Impact of water quality on the health of households in Tiruvallur district – An empirical study

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ABSTRACT:

Clean and accessible water is an essential requirement for every human being in the world. There is enough fresh water available on earth to fulfil this human requirement. However, due to poor governance or lack of proper infrastructure, thousands of Indians including children die every year from diseases associated with inadequate water supply and poor water quality. The United Nations millennium sustainable development goal of ensuring clean water and sanitation for all tells us that even in this era not everyone in the world are getting quality water despite so much advancement in cleaning and purification technology for getting clean and pure water. This empirical study attempts to understand the role of the quality of water on the health of the households in Tiruvallur district. A descriptive study was made and the primary data was collected through a questionnaire. The collected data was tabulated and analysed through SPSS software. The findings of the study revealed that the quality of water had an impact on the health of the respondent's households.

Keywords: Quality of water, Source of water, Cleaning and purification, Quantity of water, Frequency of illness and Health.

INTRODUCTION:

Water the elixir of life without which the life on earth cannot be sustained, plays a crucial role in the health of every living being. Water is an important component of our body, hence it makes sense that the quality of the water is as important as the quantity. Therefore, the drinking water should always be clean and free of contaminants to ensure proper health.

According to the United Nations report water scarcity has affected nearly 40% of the world's population and that around 663 million people are unable access improved drinking water

NEED FOR THE STUDY:

The quality of water, used for drinking, or domestic purposes, has an important impact on health. Poor quality water can cause outbreak of diseases and it can contribute to further manifestation of diseases themselves on different time scales. Initiatives to improve the quality of water not only supports public health, promotes socioeconomic development and human well-being as well.

According to the United Nations report water scarcity has affected nearly 40% of the world's population and that around 663 million people are unable access improved drinking water.

To improve access to drinking water, there needs to be increased investment in management of freshwater ecosystems on a local level in developing countries like India

This study was done to understand the burden of disease attributable to unsafe drinking-water, identify its sources, the cleaning and purification process followed by the households in Tiruvallur District.

OBJECTIVES OF THE STUDY:

1. To evaluate the impact of main source of water on the frequency of family members' falling sick
2. Estimate the family size and amount of money spent on drinking water per day
3. To understand the association between Methods used for cleaning and purifying water and family members affected with diarrhoea
4. To study the difference between the method used for filtering and purifying the water and the family members suffering with typhoid
5. To understand the difference between the family size and the sufficiency of water supplied by the municipality.

RESEARCH METHODOLOGY:

The Aim of this research is to study the impact of water quality on health of the households in Tiruvallur district. Descriptive research design was adopted, the study was done on a sample of 103 respondents, both primary and secondary data sources were used, primary data was collected through a questionnaire/interview schedule using judgemental sampling technique. The collected data was tabulated and analysed with the SPSS software. And the findings of the study along with suggestions for future scope were also presented. The data collected was presents in the form of tables and charts. The tools used for data analysis were Chi square test and one-way ANOVA.

LITERATURE REVIEW

Lorna Fewtrell, et al 2005 examined articles with specific measurement of diarrhoea morbidity as a health outcome in non-outbreak conditions. All of the interventions studied were found to reduce significantly the risks of diarrhoeal illness. Most of the interventions had a similar degree of impact on diarrhoeal illness, with the relative risk estimates from the overall meta-analyses ranging between 0·63 and 0·75. The results generally agree with those from previous reviews, but water quality interventions (point-of-use water treatment) were found to be more effective than previously thought,

Annette Pruss-Ustun, et al 2014 this study attempts to estimate the burden of diarrhoeal diseases from exposure to inadequate water, sanitation and hand hygiene in low- and middle-income settings and provide an overview of the impact on other diseases.

This estimate confirms the importance of improving water and sanitation in low- and

middle-income settings for the prevention of diarrhoeal disease burden. It also underscores the need for better data on exposure and risk reductions that can be achieved with provision of reliable piped water, community sewage with treatment and hand hygiene.

Prüss et al 2002;.Murray 2002; and Lopez, 1996a)The World Health Organization (WHO) carried out an assessment of the global disease burden from unsafe water, sanitation and hygiene, as part of a larger initiative to assess the impact of 25 risk factors in a standardized manner. It also commissioned systematic literature reviews of the fraction of the estimated burden of four water-associated vector-borne diseases that can be attributed to water resources development.

Annette Prüss,2002, Estimating the Burden of Disease from Water, Sanitation, and Hygiene at a Global Level. 107 major diseases and 10 risk factors at global and regional levels, using an internally consistent approach (1). Estimates were reported in summary measures of population health combining mortality and morbidity, in terms of the disability-adjusted life year (DALY). This significant and avoidable burden suggests that it should be a priority for public health policy.

Guy Howard et al 2003 The quantity of water delivered and used for households is an important aspect of domestic water supplies, which influences hygiene and therefore public health. To date, WHO has not provided guidance on the quantity of domestic water that is required to promote good health. This paper reviews the requirements for water for health-related purposes to derive a figure of an acceptable minimum to meet the needs for consumption (hydration and food preparation) and basic hygiene. Accessibility can be categorised in terms of service level.

TABULATION OF COLLECTED DATA:

Table 1 Showing Gender of the respondents

Gender	Frequency	Percent
Male	64	62.1
Female	39	37.9
Total	103	100
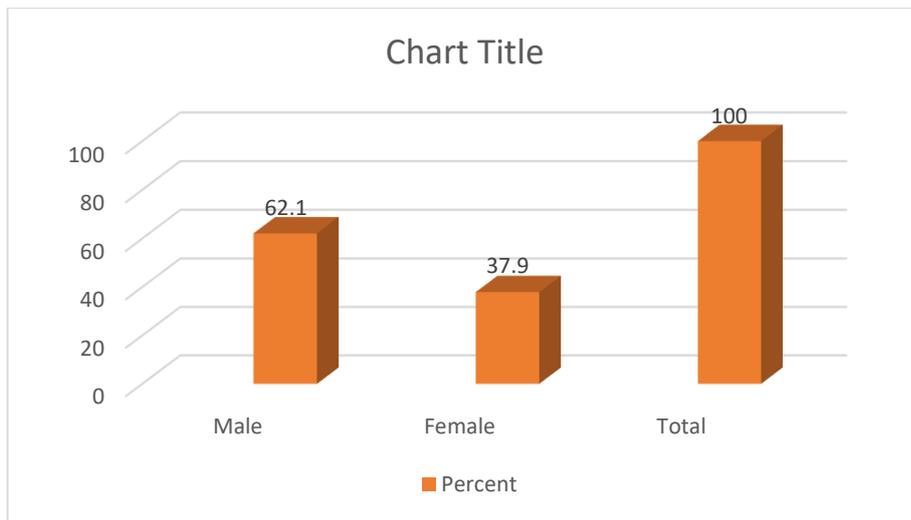
Interpretation: table 1 shows that 62% of respondents are males and 37.9% of respondents are females.

Table 2 Showing Occupation of Respondents

| Occupation	Frequency	Percent
daily labour	16	15.5
employment- private	59	57.3
employment - Government	12	11.7
Business	16	15.5
Total	103	100
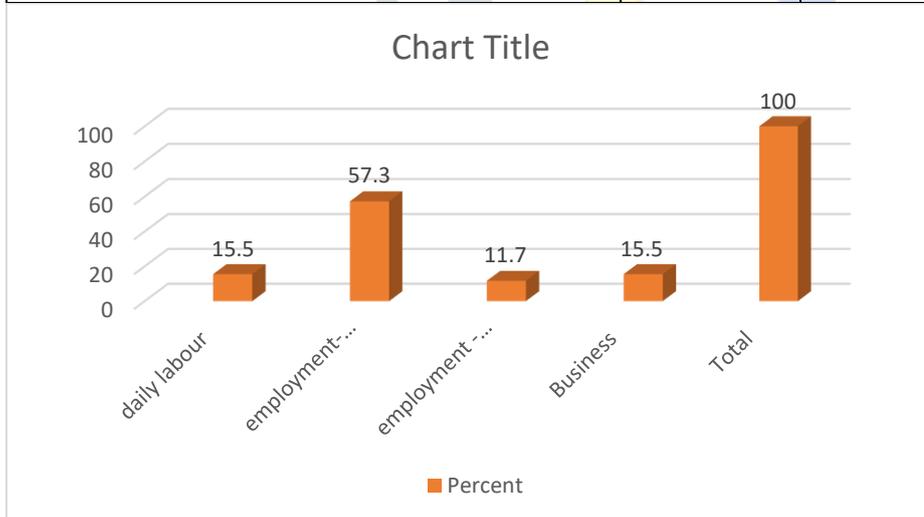
Interpretation: Table 2 shows that 57.3% of respondents are in private employment,15.5% are daily labour.15.5% are doing business and 11.7% are employed in the Government.

Table 3 showing household status of the respondents

| Household status	Frequency	Percent
Owned	28	27.2
Rented	68	66

provided by the employer	7	6.8
Total	103	100
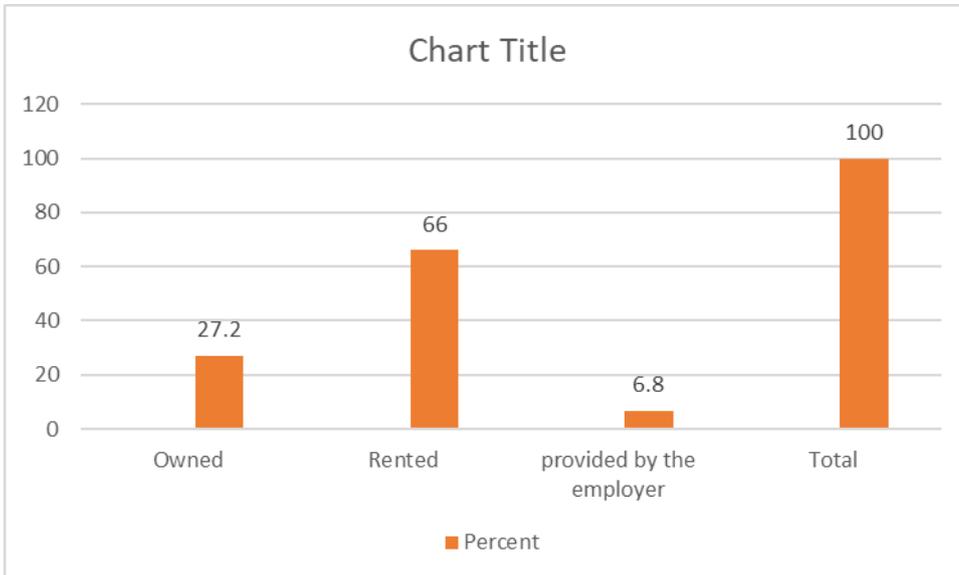
Interpretation: Table 3 shows that 66% of respondents are in rented house, 27.2% are in owned house and 6.8% are in the house provided by the employer.

**Table 4. Showing spending made by households on drinking water**

Spending on drinking water	Frequency	Percent
Rs. 10-30	55	53.4
Rs. 31- 50	44	42.7
Rs. 51-100	4	3.9
Total	103	100
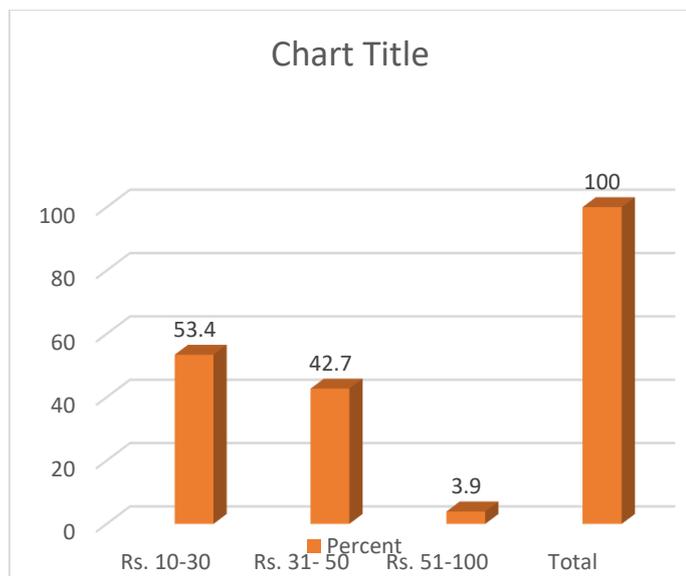
Interpretation: table 4 shoes that 53.4% of respondents spend Rs10-30, 42.7%spend Rs 31-50 and 3.9% spend Rs 51-100 on their daily water consumption

Table 5 Showing Duration of water supplied by the municipality

Hours of water supply from municipality	Frequency	Percent
1-2 hours	48	46.6
3-4 hours	55	53.4
Total	103	100
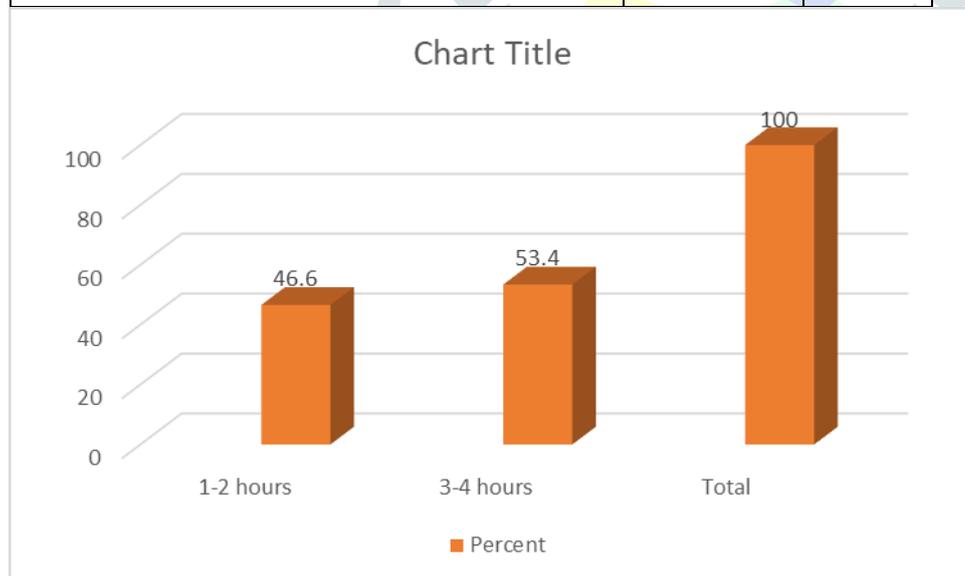
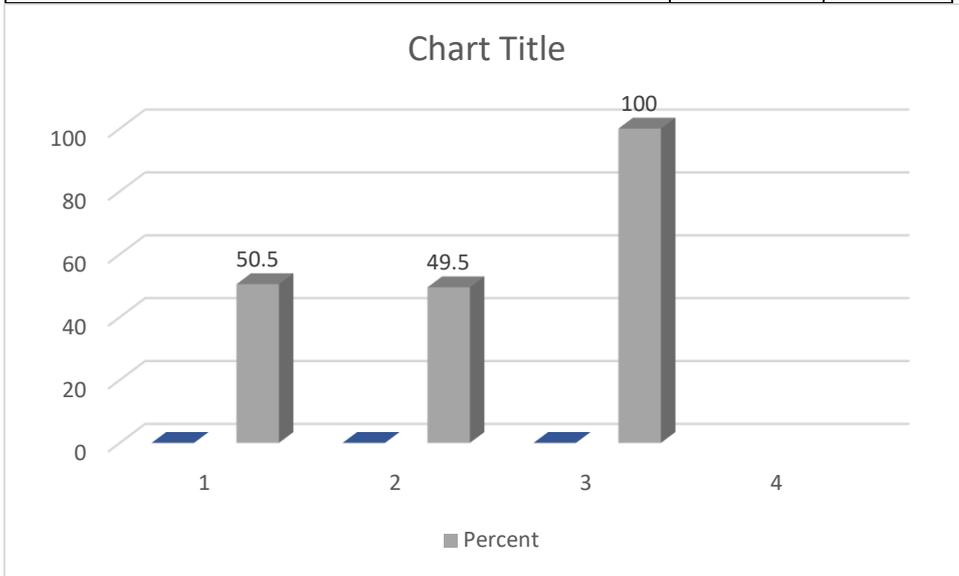Interpretation: Table 5 shows that 53.4% of respondents have stated that they get water supply for 3-4 hours in a day and 46.6% of respondents state that they get water supply for only 1-2 hours in a day

Table 6. Showing the respondents sufficiency of water supplied for their daily needs

Sufficiency of water supplied for daily needs	Frequency	Percent
sufficient	52	50.5

insufficient	51	49.5
Total	103	100

Interpretation: table 6 shows that 50.5% of respondents state that the water supplied by the municipality is sufficient and 49.5% of respondents state that it is insufficient.

DATA ANALYSIS

Chi Square Test

Null Hypotheses (Ho)– there is no significant association between Methods used for cleaning and purifying water and family members affected with diarrhoea

Alternate Hypotheses (H_A) – there is significant association between Methods used for cleaning and purifying water and family members affected with diarrhoea

Method used for cleaning and drinking water * family members affected with diarrhoea recently

Crosstabulation			Family member affected with diarrhoea recently				Total
			child	adult	elder member	none	
MethodS used for cleaning and drinking water	manual filtering	Count	39	4	12	8	63
		Expected Count	41.0	4.9	9.8	7.3	63.0
	using water purifiers	Count	28	4	4	0	36
		Expected Count	23.4	2.8	5.6	4.2	36.0
	boiling and using	Count	0	0	0	4	4
		Expected Count	2.6	.3	.6	.5	4.0
Total		Count	67	8	16	12	103
		Expected Count	67.0	8.0	16.0	12.0	103.0

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	37.215a	6	0
Likelihood Ratio	28.187	6	0
Linear-by-Linear Association	0.31	1	0.578
N of Valid Cases	103		
a 7 cells (58.3%) have expected count less than 5. The minimum expected count is .31.			

Inference: Since the p value is less than 0.5 the null hypotheses is rejected and alternate hypotheses is accepted

Interpretation: The analysis shows that the methods used for cleaning and filtering water has an effect on respondents getting affected with diarrhoea.

One Way Anova

Null hypotheses (H_0) There is no significant difference between the method used for filtering and purifying the water and the family members suffering with typhoid.

Alternate hypotheses (H_A) There is significant difference between the method used for filtering and purifying the water and the family members suffering with typhoid

ANOVA

Family member suffered with typhoid recently

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.994	2	3.997	3.930	.023
Within Groups	101.714	100	1.017		
Total	109.709	102			

Inference: Since the P value is less than 0.05 the null hypothesis is rejected and alternate hypotheses is accepted

Interpretation: The difference in the method used for filtering and purifying the water influences the family members suffering with typhoid.

One Way Anova

Null hypotheses (H_0) There is no significant difference between the family size and the sufficiency of water supplied by the municipality.

Alternate hypotheses (H_A) There is significant difference between the the family size and the sufficiency of water supplied by the municipality.

ANOVA

The water supplied sufficient for daily needs

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.336	2	1.168	4.990	.009
Within Groups	23.411	100	.234		
Total	25.748	102			

Inference: Since the P value is less than 0.05 the null hypothesis is rejected and alternate hypotheses is accepted

Interpretation: The difference in family size has influence on the respondents feeling of sufficiency with the water supplied by the municipality.

Chi square Test

Null Hypotheses (Ho)– there is no significant association between main source of water and the frequency of family members' falling sick

Hypotheses (H_A)– there is significant association between main source of water and the frequency of family members' falling sick

Main source of water * how frequently the members of the family fall sick Crosstabulation

			How frequently the members of the family fall sick				
			once in a week	once in two weeks	once in a month	once in three months	Total
Main source of water	municipality water connection inside the house	Count	0	4	4	0	8
		Expected Count	.3	1.8	5.0	.9	8.0
	municipality tap in the street	Count	0	11	56	12	79
		Expected Count	3.1	17.6	49.1	9.2	79.0

	borewell water	Count	4	4	4	0	12
		Expected Count	.5	2.7	7.5	1.4	12.0
	well water	Count	0	4	0	0	4
		Expected Count	.2	.9	2.5	.5	4.0
Total		Count	4	23	64	12	103
		Expected Count	4.0	23.0	64.0	12.0	103.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	55.929[a]	9	.000
Likelihood Ratio	42.857	9	.000
Linear-by-Linear Association	11.796	1	.001
N of Valid Cases	103		

Inference: Since the P value is less than 0.05 the null hypothesis is rejected and alternate hypotheses is accepted

Interpretation: The difference in source of water has influence on the family members falling sick frequently.

SUMMARY OF FINDINGS

62% of respondents are males

57.3% of respondents are in private employment

66% of respondents are in rented house

53.4% of respondents spend Rs10-30

53.4% of respondents have stated that they get water supply for 3-4 hours in a day and 46.6% of respondents state that they get water supply for only 1-2 hours in a day

50.5% of respondents state that the water supplied by the municipality is sufficient and 49.5% of respondents state that it is insufficient.

FINDINGS FROM DATA ANALYSIS

Chi square test revealed that the methods used for cleaning and filtering water has an effect on respondents getting affected with diarrhoea.

One-way ANOVA revealed that the difference in the method used for filtering and purifying the water influences the family members suffering with typhoid**.**

One-way ANOVA revealed that the difference in family size has influence on the respondents feeling of sufficiency with the water supplied by the municipality**.**

Chi square test revealed that the difference in source of water has influence on the family members falling sick frequently.

CONCLUSION

The findings of the study clearly indicate that there is a strong association between the quality of water and the health of the members of the household interviewed. Hence intensive awareness programs on filtering and purifying water may be taken up to make people follow the above process for purifying their drinking water. The study has revealed that there is an association between main source of drinking water with respondent's family members falling ill frequently. Also, non-purified or non-filtered water has shown as a cause for diarrhoea or typhoid among the family members of the respondents. The size of the family is also a significant determinant for the felt sufficiency of drinking water supplied by the municipality. The study also leaves scope for quality and quantity of domestic water and its impact on the health and hygiene of the households in Tiruvallur district.

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