

# Domestic water consumption patterns in a village in Bangladesh

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**ABSTRACT:** The study determines the relationship between domestic water use and socioeconomic factors at the household level in a village in Manikganj district of Bangladesh. The study area is facilitated with piped water supply system. In addition household activities affecting the water use in rural village are also assessed. The data for the study were collected from direct observation, household interviews in Dorogram village of Manikganj district. The study revealed that the daily per capita water consumption for the area was found to be 83.17 litre per person per day (Lpcd) with a standard deviation of 11.9. Water consumption was found to be correlated with socioeconomic factors such as household size, house quality, income etc.

## 1 INTRODUCTION

Domestic fresh water is an essential requirement for human wellbeing. In rural areas of Bangladesh water is required for households and agricultural purposes. Information on the water uses pattern of rural settlements is vital in developing sustainable water supply system for the rural people. Introduction of water supply system without considering the socio-cultural aspects of the community is rarely successful or sustainable (Sobsey, 2001). The domestic water can be classified according to its final use such as domestic, commercial, industrial, public, loss and wastage (steel & McGhee, 1979). Domestic water use varies according to the living standards of the consumers in urban and rural areas (Thomas, 1998). The use of water for domestic purposes may be subdivided in drinking, food preparation and cooking, washing clothes and utensils, house cleaning and polishing, vegetable gardening, stock watering and other uses (Hopkes, 1983).

The quantity of water is variable depending on the cultural habit, settlement pattern, type of supply, water source etc. A study in Nicaragua showed that a decrease in distance to the water source from 1000 to 10 meter in resulted in an increase in per capita water consumption of 20% (Sandiford et al., 1990). The study conducted by Hunnings (1996) revealed that the quantity of water used depends on the household size, how water is used, level of maintenance of water supply system and some other factors such as level of education and age of the head of the household.

There is a difference in the quantity of water used by piped and un-piped household. Piped households use on an average almost three times more water than that of un-piped households (Thompson et al., 2001). Gazzinelli et al., (1998) and Keshavarzi et al. (2006) showed that certain socio-economic and cultural factors, house quality, type of water source and a utility index were significantly correlated with water use.

This study is aimed to determine the water consumption pattern of a rural settlement facilitated with piped water supply system in Bangladesh. Socio-economic factors influencing the water use are also investigated.

## 2 METHOD

The study area (Dorogram) is located in Saturia Upazila Manikgonj District of Bangladesh. the study area is a small village attributed to traditional rural settlements of Bangladesh. The most of the people of the study area are farmer. Most of the house has livestock and vegetable garden. The area is facilitated with small piped water supply system by a local NGO. The village has a primary and a secondary school. The dominant religion

of the study area is Islam.

In this study survey research method is used to collect information regarding water use in households. A pre- tested questionnaire was made addressing the domestic water use patterns and some socio-economic characteristics (house area, income, Garden area, and number of livestock, Quality of house, house hold size, and share of piped water in total quantity of water used of individual household. In the study house quality is defined by numeric value of 4, 3, 2, and 1 for house with brick masonry wall and concrete floor, corrugated sheet and concrete floor, corrugated sheet and earthen floor and bamboo made wall respectively. The data were collected between May 2007 and July 2007.

A total of 40 household having one respondent from each were selected using random selection technique for interview. Of which 35 household participated in the survey. Water uses for different purposes include drinking, kitchen (cooking and washing utensils), bathing, washing clothes, house cleaning, toileting and others including water used for livestock, gardening. To ascertain the volume of water for different purposes a standard size container of 15 litre (L) was used. Statistics used in this study include percentage, mean standard deviation, Pearson correlation coefficient.

### 3 RESSULT AND DISCUSSION

In this study the mean water consumption was found 83.17 litre per person per day (Lpcd) with standard deviation of 11.93. Household were divided in three groups according to the per capita water consumption as low (less than 65 Lpcd), medium (65 – 90 Lpcd) and high (more than 90 Lpcd) water use as shown in table 1. According to table 1, the percentage of water user groups are classified as 14.3%, 51.4% and 34.3% for low, medium and high consumers respectively.

Table 1: Domestic water consumption by household groups

Water consumer groups		n	%
Level	Usage (lpcd)		
Low	<65	5	14.3
Medium	65 – 90	18	51.4
High	>90	12	34.3

Table 2: Amount of water used for different Household activities

Activities	Per capita consumption per day	
	Mean (Standard Deviation)	
Kitchen (litre per day)	8.4 (3.3)	
Drinking (litre per day)	2.5 (0.4)	
Personal hygiene (litre per day)	2.9 (1.0)	
Bathing and washing clothes (litre per day)	46.6(10.9)	
Toileting (litre per day)	6.7(1.0)	
Cleaning Houses (litre per day)	12.1(4.0)	
Others (litre per day)	4.0(5.7)	
For all purposes (litre per day)	83.2(12.0)	

In this study daily per capita water consumption for drinking is 2.5 litre, which is close to the EPA estimate of 2 litre per day (Ershow et al., 1991). According to the study conducted by Ahmed and Smith (1987) water consumption per person per day for drinking, Kitchen (cooking and utensil washing), Bathing (bathing and washing clothes), Sanitary and other purposes were 2 litre, 9 litre, 20 litre, and 8 litre respectively. In the present study, water consumption for Bathing and washing clothes is significantly higher than that of reported by Ahmed & Smith (1987). This difference may be due piped water supply system as water is available in close proximity of the consumers.

To understand the relationship between water consumption in rural households and variables affecting the water consumption, a correlation matrix is constructed using 8 variables (table 3). It can be seen from the correlation matrix the water consumption per person per day is significantly correlated with such variable as house quality, household size, monthly income and piped water use. The study reveal that water consumption is has a positive correlation ( $r = 0.363$ ,  $p < 0.05$ ). This association demonstrates that there is increase in household water consumption as the monthly income of the household increases. As the main water source of the study area is piped water supply which has an initial connection cost and monthly charge per connection, monthly income has an influence on water consumption. There are little or no correlation between water con-

sumption per person per day and variables such as house area, garden area, and number of livestock. This is due to the fact that different groups of water consumers were not different in possessing house, garden area and number of live stocks.

Table 3: Correlation matrix of relationship between house hold water consumption and 7 independent variables

	1	2	3	4	5	6	7	8
Water Consumption/person/day (1)	1							
House Area (2)	-0.001	1						
Garden Area (3)	-0.097	0.946	1					
Live Stock feeding/washing(4)	0.095	0.013	-0.056	1				
House Quality (5)	0.790	-0.034	-0.226	0.075	1			
Household Size (6)	0.846	0.138	0.023	0.078	0.811	1		
Monthly Income (7)	0.363	0.492	0.287	0.034	0.343	0.597	1	
Piped Water use (8)	0.298	0.015	0.034	0.039	0.139	0.516	0.560	1

p <0.05

#### 4 CONCLUSION

Accurate estimate of water uses is an important factor is sustainable development of water supply system for rural people especially in Bangladesh. Studying rural water consumption pattern in the study area showed that house quality, household size, monthly income and piped water use influence the water consumption behavior. The study also shows that significant portion of per capita water consumption is bathing and washing clothes which may be reduced by building community awareness. This may be helpful optimizing the demand of water. Furthermore, other variables such as water price, types of piped water supply, quality of water, climatic condition should be incorporated in the future study.

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