Original Research Article

Sanitary conditions of few urban slums in New Delhi: a cross-sectional study

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ABSTRACT

Background: Sanitation is essential for a society's well-being and general health. Water, sanitation, and hygiene standards that are both adequate and safe can prevent numerous infections in the context of the present study, which was conducted with the aim of spreading knowledge regarding water sanitation, disposal, and treatment in the urban slums of southeast Delhi to prevent and control several water-borne diseases.
Methods: A cross-sectional study was conducted with 294 participants from 144 households, between May 2022 to April 2023. Data were collected using door-to-door surveys. The sample size was 294 and houses were selected using convenience sampling. The data obtained were analyzed using MS Office (Excel).
Results: Based on data collected from 144 households and 294 participants, 44.2% of participants in the Trilokpuri area had an interrupted water supply. There was a significant correlation between the water supply groups in our analysis (p<0.0001).
Conclusions: Our research revealed a strong correlation among sociodemographic profile, water supply, water usage, cleaning of water storage utensils, water stagnation, water disposal, treatment of stagnation, type of toilet, and sanitation conditions. According to the study's key findings, the majority of people in southern Delhi did not have access to clean drinking water. There is obvious evidence of restricted access to contemporary piped water supplies. Thus, since drinking contaminated water can lead to a number of water-borne diseases, our research provides a framework for methodically raising awareness of the issues that need to be resolved to enable fair governance of the water supply.

Keywords: Preventive medicine, Public health, Sanitation, Unani Medicine, Water usage

INTRODUCTION

Many Delhi citizens reside in unregistered residential complexes or slums where they are forced to live in poor-quality houses. Additionally, they struggle to access basic services such as water and sanitary facilities. With their low cost of living, poor migrants helped Delhi's "modernization" as it developed into a worldwide metropolis by coming in large numbers in pursuit of jobs.[1] Sanitation is essential for society's well-being and general health. Recurrent incidences of water- and sanitation-related diseases are inevitable, unless there are sufficient functional sanitation facilities and proper hygiene practices. It is a fundamental factor that influences human development and the quality of life. Safe fecal disposal, hand washing with disinfection at key times, and safe treatment and storage of drinking water are three essential hygiene practices for reducing water-borne illnesses. Approximately 1.7 billion people (21%) worldwide do not have access to basic sanitation facilities.[2] Basic sanitation includes the safe disposal of human excreta, management of industrial hazardous waste, wastewater treatment and disposal, and preservation of hygienic conditions through garbage disposal. The number of people who lack the resources to practice basic hygiene is estimated to be 2.3 billion (29%)

worldwide. Washing hands with water and soap.[3] Water, sanitation, and hygiene standards that are both adequate and safe can prevent numerous infections, including schistosomiasis, helminths, trachoma, and diarrheal mortality, through WASH. More than 1.7 billion people lack access to even the most basic latrines or private restrooms. Over 45% of domestic wastewater worldwide is released into untreated environments.[4] Intake of contaminated water for drinking purpose may results several water borne diseases e.g., diarrhoea, giardiasis, dysentery, typhoid fever, *E. coli* infection, and salmonellosis etc. In the Unani System of Medicine, water is crucial because food is only effective in solution. Thus, it provides extensive guidelines for the type of water and appropriate time for drinking water. For instance, to ensure proper digestion, people of hot temperament (har mizaj) should drink water during meals, but people of cold temperament (barid mizaj) should use water only after the digestion has fully set in. The concept of mizaj is important in the Unani system of medicine, and it is believed that an abnormal shift in humeral imbalance in body mizaj (temperament) can cause several diseases. Like, amrāḍ mufrada: sū' mizāj (temperamental disorder, especially of liver, with cold and wet temperament), sū'tarkeeb (derangement and disorder in formation) and tafarruqe ittesal (malformation and disorder in attachment or connections especially in stomach, intestine, kidney, gall bladder etc.

Aim

In the context of the present study, we aimed to spread knowledge regarding water sanitation, disposal, and treatment in the urban slums of southeast Delhi to prevent and control several water-borne diseases.[5-7]

METHODS

Study design

The present cross-sectional study was conducted in five urban slums in south east Delhi: 1) Tirlokpuri, 2) Madangir, 3) Khanpur, 4) Kalu Sarai, and 5) Gaddha colony, via a questionnaire-based household survey under the schedule cast sub plan and tribal sub plan (SCSP and TSP) program, stationed at the Regional Research Institute of Unani Medicine (RRIUM), New Delhi.

Study period

This study was conducted with 294 participants from 144 households between May 2022 to April 2023.

Data collection

Data were collected using door-to-door surveys. The sample size was 294, and houses were selected using convenient sampling. The data were collected using a structured previously validated questionnaire prepared at the Central Council for Research in Unani Medicine (CCRUM) headquarters, New Delhi, which had three sections: section 1 pertained to demographic details, and section 2 pertained to knowledge of water, sanitation, and hygiene. Section 3 comprised of questions to assess sanitation and hygiene practices, such as water treatment and water storage.

The questionnaire comprised questions regarding socio-demographic profile, water supply, use of water, source of water, water storage, cleaning of water storage utensils, stagnation of water, water disposal, treatment of stagnation, toilet type, and toilet situation. In the context of the present study, we aimed to understand the situation of water sanitation, disposal, and treatment in the urban slums of southeast Delhi. That was also provide the knowledge regarding water sanitation, disposal and how to treat water for use drinking purpose to prevent multiple water borne diseases like, diarrhea, giardiasis, dysentery, typhoid fever, *E. coli* infection, and salmonellosis etc.

Data collection process administrative permission and informed consent were obtained from each subject and anonymity was maintained. The questionnaire was duly filled by the surveying officer, and the practices were inquired and rated. The data were recorded in the questionnaire.

Data analysis

The Chi-Square/Fisher's exact test was used to find the significance of study parameters between the groups and the data obtained were coded and analyzed. Frequency, percentages, and associations were obtained. MS Office (Excel) was used for data analysis.

RESULTS

The present study was conducted in five urban slums in southeastern Delhi. The following variables were used in this study: socio-demographic profile, water supply, use of water, source of water, water storage, cleaning of water storage utensils, stagnation of water, water disposal, treatment of stagnation, toilet type, and toilet situation. The study found significant correlations between the variables, as shown in Table 1.

Table 1: Significant correlations between the variables.

Variables		Trilokpuri n=61 (%)	Madangir n=57 (%)	Khanpur n=63 (%)	Kalu Sarai n=51 (%)	Gaddha Colony n=62 (%)	P value
Caste	SC	58 (95.1)	51 (89.5)	48 (76.2)	31 (60.8)	37 (59.7)	P<0.0001
	ST	03 (4.9)	0 (0)	03 (4.8)	0 (0)	02 (3.2)	
	Gen	0 (0)	06 (10.5)	12 (19)	20 (39.2)	23 (37.1)	

Continued.

Variables		Trilokpuri n=61 (%)	Madangir n=57 (%)	Khanpur n=63 (%)	Kalu Sarai n=51 (%)	Gaddha Colony n=62 (%)	P value
Family members	2-4	20 (32.8)	30 (52.6)	29 (46)	13 (24.5)	32 (51.6)	P=0.0003
	5-7	41 (67.2)	27 (47.4)	34 (54)	38 (74.5)	30 (48.4)	
Income	1000-10000	27 (44.3)	21 (36.8)	14 (22.2)	12 (23.5)	49 (79)	P=0
	10000-20000	15 (24.6)	33 (57.9)	31 (49.2)	33 (64.7)	13 (21)	
	20000-30000	05 (8.3)	0 (0)	01 (1.6)	03 (5.9)	0 (0)	
	30000-40000	02 (3.3)	0 (0)	03 (4.8)	0 (0)	0 (0)	
	40000- 50000	03 (4.9)	0 (0)	0 (0)	03 (5.9)	0 (0)	
	50000- 60000	04 (6.5)	0 (0)	14 (22.2)	0 (0)	0 (0)	
	60000-70000	04 (6.5)	03 (5.3)	0 (0)	0 (0)	0 (0)	
	70000- 80000	01 (1.6)	0 (0)	0 (0)	0 (0)	0 (0)	
Education	Matric	33 (54.2)	27 (47.4)	18 (28.6)	13 (25.5)	15 (24.2)	P<0.0001
	Graduate	09 (14.7)	06 (10.5)	13 (20.6)	09 (17.6)	03 (4.8)	
	Primary	16 (26.2)	12 (21.1)	14 (22.6)	24 (47)	44 (71)	
	SSC	03 (4.9)	12 (21.1)	18 (28.6)	05 (9.8)	0 (0)	
Water Supply	Continuous	34 (55.8)	54 (94.7)	59 (93.7)	48 (94.1)	55 (88.7)	P<0.0001
	Interrupted	27 (44.2)	03 (5.3)	04 (6.3)	03 (5.9)	07 (11.3)	
Distance from water source	100-200	18 (29.5)	22 (38.6)	6 (9.5)	15 (29.4)	11 (17.7)	P=0
	200-300	03 (4.9)	16 (28.1)	10 (15.9)	20 (39.2)	27 (43.5)	
	300-400	13 (21.3)	09 (15.8)	10 (15.9)	07 (13.7)	09 (14.5)	
	400-500	05 (8.2)	10 (17.5)	33 (52.3)	09 (17.6)	15 (24.2)	
	500-600	17 (27.9)	0 (0)	02 (3.2)	0 (0)	0 (0)	
	600-700	05 (8.2)	0 (0)	02 (3.2)	0 (0)	0 (0)	
Stored	Can	08 (13.1)	08 (14)	19 (30.2)	0 (0)	0 (0)	P<0.0001
	Drum	28 (44.9)	10 (17.5)	31 (49.2)	21 (41.2)	14 (22.6)	
	Water tank	25 (41)	39 (68.4)	13 (20.6)	30 (58.8)	48 (77.4)	
Use	Both	41 (67.2)	30 (52.6)	63 (100)	27 (52.9)	50 (80.6)	P<0.0001
	Domestic	20 (32.8)	22 (38.6)	0 (0)	15 (29.4)	03 (4.5)	
	Drinking	0 (0)	05 (8.8)	0 (0)	09 (17.6)	09 (14.5)	
Cleaning of water storage utensil	Daily	08 (13.1)	07 (12.3)	15 (23.8)	06 (11.8)	06 (9.7)	P<0.0001
	Fortnightly	07 (11.5)	08 (14)	05 (7.9)	02 (3.9)	05 (8.1)	
	Occasionally	05 (8.2)	05 (8.8)	0 (0)	0 (0)	0 (0)	
	Weekly	41 (67.2)	37 (64.9)	43 (68.2)	43 (84.3)	51 (82.3)	
Stagnation of water	Occasional	23 (37.7)	06 (10.5)	25 (39.7)	21 (41.2)	11 (17.7)	P<0.0001
	weekly	38 (62.3)	51 (89.5)	38 (60.3)	30 (58.8)	44 (71)	
	Daily	0 (0)	0 (0)	0 (0)	0 (0)	07 (11.3)	
Water disposal	Open	47 (77)	30 (52.6)	37 (58.7)	13 (25.5)	33 (53.2)	P<0.0001
	Covered	14(23)	27 (47.4)	26 (41.3)	32 (62.7)	03 (4.5)	
	No drain	0 (0)	0 (0)	0 (0)	06 (11.8)	26 (41.9)	
Treatment of stagnation	chlorinate	04(6.6)	09 (15.8)	36 (57.1)	12 (23.5)	01 (1.6)	P<0.0001
	None	57 (93.4)	48 (84.2)	27 (42.9)	39 (76.5)	61(98.4)	
Type of toilet	Pit	44 (72.1)	46 (80.7)	62 (98.4)	04 (7.8)	30 (48.4)	P<0.0001
	Flush	15 (24.6)	08 (14)	01 (1.6)	46 (90.2)	13 (21)	
	Open field	02 (3.3)	03 (5.3)	0 (0)	01 (2)	01 (1.6)	
Situation of toilet	Colony	31 (50.8)	01 (1.8)	06 (9.5)	11 (21.6)	13 (21)	P<0.0001
	House	28 (45.9)	54 (94.7)	57 (90.5)	39 (76.5)	48 (77.4)	
	Open	02 (3.3)	02 (3.5)	0 (0)	01 (2)	01 (1.6)	

DISCUSSION

We explored five urban slums in southeast Delhi through a survey conducted by CCRUM under the Ministry of Ayush Government of India to understand the situation of water sanitation. Our study found that inequality was deeply embedded in the supply of drinking water in Delhi. The results of the study were discussed point-wise: First, they started from the demographic condition, and the caste-wise distribution of the majority was found in the study, such as schedule caste (SC) 95.1% in

Trilokpuri than in other areas. The schedule tribe (ST) 4.9% Trilok Puri was higher than that in other areas. There was a significant correlation p<0.0001, between the area groups in our study. According to the study Family members 2-4 were higher in the Madangir area 30 (52.6%), and family members 5-7 were higher in Kalu Sarai 38 (74.5%). There was a significant correlation p=0.0003 between the family member groups in our study. 13 (20.6%) higher education graduates in the Khanpur area. There was a significant correlation p<0.0001, between the education groups in our study. In terms of water supply, 54 (94.7%) participants continuous water supply in the Madangir area and 27 (44.2%) Trilokpuri interrupted water supply. There was a significant correlation p<0.0001 between the water supply groups in our study. Our results are closely related to those reported by Kumar et al. Most of the population in southern Delhi did not have access to safe drinking water. Limited access to modern piped water supply is clearly visible.[8] Similar to the situation of water storage. Our study showed that the majority of participants 19 (30.2%) stored water through a can in the Khanpur area. The amount of water stored in the drums of 31 participants (49.2 %) was also high in the Khanpur area. Water was stored in a water tank by 48 (77.4%) participants in the Gaddha Colony area. There was a significant correlation p<0.0001 between the water-stored groups in our study. Regarding water use, our study found that the majority of participants 9 (17.6%) drank water sources in Kalu Sarai. Domestic water was used by 22 (38.6%) participants in the Madangir area, and the majority of the 63 (100%) participants in the Khanpur area. There was a significant correlation p<0.0001 between the water-stored groups in our study. With regard to the cleaning of water storage utensils, on a daily basis, 15 (23.8%) participants were found in the Khanpur area. There was a significant correlation p<0.0001 between cleaning of the water storage utensil group in our study. Water stagnation on a weekly basis was found in 51 (89.5%) of the Madangir area. There was a significant correlation (p<0.0001 between stagnation of the water groups in our study. Stagnation treatment with chlorine resulted in 36 (57.1%) cases in the Khanpur area. There was a significant correlation (p<0.0001 between the treatments in the stagnation group in our study. With regard to toilet types such as pits, flushes, and open fields, the majority of pit toilets 62 (98.4 %) in the Khanpur area, flush toilets had majority 46 (90.2%) in Kalu Sarai, and open field toiles found only 3 (5.3%) in the Madangir area were found. There was a significant correlation p<0.0001 between the type of toilet used in our study. Our study found the situation of toilets such as colonies, houses, and open; the majority of toilets in the colony had 31 (50.8%) in the Trilokpuri area, toilet situation in the house, majority of 54 (94.7%) in Madangir, and open two (3.5%) in the Madangir area. There was a significant correlation (p<0.0001 between the situation of the toilet group in our study.

CONCLUSION

The study included 294 participants from 144 households. The findings of the study showed that the majority of individuals had average knowledge and practiced unsafe practices regarding water, sanitation, and hygiene. Our study found a significant association between sociodemographic profile, water supply, use of water, water sources, water storage, cleaning of water storage utensils, stagnation of water, water disposal, treatment of stagnation, toilet type, and toilet situation. The main outcome of this study was that most of the population in southern Delhi did not have access to safe drinking water. Limited access to modern piped water supplies is clearly visible. Therefore, our analysis offers a framework to systematically create awareness of the factors to be addressed to enable a more equitable governance of water supply because intake of contaminated water for drinking purposes may result in several water-borne diseases, such as diarrhoea, giardiasis, dysentery, typhoid fever, *E. coli* infection, and salmonellosis. In the context of the present study, we aimed to disseminate knowledge regarding water sanitation, disposal, and treatment in the urban slums of southeast Delhi to prevent and control several water-borne diseases. The SCSP mobile health program was organized by CCRUM, under the Ministry of Ayush Government of India play an important role in determining the sanitary conditions of urban slums through door-to-door household surveys and educate them regarding personal hygiene, the importance of water sanitation to prevent several water-borne diseases.

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