



Original Research Article

COMPARATIVE STUDY ON WATER, SANITATION AND HYGIENE (WASH) PRACTICES AMONG URBAN AND RURAL HOUSEHOLDS IN THE FIELD PRACTICE AREA OF TERTIARY CARE INSTITUTE

Kethana Poola¹, H. Hemachandra², M.K. Sasikala³, Sunita. Sreegiri⁴

¹Postgraduate, Department of Community Medicine, Sri Venkateswara Medical College, Tirupati, Andhra Pradesh, India

²Assistant Professor, Department of Community Medicine, Sri Venkateswara Medical College, Tirupati, Andhra Pradesh, India

³Assistant Professor, Department of Community Medicine, Sri Venkateswara Medical College, Tirupati, Andhra Pradesh, India

⁴Professor and HOD, Department of Community Medicine, Sri Venkateswara Medical College, Tirupati, Andhra Pradesh, India

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Corresponding Author:

Dr. Kethana Poola,
Department of Community Medicine,
Sri Venkateswara Medical College,
Tirupati, Andhra Pradesh, India.
Email: drkethanaofficial.1999@gmail.com

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ABSTRACT

Background: Safe WASH practices are important for the health and well-being of humans, contributes to healthy nutrition and helps to live in healthy environments. As per WHO, the burden of illness associated with WASH accounts for 4.0% of all fatalities and 5.7% of total disease burden across worldwide and 7.5% of all mortality in India. Appropriate WASH practices can prevent at least 9.1% of the global disease burden and 6.3% of all deaths by reducing the burden of water borne diseases, under-nutrition and contribute to economic development of the country. Development of infrastructure and proper regulations will improve the WASH practices to reduce the disease burden. This is study to assess and compare the water, sanitation and hygiene (WASH) practices among urban and rural households.

Materials and Methods: Community based analytical cross-sectional study was conducted in the Urban and rural field practice area of Tertiary Care Institute, Tirupati during the period of July – September 2025. Using multistage random sampling, 170 households were selected. the data was collected regarding socio demographic details and WASH practices using “WHO Core questions on water, sanitation and hygiene for household surveys” by Interview method. Data was entered in MS Excel spread sheet and analysed using R software version 4.5.2.

Results: Among the 170 households (85 - Urban and 85 – Rural), main source of drinking water in urban areas was piped water into dwelling (37.6%) whereas it was a water kiosk (70.6%) among rural households. Majority (46.8%) in urban areas had flush toilets to piped sewer system whereas in rural areas, majority (91.1%) had flush toilets to septic tank. Safe drinking water practices have been found to be significantly associated with locality ($p = 0.002$) using a Pearson chi-square test. Similarly, rural households (90.5%) had improved sanitation facilities compared to urban households (88.2%).

Conclusion: A significantly higher proportion of rural households had access to improved drinking water sources and sanitation facilities compared to urban households. Overall, safe drinking water practices were strongly associated with locality, emphasizing the need for context-specific interventions to further enhance WASH standards in both settings.

Keywords: Drinking water, Sanitation, Hygiene, WASH, Urban and rural households.

INTRODUCTION

Safe WASH practices are important for the health and well-being of humans and contributes to livelihoods, healthy nutrition and helps to live in healthy environments.^[1] According to WHO (2022), around 6 billion people globally had access to safely managed drinking water, while 1.7 billion relied on faecal contaminated sources. Similarly, 4.6 billion people used safe sanitation facilities, but 1.5 billion still lacked even basic sanitation such as private toilets.^[2] In India, NFHS-5 reports that 82% of the population follow good sanitary practices.^[3]

Despite this progress, inadequate WASH (Water, Sanitation, and Hygiene) remains a major public health concern, contributing to approximately 2.48 million deaths and 5.7% of the global disease burden, with a disproportionate impact on low- and middle-income countries.^[4] Mortality rates are particularly high in Southeast Asia and Africa, and in India alone, poor WASH practices account for nearly 0.98 million deaths.^[5] Improving WASH can prevent up to 9.1% of the global disease burden and 6.3% of deaths by reducing diarrhoeal diseases, water-borne infections and undernutrition, while also supporting economic development.^[6,7]

In view of this, the sixth goal of United Nations Sustainable Development Goals (SDGs), is directed towards achieving universal access to safe drinking water and sanitation facilities to all by 2030.^[8] Government of India also launched key initiatives like “The Swachh Bharat Mission, the Jal Jeevan Mission, and WASH in Schools (with the support of UNICEF)”. A rapid progress has also been made in ending open defecation all over India, which helps in improving water, sanitation, and hygiene (WASH).^[9] Development of infrastructure and proper regulations will improve the WASH practices to reduce the disease burden. Hence, it is essential to understand the conditions affecting the WASH practices of urban and rural areas to decrease the effects of poor water and sanitation practices.

MATERIALS AND METHODS

Study design: Community based Analytical Cross-sectional study.

Place of Study: Urban and rural field practice area of Sri Venkateswara Medical College.

Study population: Urban and rural households.

Study tool: “WHO Core questions on water, sanitation and hygiene for household surveys”^[4].

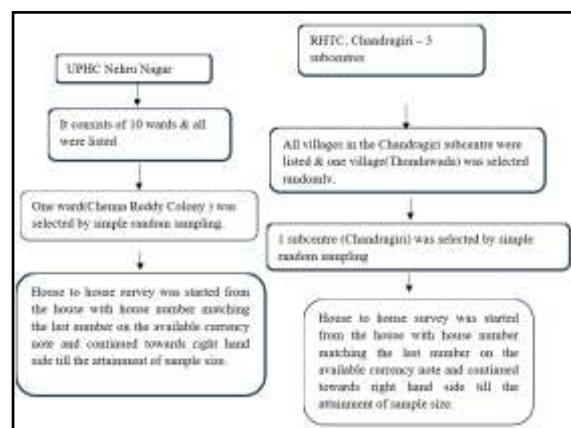
Sample size: Based on the NFHS -5, the proportion of households having improved WASH practices in urban and rural areas of Andhra Pradesh are 89.1% and 72.1% respectively.^[5]

$$n = \frac{(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2 [p_1(1-p_1) + p_2(1-p_2)]}{(p_1 - p_2)^2}$$

By substituting the values in above formula, the calculated sample size is 85 per each group with a total sample size of 170.

Study method:

The urban and rural field practice area of Sri Venkateswara Medical College, Tirupati has 10 wards and 43 villages respectively.



Data Collection: Written informed consent was taken from the study subjects, the data was collected regarding socio demographic details and WaSH practices using “WHO Core questions on water, sanitation and hygiene for household surveys”.^[10] by Interview method.

Results and data analysis: The collected data was entered in MS Excel spread sheet and analysed by using R Software version 4.5.2. Tables, Bar charts and Pie diagrams were used to represent data. Quantitative data was analysed using means, standard deviations. Qualitative data was expressed in frequencies, percentages. The difference in proportions was analysed by Chi-square test.

RESULTS

Mean age of the study participants is 45 ±13 years and 42 ±14 years in Rural and Urban respectively. Majority of them belong to Upper middle class in Rural (51%) & Urban (45%) based on Modified BG Prasad classification.

Table 1: Socio-demographic characteristics of the study participants (n = 170)

Characteristic	Improved Frequency (%)
Age	43 (13)*
Gender	
Female	89 (52%)
Male	81 (48%)
Employment status	
Employed	95 (56%)
Unemployed	75 (44%)

Education	
Literate	146 (86%)
Illiterate	24 (14%)
Marital status	
Married	132 (78%)
Unmarried	21 (12%)
Widowed	17 (10%)
Socioeconomic status	
Lower middle class (1412 - 2823)	12 (7.1%)
Middle class (2824 - 4706)	44 (26%)
Upper class (9414 and above)	33 (19%)
Upper middle class (4707 - 9413)	81 (48%)

*Mean age with standard deviation

In the urban population, the most common source of drinking water was piped water into the dwelling (38%) followed by sources such as boreholes/tube wells (15%), piped water into compound (11%), packaged/bottled water (8.3%), and tanker or cart-based supply (approximately 7–10%). In contrast, the rural population showed a markedly different pattern, with a predominant reliance on water kiosks (71%). Only a small proportion of rural households had piped water into the dwelling (8.2%). Other sources such as protected dug wells (16%) and unprotected dug wells (4.7%) were also reported exclusively in rural areas. (Table 1).

Sanitation practices in the rural setting were dominated by septic tank systems (90.6%), while a smaller proportion of households used open drains (9.4%). In contrast, nearly half of the urban households (47.1%) connected to a piped sewer system. However, a substantial proportion (40%) continued to depend on septic tanks followed by the use of open drains (11.8%).

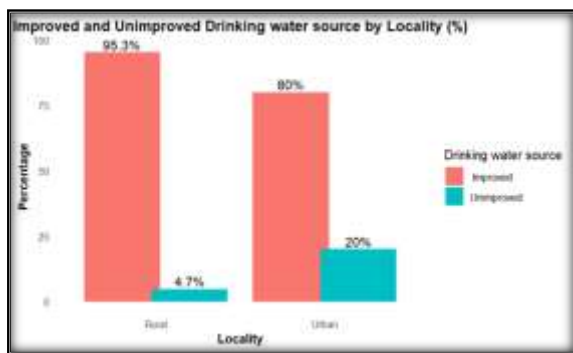


Figure 1: Bar chart showing drinking water source based on locality

A higher proportion of the rural population had access to improved drinking water sources (95.3%)

compared to the urban population (80%), whereas reliance on unimproved water sources was considerably greater in urban areas (20%) than in rural areas (4.7%). [Figure 1].

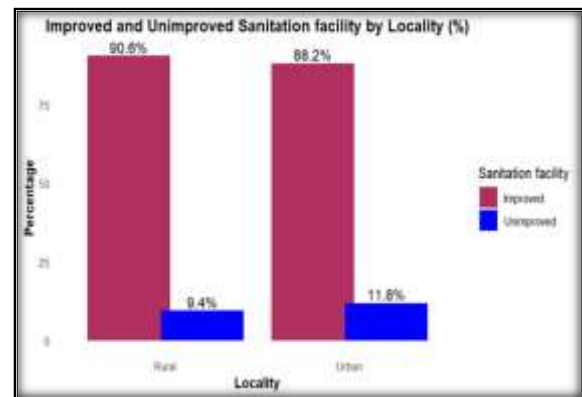


Figure 2: Bar chart showing sanitation facility based on locality.

In terms of sanitation, both settings demonstrated a high prevalence of improved facilities, with 90.6% in rural areas and 88.2% in urban areas. However, the proportion of households using unimproved sanitation facilities was slightly higher in urban areas (11.8%) compared to rural areas (9.4%). [Figure 2].

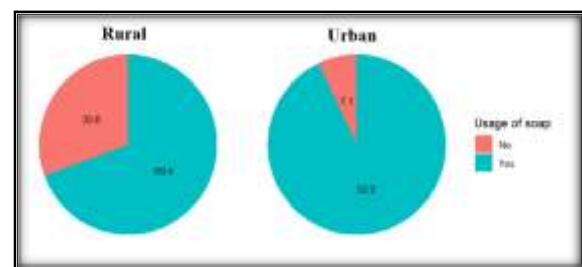


Figure 3: Pie chart showing usage of soap while handwashing (%) by locality

Table 2: Association between Socio demographic variables and drinking water, sanitation facility.

Variable	Drinking water		p-value	Sanitation facility		p-value
	Improved (n = 150) n (%)	Unimproved (n = 20) n (%)		Improved (n = 152) n (%)	Unimproved (n = 18) n (%)	
Age			0.5			0.003*
<45	74 (49%)	12 (60%)		77 (51%)	9 (50%)	
≥60	22 (15%)	1 (5.0%)		16 (11%)	7 (39%)	
45-59	54 (36%)	7 (35%)		59 (39%)	2 (11%)	
Gender			0.5			0.074
Female	80 (53%)	9 (45%)		76 (50%)	13 (72%)	
Male	70 (47%)	11 (55%)		76 (50%)	5 (28%)	
Locality			0.004*			0.6

Rural	81 (54%)	4 (20%)		77 (51%)	8 (44%)	
Urban	69 (46%)	16 (80%)		75 (49%)	10 (56%)	
Occupation			0.4			0.042*
Employed	82 (55%)	13 (65%)		89 (59%)	6 (33%)	
Unemployed	68 (45%)	7 (35%)		63 (41%)	12 (67%)	
Education			0.3			0.14
Literate	127 (85%)	19 (95%)		133 (88%)	13 (72%)	
Illiterate	23 (15%)	1 (5.0%)		19 (13%)	5 (28%)	
Socio-economic status (SES)			0.2			0.5
Higher SES	27 (18%)	6 (30%)		31 (20%)	2 (11%)	
Lower SES	123 (82%)	14 (70%)		121 (80%)	16 (89%)	

(*p value of < 0.05 is considered as statistically significant)

In both the settings, the most common place of handwashing was a sink or tap within the dwelling with a higher proportion of 76.5% in urban households compared to 64.7% of rural households. With regard to hygiene practices, the use of soap during handwashing was higher in urban households (92.9%) compared to rural (69.4%). Overall, the findings suggest that urban households demonstrate better handwashing practices, particularly in terms of availability of facilities and usage of soap [Figure 3]. The association between source of drinking water and selected sociodemographic characteristics revealed that locality showed a statistically significant association with drinking water source ($p=0.004$). A higher proportion of rural households (54%) reported using improved drinking water sources compared to urban households (46%), whereas the majority of those relying on unimproved sources were from urban areas (80%). Other factors such as age, gender, occupation, education, and socioeconomic status did not significantly influence the type of drinking water source were also not significantly associated with the source of drinking water. Similarly, the variables such as age ($p=0.003$) and occupation ($p=0.042$) were significantly associated with the type of sanitation facility used whereas variables such as gender, locality, education, and socioeconomic status were not significantly associated [Table 2].

DISCUSSION

Safe water, sanitation and hygiene practices are important for a healthy living and to reduce the burden of associated illness. The present study was conducted to assess the WASH practices among 170 Urban (85) and Rural (85) households in field practice area of Sri Venkateswara Medical College. Out of 170 respondents, 89 (52%) were females and 81(48%) were males, similar to the study by Malan A et.al,^[11] 47.5% were females and 52.5% were males. In contrast, study conducted by Shukla R P et al,^[12] the proportion of males (77.7%) were high compared to females (22.3 %). Nearly half of the study population (81, 48%) belonged to Upper middle class according to modified BG Prasad classification 2025. The study conducted by Shukla R P et al,^[12] reported that 69.3% belonged to Lower class.

The present study reported that the main source of drinking water in Urban and rural areas was Piped water into the dwelling (39%) and Water Kiosk (71%) respectively. In contrast, a study by Muniyapillai et al,^[4] found that 54.38% of urban households were using cart with a small tank or drum as the source of drinking water whereas in rural areas, public taps or standpipes were used by more than half of households (56.78%). A study conducted by Alice et al,^[3] stated that the source of drinking water was piped water from community sources (79.5%) for the majority of the urban slum households.

It was reported that majority of rural households (91%) used flush latrines connected to septic tank, whereas flush to piped sewer system (47%) was used by urban households. The study findings in Gwalior found that 63% had access to latrines connected to septic tank.^[6] A similar study conducted by Madhavi D et al,^[13] in Visakhapatnam has reported that 70.7% of the study population used flush latrines and the area was open defecation free.

The present study revealed that locality was strongly associated with source of drinking water ($p=0.004$) and the type of sanitation facility had significant association with variables, age ($p=0.003$) and occupation ($p=0.042$).

CONCLUSION

This study concluded that significantly higher proportion of rural households had access to improved drinking water sources and sanitation facilities compared to urban households whereas handwashing practices are better in urban households compared to rural. Overall, safe drinking water practices were strongly associated with locality, emphasizing the need for context-specific interventions to further enhance WASH standards in both settings. Urban households, despite better infrastructure on paper, showed comparatively lower access to improved drinking water and sanitation facilities are due to dependence on piped water supply, tanker water, and shared sanitation facilities, especially in peri-urban settings.

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