chattogram Veterinary and Animal Sciences University, Chattogram, Bangladesh.
Abu Ansar Md Rizwan (Corresponding author), W A N Research & Consultancy, Dhaka, Bangladesh.

Introduction

Handwashing with soap is universally acknowledged as one of the most effective interventions for preventing the spread of infectious diseases (Odo & Mekonnen, 2021). The critical role of hand hygiene has been further highlighted by the COVID-19 pandemic, emphasizing basic hygiene practices as foundational in the public health effort to control disease transmission (Berendes et al., 2022). Despite global recognition of its importance, adherence to hand hygiene practices, especially in developing countries, is significantly influenced by various socio-economic factors, impacting their effectiveness and implementation (Lotfinejad et al., 2021). In Bangladesh, a country marked by a dense population and challenging socio-economic conditions, handwashing transcends personal hygiene, emerging as a public health necessity (Wami, 2022). The Ukhiya subdistrict of Cox's Bazar, home to one of the world's largest refugee populations and its local community, presents a distinctive setting to examine handwashing knowledge and practices due to its diverse socio-economic landscape and increased risk of disease transmission in densely populated areas. Despite the acknowledged benefits of handwashing, there remains a significant gap in the understanding and practice of proper hand hygiene among student populations in Ukhiya, Cox's Bazar. This gap is influenced by the area's unique socio-economic conditions, such as limited access to water and sanitation infrastructure, educational disparities, and cultural practices, which may affect handwashing knowledge and behaviors (White et al., 2022). This deficiency in hand hygiene practices contributes to the spread of infectious diseases, negatively impacting students' health and educational attainment (Wang et al., 2018). The complexity is further intensified by the region's susceptibility to health challenges and the exacerbating effects of seasonal monsoons on sanitation conditions (Barua et al., 2023). This study is necessitated by the urgent need to dissect the socio-economic factors influencing handwashing practices among vulnerable populations to bolster public health strategies. A thorough understanding of the socio-economic dimensions shaping handwashing knowledge among students in Ukhiya is crucial for crafting focused interventions that can lead to enhanced hygiene practices, diminished disease transmission, and improved health outcomes (Patel et al., 2024). This research endeavors to bridge the current knowledge gap by delivering empirical insights into the determinants of handwashing behaviors among student populations in this specific geographical and socio-economic context. The anticipated findings could serve as a valuable resource for policymakers, educators, and public health professionals in formulating customized, efficacious, and sustainable handwashing promotion strategies, mindful of the local socio-economic fabric.

Literature review

A study by Smith et al. (2020) revealed a significant prevalence of inadequate hand-washing practices among adolescents across 80 countries, with particularly low rates in low-income countries and among those experiencing severe food insecurity. Specifically, a considerable proportion of adolescents reported never or rarely washing their hands before eating (6.4%), after using the toilet (5.6%), or with soap (8.8%). The odds of poor hand-washing habits were substantially higher among adolescents facing severe food insecurity, indicating a strong association between economic status and hand hygiene practices. A study by Saboori et al. (2013) in Kenya examined the relationship between school-based handwashing programs and the improvement of hand hygiene practices among children. The study found that the provision of water, soap, and hygiene education in schools significantly improved handwashing behavior among students, highlighting the importance of combining educational interventions with the provision of necessary resources. A study conducted by Contzen, N., Meili, I. H., & Mosler, H. J. (2015) in Southern Ethiopia focused on the psychological factors influencing handwashing. The research identified that factors such as perceived vulnerability, attitudes, and social norms play crucial roles in handwashing behavior, suggesting that interventions need to address these

psychological aspects to be effective. A randomized controlled trial by Gautam et al. (2017) in Nepal evaluated the impact of a school-based water, sanitation, and hygiene (WASH) intervention on handwashing with soap and respiratory infections among children. The study found that the intervention led to an improvement in handwashing practices and a reduction in the incidence of respiratory infections, emphasizing the importance of WASH interventions in schools. A study by Seimetz, E., Kumar, S., & Mosler, H.J. (2016) assessed the effects of behavior change strategies on handwashing practices in India. It found that interventions tailored to address specific behavioral determinants, such as social norms and personal agency, were more effective in promoting handwashing. This indicates the importance of understanding and targeting the underlying behavioral factors influenced by socioeconomic conditions.

Methodology

The study was conducted in Ukhiya subdistrict of Cox's Bazar, Bangladesh. It involved a school-centric cross-sectional approach across ten government primary schools. The schools were selected based on a random sampling procedure. The study was conducted during March-April 2022. The sample size was 400 which was calculated using the formula ($n=z^2pq/d^2$) with 95% confidence interval and 5% level of significance. Systematic sampling was employed within each selected school to choose the participants. Starting from a randomly chosen point, every k^{th} student was selected, where k was determined by dividing the total number of students in each school by the sample size required from that school. Students with learning disabilities and not interested in giving interviews were not included in the sample. A pre-designed and well-structured questionnaire was used for data collection. The questionnaire was developed through a rigorous process involving literature review, expert consultations, and pilot testing in a similar setting outside the study area. The pilot test results were analyzed for reliability and validity, leading to further refinement of the questionnaire. The questions were closed-ended and behavioral, focusing on knowledge of handwashing practices such as the use of soap and water, the relevance of handwashing in disease prevention, and hand hygiene in different scenarios (e.g., before/after eating, handling garbage, preparing food, using the toilet, playing, and at school). The questions also probe into the respondents' education on handwashing techniques and the necessity of hand drying post-washing. The total number of knowledge-related questions was 16. Data was collected in the schools using interviewer-administered questionnaires. Well-oriented data collectors visited the schools on pre-fixed dates for collecting data. The teachers and the primary and secondary caregivers of the students who were present in the school during the data collection period helped to collect data. Before collecting the data, written consent from the respondents was collected. Data entry and cleaning were done using SPSS version 26. Data analysis was done using Stata version 13. In the scoring system for assessing handwashing knowledge from these 16 questions, respondents were awarded points based on their answers. Each correct response, indicating good knowledge of handwashing practices, earned 1 point. Incorrect answers or those reflecting poor knowledge received 0 points. The total possible score was 16. Scores were categorized as poor knowledge (scores of 0 to 7) and good knowledge (scores of 8 to 16). To check the association between the variables, the Pearson chi-square test was conducted. Logistic regression was also conducted to establish the relationship between the level of knowledge with the socio-demographic variables. In every stage of the study, anonymity and confidentiality were maintained very strictly.

Results

Table 01 offers a comprehensive overview of various socio-demographic variables pertinent to a sample of 400 students. The student population is nearly evenly divided by gender, with

females slightly outnumbering males. Specifically, 190 students (47.5%) are male, while 210 students (52.5%) are female. This gender distribution is reflective of the sample's diversity. The educational levels of the students' mothers vary significantly. A portion of the mothers, 57 in total (14.2%), have not received any formal education. The majority, comprising 279 mothers (69.8%), have education up to the Secondary School Certificate (SSC) level. A smaller segment, 64 mothers (16.0%), have attained an education level of Higher Secondary Certificate (HSC) or above. The occupational spread among the students' fathers is diverse. A minority, 32 fathers (8.0%), are unemployed. Laborers constitute a significant portion, with 99 fathers (24.8%) falling into this category. Businessmen are also a notable group, with 72 fathers (18.0%) engaged in business activities. The largest group is service holders, accounting for 197 fathers (49.3%) of the student sample. The occupation of the students' mothers is predominantly homemaker, with a vast majority, 361 mothers (90.2%), identified as housewives. A smaller proportion, 39 mothers (9.8%), are service holders, indicating limited participation in formal employment sectors. In terms of community facilities, 280 students (70.0%) reported the absence of a hygiene and sanitation club in their residential area. Conversely, 120 students (30.0%) indicated the presence of such a club, suggesting varied access to communal hygiene and sanitation resources. A significant majority of the students or their family members, 342 individuals (85.5%), have received handwashing training, highlighting a strong emphasis on hygiene education. However, there remains a minority, 58 students (14.5%), who have not had such training.

Table 01: Socio-demographic characteristics of the students (n=400)

Socio-demographic characteristics	Frequency	Percentage
Gender		
Male	190	47.5%
Female	210	52.5%
Student's mothers' highest education attainment		
No formal education	57	14.2%
Up to SSC	279	69.8%
HSC or above	64	16.0%
Student's father's occupation		
Unemployed	32	8.0%
Laborer	99	24.8%
Businessman	72	18.0%
Service holder	197	49.3%
Student's mother's occupation		
Housewife	361	90.2%
Service holder	39	9.8%
Availability of hygiene and sanitation club in the residence community		
No	280	70.0%
Yes	120	30.0%
Student or their family members received handwashing training		
No	58	14.5%
Yes	342	85.5%

The data in Figure 01 distinctly categorizes the level of knowledge into two groups: 'Good' and 'Poor'. A substantial majority of the respondents, 362 individuals, representing 90.5% of the sample, are classified under the 'Good' knowledge category. This indicates a high level of awareness and understanding of hand-washing practices among most of the surveyed individuals. Such a significant percentage reflects the effectiveness of health education and the dissemination of hygiene information among the study population. In contrast, a minority of the sample, comprising 38 individuals which accounts for 9.5% of the total, falls under the 'Poor' knowledge category. This segment of the population exhibits a lack of adequate understanding or awareness regarding hand-washing practices. This could be indicative of

gaps in health education, accessibility to information, or varying levels of education and comprehension among the respondents.

Figure 01: Level of knowledge of the respondents on hand washing practice

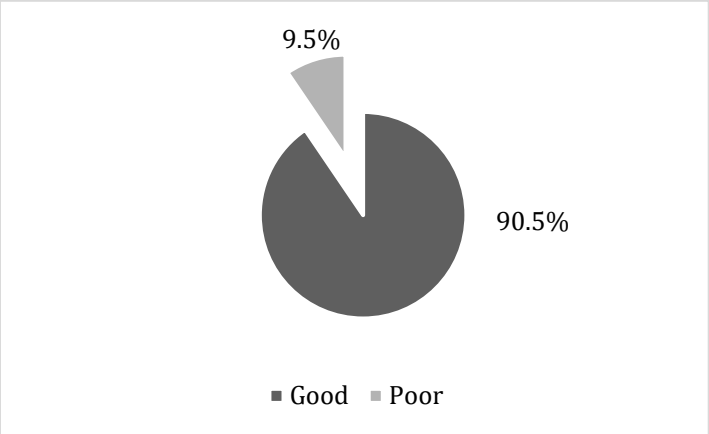

Table 02 elaborates on the association between respondents' knowledge of hand washing and their socio-demographic characteristics. The findings indicate no significant gender difference in hand washing knowledge, with both males and females showing a similar understanding (90.5% good knowledge). However, a notable association is observed between the level of hand-washing knowledge and the educational attainment of the respondents' mothers. Those with mothers having higher education (HSC or above) demonstrate a higher percentage (95.3%) of good knowledge, contrasting with those whose mothers have no formal education (77.2% good knowledge). Similarly, the occupation of the respondents' fathers shows a significant correlation with hand-washing knowledge. Children of service holders exhibit higher knowledge levels (93.9% good knowledge) compared to those with fathers who are laborers (79.8% good knowledge). The presence of a hygiene and sanitation club in the community also correlates with better hand-washing knowledge. Respondents from communities with such clubs show a higher percentage (95.8%) of good knowledge compared to those without (88.2%). Finally, a significant association is seen with handwashing training. Respondents or their family members who received training demonstrated substantially higher good knowledge levels (93.9%) compared to those who did not (70.7%). The Pearson chi-square test results, indicating p-values, reveal the statistical significance of these associations. These findings underscore the importance of parental education, occupational background, community resources, and handwashing training in influencing hand-washing knowledge, offering valuable insights for public health strategies and educational interventions.

Additionally, Table 03 offers a detailed logistic regression analysis of factors influencing handwashing awareness among students. This comprehensive analysis includes variables like the educational levels of students' mothers, occupational backgrounds of fathers, availability of hygiene and sanitation clubs in their community, and whether the students or their family members have received handwashing training. The results are quantified using Crude Odds Ratio (COR) and Adjusted Odds Ratio (AOR) with 95% confidence intervals. The analysis highlights significant associations, such as the impact of mothers' education and handwashing training on students' handwashing awareness. These findings underline the importance of familial and environmental factors in shaping health-related knowledge and behaviors among students.

Table 02: Association of respondents' hand washing knowledge with their socio-demographic characteristics

Socio-demographic variables	Freq. (Perc.)	Level of knowledge				Pearson chi-square	P-value
		Poor knowledge		Good knowledge			
		Freq.	Perc.	Freq.	Perc.		
Gender							
Male	190 (47.5%)	18	9.5%	172	90.5%	0.000	0.986
Female	210 (52.5%)	20	9.5%	190	90.5%		
Student's mother's highest education attainment							
No formal education	57 (14.2%)	13	22.8%	44	77.2%	14.310	0.001
Up to SSC	279 (69.8%)	22	7.9%	257	92.5%		
HSC or above	64 (16.0%)	3	4.7%	61	95.3%		
Student's father's occupation							
Unemployed	32 (8.0%)	1	3.1%	31	96.9%	17.910	0.000
Laborer	99 (24.8%)	20	20.2%	79	79.8%		
Businessman	72 (18.0%)	5	6.9%	67	93.1%		
Service holder	197 (49.3%)	12	6.1%	185	93.9%		
Student's mother's occupation							
Housewife	361 (90.2%)	37	10.2%	324	89.8%	2.418	0.120
Service holder	39 (9.8%)	1	2.6%	38	97.4%		
Availability of hygiene and sanitation club in the residence community							
No	280 (70.0%)	33	11.8%	247	88.2%	5.672	0.017
Yes	120 (30.0%)	5	4.2%	115	95.8%		
Student or their family members received handwashing training							
No	58 (14.5%)	17	29.3%	41	70.7%	30.965	0.000
Yes	342 (85.5%)	21	6.1%	321	93.9%		

Table 03: Logistic regressions of factors affecting handwashing awareness among the students

Socio-demographic variables	Freq. (Perc.)	Level of knowledge				COR (95% confidence interval)	AOR (95% confidence interval)
		Poor knowledge		Good knowledge			
		Freq.	Perc.	Freq.	Perc.		
Student's mothers' highest education attainment							
No formal education	57 (14.2%)	13	22.8%	44	77.2%	1	1
Up to SSC	279 (69.8%)	22	7.9%	257	92.5%	3.451 (10.620-7.355)	1.676 (0.692-4.056)
HSC or above	64 (16.0%)	3	4.7%	61	95.3%	6.008 (1.615-22.352)	2.075 (0.448-9.617)
Student's father's occupation							
Unemployed	32 (8.0%)	1	3.1%	31	96.9%	1	1
Laborer	99 (24.8%)	20	20.2%	79	79.8%	0.127 (0.016-0.991)	0.369 (0.042-3.227)
Businessman	72 (18.0%)	5	6.9%	67	93.1%	0.432 (0.048-3.858)	0.569 (0.061-5.316)
Service holder	197 (49.3%)	12	6.1%	185	93.9%	0.497 (0.062-3.961)	0.525 (0.065-4.248)
Availability of hygiene and sanitation club in the residence community							
No	280 (70.0%)	33	11.8%	247	88.2%	1	1
Yes	120 (30.0%)	5	4.2%	115	95.8%	3.073 (1.169-8.076)	1.615 (0.570-4.574)
Student or their family members received handwashing training							
No	58 (14.5%)	17	29.3%	41	70.7%	1	1
Yes	342 (85.5%)	21	6.1%	321	93.9%	6.338 (3.093-12.986)	4.174 (1.578-11.043)

Discussion

The findings of this study highlight a high level of handwashing knowledge among student populations in Ukhiya, with 90.5% of respondents categorized as having 'Good' knowledge. This is consistent with the results of Odo & Mekonnen (2021), who found high awareness levels

of hand hygiene practices in similar socio-economic settings. The emphasis on health education and hygiene promotion, particularly in the context of the COVID-19 pandemic, has likely contributed to this heightened awareness (Berendes et al., 2022). The lack of a significant gender difference in handwashing knowledge aligns with the findings of Lotfinejad et al. (2021), suggesting that handwashing promotion efforts have been equally effective across genders. However, this study reveals a strong correlation between the educational attainment of respondents' mothers and handwashing knowledge, underscoring the role of maternal education in health behaviors, a finding supported by Wami (2022). The higher percentage of good knowledge among students with more educated mothers suggests that education acts as a catalyst for transmitting health-related knowledge and practices within households. Similarly, the occupational background of students' fathers influenced handwashing knowledge, with children of service holders showing higher knowledge levels. This may reflect broader socio-economic implications, where higher occupational status is associated with better access to information and resources, facilitating health-promoting behaviors (White et al., 2022). The presence of a hygiene and sanitation club in the community and receipt of handwashing training were also significant predictors of good handwashing knowledge, highlighting the importance of community-based interventions and education in promoting hand hygiene (Wang et al., 2018; Barua et al., 2023). Comparatively, Patel et al. (2024) also emphasized the effectiveness of structured handwashing programs in improving knowledge and practices among school-aged children. The positive impact of handwashing training observed in this study supports their conclusions, suggesting that educational interventions can substantially elevate hand hygiene awareness and potentially transform behaviors. Despite the overall high levels of handwashing knowledge, 9.5% of students classified with 'Poor' knowledge represent a critical area for intervention. This segment may lack access to educational resources or reside in environments where hand hygiene is not adequately emphasized. Addressing this gap requires targeted efforts to ensure that handwashing promotion reaches all community segments, particularly those at higher risk due to socio-economic disadvantages. The association between socio-demographic factors and handwashing knowledge observed in this study mirrors the broader literature, indicating that interventions must be sensitive to the socio-economic and educational landscape of the target population (White et al., 2022; Wang et al., 2018). This underscores the need for multi-faceted, inclusive public health strategies that consider the complex interplay of socio-economic factors in health promotion.

Conclusion

This study from the Ukhiya subdistrict, Cox's Bazar, Bangladesh, underscores the success of public health initiatives in hygiene promotion, evidenced by the widespread handwashing knowledge among students. It highlights the significant impact of parental education, particularly mothers', and socio-economic factors on this knowledge, advocating for targeted educational efforts. The positive role of hygiene clubs and formal training in promoting hand hygiene is also evident. However, the presence of a minority lacking adequate handwashing knowledge points to areas needing enhancement. This research emphasizes the necessity of integrating socio-economic aspects into public health strategies to guarantee universal access to health education, aiming to narrow the knowledge gap and ensure the translation of awareness into habitual practice for holistic community health.

Applications

The findings of this study can inform the development of more inclusive and effective public health campaigns, focusing on tailored educational programs that consider socio-economic

disparities. Implementing these insights can lead to improved hygiene practices across diverse community segments, contributing to better health outcomes.

Limitations and Future Research Directions

While the study provides valuable insights, it is limited by its geographical and demographic scope. Future research should explore diverse settings to enhance the generalizability of the findings. Additionally, longitudinal studies could assess the long-term impact of educational interventions on handwashing practices, providing a more dynamic understanding of behavior change in public health.

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Consent for publication

The permission of each author to publish this article has been obtained.

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