

An Assessment on Availability of Water Supply System in the Rajshahi City Corporation Area

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Abstract

Freshwater scarcity is a significant problem all across the planet. Cities like Rajshahi, which are expanding rapidly, struggle to provide enough water for their residents. Understanding the current water supply scenario and assessing the quality of consumed water based on public opinion are, thus, the primary goals of this research. Data was gathered primarily through questionnaires, with some secondary research also used. The acquired data was examined using SPSS and Excel. From the numbers, we may infer that around 62% of the population used water from tube wells as their primary source of drinking water. Many people, however, were compelled to travel long distances to obtain potable water. Despite an extreme lack of available water, around 80% of the population uses WASA daily. In addition, the research shows how different parts of the city's infrastructure manage water distribution. The study will help concerned authorities to identify which neighborhoods need sufficient water infrastructure, making the city more accessible and sustainable for all residents.

Keywords: *Rajshahi City; Water Demand; Water Supply; Public Perception; Water Shortage*

1 Introduction

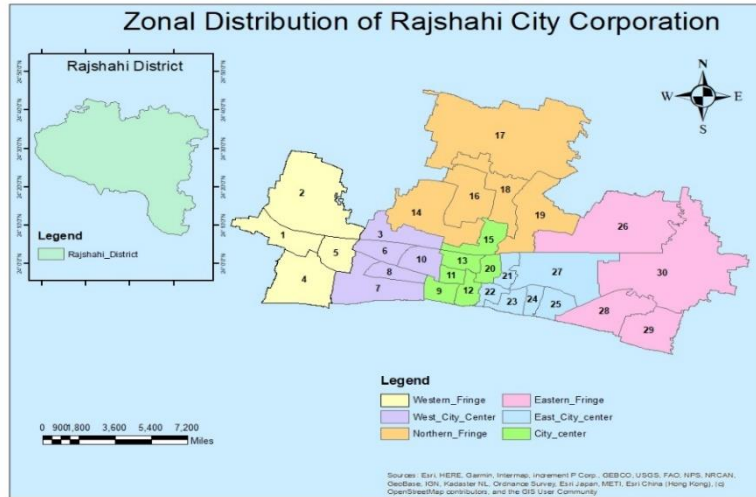
One of the most essential needs for all living things is water. Water scarcity affects over 1.6 billion people worldwide or about two-thirds of the population (FAO, 2017) (Mekonnen & Hoekstra, 2016). The sustainability tipping point has been reached in 21 of the 37 largest aquifers on Earth. (Richey et al., 2015). Despite Bangladesh's reputation for having an abundance of water from rivers, there is a severe water shortage there (Chowdhury et al., 2017). According to a study, problems with water, sanitation, and hygiene account for 8.5% of all deaths in Bangladesh (UN-Water, 2013). In Rajshahi City Corporation, the water amenities are similarly subpar to those in other parts of the nation. Although groundwater is present in sufficient quantities, its accessibility for drinking has become problematic because of arsenic contamination, traces of heavy metals, salinity intrusion in the shallow aquifers in the coastal areas, lowering of the groundwater level, rock layers in hill tracts, etc. (Lamia 2018). Only 67 percent of Rajshahi City's residents can receive water service from Rajshahi WASA, while 33 percent of residents still lack access to clean drinking water (The Independent, 2018). Despite recent threefold increases in the cost of water supply, some individuals still have difficulty getting water. And the water cost is not compatible with the service. This paper focuses on the availability of water supply & consumer satisfaction in Rajshahi city depending on the study, social survey, and preliminary information collected. The main objectives are to identify the present scenario of water supply in different localities of the Rajshahi City Corporation area and to evaluate the status of consumed Water based on public Perception.

2 Methodology

The study area is the whole Rajshahi City corporation area which is divided into 30 wards. (Mostafa et al., 2017). These 30 wards are distributed in six zones. They are the city center, east city center, west city center, eastern fringe, western fringe, and northern fringe. As the RCC population is 0.85 million, a total of 390 samples were needed as a simple random sampling process for 95 percent confidence level and a 5 percent margin of error (WaterAid, 2018). So, 13 samples were collected from each ward. The city center and its environs have been designated as the primary commercial sector, while the East, West, and Northern perimeter have been designated

as the wards that are located far from the RCC center. While SPZ 14, 17, and 18 encompass three portions of the city center; the Western fringe covers the entirety of SPZ 15 and a small portion of SPZ 17, the Eastern fringe covers the entirety of SPZ 13 and 19, and the Northern fringe covers the entirety of SPZ 8 and a small portion of SPZ 14 (Faridatul & Jahan, 2014). Additionally, Rajshahi City's surface water is unfit for use as drinking or cooking water, thus its residents must rely on arsenic-free tube-well water as their only reliable source of safe and usable water (Rahman, 2005) the location is at a certain distant, and water quality has to be different from each other.

Figure 1. Study Area Map



For primary data collection, a questionnaire form is made using some indications under six dimensions. Before conducting the main poll, a pilot survey was carried out with ten randomly chosen respondents. A semi-structured questionnaire was altered following a pilot study, and data was then gathered using the amended questionnaire from the local residents of Rajshahi City. Secondary data was collected from appropriate books, papers, records, and web searches. Lastly, the gathered data were analyzed and presented with various graphs and charts using software such as SPSS and MS Excel.

3. Result and Discussion

3.1 Existing Water Supply Condition

The existing water supply scenario includes the sources of drinking water as well as household use. Mainly WASA, Tube well and submersible pumps are the main sources of water for the inhabitants of RCC. The analysis shows that 62% of respondents prefer Tube well for drinking water and 25% of individuals use submersible pumps to collect drinking water, which is typically attached to their homes (See Figure 2). About 54% of the respondents have tube well/submersible pumps attached to their homes. But the rest of the population find it very difficult to collect water as they have to a distance of more than 25 meters from their house (See Figure 3).

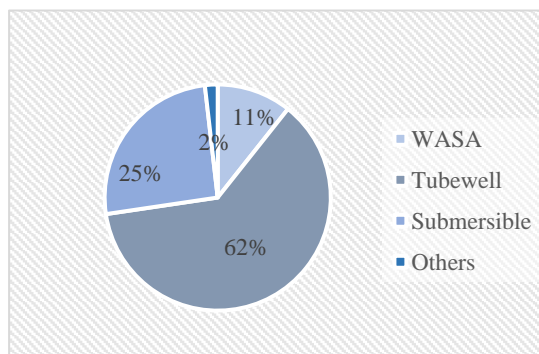


Figure 2. Drinking Water Sources

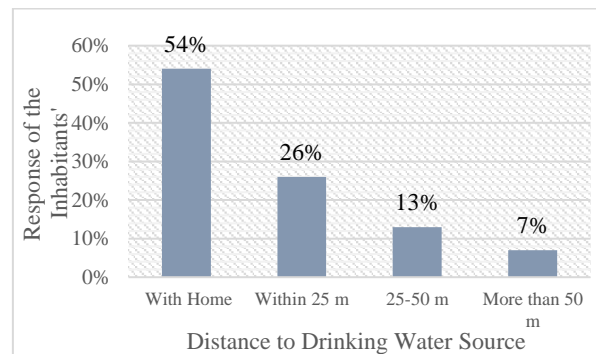


Figure 3. Drinking Water Collecting Distance

WASA is a very popular source of water for household activities in Rajshahi City Corporation. 81% of people in RCC use WASA water for their daily activities, while only 15% use water from submersible pumps. (See Figure

4) Due to the inadequate water supply in WASA, 38% of people claim that they face acute water shortage problems (See Figure 5). The insufficient water storage system and inconsistent water supply can be mentioned as the causes.

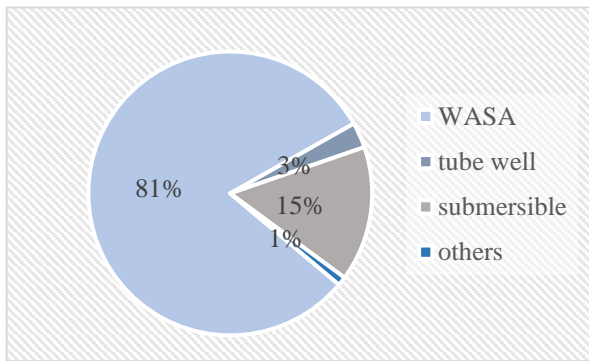


Figure 4. Water Sources of Household Use

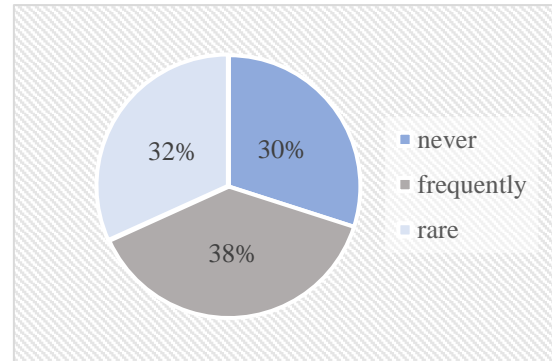


Figure 5. Water Shortage Experience

3.1.1 Zone-based Water Supply Condition

The analysis shows the zone-based comparison of drinking water. It is shown in every zone, people mostly rely on tube well. 35% of people in the city center with pucca households mostly use submersible pumps whereas only 12% of people in Eastern Fringe use these (See Figure 6)

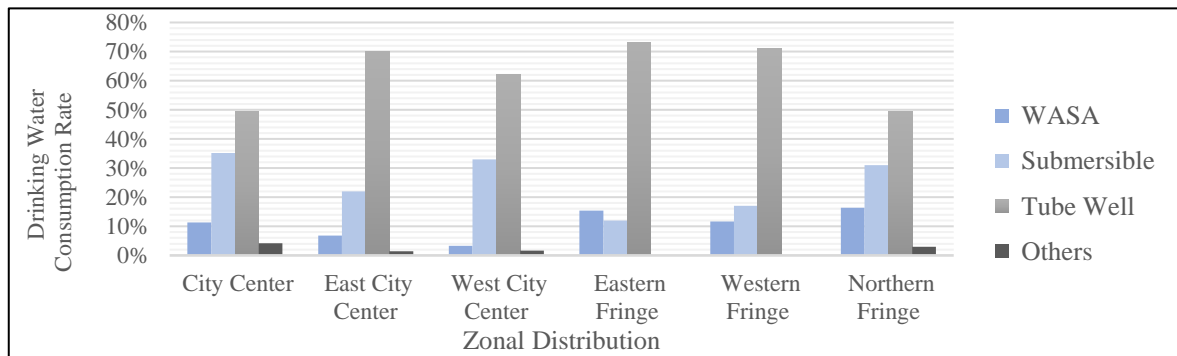


Figure 6. Zone-Based Drinking Water Source

For the concern of household activities, WASA is the main source for the people of all zone. The Western fringe has comparatively fewer water users about 73% from WASA and 12% tube-well water users. And the Eastern Fringe has only 2% of submersible users for household activities. (See Figure 7)

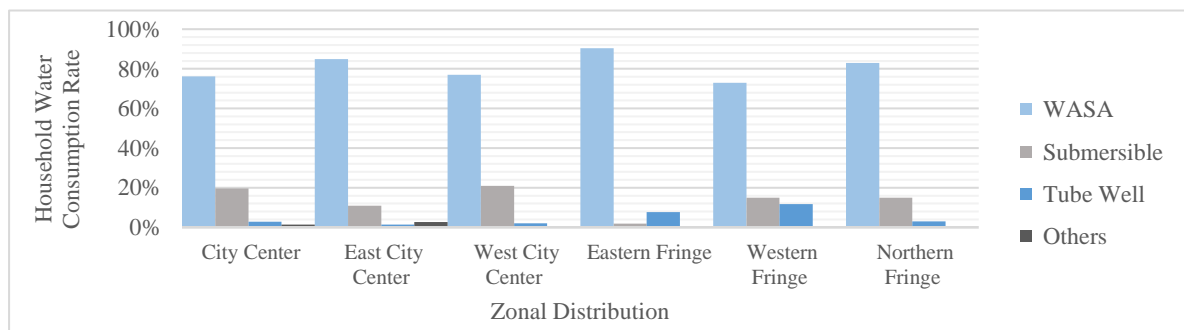


Figure 7. Zone-Based Household Water Source

The following analysis displays a comparison of water shortage experiences by zone. The Northern Fringe has faced a high-water shortage experience (52%) compared to the other zones whereas the acute water shortage problem is lowest in the city center. (See Figure 8)

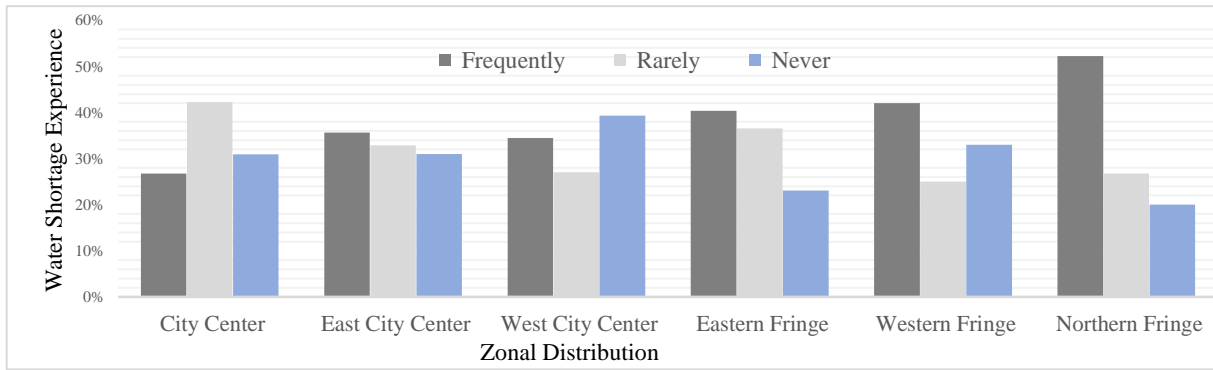


Figure 8. Zone-Based Water Shortage Experience

3.2 Analysis of Water-Related Problems

People believe that poor water quality is the root of the hair fall problem in 90.62% of cases. Because it smells unpleasant right away after collecting water from the reservoir, half of the respondents wait 30 minutes before collecting water (See Figure 9). The condition of the consumed water is not satisfactory. About 22% of people have faced waterborne diseases in recent times. Most of them have had diarrhea as a water-borne health problem (See Figure 10)

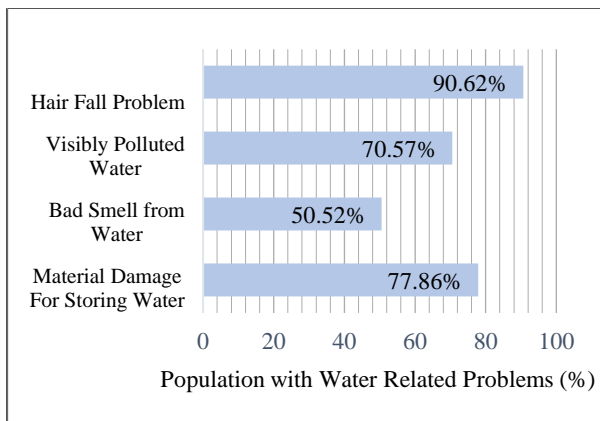


Figure 9. Water-Related Problems

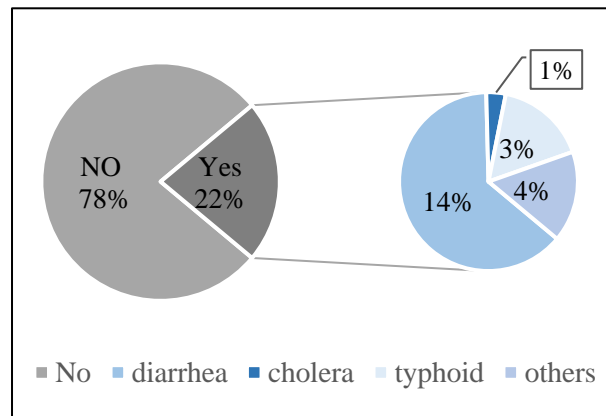


Figure 10. Percentage of Water-Related Diseases

3.2.1 Zone wise water Related Diseases

People of the Northern fringe are mostly affected by water, which indicates that water quality in the northern fringe is comparatively worse than in rest zones. On the other hand, people of the western fringe face fewer health issues due to water. (See Table 1)

Table 1. Zone-Based Water-Related Diseases

Name of Zone	Water Related Diseases (%)
City Center	28.17
East City Center	19.18
West City Center	22.95
Eastern Fringe	19.23
Western Fringe	16.67
Northern Fringe	28.36

3.3 Satisfaction with Water Supply

The people having submersible pumps are mostly satisfied with their water quality. On the other hand, users of WASA for consuming water seemed to be least satisfied. This indicates the deterioration of the water quality of WASA that causes dissatisfaction among people (See Table 2). The degree of satisfaction with the water supply is seen in Figure 11. Most individuals are moderately satisfied with the availability and quality of water supply.

About 26% of people are dissatisfied with the quality of water, while just 19% of people are satisfied with the water they consume (See Figure 11)

Table 2. Satisfaction With Water Source

Water Source	Average Satisfaction Rate (%)
Submersible Pump	84.69
Tube Well	69.75
WASA	56.1

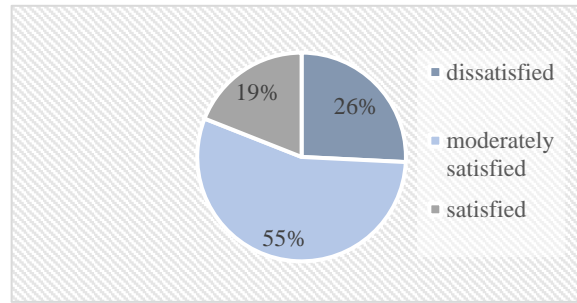


Figure 11. Overall satisfaction With Water Supply

3.3.1 Zone-wise Water Satisfaction

Analyzing the mean value of satisfaction, it is observed that People living in the City Centre are mostly satisfied. East City Center has almost same condition. On the contrary, Northern Fringe has the lowest mean value of satisfaction. People in that region are still pretty much dependent on WASA (See Table 3)

Table 3. Comparison of Satisfaction in Different Zone

Name of Zone	Mean Value of Satisfaction
City Center	1.04
East City Center	1.01
West City Center	0.97
Eastern Fringe	0.98
Western Fringe	0.82
Northern Fringe	0.76

4. Recommendation

The WASA water collection system must be improved. To ensure better-quality water, the government must take the appropriate actions. Unfiltered pipes need to be removed. Although a water supply at every door may not be feasible, safety is. There are some possible recommendations that may be helpful for further development of water facilities.

- WASA should follow techniques for refining water that are used in developed countries.
- Water from tube wells needs to have frequent laboratory testing. If the test yields a dangerous report, some form of water filtration will be required.
- The rainwater harvesting technique can be an alternative solution for avoiding water shortage as well as underground recharge.
- The quality of surface water should be monitored and controlled by the local authority.
- People should be aware of water conservation and use so that the wastage of water can be minimized.

5. Conclusion

Water is essential for life. Even though WASA has adequate water supply in almost all parts of the Rajshahi City Corporation, People who can afford it are using their water supply equipment. This reluctance to use WASA water shows the quality of water supplied by WASA. Its victims are always the underprivileged. Because they cannot afford to use their own water supply equipment like others. Since they have no other choice, they utilize the contaminated water that is provided, which is quite dangerous for their health. On the other hand, WASA shows no trace of monitoring or upkeep; they merely consistently raise their rates. The government has not yet implemented new technology in this field. If the city's water is not readily accessible with safety assurance, it cannot be perfect and self-sufficient.

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