

# “Case Study: An investigation on sanitation and waste management problem among the slum dwellers on Uttara, Dhaka.”

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## Abstract

Bangladesh is a country with a population of about 147 million of which around 30% still live below the poverty line (having an income of less than \$ 1.25/day). Although Bangladesh has managed to increase its per capita by more than 30% and cut poverty by more than half still the country suffers from poverty rate of 36% in rural areas and poverty rate of 28% in urban areas. Although the percentage of population below poverty line is higher in rural areas, the urban poor are more susceptible to dangerous contagious diseases like vital hepatitis, typhoid, cholera and also non-contagious diseases. High percentage of slum-children suffer from malnutrition, lack basic no knowledge on sanitation, doesn't have access to pure water. The study is mainly based on questionnaire survey with a sample size of 100 which tried to evaluate the socio-physical and socio-economical condition of the slum population. Also, limited tests were carried out of their drinking water sources to check their compatibility with water standards and its corresponding effects on the slum populations' susceptibility to water borne diseases.

**Keywords:** *Slum; Sanitation; Air pollution; Climate impact*

## Introduction:

Slum is an unhealthy area where basic amenities like water supply, drainage for standard living are lacking, unsanitary conditions prevail and diseases flourish. Slums have legal owner of its land. The ownership may be public, organizational or private. Squatter settlements contain the same unhygienic condition like slums having no legal owner of its land. Rapid urbanization and inadequate capability of the respective authority to manage with the housing needs of people in urban areas have contributed to the development of informal settlements. Living in these settlements often poses significant health risks. The sanitation and drinking water quality of the informal settlements are often poor. About 30 percent (9 million) of them are living under poverty level and about 17 percent (5 million) are living in slum areas (World Bank Memorandum 1985, p: 35). According to the definition of urban poor by World Bank there are 12.45 million urban poor and 6.97 million urban hard-core poor in Bangladesh, who lived in slum and squatter settlements (Islam, 1998, p: 2) or in informal settlements.

Poverty reduction and access to food, government's important development agenda at all time, are under threat due to climate change. Environmental displacement has already become intense in geographically and environmentally vulnerable areas in Bangladesh. Thus, climate induced migration to big cities or nearby places is getting spontaneous over the last few decades. For instance, frequent exposure to natural disasters makes coastal people often bound to migrate in search of secure lives and livelihoods. Therefore, increased slum settlements in western and eastern periphery of Dhaka city indicate physical manifestation of growing urban poverty. Slums are supposed

to be potential target for the habitation of displaced people. But planned migration of displaced people in urban slums is yet to consider reducing their vulnerabilities.

According to Richard Odingo, climate change will increase poverty and worsen food security (cited in Davis et al. 2009). Urban poverty will increase if environmentally displaced people keep moving to city, while slum is their potential target for habitation. Such people create pressure on limited natural resources like land, water. Also, the poor are often compelled to live in environmentally hazardous area like low lying flood prone area occupying swamps, natural lakes.

Poor living conditions and unsanitary environment have been substantiated in the elements of food security. In national food policy, 2006, food security has been defined as availability of and access to sufficient, safe and nutritious food that meets their dietary needs. The other essential element of food security is biological utilization of food emphasizing environmental sanitation, clean water, and adequate diet. Availability does not ensure food security at specific level like household or individual level. Household or individual's access to food and more specifically, to absorb diet properly lead to food security.

This study particularly depicts living condition and its implications for food and water security of Uttara slum dwellers. Children being one of the vulnerable groups in society in terms of climate change, movement, haphazard growth and unhealthy environment are the target group for this research. Slum settlement has been considered in this study focusing planned migration of displaced people as one of the adaptation measures of climate change can reduce vulnerability of the poor.

### **Data and method**

The study is based on both primary and secondary data. The trend of environmental displacement and population growth in slums is supported by secondary data. Living conditions of slum dwellers is depicted using primary data. The survey questionnaire includes household's socio-economic, physical environment, health behavior and health outcome. For this study, total 100 samples were collected to investigate household's food security by collecting information on selected factors. The target group of questionnaire survey is mothers of the children who are supposed to be well informed about children's food intake and health status.

Socio-economic factors characterizing living conditions, physical environment (mode of waste disposal), households' health behavior particularly dietary practice and health outcome (disease occurrence) have been analyzed by applying statistical technique, frequency distribution.

### **Assessment of food security**

Measurement of food security is an integration of many factors like agro-ecological, environmental, socio-economic, political and biological factors. The concept is generalized into three main aspects like (WFP, 2002):

- o Availability of food
- o Access to food
- o Utilization of food

Assessment of food security is a complex phenomenon as it is interrelated with many factors. This study investigates second and third elements of food security in terms of living conditions of slum dwellers through field survey. A set of indicators is used to analyze living conditions and the situation of food security of Uttara slum people. Socio-economic factors including income, expenditure and education influence food habit and knowledge about hygiene.

Socio-economic factors entail individual's ability to have adequate and nutritious food as well as water treatment practice for safe drinking water. Environmental sanitation is characterized by household's latrine type and waste disposal system, while children are easy victim of unhygienic environment. Following figure depicts conceptual framework of assessing food security integrating inter-related factors.

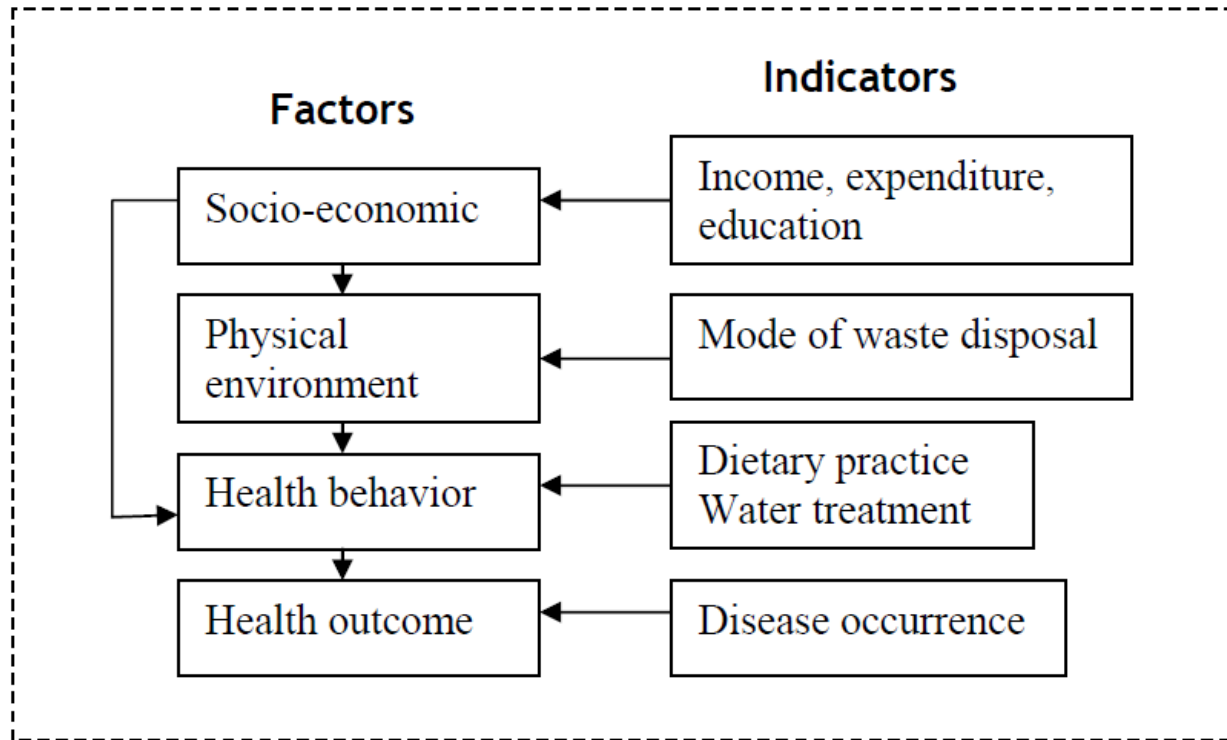


Figure 1: Conceptual framework (Adapted from Cohen et al., 2003)

Children’s health status measured by water-borne disease occurrence well depicts their exposure to sanitation. Children’s health status is a good indication of food security as it is said that healthy children can recover diarrhea quickly.

**Source of Drinking Water and Other Purposes:**

In most cases water supply facility in the slums is provided by the NGOs through water point from Dhaka Water Supply and Sewerage Authority (DWASA). Water point is basically water storage facility where water is stored from WASA main lines. In those slums where the above facilities are absent or inadequate, the inhabitants use maximum water from the Dhaka WASA and very few numbers depend on adjacent water bodies like ponds. However, the main source of drinking water in Uttara slum is the Dhaka WASA supply water. Around 80% respondents use Dhaka WASA supply water and 20% respondents use shallow tube well for their drinking water and other purposes, respectively. We observed that collecting water from far away is a major problem.

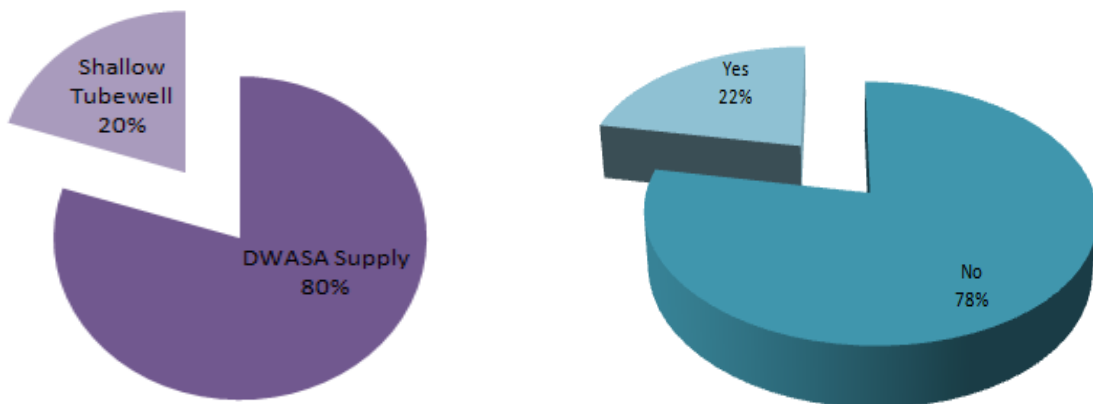


Figure 2

Figure 3

The peoples of the selected slum areas are not satisfied for the lack of proper water supply. 78% respondents are not satisfied while 22% are satisfied for the availability of water source in selected slum areas in Dhaka City.

**Water Quality and its Comparison:**

Descriptive analysis of the water samples from the analytical results of the physical, chemical and biological parameters in the Uttara slum area is shown in Table 1.

Table 1: Descriptive Statistic and Quality Comparison of Different Parameters of The Water Samples

Parameters	Sample-1	Sample-2	Sample-3	Mean	Bangladesh Standard	WHO Standard
pH	6.7	6.8	6.7	6.73	6.5-8.5	6.5-8.5
Color, PCU	Dark	Light Dark	Light Dark	Light Dark	15	15
Turbidity, NTU	1.5	2.5	3	2.33	10	5
TDS, mg/l	100	270	150	173.33	1000	1000
TSS, mg/l	15	15	15	15	10	10
CO <sub>2</sub> , mg/l	27	28	28	27.67	-	-
Alkalinity, mg/l	70	65	70	68.33	100	100
Hardness, mg/l	150	160	170	160	250-500	-
Cl, mg/l	80	110	105	98.33	150-600	250
Fe, mg/l	0.01	0.20	0.15	0.12	0.3-1.0	0.3
BOD, mg/l	1.9	2.1	2.2	2.07	0.2	-
COD, mg/l	5.5	7.5	6.0	6.33	4	-
TC, cfu/100ml	0	0	0	0	0	0
FC, cfu/100ml	0	0	0	0	0	0
Sodium (Na <sup>+</sup> ), ppm	260	255	257	257.33	200	200
Calcium (Ca <sup>2+</sup> ), ppm	80	83	81	81.33	75	75-200
Carbonate (CO <sub>3</sub> <sup>2-</sup> ), ppm	Absent	Absent	Absent	Absent	-	-
Phosphate (PO <sub>4</sub> <sup>3-</sup> ), ppm	0.55	0.75	0.90	0.73	6	-
Salinity, ppt	8	10	6	8	-	-

**Water Borne Diseases:**

Data were collected from different sources and persons for common water borne diseases in the Uttara slum area where the diseases of diarrhea, dysentery and cholera were 66%, 21% and 13%, respectively.

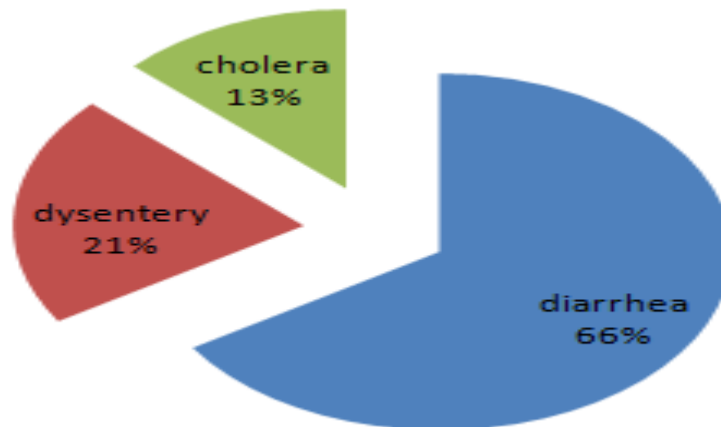


Figure 4

Here we observed that major people affected by diarrhea. The respondents seem to have fair knowledge on the mode of transmitting germs from human excreta. Most of the households reporting to have at least one sick person in their households during last two months were asked about loss of working days.

#### Education Status of the Slum Dwellers:

Education has significant influence on knowledge about food habit, nutrient contents and hygiene. Thus parent's educational attainment has important implications for children's diet, sanitation and health status. Based on survey data, 90% female and 78% male parents have no education. Though, only 10% female and 22% male parents have higher education and 21% female and 36% male parents have some sort of primary education. Also 30% of the children don't go to school.

#### Expenditure:

A major portion of households' income is spent on food items following expenditure on nonfood items and house rent. Survey data reveals that a major share of their income is spent on food (average monthly expenditure Tk. 3500) followed by house rent (Tk 300 on average) and non-food items (Tk 981 on average) respectively.

#### Consumption pattern

According to respondents, children are provided with three meals in a day. But inadequate quality and lack of diversity of food are matter of concern in food habit. Consumption pattern of slum dwellers depict that rice, potato, vegetable and edible oil are consumed on daily basis. Food composition sometimes is only rice with potato or peas or fish which are cheap to them. But access to protein rich animal product (milk and milk product, meat or poultry, eggs) is very low among the poor. They can consume them mainly on monthly basis or sometimes on special occasion like Eid festival. According to households these are expensive food item and most of them cannot afford it. Though, a large number of households can manage fish in weekly basis, but the quality of fish is relatively low. Also, most of them replied eating fruits on weekly basis. In this case, they can afford mainly banana which is relatively cheaper than other seasonal fruits.

#### Physical environment: waste disposal

According to the households in study area, there is no fixed place for waste disposal. Generally wastes are disposed wherever they live like on the ground or above the water body. Therefore, scattered wastes are found visible in open place. It indicates that adequate facilities of waste disposal as well as collection are almost non-existent in slum area. From the sample data, it has been found that a large number of households (25%) dispose wastes into the water body, while 73% of households dispose on the ground, mainly on the street. Though, only 2% of households have

been found to dispose wastes in dustbin. Exposure to such dirty environment is very risky for children as they spend most of their time playing outside.

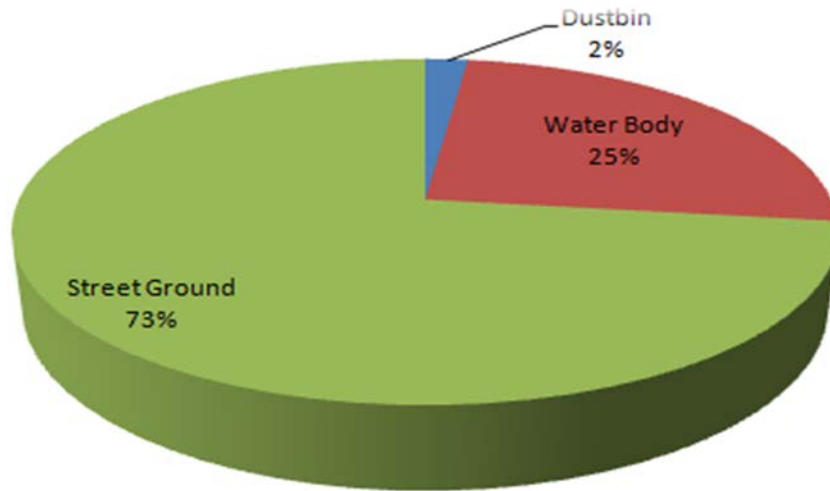


Figure 5

**Drainage Facilities:**

There are no proper drainage systems in the total area. Some people use the khal as draine and at the same time use the water of the khal for different purposes. But in other slum, there exist some draine. It is found hat most of the respondents have the provision of katcha drain. In the slum all the respondents have katcha drain because there is no pucca drain around the slum. The katcha drain is within 7 meters from their houses. As most of the respondents living in the slum have katcha drain adjacent to their houses the environmental condition of the slum is not hygienic. They throw their all kind of waste here and there and thus cause many health problems.

**Noise Level:**

The slum in very nearer to the bus terminal and by the side of the main road. The slum has main roads in two sides. So, it’s noisy most of the time. The noise level is measured by a Noise meter. The data were taken in various time of the day and the data were taken for two days from every distance. So, it was identified that noise level is high here (between 58dB- 79dB) and the recorded maximum noise level was 79 dB.

**Crime and Illegal Work:**

Many types of illegal work are occurred here. Theft and hijacking is main criminal works here (30%). Other criminal works are like drug addiction (28%), smuggling (20%), terrorism (10%) and others (12%). Here, people were asked to select only one option which the respondent’s thinks most dangerous and frequent in this slum. But the slum dwellers said that occasionally they have to pay money to the mastans and also the mastans take shelter in their slum for safety.

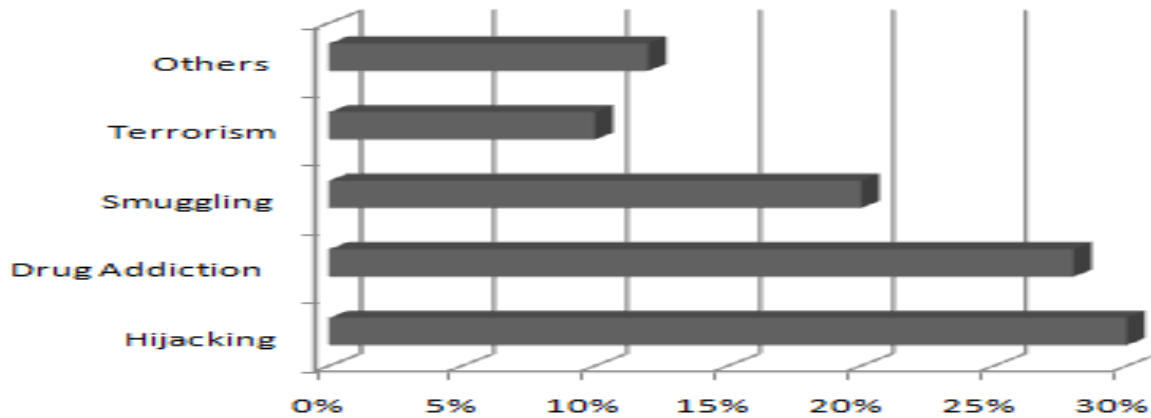


Figure 6

**Absence of proper solid waste management system:**

Solid waste is the third pollutant after air and water. Due to lack of proper knowledge most of the household dispose their domestic waste in the nearby drain or nearby pond. As a result this waste impact on the physical environment and pollutes the pond water that people use this water for many purposes and create some diseases such as dysentery, diarrhea, cholera etc. Some of the households dispose their waste inside the house in a hole and create air pollution.

**Absence of recreational facilities:**

The occupational life of the majority of slum dwellers is such that they find very little time for recreation. There is no time available for leisure in the daily routine of their life. Young children suffered from lack of recreation. In the study area there is a great lack or provision of parks and playgrounds. As a result people deprived from mental refreshment.

**Utility Service Facilities:**

Without water supply and sanitation services there are more utility services are needed to provide in a housing system such as electricity, open spaces, garbage disposal, drainage, health services etc. in Uttara slum all utilities are not provided here but some are provided. The existing condition of utilities are providing in the Table below.

Table 2: Utility Service Facilities

Name of Services	Yes (%)	No (%)	Remarks
Electricity	70	30	50% illegal
Open Space	Not Available	Not Available	-
Toilet	90	10	Without proper sanitation
Garbage	Not Available	Not Available	-
Drainage	Not Available	Not Available	-
Health	85	15	Not get service from a MBBS doctor

**Economical Condition of the Slum Dwellers:**

Doing questionnaire survey it is obtained that 35% of people are rickshaw driver, 15% of peoples are working as street hawker, 43% of people are working as day labour and 07% of people are mason.

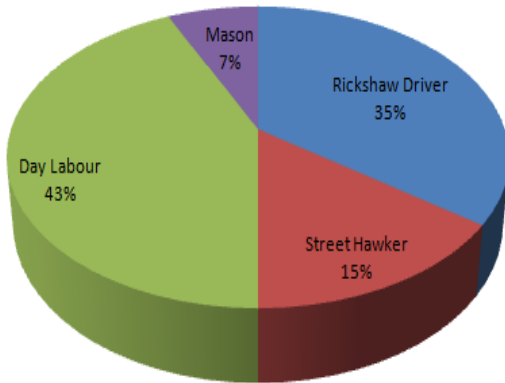


Figure 7

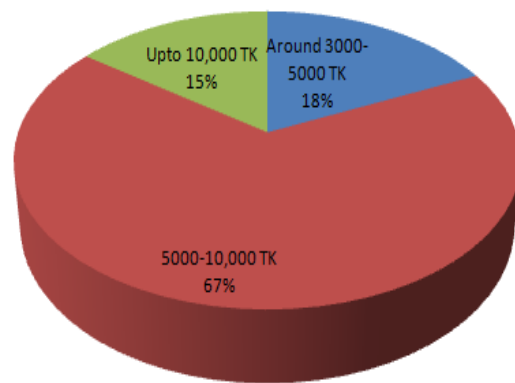


Figure 8

Monthly income level of the people living in this slum is very low. In that survey 18% slum dwellers income around TK. 3000-5000, 67% slum dwellers income are getting approximately TK.5000-10000 and remaining 15% are income level around TK. 10000-20000 per month. The low level of income bound them to lead a low standard of life (can not fulfill their fundamental needs). And such factors directly and indirectly affect the sanitary and water supply condition in the slums peoples.

#### Latrine facilities and Mode of defecation:

Sanitation situation is worse compare to water supply in the Uttara Slum area. The commonly available sanitation facilities include pit latrines, hanging latrines and water seal latrines in Uttara slum area and pit latrines and over hanging latrines is low cost area in slum. The result obtained about mode of defecation for Pit latrine, septic tank system and water seal latrine are 65%, 27% and 08%, respectively in the study area. All the latrines are not hygienic and environmental friendly. So, it was observed that the sanitation system was found comparatively unsatisfactory for the slum area. We also saw that children are generally used the yard and the places near the tube-wells for defecating. However, no proper hygienic latrines such as water sealed latrine exist in any of the slum observed. The situation analysis of slums has pit latrines or sanitation and it block given by different source. So, the sanitation facility in Uttara slum is not sufficient.

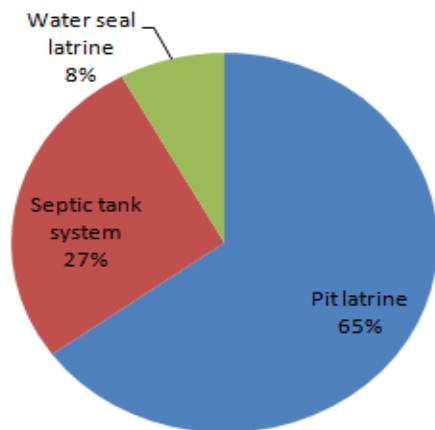


Figure 9

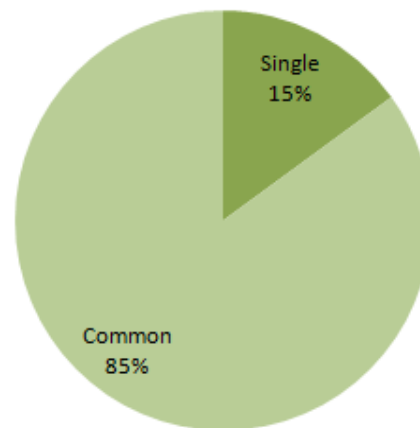


Figure 10

In case of analyzing existing latrine facilities we get for common 85% and single 15% in the slum area. So, it is observed that the type of common latrine is gathering for slums area's i.e. unhygienic condition (15-18).

#### Sanitation Practices:



Health and hygienic facilities in the Uttara slum area is in the worst condition. Therefore, different diseases frequently occur in this area. Besides safe distance between water point and latrine is not maintained in most cases that are very harmful for human health. Majority of the people (72%) of the sum areas are not use soap after defecation.

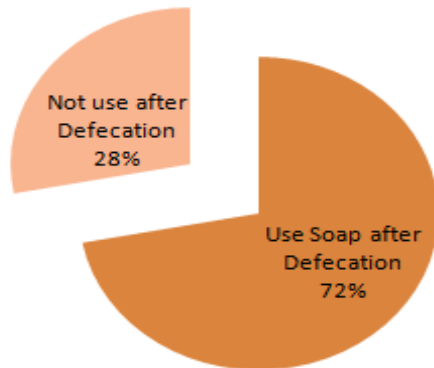


Figure 11

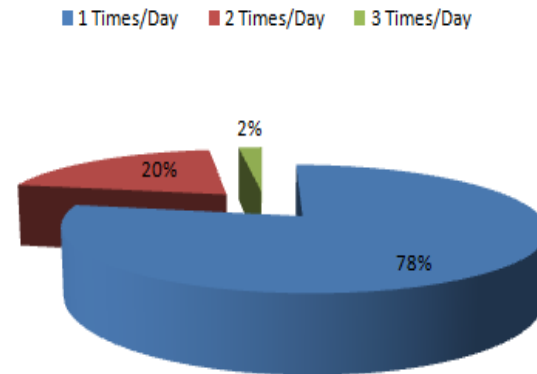


Figure 12

Also it was found that the 78% of the house sweeps only single times a day.

**Conclusion:**

The study in the Uttara Slum area of Dhaka city found that the sanitary and water supply condition are improving very slowly. Majority slum people use tap water for drinking. Significant amount of open defecation is also found. High prevalence of disease (water-borne) among children living in this slum indicates leading unhealthy environment. On the other hand pit latrines which are no fully hygienic. These may cause ground- water contamination depending on the soil characteristics and distance between the water sources and latrines. The drainage system is the most neglected sector in this slum. Due to lack of proper sanitation knowledge rural as well as slum people under poverty limit do not construct latrines. As very few people go school after primary education they do not get enough awareness and knowledge about the harmful effect of unhealthy sanitary condition and water supply. Unhygienic latrines were the main sources of spreading diarrheal and other sanitation related diseases. Over flowing of excreta even in negligible flooding and rainfall occurred for most of the latrines of slum areas. Poor and unsuitable condition of superstructure of the latrines creates privacy problem especially for the women. The deteriorated scenario causes severe environmental degradation affecting the environment of entire Uttara Model Town. Slum people are fighting against poverty and trying to improve their economic condition and standard of living. Education can play a vital role in influencing parent’s knowledge about nutrition, hygiene and health. However, Government and in some cases, NGOs should be encouraged and offered the best facilities for taking more programs in Uttara slum area on water supply, sanitation and solid waste management sectors.

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**REFERENCES:**

[1] S.M.Helal Uddin, Khan & Alom, 01,February,2013. “Evaluation of water quality and sanitation system of eight selected slum areas in Dhaka City.” Development Compilation.Vol.08.No.01. ISSN 2072-3334, pp.167-176

[2] T.T.Tanni, Hasan, Azad & B. Bakali, 2014, “State of the Environment in Slum Area: A Case Study on Khora Slum,Khulna”, J.Environ.Sci. & Natural Resources, ISSN 1999-7361, 7(1):295-304



[3] ADB Report, 1997.

[4] WHO. Basic Environmental Health, Geneva, 1997.

[5] Yousuf, T. B. & Rahman, M. 2007. Monitoring quantity and characteristics of municipal solid waste in Dhaka City. Environmental Monitoring Assessment, 135: 3-11.

[6] American Public Health Association (APHA) (1995). Standard methods for the examination of water and wastewater, 19th edn, Washington DC, USA, pp.1467.