



Effect of Water Quality, Environmental Sanitation and Hygiene Practices on Health of School Going Children of Urban Slum Areas

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Abstract

The study was carried out among the 246 school going children of urban slum of Tangail district and random sampling methods were applied. Slum population has been increasing in Bangladesh over the last three decades along with the growth and expansion of cities and towns. The facilities in urban slums were very much unsatisfactory due to lack of proper water supply and adequate hygiene and sanitation facilities. The good hygienic and sanitation knowledge and the practice have been found to be significantly low among the slum dwellers of Tangail district. The water supply and sanitation condition are improving very slowly in the urban slums of Tangail. Majority (94.7%) of the slum people use tube well water for drinking, cleaning and household purposes. The dustbin facility was the most neglected sector in these slums. Besides, solid waste management and drainage system were totally unsatisfactory. It was observed that houses, shops, drains, roads etc. have been constructed unplanned and solid wastes were preserved on open places. Majority (58.1%) of the children did not wear sandals while going to latrine and did not cut finger nail regularly (54.5%). Most of the slum dwellers (63.4%) did not use cover for safety of the prepared food. It was observed that there was presence of pet/animal/insect in food preparation area of maximum households. Most of the people were unaware about toilet cleaning regularly. Findings of the study showed that 40.7% children were underweight, 28.9% children were stunted and 31.3% children were wasted. The child morbidity rate was high. Water quality, environmental sanitation and hygiene practices were positively correlated ($r = 0$ to $+1$) with health status of school going children. The water quality, environmental sanitation and hygiene practices have significant impact ($p \leq 0.05$) on the health of school going children of these slums.

Key words: Environmental sanitation, Hygiene, Health status, Water quality

Introduction

In the words of the 35th president of the United States, John F. Kennedy, "Children are the world's most valuable resource and its best hope for the future." It is undeniably true that the future is in the hands of the children. Hence, the health and wellbeing of children go a long way in nurturing them into better adults (Rema and Vasanthamani, 2011). Children are the most important assets of a country because they will be tomorrow's youth and provide the human potential required for its development. Nutrition in the early years of life plays a big role in physical, mental and emotional development (Biswas *et al.*, 2009). Malnutrition is one of the principle public health problems that affect large numbers of children in developing countries. School children may also be at high nutritional risk, not only under-five children. The school age is a dynamic period of growth and development. During this period physical, mental, social development of child takes place (Singh and West, 2004). Poor health and malnutrition may impair both the growth and cognitive development of primary school children. School children are dramatically affected by anemia (Hasan *et al.*, 2013), vitamin A deficiency (Brooker *et al.*, 2006) and parasitic infections (Awasthi and Bundy, 2007) with adverse impact on their nutritional status (Awasthi and Bundy, 2007; Casapia *et al.*, 2006) as well as on their cognitive development and school performance also (Ong *et al.*, 1991; Pollitt, 1999; Singh, 2004; Florence *et al.*, 2008). The major portion of these excreta is deposited into water

bodies and open places which pollute water sources, groundwater and the general environment. As a result, majority of the population in Bangladesh suffer from different kinds of water and excreta-borne diseases that aggravate their poverty situations. The global health burden associated with these conditions is staggering, with an estimated 4000–6000 children dying each day from diseases associated with lack of access to safe drinking water, inadequate sanitation and poor hygiene (Moe and Rheingans, 2006). High levels of stunting among children suggest that there was also a long term deficit in mental and physical development that leaves children unable to take maximum advantage of learning opportunities in schools. Epidemiological evidences suggest a strong link between maternal and early childhood under nutrition and increased adult risk of various chronic diseases (UNICEF, 2000).

Materials and Methods

Study design

This cross-sectional descriptive study of Effect of Water Quality, Environmental Sanitation and Food Hygiene Practices on Health of school-age slum children 5 to 12 years old, took place between October 2014 and March 2015 in urban slums of Tangail Pourashava.

Study area

The study area includes Horizon polli, Robidas para, Mishuk mohollah, Rotary polli slum of Tangail pourashava.

Study population

Pre-school and school going children of the selected slums were the population of this study.

Sample size and sampling technique

Random sampling method was adopted to conduct this study. A total of 246 (123 boys and 123 girls) children were assigned randomly to collect data. 246 children and their mothers were interviewed.

Data collection tools and techniques

A pre-designed and pre-tested questionnaire was used to interview the study participants to elicit information on socioeconomic condition, water quality, environmental sanitation, hygiene practices, and anthropometric measurements like weight, height, MUAC and physical fitness of school going children.

Anthropometric measurement

The anthropometric data were collected based on standard methods. The age of the children was collected from the school record as well as respondents itself or from the mother of the children. Weight was recorded in kilograms by using standard weighting machine. Height was recorded in centimeter by using standard height measurement scale. Height was measured to the nearest 0.1 cm.

Assessment of nutritional status

The nutritional status of school children was assessed by anthropometric measurements, age in year, height in centimeter (cm) and weight in kilograms (kg). It was determined by Z-score value.

Assessment of hygienic condition

Some basic hygiene practice related questions were asked for the assessment of hygienic condition.

Assessment of environmental sanitation

Some Environmental sanitation related questions were asked for the assessment of environmental sanitation condition.

Assessment of water quality

Some basic water quality related questions were asked for the assessment of water quality.

Morbidity pattern

Morbidity pattern was assessed by the presence of illness during the study period and any disease that had occurred since the last one year.

Data analysis

All of the statistical analysis and all other data processing were done by using SPSS 16.0 windows program. For tabular, charts and graphical

presentation Microsoft Word and Microsoft Excel was used.

Study period

October, 2014 to March, 2015

Results and Discussion

Table 1. Level of education of the children

Level of education	Gender		Total
	Boys	Girls	Frequency (%)
Pre-primary	35 (28.5%)	29 (23.6%)	64(26.0%)
Primary	88 (71.5%)	94 (76.4%)	182(74.0%)
Total	123 (100.0%)	123 (100.0%)	246(100.0%)

Table 1 shows the total of 26.0% child respondents were pre-primary student and 74.0% children respondents were primary student. It was observed that 28.5% of boys and 23.6% of girls were pre-primary student, 71.5% of boys and 76.4% of girls were primary student.

Table 2. Water sources for drinking, cleaning utensils and household purposes

Water source for drinking, cleaning utensils and household purposes	Frequency	%
Tube well	233	94.7
Supply water by Tap	13	5.3
Total	246	100

Table 2 shows that maximum (94.7 %) households of the slum used tube-well water for drinking, cleaning utensils and household purposes. Only 5.3 % households of the slum used supply water by Tap for drinking, cleaning utensils and household purposes.

Table 3. Purification of water before drinking

Purification of water before drinking	Frequency	%
Yes	0	0
No	246	100.0
Total	246	100

Table 3 shows that the entire (100%) household didn't purify water before drinking. They drink water directly from tube well or supply water by Tap without any purification. Economic problem is another barrier; they are not interested to buy water purification tools due to their economic problems.

Table 4. Appearance of drinking water

Appearance of drinking water	Frequency	%
Clean	40	16.3
Ironic (looks yellow)	185	75.2
Presence of odor	21	8.5
Total	246	100

Table 4 shows that the appearance of maximum household's drinking water was Ironic (yellow color), 16.3% household drinking water was clean and 8.5% had presence of odor. There is no deep tube well facility in these slum areas. Ironic water is a main problem for using drinking and domestic purposes.

Table 5. Frequency of toilet cleaning

Frequency toilet cleaning	Frequency	%
One day per week	61	24.8
Two day per week	9	3.7
Three day per week	49	19.9
Not aware	127	51.6
Total	246	100.0

Table 5 shows that most of the household members were unaware about toilet cleaning, 51.6% toilets were not cleaned regularly, 24.8% toilets were cleaned one day per week and 19.9% toilets were cleaned three day per week. Most of the slum dwellers has no complete knowledge about the importance of cleanliness and sanitation on health for that reason they are not completely aware about toilet cleaning.

Table 6. Way to dispose solid waste

Way to dispose solid waste	Frequency	%
Thrown outside the house	42	17.1
Thrown in dustbin	23	9.3
Thrown in drain/canal	26	10.6
Preserve in open space	155	63.0
Total	246	100.0

Table 6 shows that 63% households were preserve their solid waste in open space, 17.1 % and 10.6% households were thrown their solid waste outside the house and drain/canal respectively. Only 9.3% households were thrown in dustbin. Due to unawareness and lack of dustbin facilities most of the slum people preserve their solid waste in open space or thrown into drain/ canal or outside the house.

Table 7. Wearing sandal while going to latrine

Wear sandal while going to latrine	Frequency	%
Yes	103	41.9
No	143	58.1
Total	246	100.0

Table 7 shows that maximum children (58.1%) didn't wear sandal while going to latrine, 41.9% children wear sandal while going to latrine. In the slum parents don't properly care their children, children are unaware about hygiene and sanitation information and don't interested to maintain hygiene and sanitation.

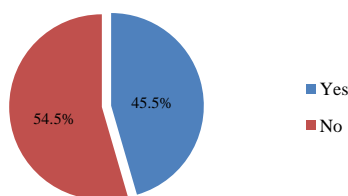


Fig. 1. Cut finger nail regularly

Fig. 1 shows that majority (54.5%) of the children didn't cut finger nail regularly, 45.5% children cut their finger nail regularly.

Table 8. Use covers for safety of the prepared food

Use cover for safety of the prepared food	Frequency	%
Yes	90	36.6
No	156	63.4
Total	246	100.0

Table 8 shows that most of the (63.4%) household didn't use cover for safety of the prepared food, 36.6% use cover properly for safety of the prepared food. Lack of proper knowledge about food safety is the main reason of unawareness about food safety.

Table 9. Presence of pet/animal/insect in food preparation area

Presence of pet/animal/insect in food preparation area	Frequency	%
Yes	194	78.9
No	52	21.1
Total	246	100.0

Table 9 shows that pet/animal/insect were present in food preparation area of maximum households (78.9), only in 21.1% households there is no presence of pet/animal/insect in food preparation area.

Table 10. Frequency of drain/sewage lines cleaning

Frequency of drain/sewage lines cleaning	Frequency	%
Rarely cleaned up	155	63.0
No drainage facility	91	37.0
Total	246	100.0

Table 10 shows that majority (63%) of the drain/sewage lines in the slum were rarely cleaned up 37% households have no drainage facility. The Pourashava cleaner do not regularly clean the drain/sewage line.

Table 11. Frequency of removing waste from the dustbin

Frequency of removing waste from the dustbin	Frequency	%
Rarely remove	31	12.6
No dustbin near the slum	215	87.4
Total	246	100.0

Table 11 shows that only 12.6% dustbin waste removed rarely, most of the households have no dustbin facility. The Pourashava cleaner do not regularly remove waste from dustbin.

Table 12. Morbidity profile of school going children (n=246)

*Disease	Boysn (%)	Girlsn(%)	Totaln(%)
Diarrhea	30(24.4)	24(19.5)	54(21.9)
Dycenty	20(16.3)	14(11.4)	34(13.8)
Cold cough	122(99.2)	122(99.2)	244(99.2)
Fever	41(33.3)	34(27.6)	75(30.5)
Worm	26(21.1)	28(22.6)	54(21.9)
Jaundice	3(2.4)	4(3.2)	7(2.8)
Oral cavity	11(8.9)	11(8.9)	22(8.9)
Eye infection	3(2.4)	3(2.4)	6(2.4)
Skin	42(34.1)	49(39.8)	91(36.9)
Ear infection	16(13.0)	20(16.3)	36(14.6)
Others	90(73.2)	81(65.8)	171(69.5)

*Multiple Responses

The morbidity rate was high. This was obtained by asking whether the child had fallen ill within the last one year. Table 12 indicates that 99.2% of the children suffered from cold, 36.9% from skin disease and 30.5% from fever, 21.9% suffered from diarrhea, 13.8% suffered from dycenty, 21.9%

suffered from worm, 14.6% suffered from ear infection and 69.5% suffered from other diseases.

Table 13. Overall nutritional status of children (n=246)

Nutritional Status	WAZ	HAZ	WHZ
Under the Normal	100 (40.7%)	71 (28.9%)	77 (31.3%)
Normal	145 (58.9%)	172 (69.9%)	164 (66.7%)
Over the Normal	1 (0.4%)	3(1.2%)	5(2.0%)
Total (100%)	246	246	246

Table 13 shows that in case of Weight for Age (WAZ) a total of 40.7% children were underweight, 58.9% were normal and only 0.4% was over normal. In case of Height for Age (HAZ) 28.9% children were stunted, 69.9% were normal and only 1.2% was over normal. In case of Weight for Height (WHZ) 31.3% children were wasted, 66.7% were normal and only 2% were over normal.

Table 14. Relation and impact of hygiene, sanitation and water quality on health status

Health status	Variable	r	P value
Underweight (WAZ)	Condition of the platform of water source	0.183	0.016
	Toilet/latrine being cleaned regularly	0.215	0.003
	Cleanness of toilet floor	0.138	0.014
	Condition of toilet surroundings and entrance to toilet	0.206	0.007
	Presence of solid waste pit / secondary station near the house	0.159	0.044
Stunting (HAZ)	Water source for drinking	0.057	0.042
	Condition of the platform of water source	0.198	0.001
	Toilet/latrine being cleaned regularly	0.226	0.001
	Presence of solid waste pit / secondary station near the house	0.126	0.012
	Frequency of the drain/sewage line cleaning	0.220	0.001
Wasting (WHZ)	Water source for drinking	0.309	0.001
	Place of solid waste disposal	0.065	0.001
	Place of household waste water disposal	0.156	0.036
	Presence of dustbin near the slum	0.196	0.000
	Frequency removing waste from the dustbin	0.222	0.000

Table 14 shows that there is a weak but positive correlation among the health status, water quality, environmental sanitation and hygiene practices. The impact of water quality, environmental sanitation and hygiene practices on health status is significant ($p \leq 0.05$). The results show that water quality, environmental sanitation and hygiene practices could influence the health status of school going children of the slum, while better water quality, environmental sanitation and hygiene practices may lead to healthy child outcome. The results of this study revealed that a total of 26.0% child respondents were pre-primary student and 74.0% children respondents were primary student. Maximum households (94.7%) of the slum use tube-well water for drinking, domestic /household, cleaning purpose. On the other hand only 5.3% households of the slum use supply water by tap for drinking, domestic /household and cleaning

purpose. It was observed that the appearance of maximum household's drinking water was Ironic (yellow color). Most of the household's (56.1%) drinking water source is within 4-7 meter from toilet. Only 0.4% drinking water source was greater than ten meter from toilet. Most of the household members were unaware about toilet cleaning, 51.6% toilets were not cleaned regularly. It was observed that the poor maintenance of toilet surroundings and entrance. About 63% households were preserved their solid waste in open space, only 9.3% households were thrown in dustbin. Maximum children (58.1%) did not wear sandals while going to latrine, 41.9% children wear sandals while going to latrine. Majority (54.5%) of the children do not cut finger nail regularly, 45.5% children cut their finger nail regularly. Most of the (63.4%) household do not use cover for safety of the prepared food, 36.6% use cover properly for

safety of the prepared food. It is observed that there was presence of pet/animal/insect in food preparation area in maximum households (78.9). Majorities (63%) of the drain/sewage lines in the slum were rarely cleaned up and 37% households of the slum had no drainage facility and 87.4% households had no dustbin facility near the slum. The child morbidity rate was high. The overall health status of the children shows that 40.7% children were underweight, 28.9% children were stunted and 31.3% children were wasted. The water quality parameters, Environmental sanitation parameters and Hygiene practices parameters are positively correlated with health status. The impact of water quality, environmental sanitation and hygiene practices on health status is significant ($p \leq 0.05$).

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Conclusions

The good hygienic and sanitation knowledge and the practice have been found to be significantly low among the slum dwellers. Majority of the slum people use iron tube well water for drinking, households and cleaning purposes. The dustbin facility is the most neglected sector in the slums. Besides, Solid waste management and drainage system are totally unsatisfactory in the slum area. The child morbidity rate was high. The water quality, environmental sanitation and hygiene practices have significant impact ($p \leq 0.05$) on the health of school going children of these slums.

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