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EFFECTS OF SOCIOECONOMIC STATUS ON WATER SANITATION AND HYGIENE (WASH) IN RURAL AREA TELANGANA.

Epidemiology

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ABSTRACT

Introduction: Safely managed water, sanitation, and hygiene (WASH) services are an essential part of preventing and protecting human health. Many Indian and International organisations have joined hands in the WASH initiative. But still According to many analyst these policies and programmes improves the WASH condition as a whole but are not able to focus on the inequality in WASH in various places within the country. Hence the current study is done to estimate WASH availability and WASH accessibility indices of a rural area in south India and also to understand the effect of socioeconomic status on WASH Variables. **Methodology:** A cross sectional study was done in Siddipet district, in 1355 households, during December 2018 to April 2019. After obtaining ethical committee clearance and informed consent data was collected using semi-structured questionnaire with core questions on various indicators for monitoring of WASH service levels at the level of household (by WHO and UNICEF JMP). The data was entered in MS excel 2007 and analysed using SPSS version 16. Outcome indicators like WASH availability and accessibility indices were estimated and its association with socioeconomic was analysed. **Results:** In mulugu village total cumulative score for WASH availability and accessibility indicators were 76.08% and 48.8% respectively. Type of family, hand hygiene and fuel used were the WASH indices which were significantly low in households with lower socioeconomic status. **Conclusions:** Variation in both intra regional and interregional cumulative scores of WASH availability and accessibility indices can be addressed by reducing poverty.

KEYWORDS

WASH (Water, sanitation and hygiene) indices, rural area, India.

INTRODUCTION:

Safely managed water, sanitation, and hygiene (WASH) services are an essential part of preventing and protecting human health especially during infectious disease outbreaks, and the current COVID-19 pandemic.[1] The first two targets of Sustainable Development Goal 6 (SDG 6) targets 6.1 (safe and affordable drinking water for all) and 6.2 (access to adequate and equitable sanitation and hygiene for all and end open defecation, with special attention to the needs of women and girls) aim at equitable and accessible water and sanitation for all., and contribute directly and indirectly to SDG 3 focused on "health" - ensuring healthy lives and promoting well-being for all at all ages.[2]

Hence 2030 Agenda for Sustainable Development recognize safe drinking water, effective sanitation, and good hygiene (WASH) both as an end in itself and as a driver of progress on many of the SDGS, including health, life expectancy nutrition, education and gender equality and other important issues of international development.[3]

The WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP) has produced regular estimates of global progress on drinking water, sanitation and hygiene (WASH) since 1990. It updates the global baseline estimates for SDG targets 6.1 and 6.2.[4]

In 2020, 74% (5.8 billion) of global population used a safely managed drinking water service – that is, one located on premises available when needed, and free from contamination. Also 89% of the global population (6.5 billion people) used at least a basic service. A basic service is an improved drinking water source within a round trip of 30 minutes to collect water. Globally at least 2 billion people use a drinking water source contaminated with faeces. Contaminated water can transmit diseases such as diarrhoea, cholera, dysentery, typhoid and polio.1 Improved source for which collection time exceeds 30 minutes for a round trip, including queuing is Limited. UNIMPROVED is Drinking water from an unprotected dug well or spring and SURFACE WATER.[5]

In 2020, 54% of the Global population **(4.2 billion people)** used a safely managed sanitation service– defined as a toilet or improved latrine, not shared with other households, with a system in place to ensure that excreta are treated or disposed of safely. Globally 2.3 billion people still do not have basic sanitation facilities such as toilets or latrines, of these 893 million still defecate in the open, for example in street gutters, behind bushes or into open bodies of water. Poor sanitation is linked to transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid and polio. Inadequate sanitation is estimated to cause 280,000 diarrhoeal deaths annually and is a major factor in several neglected tropical diseases, including intestinal worms, schistosomiasis and trachoma. Poor sanitation can also contribute to malnutrition.[6] Hygiene is multi-faceted and can comprise such behaviour, including hand washing, menstrual hygiene and food hygiene. International consultations among WASH sector professionals identified hand washing with soap and water as a top priority.[7]

In 2017 60% of global population had hand washing facility with soap and water. In 2020, 46% and 71.27% of the Indian population used a safely managed sanitation service and basic sanitation services and 68% of the Indian population used soap and water for handwashing as per WHO.[8] As per NFHS -5 (2019-21) Indian Population living in households with an improved drinking-water source and improved sanitation facility was 95.9% and 70.2%. In telangana state Population living in households with an improved drinking-water source was 98.7% and an improved sanitation facility was 76.2%.[9]

Many Indian and International organisations have joined hands in the WASH initiative. A few of these include United Nations Children's Fund (UNICEF), USAID United Nations Development Programme (UNDP) UN-Water, Welthungerhilfe India, WaterAid India, and many more. Also Swacch Bharat Abhiyan launched by Prime Minister Narendra Modi has worked tremendously in the health and sanitation sector.[10]

But still According to many analyst these policies and programmes improves the WASH condition as a whole but are not able to focus on the inequality in WASH in various places within the country. Hence the current study is done to estimate WASH availability and WASH accessibility indices of a rural area in south India and also to understand the effect of socioeconomic status on WASH Variables.

Objectives:

To estimate WASH indices of rural areas of Telangana and its association with socioeconomic status of the population.

MATERIALS AND METHODS:

Study area:

A cross sectional study was done in Siddipet district (has 12 mandals with total population of 15,307) during December 2018 to April 2019. Study unit was household.

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Inclusion criteria:

All the houses where valid respondent was present to give data about household.

Exclusion criteria:

Households which were locked on two visits or where valid respondents were not present and households where people were not willing to participate in the study.

Sampling design:
Multistage stratified random sampling was used. Total of 12 villages were selected from each mandal randomly. Complete enumeration of all households was done in selected villages.

Sample size:
Sample size arrived at by using the formula for infinite population. Where, Z α is the standard normal deviate at 99% confidence interval. P = Prevalence of households with improved sanitation facilities= 76.7% as per NFHS 5 in telanagana state.[9] e = Absolute precision taken as 3% (<5% is acceptable)

$$Sample\ size(n) = \frac{z^2 X\ p(1-p)}{e^2}$$

$$Sample\ size(n) required\ is = 1322$$

N = Minimum number of house holds to be surveyed is 1322
Total of 1355 houses were studied

Methodology:
A prior permission was obtained from concerned authorities to conduct the study from RVM Medical college and heads of villages. Ethical clearance was taken from ethical committee. Informed consent was taken from the respondents. After selecting of the villages each house was enumerated. Houses locked on first visit were visited again at the end of the study. Semistructured questionnaire was used to collect information. Details like resident village, age, sex, education and occupation of respondents was recorded. Family details like type of the family, annual income from all sources, caste was taken.

Socioeconomic status was calculated using revised B G Prasad's classification(2018).[11] Data on core questions on various indicators for monitoring of WASH service levels at the level of household (by WHO and UNICEF JMP)[4] like type of house, ventilation, source of water, disposal of waste water, presence of sanitary latrine and type of the fuel used were noted.

Outcome indicators to measure the WASH availability, indicators are: a source of drinking water, sanitation facility, and materials used for the hygienic condition in the household. While WASH accessibility comprises location and reach-ability to drinking water sources, sanitation facilities and hygienic practices, the hygienic practices are defined as whether the household uses the separate kitchen, persons living per room and hygienic storage of water and hand wash after defecation.

The variables selected for the availability and accessibility indexes were dichotomized as 0 for disadvantageous and 1 for the advantageous group to convert them into the generalised linear form.[1] Ventilation was considered unsatisfactory when there were no windows in adjacent walls to door and when door and window space was less than 2/5th of total floor space area.

Statistical analysis:
The data was entered in MS excel 2007 and analysed using SPSS version 16. Results are summarized as frequency and proportion. Chi-square test of significance was employed for testing significant difference in proportions with P<0.05 considered as significant.

Results

Table 1: Village wise distribution of households

Villages	Frequency (1355)	Percentage
Laxmakkapally	164	12.1
Nagireddypally	80	5.9
Mulugu	397	29.3
Bandanarsapally	119	8.8
Adavi Majid	152	11.2
Kotyal	130	9.6
Bailampur	131	9.7
Mamidiyal	103	7.6
Ali Nagar	79	5.8
Total	1355	100.0

Table shows village wise number of households surveyed which was 1355. Number of people in each household varied from 1 to 14 members. Total number of uneducated respondents were 225 (16.6%).

Table 2: Distribution of households by Social factors

SES (Revised B G Prasad 2018)	Frequency (n=1355)	Percent (100%)
Class1 (6574 and above)	10	.7
Class 2 (3287-6573)	46	3.4
Class 3 (1972-3286)	160	11.8
Class 4 (936-1971)	440	32.5
Class 5 (985 and below)	490	36.2
Who did not give information	209	15.4
Type of family	Frequency	Percent
Nuclear	964	71.1
Joint	346	25.5
Extended	45	3.3
Caste	Frequency	Percent
ST	6	.4
SC	216	15.9
OBC	1062	78.4
Others	71	5.2

Most of the population belonged to class 4 and class 5 of socioeconomic status and 15.4% of population refused to give information regarding there annual income. Majority (71.1%) of the households were nuclear family with OBC being the major caste (78.4%).

Table 3: Distribution of households by housing and basic services

Housing and basic services available		Frequency (1355)	Percent
Type of house	Kaccha	347	25.6
	Pukka	1008	74.4
Ventilation	Satisfactory	828	61.1
	Not satisfactory	527	38.9
Lighting	Satisfactory	1090	80.4
	Not satisfactory	265	19.6
Source of water	Tap in home	602	44.4
	Public tap	518	38.2
	Well	36	2.7
	others	199	14.7
Storage of water	Safe	1102	81.3
	unsafe	253	18.7
Handling of water	Safe	1031	76.1
	Unsafe	324	23.9
Waste water disposal	Drain	815	60.1
	Kitchen Garden	71	5.2
	Surrounding	469	34.6
Sanitary latrine	Available	1241	91.6
	Not available	114	8.4
Fuel used	LPG	1203	88.8
	Others	152	11.2

Table 3 shows 25.6% of the rural population still lived in kaccha houses i.e where either roof or walls were made of kuccha materials or was permeable to water or insects. 38.9% of houses had unsatisfactory ventilation.19.6% of houses had poor lighting. 82.6% of the population had access to safe water supply from the government.

17.4% population depended on water sources like well and others like pond water. Storage of water was safe in 81.3% and handling of water was safe in 76%. 34.6% of people disposed waste water in the surrounding. Availability of sanitary latrine was seen in 91.6% of the households. 88.8% of the people used LPG as fuel and 11.2% still used wood as fuel.

Table 4: WASH Availability and acceptability indicators

WASH Availability indicators			Frequency	Percentage
1.	Source of drinking water	(1) Piped, bottled,hand pump	1120	82.7%
		(0) river,pond,others	235	17.3%
2.	Time of water supply	> 1 hour	828	61.1%
		< 1 hour	527	38.9%
3.	Toilet Facility available	Proper defecation	1241	91.6%
		Open defecation	114	8.4%

4.	Hand wash after defecation	Yes	1090	80.4%
		No	265	19.6%
5.	Drinking water storage	Hygienic storage	1102	81.3%
		Unhygienic storage	253	18.7%
6.	Kitchen (Cooking place)	Separate from living area	828	61.1%
		Within living area	527	38.9%
7.	Type of house	Pucca	1008	74.4%
		Kutcha	347	25.6%

Total cumulative score	76.08%			
WASH acceptability indicators			Frequency	Percentage
1.	Time taken to access to water	(1)<30min hour	886	66.4%
		(0) >30 min	469	34.6%
2.	Location of toilet	(1) proper defecation	1241	91.6%
		(0) Open defecation	114	8.4%
3.	The material used for hand wash	(1) Soap	972	71.7%
		(0) Ash, mud, water only	383	28.3%
4.	Purification of drinking water	(1) Always	523	38.6%
		(0) Rarely, sometimes, never	832	61.4%
5.	Method of Pouring water	(1) Long ladle or tap	1031	76.1%
		(0) Cups, utensils, hand	324	23.9%
6.	Type of fuel used in cooking	(1) LPG and kerosene	1203	88.8%
		(0) Firewood, cow dung,etc	152	11.2%
Total cumulative score	48.8%			

In mulugu village total cumulative score for WASH availability and accessibility indicators were 76.08% and 48.8% respectively.

Table 5: Association of socioeconomic status with various WASH indices

WASH indices		New socioeconomic class1 (216)	New socioeconomic class 2 (440)	New socioeconomic class 3 (489)	Total (1146)	P value
Type of house	kaccha	104 (48.1%)	186(42.3 %)	211(43. 1%)	501(43.7 %)	.334
	pukka	112 (51.9%)	254 (57.7%)	279(56. 9%)	645(56.3 %)	
Type of family	Nuclear	178 (82.4%)	330 (74.9%)	315 (64.3%)	823(71.8 %)	.000
	Joint	34 (15.7)	98 (22.3%)	155 (31.6%)	287 (25.1%)	
	Extended	4 (1.9%)	12(2.7%)	20 (4.1%)	36 (3.1%)	
Source of water	Safely managed Improved	106 (49.1%)	211 (48.0%)	202 (41.2%)	519 (45.3%)	.069
	Improved Basic services	81 (37.5%)	150 (34.1%)	211 (43.1%)	442 (38.6%)	
	Limited water services	2 (.9%)	10(2.3%)	13(2.7 %)	25(2.2%)	
	Unimproved and surface water	27 (12.5%)	69 (15.7%)	64 (13.1%)	160 (14.0%)	
Storage of water	Safe	179 (82.9%)	356 (80.9%)	403 (82.2%)	938 (81.8%)	.793
	unsafe	37 (17.1%)	84 (19.1%)	87 (17.8%)	208 (18.2%)	
Handling	Safe	165 (76.4%)	334(75.9 %)	375 (76.5%)	874 (76.3%)	.974
	Unsafe	51(23.6%)	106 (24.1%)	115 (23.5%)	272(23.7 %)	
Waste water disposal	Drain	144 (66.7%)	263 (59.8%)	275 (56.1%)	682 (59.5%)	.125
	Kitchen Garden	10 (4.6%)	24 (5.5%)	33 (67%)	67 (5.85)	
	Surrounding	62 (28.7%)	153 (34.8%)	182 (37.1%)	397 (34.6%)	
Sanitary latrine	Improved	197 (91.2%)	401(91.1 %)	451(92%)	1049 (91.5%)	.868
	Unimproved	19 (8.8%)	39 (8.9%)	39 (8%)	97 (8.5%)	
Hand Hygiene	Soap	202(93.5%)	341(77.5 %)	289 (59.1%)	972 (71.7%)	< 0.00 001
	Ash, mud, water only	14 (6.5%)	99 (22.5%)	200 (40.9%)	383 (28.3%)	
Fuel used	LPG	205 (94.9%)	387 (88.0%)	433 (88.4%)	1025 (89.4%)	.015
	Others	11 (5.1%)	53(12.0 %)	57 (11.6%)	121 (10.6%)	

Socioeconomic status was reclassified in to 3 new groups with B G Prasad Class I, II, III under new class1, B G Prasad class IV under new class II and B G Prasad class V under new class III to check the association, as there were very few households under BG prasad class I,II,III. Type of family, hand hygiene and fuel used were the WASH indices which were significantly associated with socioeconomic status. It shows that these indices were low in households with lower socioeconomic status as shown in table 5.

DISCUSSION:

As of 2021, the Sustainable Development Goal (SDG) index score for clean water and sanitation (SDG 6) ranges between 100 and 54 for Indian states and union territories with telangana state score at 96.[12]But in the current study done in mulugu village a rural area in Telangana state shows total cumulative score for WASH availability and accessibility indicators were 76.08% and 48.8% respectively.

Also Poor sanitation reduces human well-being, social and economic development due to impacts such as anxiety, risk of sexual assault, and lost opportunities for education and work. Poor sanitation is linked to transmission of diarrhoeal diseases such as cholera and dysentery, as well as typhoid, intestinal worm infections and polio. Poor exacerbates stunting and contributes to the spread of antimicrobial resistance.[13]

In our study Improved source of water which was safe was seen n 82.7% which was low compared to study by Kubern et,al, where majority of the participants (95%) perceived that the quality of water being used was safe.

In our study sanitary toilet was available in 91.6% which was quite high when compared to study by Rekha H et al, where sanitary toilet was present in only 51.7% households but only 46% were fully utilizing them.

In the current study open defecation was seen in 4.6% which is very low when compared to study by Rekha et.al where 75% households were practicing open field defecation In the current study hand hygiene with soap and water is present in 71.7% of households. In a baseline survey conducted by UNICEF in Myanmar observed that 40% washed their hands with soap and clean water before eating and 69% said they wash their hands with water and soap after defecating these differences.15

In the current study type of family, hand hygiene and fuel used were the WASH indices which were significantly associated with socioeconomic status. It shows the indices were low in households

with lower socioeconomic status. A similar opinion was given in a study done by Saroj et.al among 6 metro cities in India, that cities with poor WASH performance (Kolkata, Hyderabad, and Chennai) exhibited more inequality compared to better performing cities (Mumbai, Bangalore, and Delhi). The intra-city inequality is attributable to housing conditions, economic status, educational level, socio-religious affiliation, and occupational status. [16]

CONCLUSIONS:

There is a variation in both intra regional and interregional cumulative scores of WASH availability and accessibility indices. Improving the socioeconomic status has both direct and indirect effect on WASH indices and the above mentioned variation. Thus reducing poverty which is a vicious cycle should be addressed by strengthening existing integrated policies and programmes.

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