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Water and Sanitation Problems in Virudhurnagar District with Special Reference to Sivakasi Taluk

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Abstract

In India, water becomes a valuable commodity on par with gold. The nation is among the most water-stressed in the world because it only possesses 4% of the world's water resources compared to its 18% population. India is the second most populous nation in the world, with 1.38 billion inhabitants. More than 6% of this population does not have access to clean water, while about 15% of Indians defecate in the open. Water-borne diseases, stunting, and death are mostly caused by a lack of toilets and domestic water connections. Millions of people in India and throughout the world are coping with the COVID-19 pandemic while also dealing with the additional hardship of not having access to clean water. More than ever, Indian families' health depends on having access to clean water. These elements—combined with the political pressure being applied to end the crisis—have heightened the urgency with which practical solutions to expand access to clean water and sanitary facilities must be put into place. A recent study by the government's policy think tank, the NITI Aayog, found that a significant portion of Indians experience high to extreme water stress. This difficulty is exacerbated by India's reliance on a monsoon that is becoming more unpredictable for its water needs. Even as the country experiences more floods and droughts, climate change is likely to make this pressure on water resources worse.The management of water resources, as well as the provision of clean water and sanitary facilities nationwide, are all areas in which the World Bank is active. Here are a few examples of how.

Keywords: Water, Sanitation, Hygienic Practices, Rural Areas, Urban Areas

Introduction

When water fails, functions of nature cease, you say: Thus When rain fails, no men can walk in "duty's ordered way". – Thirukkural 20

Water is a necessity for all human activity and is crucial to a nation's economic growth. There is no life on Earth if there is no water. A source of energy is water. Water is a renewable resource,

although it isn't always present in the natural world. The most valuable and fiercely fought resource is water. Water is more than just a physical resource; it is also intricately entwined with social, spiritual, political, and environmental meanings in every cultural setting. These meanings have a significant impact on water use patterns as well as on the interactions between water users and suppliers.

Importance of Water

One of the most vital elements on earth is water. For survival, all types of plants and animals require water. There wouldn't be any life on earth if there wasn't any water. Given that the human body contains 75% water and that the globe's surface is covered by two thirds water, it is obvious that water is one of the primary causes of life on earth. The same way that water circulates through the human body, it also does so through the ground, taking away waste while conveying nutrients and organic matter. It also controls the actions of tissues, cells, lymph, blood, and glandular secretions further inside the body.

An average adult's body stores 42 litres of water, thus even a little loss of 2.7 litres can cause dehydration, which manifests as irritation, weariness, anxiousness, weakness, and headaches before reaching a pathological state. In his book "Your body's many screams for water," Dr. F. Batmanghelidj provides a remarkable article on water and its crucial role in the health of a society that is "starved" of water. "Since the 'water' we drink provides for cell function and its volume requirements, the decrease in our daily water intake affects the efficiency of cell activity, resulting in chronic dehydration causes symptoms that equal disease," the author writes.Humans use water for a variety of purposes besides just drinking it to stay alive. These include maintaining clean homes and communities, engaging in recreation activities like swimming pools, maintaining plant life in gardens and parks, etc., as well as cooking, bathing their bodies, washing clothes, and washing utensils.

Water is used in the production of numerous goods and is necessary for the proper growth of livestock and agricultural crops. The cleanliness of the water that people consume and use for various purposes is crucial. This demands that the water be clean, clear, and devoid of contaminants (not cloudy) Cleaning water is defined as water that is fit for consumption. Chemicals and bacteria that cause disease can get into water systems. When this occurs, the water is contaminated or poisoned, and those who consume it or come into contact with it in other ways risk getting severely ill. Water sources are constantly tested for bacteria and other contaminants that could contaminate the water. Water is treated if it is unsafe to drink. Water treatment refers to all the steps taken to ensure that drinking water is clean.

- The human body requires air, water, and food in that order in order to function properly. The first thing we need to survive is oxygen. Since we cannot survive for more than a short period of time without oxygen. Given that we can go without drinking water for a short period of time, water has been ranked as the second most essential for life, right after oxygen. The food then follows.
- The human body is composed of two thirds water and one third solid. The water content of the average adult is between 55% and 75%. More than 80% of a human embryo is made up of water. 74% of a newborn baby is water.
- For our bodies, water is more essential than matter, and a 2:1 water-to-matter ratio should be maintained every day. Water is the force behind all bodily motion. The body's activity is accounted for by water to the tune of two thirds.

Statement of the Problem

There are numerous factors that affect the distribution of water between urban and rural areas. The supply and demand for water are vastly out of balance. People have the option to use some of their money to buy water from the market in order to make up for this deficit. It's challenging for the people. Both rural and urban communities frequently have sanitation issues. In rural areas, open defecation is a common occurrence. In addition, many people lack hygienic knowledge, which is harmful to their health.

Objectives

- The objectives of the present study are as follows.
- To determine the number of households with access to improved drinking water sources.
- To estimate the money spent on drinking water in the study area.
- To estimate the relationship between number of households and water demanded for various purposes.
- To identify the hygienic practices followed by the sample respondents
- To suggest measures pertaining to cleaning water and sanitation problems.

Hypotheses

To give a specific focus to the objectives, following hypotheses have been framed to test the above objectives by using appropriate statistical tools in the analysis chapter.

- There is no significant difference between the methods of water treatment used by rural and urban people.
- There is no significant difference between the habit of using toilet facilities at home by rural and urban people.

Sampling Frame

There are eight taluks in Virudhunagar district. Among the eight taluks, the researcher has selected one taluk by applying lottery method. Accordingly the selected taluk is Sivakasi. Sivakasi taluk consists of 54 panchayats, and two municipalities. Out of this 54 panchayats five panchayats are selected by adopting systematic sampling method. From each Panchayat, the researcher intended to select 25 respondents adopting systematic sampling technique. Totally the researcher has selected 125 respondents from the rural panchayats. From two municipalities, the researcher selected 40 respondents from each municipalities (Total 80 respondents). On the whole the total number of respondents taken for the study is 205. The selected panchayats are Anaiyoor, Thevarkulam, Enjar, Naranapuram and S.N. Puram. The Municipalities are Sivakasi and Thiruthangal.

Tools of Analysis

For the analysis of data and testing the hypotheses, the following statistical tools are applied.

- Percentage
- Chi- Square Test
- Correlation

Socio-Economic Characteristics of the Respondents

A few fundamental social traits of the sample respondents are necessary for any study focused on the household sector. In this sense, Table 1.1 accurately depicts the socioeconomic traits of the sample respondents, including age, sex, caste, religion, and educational attainment.

Table 1.1 Social Characteristics of the Respondents

Particulars	Classification / Particulars	No. of Respondents	%
Age	Below – 30	50	24.39
	30 – 40	75	36.59
	40 – 50	57	27.80
	50 – 60	22	10.73
	Above – 60	01	00.49
Sex	Male	123	60.00
	Female	82	40.00
Caste	BC	75	36.59
	MBC	52	25.36
	SC/ST	78	38.05
Religion	Hindu	174	84.88
	Christian	17	08.29
	Muslim	14	06.83
Educational Qualification	Illiterate	41	20.00
	Primary School	34	16.59
	Secondary School	63	30.73
	Hr. Sec School	40	19.51
	U.G	17	08.29
	P.G	06	02.93
	Diploma	04	01.95

Source: Survey Data

It is evident from Table 1.1 that, out of 205 respondents, 75 (36.59 per cent) respondents belong to the age group of 30 to 40 years. The remaining 57 (27.80 per cent), 50 (24.39 per cent), 22 (10.73 percent) and one (00.49 per cent) respondents are in the age group of 40 to 50 years, 20 to 30 years, 50 to 60 years and above 60 years respectively. Sex-wise classification of the sample respondents inferred that out 205 respondents, 123 (60.00 per cent) respondents are male and the remaining 82 (40.00 per cent) are female. A majority of the sample respondents are SC/ST i.e., out 205, 78 (38.05 per cent) respondents belong to Schedule Caste / Schedule Tribe community. Further, 174 (84.88 per cent) respondents, out of 205 are Hindus. Regarding educational qualification, out of 205, 63 (30.73 per cent) respondents are having Secondary school education, 41 (20.00 per cent) respondents have illiterate. The remaining 40 (19.51 per cent), 34 (16.59 per cent), 17 (08.29 per cent), six (02.93 per cent and four (01.95 per cent) respondents have higher secondary school education, Primary school education, U.G, P.G and others respectively.

Provision of Adequate Drinking Water and Water for Cleaning

One of the essential requirements of humanity is access to water. The local government should provide it to the populace. The researcher is interested in learning more about how to give individuals access to clean water for washing and drinking. As a result, the researcher gathered data, which is shown in Table 1.2.

Table 1.2 Provision of Adequate Drinking Water and Water for Cleaning

Village / Municipality	Drinking Water			Water for Cleaning		
	Yes	No	Total	Yes	No	Total
Thaverkulam	11	14	25	11	14	25
Naranapuram	8	17	25	17	08	25
S.N Puram	25	-	25	25	-	25
Anaiyoor	-	25	25	18	07	25
Enjar	25	-	25	25	-	25
Thiruthangal Municipality	22	18	40	24	16	40
Sivakasi Municipality	17	23	40	22	18	40
Total			205			205

Source: Survey Data

It is evident from Table 1.2 that out of 125 respondents in the rural areas, 69 respondents opined that adequate amount of drinking water is provided by the village authorities and the remaining 56 respondents informed that the village authorities are not supplying adequate amount of drinking water to the people. Further, out of 80 respondents in the urban area, 39 respondents revealed that the municipal authorities supply adequate drinking water and the remaining 41 respondents opined that the municipal authorities are not supplying adequate amount of drinking water and the drinking water needs are fulfilled by purchasing water from the market. Considering water for cleaning, out of 125 respondents in the rural areas, 96 respondents opined that the village authorities provide adequate amount of water for cleaning to the people and remaining 29 respondents said that the cleaning water supply in the villages are inadequate. Regarding urban areas 46 respondents, out of 80 respondents revealed that the water for cleaning supplied by the municipal authorities are adequate and the remaining 34 respondents opined that it is inadequate. From the above analysis, one can come to the conclusion that in Sivakasi block both in rural and urban areas, there is shortage of drinking water and water for cleaning. The problem is more in urban areas than in rural areas. Hence, both the village and municipal authorities should take efficient steps to provide adequate amount of water. Further, the water supplied by the authorities is not good for drinking. It should be changed by constructing common water treatment plant both in the rural and urban areas.

Sources of Drinking Water

Both in rural and urban areas, the researcher is looking for sources of potable water. As a result, the researcher gathered data, which is shown in Table 1.3.

Table 1.3 Sources of Drinking Water

Source	No. of Respondents in Rural	No. of Respondents in Urban
Bore well	06 (04.80)	02 (02.50)
Village / Town Pumps	69 (55.20)	39 (48.75)
Private Trucker	47 (37.60)	39 (48.75)
Hand Pumps With in the Town / Village	03 (02.40)	-
	125 (100)	80 (100)

Source: Survey Data

It is understood from Table 1.3 that, out of 125 respondents, in the rural areas, 69 (55.20 per cent) respondents informed that they take water from the village pump. Another six (04.80 per cent) respondents and three (02.40) respondents opined that they take water from their own bore well and using hand pumps in the village. The remaining 47 (37.60 per cent) respondents revealed that they purchase water from the private truckers by paying money. It is clear that in Sivakasi taluk many villages are facing drinking water problem and nearly 40 per cent of the village people in the taluk pay money for water. It is a pathetic condition. Hence, it should be removed. Considering urban areas, out of 80 respondents, 39 (48.75 per cent) and two (02.50per cent) opined that the drinking water is managed by using tap connection provided by the municipal authorities and using bore water respectively. The remaining 39 (48.75 per cent) respondents informed that, they meet out their drinking water by purchasing water from the water venders. It is concluded that 50 per cent of the water need by the people is fulfilled by the private venders. If we compaine both the rural and urban areas of Sivakasi taluk nearly about 45 per cent of the people purchase water from the private water venders by paying money.

Money Spent on Drinking Water

Water was formerly a free good, but today it is an economic good, so the researcher wants to estimate how much money the sample respondents paid to buy drinking water. Many residents of the study region buy water from a private water vending machine. Consequently, the researcher gathered data on drinking water demand, cost, etc., and approximated the money spent by the sample respondents. The resulting information is shown in Table 1.4.

Table 1.4 Money Spent on Drinking Water

No. of pot of Water Demanded per day (18 litre)	No. of Respodents	Price Per Pot (Rs.)	Total Money Spent per day (Rs.)	Total Money Spent per Month (Rs.)
One	22	6	132	3960
Two	33	6	396	11880
Three	31	6	558	16740
Total	**86**		**1086**	**32580**

Source: Survey Data

It is understood from Table 1.4 that, Out of 205 respondents (both rural and urban combined), 86 respondents purchase water from the private water venders. The remaining is using the water supplied by the local authorities for drinking. Out of this 86, one pot of water (18 litre) demanded by 22 respondents and spent Rs.66 per day and Rs.1980 per month. Two pots of water per day are demanded by the respondents and spent Rs. 198 per day and Rs.5940 per month. The remaining 31 respondents are demanding three pots of water per day and spent Rs.279 per day and Rs.8370 per month. The total money spent by the respondents for drinking water per day is Rs.543 and Rs.16290 per month.

Total Water Demanded in the Study Area

The goal of the study was to estimate the overall water consumption of the sample of respondents. Accordingly, the researcher estimated how much water the respondents would need for various purposes, and Table 1.5 shows this estimate.

Table 1.5 Total Water Demanded in the Study Area (litre per day)

S. No	Purposes	Rural	Urban
1.	Drinking	9420	5872
2.	Cooking	5890	3213
3.	Bathing	44930	29216
4.	Cleaning Utensils	13925	9741
5.	Sanitation Services (Washing Cloths and House Cleaning)	74640	53440
Total		**148805**	**101482**

Source: Survey Data

Total water demanded by the sample respondents in the study area is clearly explained in Table 1.5 In the rural areas, the total water demanded by the sample respondents is 148805 litre per day. Out of this, 74640 litre of water is demanded for sanitation services. For bathing, the water demanded is estimated as 44930 litre per day. Further, for drinking, cooking and cleaning utensils, the water demanded by the respondents are 9420 litre, 5890 litre and 13925 litre per day respectively. Considering urban areas, the total water demanded by the sample respondents is 101482 litre per day. Out of this, 53440 litre of water is demanded for sanitation services. For bathing, the water demand is estimated as 29213 litre per day. Further, for drinking, cooking and cleaning utensils, the water demanded by the respondents are 5872 litre, 3213 litre and 9741 litre per day respectively.

Relationship between the Number of Family Members and Water Demanded

The association between the number of household members and the amount of water required for drinking, cooking, bathing, cleaning utensils, and sanitation services in the study region was determined by the researcher using correlation analysis, as shown in Table 1.6.

Table 1.6 Relationship between the Number of Family Members and Water Demanded

S. No	Correlation with Number of Family Members	Rural	Urban
1.	Drinking water Demand	0.370*	0.592*
2.	Cooking Water Demand	0.350*	0.663*
3.	Bathing Water Demand	0.722*	0.611*
4.	Utensils Cleaning water Demand	0.314*	0.244*
5.	Sanitation Services Water Demand	0.494*	0.115*

* Correlation is significant at the 0.01 level (2-tailed).

From Table 1.6, it is inferred that there is a positive correlation between all the variables. So, the increasing water need mainly depends upon the size of the family members in general and particular in the study area. The correlation between number of family members and their water demand for bathing is 0.722 in rural areas and for urban areas, it is 0.611. By comparing rural and urban water need for bathing is more in rural areas than in urban areas. Considering cooking water demand, the value for urban areas is 0.663 and for rural is 0.350 the reason behind this is in the urban areas people cook food more than one time. Regarding drinking water need, the correlation value is high (0.592) in urban areas than in rural areas (0.370).

Testing of Hypothesis

Ho: There is no significant difference between the methods of water treatment used by rural and urban people. To check the hypothesis, chi-square is used and the result is given in Table 1.7.

Table 1.7 Chi-square Result

Calculated value x2	Table value x 2
28.17	3.84*

* 5 per cent level of significance

From Table 1.7, it is observed that the calculated value of chi-square (28.17) is more than the table value (3.84). Therefore null hypothesis is rejected. Hence, one can conclude that there is a significant difference between the methods of water treatment used by rural and urban people.

Methods of Water Treatment

The researcher wants understand the methods of treatment followed by the sample respondents in the study area. Accordingly, the researcher collected information and the same is picturised in Table 1.8.

Table 1.8 Methods of Water Treatment

S. No.	Method	No. of Respondents in Rural	No. of respodents in Urban
1.	Boiling	21 (16.80)	31 (38.75)
2.	Sleeve Through Cloth	06 (04.80)	12 (15.00)
3.	Water Filter	02 (01.60)	05 (06.25)
4.	No Treatment	96 (76.80)	32 (40.00)
Total		**125 (100)**	**80 (100)**

Source: Survey Data

* Values in parentheses are percentage to total

Table 1.8 clearly depicts the methods of water treatment followed by the sample respondents in study area. Out of 125 respondents in the rural areas, 21 (16.80 per cent) respondents boil the water, before drinking. Another six (04.80 per cent) and two (01.60) respondents follow Slieve through cloth and water filter respectively. Considering urban areas, out of 80 respondents, 31 (38.75 per cent) respondents boil the water and 12 (15.00 per cent) and five (06.25 per cent) respondents follow Slieve through cloth and water filter respectively. Boiling of water is the best treatment of water. By combining rural and urban, only ¼th of the people drink boiled water. It should be extended to all people.

Toilet Facility

Many people in rural India continue to practise open defecation. Utilizing the restroom is one of the sanitary activities. In this regard, the researcher gathered data, which is displayed in Table 1.9.

Table 1.9 Toilet Facility

S. No	Particulars	No. of Respondents in Rural	No. of Respondents in Urban
1.	Yes	63 (50.40)	42 (52.50)
2.	No	62 (49.60)	38 (47.50)
Total		**125 (100)**	**80 (100)**

Source: Survey Data
* Values in parentheses are percentage to total

It is evident from Table 1.9 that out of 125 respondents in the rural areas, only 63 (50.40 per cent) respondents own toilets in their houses and the remaining 62 (49.60 per cent) respondents are not having toilet facilities in their houses. It means, nearly 50 per cent of the people in the rural areas follow open defecation practices. Further, due to the introduction of Bharath Nirmal Yojana Programme, only the said 50 per cent of the people constructed toilets, otherwise open defecation is common in rural areas. Hence, this programme should be further enlarged and make zero per cent open defecation in the rural areas. Considering urban areas, out of 80 respondents, 42 (52.50 per cent) respondents have toilets in their houses and the remaining 38 (47.50 per cent) respondents said no toilet facilities in their houses. Out of this, 47.50 per cent, a majority of them use public toilet facilities provided by the municipal authorities. On the while, only 50 per cent of the people are having access to toilet facilities and the remaining 50 per cent are not having access. It should be changed by introducing some special programmes like Bharath Nirmal Yojana, provide financial assistance and motivate the people to construct and use toilet facilities to defecate.

Testing of Hypothesis

H_o: There is no significant difference between the habit of using toilet facilities at home by rural and urban people. To check the hypothesis, chi-square is used and the result is given in Table 1.10.

Table 1.10 Chi-square Result

Calculated value 2	Table value 2
0.09	3.84*

* 5 per cent level of significance

It is clear from Table 1.10 the calculated value of chi-square (0.9) is less than the table value (3.84). Therefore, the null hypothesis is accepted. Hence, one can conclude that there is no significant difference between the habit of using toilet facilities at home by rural and urban people.

Sources of Defecation by the Non-Toilet Holders in the Study Area

In the study area, the researcher wants to identify some instances of non-toilet users defecating. As a result, the researcher gathered data, which is shown in Table 1.11

Table 1.11 Sources of Defecation by the Non-toilet Holders in the Study Area

S. No.	Particulars	No. of Respondents in Rural	No. of Respondents in Urban
1.	Open Space	47 (75.80)	12 (31.60)
2.	Public Latrine	12 (19.30)	20 (52.60)
3.	Common Latrine For Compound Houses	03 (04.90)	06 (15.80)
Total		62 (100)	38 (100)

Source: Survey Data * Values in parentheses are percentage to total

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Table 1.11 explores the sources of defecation by the non – toilet holders in the study area. Out of 62 respondents, 47 (75.80 per cent) respondents follow the practice of open defecation in the rural areas. Another 12 (19.30 per cent) and three (04.90 per cent) respondents use public latrine and sharing latrine by other houses, because they are in the compound houses there they have common latrine respectively. Sharing of common latrine and using public toilets will cause many health problems. Hence, the health authorities should motivate the people to construct latrines in their houses and the State authorities should try to achieve 100 per cent access to toilet facilities by the people. Considering urban areas, out of 38 respondents, 12 (31.60 per cent) respondents use open space for defecation. The remaining 20 (50.60 per cent) and six (15.80 per cent) respondents use public toilets and sharing toilets with others.

Hand Washing Habits of the Sample Respondents

Regular hand washing is beneficial to your health. Many infections are controlled by proper hand washing. In this regard, data on the hand-washing habits of the sample respondents in the study area were gathered by the researcher and are displayed in Table 1.12.

Table 1.12 Hand Washing Habits of the Sample Respondents

S. No.	Particulars	No. of Respondents in Rural	No. of Respodents in Urban
1.	When going out of toilet	125	80
2.	Before and after cleaning infant Feces	125	80
3.	Before and after feeding an infant	22	46
4.	After dealing with animals	27	67
5.	Before and after Cooking	09	54
6.	Before and after Eating	125	80
7.	When using contaminated materials	46	67

Source: Survey Data

Table 1.12 explains the opinion of the sample respondents towards hand washing practices. Cent per cent of the sample respondents in the rural as well as urban areas opined that they wash their hands when going out of toilet, before and after cleaning infant fees and before and after eating. Only 22, 27, 46 and nine respondents in the rural areas opined that they wash their hands before and after feeling an infant, after dealing with animals, when using contaminated materials and before and after cooking respectively. In the urban areas, 46, 67, 53 and 67 respondents are of the opinion that, they wash their hands before and after feeling an infant, after dealing with animals, before and after cooking and when using contaminated materials respectively. Hand washing awareness and practices are better in among people of urban areas than in rural areas. Hence, awareness campaign should be organized in the rural areas.

Suggestions

Based on the findings of the study, the following suggestions are provided pertaining to cleaning water and sanitation problems in the study area.

- Various departments of the State and Central Governments, Trade Unions and Voluntary Organizations should organize seminars, conferences, workshops and such other activities to create the awareness of the evil effects of consumption of contaminated water.
- Either the village authorities or the State Government should take efficient steps to collect water from all the houses in the villages and send the water to a common village rain water harvesting pit.
- The Government should take necessary steps to establish water purification plant in each and every village.
- The "AMMA MINERAL WATER SCHEME" should be extended in rural areas also.
- The municipal authorities should take steps to construct rain water harvesting facilities in each and every house.
- Both in rural and urban areas, people are not giving importance to clean the water containers. This should be changed by creating awareness among the people in rural and urban areas.
- By combining rural and urban, only ¼th of the people drink boiled water. It should be extended to all the people.
- Bharath Nirmal Yojana Programme should be extended and make zero per cent open defecation in the rural areas.
- The health authorities should motivate the people to construct latrines in their houses and the State authorities should try to achieve 100 per cent access to toilet facilities by the people.

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