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Assessment of Urban Water Supply and Sanitation: The Case of Bedesa Town, Damot Woyde Woreda of Wolaita Zone, Southern Ethiopia

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Abstract
This study was conducted in Bedesa town, Wolaita zone, southern Ethiopia to assess the water supply and sanitation situation of the town. For this study, 195 households were selected by using systematic random sampling technique. Both primary and secondary data sources were used in this study. For primary data collection, household surveys, key informant interview, focus group discussion and personal observation were used as tools to collect the necessary information. For secondary data collection, document review was used to collect valuable information. The data from the respondents were analyzed using SPSS software. The findings revealed that the average per capita domestic water consumption of the town was found to be 9.6 l/c/d for the base year (2014) which only satisfies 48% of the minimum urban water consumption value set by WHO as a basic need (20 l/c/d) without considering the distance travelled to fetch water. Similarly, sanitation situation in the town was not good and encouraging. Lack of private sanitary pit, poor hand washing practice, lack of communal land fill, improper handling and disposal of wastes and lack of drainage ditch were identified as the major factors responsible for poor sanitation situation of the town. The major coping strategies for the challenges of Bedesa town water supply are synchronizing different water sources, conserving water sources, demand management, demand oriented supply, participating different actors, mobilizing financial resources, and establishing organizational structure with skilled staff and equipping it with material facilities. Likewise, the strategies for managing sanitation challenges include constructing communal land fill, constructing drainage ditch, awareness creation on hand washing after defecation and waste handling and disposal method, and integrating water supply and sanitation sectors.
Keywords: Water supply, sanitation, hygiene, water demand, Bedesa.

1. Introduction

Water supply and sanitation are two of the most important sectors of development. Development of community water supply and sanitation results in improved social and economic conditions and improved health (Andrea, 2002). The provision of adequate supplies of potable water for use in urban areas in developing countries is crucial for the well-being of the people. The demand for such supplies in the developing countries has been increased over time as a result of rising standards of living that occur with economic progress and population increase resulting from natural growth, and rural urban migration and rising per capital income (Rewata and Sampath, 2000).

Inadequate access to clean drinking water directly or indirectly affects health. According to WHO, more than 80% of diseases in the world are attributed due to unsafe drinking water or to inadequate sanitation practices (WHO, 2003a). Global statistics estimate that currently the world is not on track to meet the MDG sanitation target, and 2.5 billion people still lack access to improved sanitation, including 1.2 billion who have no facilities at all particularly in Sub-Saharan Africa and Southern Asia (WHO/UNICEF, 2006).

In the world, 2 million children die each year because of lack of potable water and basic sanitation, and millions of women and young girls are forced to spend hours in fetching and carrying water. Sub-Saharan African countries are at the front of the water scarcity problem, one of which is Ethiopia despite the fact that the country has abundant ground water, major lakes, and large volumes of rainfall (UNDP, 2006).

Bedesa town has been experiencing the problem of adequate safe water supply and basic sanitation. The dwellers of this town are at the forefront to be affected by the problem of poor access to potable water and basic sanitation. In this town, the demand for water is fast outpacing its availability for consumption, and the supply of domestic water is seriously constrained by the rapid population growth in and around the town. That is, there is shortage and frequent interruption of water supply in the town. Moreover, poor hygienic practice, improper disposal of liquid and solid waste results in the outbreak of water and sanitation related diseases like diarrhea and typhoid in the town. As a result, the researcher initiated to conduct this study in this particular area to assess the water supply and sanitation situation of the town.

2. Research Methodology

Description of the Study Area

Bedesa town is found in Damot Woyde Woreda of Wolaita Zone, Southern Nations, Nationalities and Peoples' Regional State. It is the capital of the Damot Woyde Woreda. The town is about 160 kms far from the SNNPRS

capital, Hawassa, and about 376 kms south from the capital of Ethiopia, Addis Ababa. Bedesa is geographically located approximately in latitudes of 6°51′30″ and 6°54′0″N, and longitudes of 37°54′30″ and 37°57′0″ E. The altitude of the Damot Woyde Woreda where the study area located ranges from 1001 to 2500 m.a.s.l.

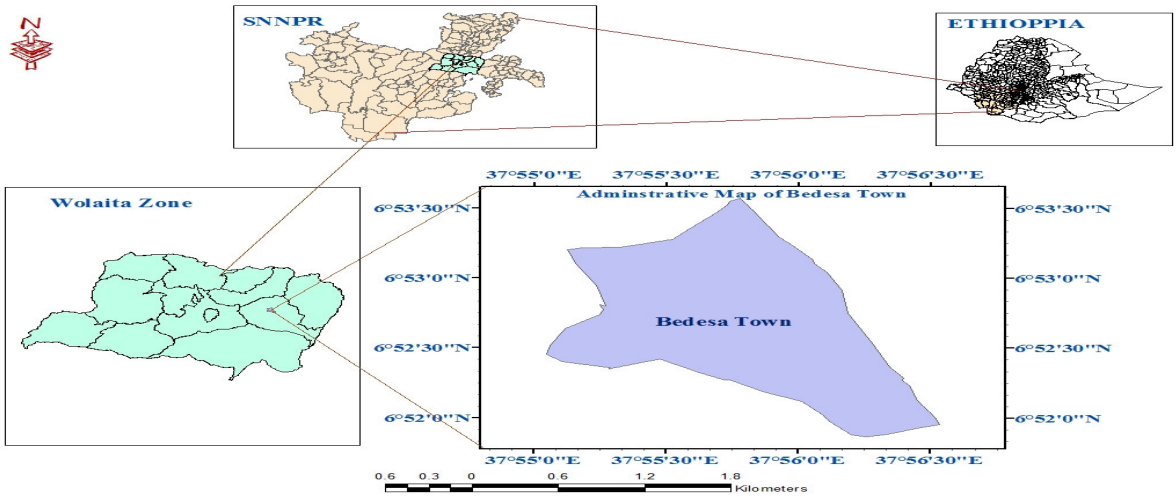

Figure 2.1. Location Map of the Study Area

Data Sources and Collection Methods

In order to achieve the stated objectives of the study, a combination of both primary and secondary data sources were used. The primary data were gathered through structured questionnaires administered to the households, focus group discussion and key informant interview. The secondary data were gathered from the available data sources such as census and survey reports, journals, internet as well as other published and unpublished documents.

Sampling Technique and Sample Size

Bedesa town has two administrative kebeles. In order to have the representative sample, both kebeles were selected for this study. In this study, both probability and non-probability sampling techniques were employed to draw the sample households, focus group discussants and key informants. Accordingly, the sample size of 195 households was selected using systematic random sampling technique from the total of 1136 households in the town.

Data Analysis

Statistical techniques were used to analyze the data obtained from the survey respondents. Accordingly, the statistical package for social science (SPSS) software was used to analyze the data obtained from household survey.

3. Results And Discussion

Assessment of Existing Water Supply System of Bedesa Town

The results presented in this section are based on interviews and annual reports of the water supply service office of the town. According to the annual report of Bedesa Town Water Supply Service Office, the current water production of the town was 35.856m^3/day while the current water demand of the town was found to be 68.020m^3/day. This implies that only 52.71% of water demand was met without considering the seasonal fluctuation of water supply. According to the Schwartz (2007), a well performing utility should be able to supply to its customers 100% of the water demand. In order to evaluate the potable water supply accessibility, the quantity of water consumed was used. To evaluate the quantity of water consumption, the annual water consumption was converted to average daily per capita consumption using the population data of Bedesa town (Table 3.1).

As shown in Table 4.1 below, the per capita domestic water consumption of Bedesa town was found to be 12.68 l/c/d in the year 2013. According to WHO (2008), the minimum quantity of domestic water required in urban areas of developing country is taken as 20 l/c/day within a radius of 0.5km. In this regard, the domestic water supply of Bedesa town satisfies about 63.4% of the standard value without considering the distance.

According to Wallingford HR (2003), a minimum quantity of 25 l/capita/day domestic water supply is categorized as basic level of service. With regard to this value, the current average domestic water consumption of Bedesa town only satisfies 50.72%.

Table 3.1 Annual Water Consumption of Bedesa Town (2008 to 2013)

Year	Population Number	Annual Consumption (m^3)	Per capita Consumption (l/c/d)
2008	5555	35953	17.73
2009	5823	35436	16.67
2010	6103	33714	15.13
2011	6396	32872	14.08
2012	6642	34039	14.04
2013	6961	32225	12.68

Source: BTWSSO, 2013

During household survey, data were collected on the quantity of water required and consumed by the consumers. As presented in Table 3.2, the survey result revealed that the average quantity of water required by the respondents was 25.34 l/c/d and the average amount of water consumed by the respondents was 9.6 l/c/d. This shows that households satisfied only 37.88% of their potable water requirement. Therefore, it can be concluded that the piped water supply system in the town was not adequate. The current production capacity is not able to meet the demand of water by the consumers.

Thus, it is advisable to develop the public preferred nearby source and supply sufficient water at a fair distance from households to improve the per capita water consumption of the town. This can be made by developing and improving the new alternative sources which were not currently used by the people of the town.

Table 3.2. The per capita water demand and consumption (l/c/d) by the sample households

	Per Capita Water Demand (l/c/d)	Per Capita Water Consumption (l/c/d)
Mean	25.34	9.6
Maximum	40	16.5
Minimum	10	1.67
Range	30	14.83
Variance	39.165	9.65
Standard Deviation	6.256	3.106

Potable Water Supply per Day

The survey result revealed that majority 95.4% of the respondents are not satisfied with the water supply while 4.6% of the respondents were satisfied with it. When asked about the reasons for un-satisfaction of the water they get, 87.3% said due to the low quantity of the water, 7.7% said they were unsatisfied due to low reliability of the scheme and only 5% of the respondents reported delay for maintenance. When asked about their alternative sources of water when pipe water supplied by water supply service was not available, 16.5% indicated that their other source is spring water, 10.5% said they derived water from neighboring houses while 73% bought water from water vendors as their alternative source.

The findings also revealed that water shortages are critical in the months of December to March. Majority of the respondents said that the amount of water supply does not meet their need throughout the year. This is true as the researcher during his field observation saw long queues of people, mostly women and children, searching for water in public taps and improved spring. This finding corresponds to the FRN (2000) estimation that currently only about 50% of the urban and 20% of the semi-urban population have access to reliable water supply of acceptable quality. Frequency of flow of water has been a major concern for the residents of Bedesa town. As the result indicated Table 3.3, water flows mainly on 1 day or maximum of 2 days in a week.

Table 3.3. Frequency of water supply in a week

Supply of water in a week	Frequency	Percentage
1 to 2 days	181	93
2 to 3 days	14	7
Total	195	100

Duration of Water Availability in a Day

It is a known fact that the period water is available to the customers in a day is an indicator of reliability of the water supply system which in turn has a significant bearing on consumer attitudes. A study carried out by Gulyani *et al.* (2005) indicated that service availability, apart from easy access, strongly influences household satisfaction. But, in the study area, water is available for limited time intervals. As a result, consumers were not satisfied with the duration of water availability in a day (Table 3.4).

Table 3.4. Duration of water availability in a day

Duration of water availability in a day	Frequency	Percentage
8 hours	179	92
10 hours	16	8
Total	195	100

On the issue of average distance travelled to collect potable water, 51.8% of the respondents said that the distance to their source of potable water is less than 100m, 34.9% said that it is between 101 and 500 m, 7.7% between 501 and 1000 m, while 5.6% said it is above 1000 m. According to WHO (2008), the minimum quantity of domestic water required in urban areas of developing country is taken as 20 l/c/day within the radius of 0.5km. Besides, MoWE (2011) indicated that an urban area should have an access of safe water supply (20 l/c/day) within a radius of 0.5km. But, in the study area, for 13.3% of the respondents, water was not accessible.

Sanitary and Hygienic Practices

In the study area, three types of latrines were commonly constructed: pit latrine with walls but without roof, pit latrine with closed wall and roof, and open pit latrine without house. On the average, 88.2% (179) of the households had latrines with a wall and roof; 6.7% (13) of the respondents had pit latrines with closed walls but without roof, 1.5% of the households had open pit latrines. The remaining 3.6% (3) of the households had latrines with bowls. The sanitation technologies are said to be improved if those sanitation facilities prevent humans, animals and insects from coming in contact with human excreta (UNICEF, 2008). However, such improved technologies have never been observed in the study area. The sanitation condition is not pleasing as some of the toilets are simply made of local materials (wood) without any facilities. As sanitation is highly linked to water supply, people in the community are suffering from sanitation problems. Therefore, lack of proper access to sanitation is the major cause of spreading diseases in Bedesa town which are harmful to human life. When asked about materials used for washing hands after defecation, majority 68.7% (134) of the respondents in the town were using water only, 17% (33) were using water and soap, 8.7% (17) were using water and ash, and 5.6% (11) were not using water at all for hand washing. The number of households who were not using water at all after defecation was small in the town.

Studies have documented that hand washing at critical times with soap reduce the risk of diarrheal diseases (Curtis and Cairncross, 2003). But, in contract to the finding of Curtis and Cairncross (2003), the finding of this study revealed that only 17% of the respondents washed their hands with soap and water. Good hygiene practices (especially hand-washing with soap after defecating and before preparing food, and safe disposal of children's faeces) prevent diarrhea (UNICEF, 2008). It has been reported that baby faeces that is not properly disposed might put household members at risk of diarrhea (Tumwine et al., 2003). Disposal of solid and liquid wastes in open field is a usual activity in the study area. During his stay in the study area, the researcher observed the people that were disposing wastes of different type in open field outside their houses. With regard to waste disposal, the focus group discussion result revealed that the households dispose the solid wastes in small sanitary pit and burn it as it dries; but, they dispose waste water on open field in their compound.

4. Conclusion and Recommendation

The current water production of the Bedesa town was 35.856m^3/day while the current water demand of the town was found to be 68.020m^3/day. This implies that only 52.71% of water demand was met without considering the seasonal fluctuation of water supply. The findings revealed that the average per capita domestic water consumption of the town was found to be 9.6l/c/d for the base year (2014) which only satisfies 48% of the minimum urban water consumption value set by WHO as a basic need (20 l/c/day). Findings revealed that nearly all of the people that have pipe-borne water in their houses are not satisfied with the water supply; therefore, the use of alternative sources of water is indispensable. Similarly, sanitation situation in the town was not good and encouraging. The finding revealed that lack of private sanitary pit, poor hand washing practice, lack of communal land fill, improper handling and disposal of wastes and lack of drainage ditch were identified as the major factors responsible for poor sanitation situation of the town. In general, the findings of this study revealed that Bedesa town was not provided with access to adequate water supply and basic sanitation. Therefore, it was recommended that the development of new sources and expansion of the existing sources should take place in order to meet increasing demand for water; there should be provision of alternative sources of water supply in strategic locations in the study area; to promote sanitation, regular inspection of private and public latrines, awareness creation on personal hygiene and environmental sanitation should be carried out by all concerned bodies and offices of the town; and further study should be carried out in order to discover and know the problems of water supply system and sanitation situation of the town.

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