

Knowledge Attitude And Practice Of Healthcare Workers About Water, Sanitation, And Hygiene In Healthcare Facilities In A District Of Central India

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Abstract

Background: Water, Sanitation and Hygiene (WASH) are human rights; they play an important role in achieving highest standard of health for all and as an integral part of Infection Prevention Control. Healthcare workers play an indispensable role in functioning and maintenance of WASH in healthcare facilities. It is a necessity to have sufficient knowledge and to perform correct practices. So it is important to spread knowledge among healthcare workers at all levels. The study aims to document the knowledge attitude and practice of healthcare workers about WASH in healthcare facilities.

Methodology: It was a community-based pre- post knowledge attitude practice study done in a block of Raipur district. The healthcare workers from public health centers were interviewed for assessing their KAP with a pre-validated semi-structured questionnaire and they were sensitized about the standards of WASH in healthcare facilities on the same day. The healthcare workers were again interviewed with the same questionnaire after 2-5 days.

Result: A total of 139 healthcare workers were interviewed in the pre-test. The mean knowledge score obtained in the pre-test was 31.42 ± 3.66 out of 43. Age, education and designation of the healthcare workers were the factors influencing their knowledge. All 139 healthcare workers were sensitized about the standards of WASH in healthcare facilities. Among 134 healthcare workers participated in the post-test, the mean score obtained was 36.22 ± 3.37 . There was a significant difference between mean pre and post-test scores ($p < 0.05$). The factors influencing the practice of healthcare workers were their education and designation.

Conclusion: The sensitization of healthcare workers was successful as there was a significant increase in the knowledge and attitude among healthcare workers about WASH in healthcare facilities though in practice a significant difference was only noticed in waste management. To maintain good WASH practices there should be training and retraining for healthcare workers.

Keywords: WASH, healthcare, KAP, India, biomedical waste, sanitation, hygiene

INTRODUCTION

WASH stands for water, sanitation, and hygiene. Access to WASH is a human right. It is the right of every human being to enjoy the highest standard of health which is impossible without adequate WASH(1). WASH is an integral part of infection prevention and control and a key public health issue. WASH services in health facilities comprise water availability and quality, the presence of sanitation facilities, and the availability of soap and water for handwashing. According to JMP 2019 Global Baseline Report, one in four HCF globally lacked basic water services, and one in eight had no sanitation service(2). In addition, many HCF do not have basic facilities for hand hygiene, safe segregation, and disposal of biomedical waste. These basic services serve to prevent infections and spread of disease. WASH also protects staff, and patients and uphold the dignity of vulnerable populations such as pregnant women, children and the disabled(3). Inadequate WASH in HCFs also can lead to the spread of various micro-organisms from one patient to another by healthcare workers.

A remarkable number of diseases could be prevented by a safe water supply, adequate sanitation services, and good hygiene practices. Over 800 children under the age of five die every day from preventable diarrheal diseases caused by lack of access to water, sanitation and hygiene. In the year 2016, 60% of diarrheal deaths were due to Inadequate WASH and the most vulnerable group affected was under-five children (4)(5). These deaths are preventable with safe drinking

water and sanitation services and handwashing with soap. Inadequate WASH can also lead to an increase in anemia, malabsorption, miscarriage, sepsis, and even death. About 25% of stunting is due to repeated diarrheal diseases and 16% of malnutrition is due to inadequate water, sanitation and hygiene as of 2016(6).

WASH amenities may be available in HCFs, yet their quality, adequacy, availability, and functionality are often a matter of concern. These are particularly based on the knowledge, attitude and practice of the HCWs. Increased capacity in this aspect will help improve the quality of HCFs. WASH is a multi-sectoral concern. It starts with the construction of facilities fulfilling the standards for which knowledge about standards of WASH in HCFs is required at the managerial level. The mere presence of WASH infrastructure won't fulfill the purpose, to maintain such facilities; all HCWs must have sufficient knowledge about WASH.

Adequate Knowledge will boost the HCWs' confidence as well as their attitude and practice towards dealing with patients. This aspect directly increases the quality of care provided boosting care giver's morale as well as the patient's confidence towards the facility. All these aspects are interlinked and form a web for delayed health-seeking behavior of patients (Figure 1). Change in one of these aspects might stop the web leading to the delayed health-seeking behavior of the patients. Though multiple studies are measuring the KAP of HCWs in Infection Prevention and Control practices as a whole, there is very limited to no literature about KAP of HCWs specifically about WASH. So, this study was done to document the knowledge attitude and practice of HCWs about WASH in HCFs.

METHODOLOGY

Study design and Study area: Cross sectional pre-post interventional knowledge attitude practice study. The Raipur district of Chhattisgarh has four blocks. Out of these four blocks, the Abhanpur block was selected by lottery method. This block has a population of 242,089 spread over 574km² of rural area and 26.08km² of urban area (Census 2011). It has 2 Community Health Centers (CHCs), 7 Primary Health Centers (PHCs) and 37 Sub Health Centers (SHCs).

Study population: All the HCWs working in the 46 HCFs of the block. All the staff present at the HCFs on the day of the survey or any of the two visits were included in the study. Staff not willing to participate in the study were excluded. The study was conducted between March 2019 – December 2020.

Study/Assessment tool: A pretested and validated semi-structured questionnaire which had 11, 12, 13, and 12 questions respectively for the water, sanitation, hygiene, and waste management components was used to assess the pre-test KAP of the participants. The same questionnaire was used for post-test KAP. Knowledge and practice were assessed by scores. In knowledge section, every correct answer was given a score of one and in practice section, 3-point Likert scale was used. The questionnaire was also translated into the local language (Hindi).

Education/ Intervention module: Self developed module containing standard WASH infrastructure in HCFs, definitions for improved water services improved sanitation services, water treatment, and storage, IPC activities such as hand hygiene, steps and timing, environmental cleaning and blood spillage cleaning, biomedical waste segregation, and disposal methods were used for sensitization of HCFs. All the information used in the module was obtained from WHO environment standards for HCFs and Kayakalp guidelines for HCFs by the Ministry of Health and Family Welfare, Government of India.

Variables: The independent variables include age, gender, designation, education and type of HCF. Knowledge was assessed by twenty-five questions carrying a maximum score of 43 marks divided into 4 parts such as water, sanitation, hygiene, and waste management. The attitude and practice questions were assessed by a Likert scale. The knowledge and practice of HCWs were divided into adequate and inadequate based on the mean scores. The pre-test mean knowledge score was 31.4, and participants who scored ≥ 32 were considered to have adequate knowledge about WASH in HCFs. The pre-test mean practice score was 14.14, participants scoring >14 were considered to have adequate practice. With the independent variables, factors associated with knowledge about WASH were found. The mean scores of pre and post-test were compared to know the result of sensitization. The change in attitude and practice among HCWs was measured by comparing the change in the proportion of responses between pre and post-test.

Data collection technique and quality control: The data was collected by the principal investigator through face-to-face interviews using a semi-structured questionnaire. The interview was in the language preferred by the participants as the questionnaire was available in English as well as the local language. Sensitization was also done by the principal investigator in local language and was done on the same day as the day of pre sensitization interview. Post-sensitization assessment was done between 2-5 days after sensitization with the same questionnaire used for the pre-test. To cover the maximum number of participants and to reduce attrition, schedules were made after discussing with the participants as most of the HCWs were not available on many days due to field activities. Each HCF was visited at least twice. CHCs were visited at least 3 times. In the case of new HCWs recruited in the study during the second visit, the HCF was visited again after 5 days for post-test. Each interview lasted between 20 -25 minutes. Each sensitization session lasted for 15 – 20 minutes. The data were examined for completeness and consistency daily by two authors.

Statistical Analysis: Data was entered in MS Excel and analyzed in SPSS version 28.0. Data were checked and cleaned for outliers and missing values. To measure the outcomes of KAP, frequencies and percentages were used. Mean scores were obtained for knowledge scores. Based on the mean knowledge score of the pre-test, the knowledge score is divided into adequate and inadequate. Univariate and multivariate analyses are done to find the factors associated with knowledge of HCWs. The pre and post-sensitization test was compared by Z proportionate test in places where proportions were used and by paired t-test/Wilcoxon sign-rank test where mean are used after checking normality of the difference between pre and post-test scores by Kolmogorov Smirnov test. A p-value of <0.05 was considered a significant difference between pre and post-test.

RESULTS

Demographic characteristics: Out of 46 HCFs, a total of 139 participants were interviewed for the pre-test with a mean age of 39.3 years and all of them were sensitized about the standards and importance of WASH in HCFs. During the post-test, 5 HCWs were absent in HCFs even after 3 visits to the HCFs. The attrition rate was 3.7%. The maximum number of participants was female. Most of them had at least a diploma degree and were from SHCs. (Table 1)

Results of pre-test: The mean knowledge scores were 8.45 ± 0.96 , 6.09 ± 1.22 , 7.28 ± 1.56 and 9.60 ± 1.5 for knowledge about water, sanitation, hygiene, and waste disposal respectively. The total mean knowledge score obtained was 31.42 ± 3.66 . About 55% HCWs had adequate knowledge about WASH in HCFs. HCWs belonging to the age group 30-39 years had more knowledge about WASH in HCFs than any other age group. The attitude of the HCWs towards WASH in HCFs was positive as more than 75% of HCWs gave positive responses to all the questions. The practice of HCWs was also good as more than 64% HCWs had good practices in all categories of WASH. The mean score obtained by HCWs for practice was 14.14 ± 2.04 . The practice was adequate in 52% of HCWs.

Factors affecting knowledge of HCWs: There was a significant association between the knowledge of HCWs and factors such as the age of HCWs, education, and designation of HCWs ($p < 0.05$). The odds of having adequate knowledge was 5.23 times higher in the age group 30-39 when compared with HCWs who are ≥ 50 years old. The odds of having adequate knowledge were 75% and 95% less in HCWs educated up to higher secondary or less respectively when compared to HCWs who own a post-graduate degree. The odds of having adequate knowledge were 66 times higher in doctors, 13.75 times higher in nurses and assistants (OT/ Dental/ Eye) and 7.27 times higher in Rural Health Organizers/ Auxiliary Nurse midwives when compared to sweepers (Table 2).

Results of post-test: 134 HCWs participated in the post-test. The mean knowledge score obtained for water, sanitation, hygiene and waste disposal were 8.75 ± 0.55 , 7.57 ± 1.23 , 9.21 ± 1.40 , and 10.68 ± 1.52 respectively and the total mean score obtained by HCWs in the post-sensitization test was 36.22 ± 3.37 . The HCWs with a score ≥ 32 was 90%. The attitudes of HCWs were positive as more than 79% participants gave positive responses to all the questions. Adequate WASH practices were seen in 66% of HCWs. The mean practice score was 14.55 ± 1.8 .

Comparison between pre and post: Normality of data was checked by Kolmogorov Smirnov test ($p = .12$ suggesting normal distribution). There was a significant difference in response between multiple pre- and post-knowledge questions ($p \text{ value} < 0.05$, Annexure: Table 1). There was a significant difference in mean knowledge scores of all categories such as water, sanitation, hygiene and waste disposal ($p \text{ value} < 0.05$, table 3). There was a difference of 4.8 marks between mean pre and post-test which was statistically significant ($p \text{ value} < 0.05$). A significant difference between mean scores of pre and post-test was found in all subcategories such as different age groups, gender, education, designation, and place of work ($p \text{ value} < 0.05$). About 90% HCWs obtained a score of ≥ 32 in the post-test compared to 55% in the pre-test suggesting a significant increase in HCWs with adequate knowledge as well as increase in knowledge among all HCWs. Though there was a positive attitude among HCWs in the pre-test, there was a significant increase in the proportion of positive responses among HCWs ($p < 0.05$) for multiple questions such as treatment of water, drinking water quantity, their attitude towards their knowledge about sanitation and hand hygiene and waste disposal methods (Annexure Table 2).

All the participants answered all the questions in practice. There was a significant difference in the segregation of waste and disposal of infectious waste between pre and post-test ($p < 0.05$). There were no significant differences noticed in other practices between pre and post-test, a possible explanation for this might be most of the HCWs already had good practices in the pre-test (Annexure: Table 3). The distribution of practice scores followed non-normal distribution, so the mean practice scores of pre and post-tests were compared by the wilcoxon sign-rank test which showed a significant difference between the pre and post-practice scores ($p < 0.05$).

The odds of having adequate knowledge were 7 times higher in HCWs after sensitization when compared to their knowledge before sensitization. The odds of having an adequate practice were 1.84 times higher in HCWs after sensitization when compared with their practice before sensitization (Table 4).

DISCUSSION

The knowledge, attitude, and practice of HCWs are directly linked with improving the quality of care provided in the facility. It is the deciding factor for patients to approach the facility. With adequate knowledge, HCWs will know what

he has to do in situations and what their facility needs and with good attitude and practice, they bring their knowledge into action and prevent themselves and their clients from getting infected. In the present study, we have acquired the KAP of HCWs regarding WASH in HCFs and the factors associated with that and also sensitized the HCWs regarding the standard WASH practices. We measured the success of sensitization by comparing the results of pre and post-tests. The mean knowledge score obtained by the HCWs was 31.42 ± 3.66 and based on that it was considered 55% of HCWs had adequate knowledge about WASH in HCFs. Age, Education status, and designation of the HCWs were found significantly associated with the knowledge of the HCWs. The mean post-sensitization knowledge score was 36.22 ± 3.37 and there was a significant difference between the mean pre and post-test knowledge scores. A significant change in attitude and practice was also noticed among HCWs after sensitization.

KAP studies have been conducted in individual components of WASH and IPC but there are very few studies which had studied WASH as a separate entity. We have compared the current study results with other KAP studies on IPC, and individual components of WASH. In few studies based on the knowledge scores, HCWs were classified as having adequate/ inadequate knowledge. HCWs with adequate knowledge ranged from 9-90% in these studies(8-16). All these studies varied from the current study in an important aspect i.e. participants and study setting. In the current study, maximum number of participants were RHO/ ANM but in many studies, maximum number of participants were nurses and few studies were done among medical students and laboratory technicians. Most of these studies were done in tertiary hospitals but studies done by Assefa et al(9) and Geberemariam et al(11) were done in primary healthcare units similar to the current study setting.

There was wide variation between the practice of HCWs among other studies and the current study. In studies done in Ethiopia on IPC, the adequate practice was observed only in 54 -57% of participants(8)(9)(10)(11)(17)(18). These studies didn't measure the attitude of HCWs except for one study which had a positive attitude among HCWs similar to the current study(8). Studies done in Trinidad and Tobago (46.7% and 44%) and a hospital in Ethiopia(18) showed even lesser HCWs with positive attitudes and adequate practice respectively. One such study from India was done in which attitudes and practices of medical students and nursing students regarding IPC were compared. Though attitude and practice among both the groups were lesser than the current study, there was significant difference between both the groups as nursing students had a better attitude and practice towards IPC (Compared by Z proportion test, $p < 0.05$)(15). In another study done among laboratory technicians and para-medical workers, positive attitude and good practice were noticed similar to the current study(16). In this study, pre-post study design was used and the results were similar to the current study. There was a significant increase in knowledge among the participants and there was a significant increase in attitude as well despite having high positive attitude in the pre-test.

In the current study, it was found that age, education, and profession were found to be significantly associated with knowledge of the HCWs while it was not significantly associated with place of work and gender which was found significantly associated in one of the studies, in which age, education, gender, experience and training were significantly associated with knowledge. The experience of the HCWs was considered the most important factor associated with knowledge about IPC as it was found significantly associated in most of the studies. Only education and experience were found to be significantly associated with knowledge in two studies(8)(11). While the presence of IP guidelines, training, and place of work along with experience was significantly associated with knowledge(9). Only training and profession were significantly associated with knowledge in another study(14). There was a contrasting view, where the knowledge of HCWs was significantly associated with only ethnicity and all other characteristics which were discussed earlier such as age, gender, education, work experience were not significantly associated with knowledge of the HCWs on IPC(13). Though, these findings might be arbitrary because the study materials used were different.

This study is one of its kind as there are very few studies on WASH in HCFs. Efforts were taken to maintain uniformity as all the interviews and sensitization were done by a single author and with the same materials. To obtain maximum number of participants, all the HCFs were visited a minimum of 2 times and a maximum of 4 times. There was a gap of 2-5 days between pre and post-test and still, there was a significant difference in mean scores between baseline knowledge of HCFs and post-sensitization showing that the message delivered was clear and retainable and this can be further explored.

CONCLUSION

The study results show that nearly half of the HCWs didn't have adequate knowledge during the baseline test and there was positive attitude and good practices among the HCWs. The knowledge of HCWs was significantly associated with age, education and designation of the HCWs. Sensitization of the HCWs leads to a significant increase in knowledge and a changed attitude and practice of HCWs. This shows that simple training can bring a huge difference by an increase in the HCWs' residual knowledge and it is recommended that all the HCWs should get induction and refresher training regularly regarding hospital IPC. There should be a provision of basic WASH services in these HCFs such that HCWs can follow good practices. The unavailability of such services can always cause decrease in interest and morale of HCWs and pose a threat to the workers as well as the patients.

List of abbreviations: WASH, Water, Sanitation and Hygiene; IPC, Infection Prevention and Control; UHC, Universal Health Coverage; HCWs, Health Care Workers; HCFs, Health Care Facilities; KAP, Knowledge Attitude and Practice

REFERENCES:

1. WHO. The Human Right to Water and Sanitation Media brief. UN-Water Decad Program Advocacy Commun Water Supply Sanit Collab Counc [Internet]. 2011;(April 2011):1–8. Available from: http://www.un.org/waterforlifedecade/pdf/human_right_to_water_and_sanitation_media_brief.pdf
2. Fund WHO and the UNC. WASH in health care facilities: Global Baseline Report 2019 [Internet]. Launch ver. Steele R, editor. Geneva, 2019; 2019. 1–124 p. Available from: <http://apps.who.int/bookorders>
3. Ryan Cronk JB. Water, sanitation and hygiene in health care facilities: Status in low- and middle-income countries and way forward [Internet]. World Health Organization. 2015. Available from: www.who.int
4. Checkley W, Buckley G, Gilman RH, Assis AM, Guerrant RL, Morris SS, et al. Multi-country analysis of the effects of diarrhoea on childhood stunting. *Int J Epidemiol*. 2008;37(4):816–30.
5. Prüss-üstün A, Wolf J, Bartram J, Clasen T, Cumming O, Freeman MC, et al. International Journal of Hygiene and Burden of disease from inadequate water , sanitation and hygiene for selected adverse health outcomes : An updated analysis with a focus on low- and middle-income countries. 2019;222(May):765–77.
6. Mshida HA, Kassim N, Mpolya E, Kimanya M. Water , Sanitation , and Hygiene Practices Associated with Nutritional Status of Under-Five Children in Semi-Pastoral Communities Tanzania. 2018;98(5):1242–9. Available from: <https://apps.who.int/iris/bitstream/handle/10665/274273/WHO-CED-PHE-WSH-18.03-eng.pdf?ua=1>
7. Bouzid M, Cumming O, Hunter PR. What is the impact of water sanitation and hygiene in healthcare facilities on care seeking behaviour and patient satisfaction? A systematic review of the evidence from low-income and middle-income countries. *BMJ Glob Heal* [Internet]. 2018;3(3):e000648. Available from: <http://gh.bmj.com/lookup/doi/10.1136/bmjgh-2017-000648>
8. Bayleyegn B, Mehari A, Damtie D, Negash M. Knowledge, attitude and practice on hospital-acquired infection prevention and associated factors among healthcare workers at university of gondar comprehensive specialized hospital, northwest ethiopia. *Infect Drug Resist*. 2021;14:259–66.
9. Assefa J, Diress G, Adane S. Infection prevention knowledge, practice, and its associated factors among healthcare providers in primary healthcare unit of Wogdie District, Northeast Ethiopia, 2019: a cross-sectional study. *Antimicrob Resist Infect Control* [Internet]. 2020;9(1):136. Available from: <https://doi.org/10.1186/s13756-020-00802-w>
10. Desta M, Ayenew T, Sitotaw N, Tegegne N, Dires M, Getie M. Knowledge, practice and associated factors of infection prevention among healthcare workers in Debre Markos referral hospital, Northwest Ethiopia. *BMC Health Serv Res*. 2018;18(1):1–10.
11. Geberemariam BS, Donka GM, Wordofa B. Assessment of knowledge and practices of healthcare workers towards infection prevention and associated factors in healthcare facilities of West Arsi District, Southeast Ethiopia: A facility-based cross-sectional study. *Arch Public Heal*. 2018;76(1):1–11.
12. Lien LTQ, Chuc NTK, Hoa NQ, Lan PT, Thoa NTM, Riggi E, et al. Knowledge and self-reported practices of infection control among various occupational groups in a rural and an urban hospital in Vietnam. *Sci Rep*. 2018;8(1):6–11.
13. Unakal CG, Nathaniel A, Keagan B, Alexandria B, Lauralee B, Varun C, et al. Assessment of knowledge, attitudes, and practices towards infection prevention among healthcare workers in Trinidad and Tobago. *Int J Community Med Public Heal*. 2017;4(7):2240.
14. Ogoina D, Pondei K, Adetunji B, Chima G, Isichei C, Gidado S. Knowledge, attitude and practice of standard precautions of infection control by hospital workers in two tertiary hospitals in Nigeria. *J Infect Prev*. 2015;16(1):16–22.
15. Nair SS, Hanumantappa R, Hiremath SG, Siraj MA, Raghunath P. Knowledge, Attitude, and Practice of Hand Hygiene among Medical and Nursing Students at a Tertiary Health Care Centre in Raichur, India. Usonis V, Fatmi Z, Trajman A, Parneix P, editors. *ISRN Prev Med* [Internet]. 2014;2014:608927. Available from: <https://doi.org/10.1155/2014/608927>
16. Goswami HM, Soni ST, Patel SM, Patel MK. a Study on Knowledge , Attitude and Practice of Laboratory Safety Measures Among Paramedical Staff of Laboratory Services. *Natl J Community Med*. 2011;2(3):470–3.
17. Tessema SB, Adane MM. Assessment of antiretroviral treatment (ART) care service provision in Tigray Region health centers , North Ethiopia. *BMC Health Serv Res* [Internet]. 2015;1–7. Available from: <http://dx.doi.org/10.1186/s12913-015-1032-8>
18. Admasu Tenna, Edward A. Stenehjelm, Lindsay Margoles, Ermias Kacha, Henry M. Blumberg RRK. Infection Control Knoewledge, Attitudes, and Practices among Healthcare Workers in Addis Ababa, Ethipia. *NIH Public Access, Infect Control Hosp Epidemiol*. 2014;34(12):1289–96.

Table 1: Demographic characteristics of HCWs

	VARIABLES	PRE (n=139)		POST (n=134)	
		Frequency	%	Frequency	%
AGE(in years)	<30	30	21.6	30	22.4
	30-39	47	33.8	45	33.6
	40-49	29	20.9	29	21.6
	50-59	27	19.4	26	19.4
	>60	06	04.3	04	03.0
GENDER	Male	58	41.7	54	40.3
	Female	81	58.3	80	59.7
EDUCATION	<Higher Secondary	09	06.5	09	06.7
	Higher Secondary	39	28.1	37	27.6
	Intermediate	11	07.9	11	08.2
	Bachelor's degree	47	33.8	45	33.6
	Postgraduate	33	23.7	32	23.9
DESIGNATION	MO/AMO	13	09.4	13	09.7
	Nurse/ Assistant (OT, Eye, Dental)/ Dresser	21	15.1	21	15.7
	Technician/ Pharmacist/NMA	09	06.5	09	06.7
	Supervisors (LHV, MSW)	11	07.9	08	06.0
	RHO/ANM	72	51.8	70	52.2
	Aaya/ Sweeper	13	09.4	13	09.7
HCF	CHC	43	30.9	43	32.1
	PHC	33	23.7	30	22.4
	SHC	63	45.3	61	45.5

Table 2:Univariate logistic regression of factors associated with knowledge of HCWs towards WASH in HCFs

Characteristics		Knowledge status		p-value	OR (95% CI)
		Adequate	Inadequate		
Sex	Male	28	30	0.200	1
	Female	48	33		1.56 (0.79 – 3.08)
Age	18-29	16	14	0.007	2.29 (0.83 – 6.33)
	30-39	34	13		5.23 (1.99 – 13.74)
	40-49	15	14		2.14 (0.77 – 5.98)
	>50	11	22		1
Education	Postgraduate	25	9	0.004	1
	Graduate	27	19		0.51 (0.20 – 1.34)
	Intermediate	7	4		0.63 (0.15 – 2.67)
	Higher Secondary	16	23		0.25 (0.09 – 0.68)
	<Higher Secondary	1	8		0.05 (0.01 – 0.41)
Designation	MO/AMO	12	1	<0.001	66 (5.23 – 833.56)
	Nurse/Assistant	15	6		13.75 (2.32 – 81.49)
	Technician/Pharmacist	3	6		2.75 (0.36 – 21.30)
	Supervisors	3	8		2.06 (0.28 – 15.36)
	RHO/ANM	41	31		7.27 (1.50 – 35.22)
	Aaya/Sweeper	2	11		1
Place of work	CHC	25	18	0.838	1.19 (0.54 – 2.59)
	PHC	17	16		0.91 (0.39 – 2.11)
	SHC	34	29		1

Table 3: Comparison of mean knowledge scores of pre and post-test

	PRE	POST	t-VALUE	p-VALUE
	MEAN ± SD	MEAN ± SD		
WATER	08.45 ± 0.96	08.75 ± 0.55	03.96	<0.001
SANITATION	06.09 ± 1.22	07.57 ± 1.23	17.56	<0.001
HYGIENE	07.28 ± 1.56	09.21 ± 1.40	14.11	<0.001
WASTE DISPOSAL	09.60 ± 1.50	10.68 ± 1.52	07.43	<0.001
TOTAL	31.42 ± 3.66	36.22 ± 3.37	17.16	<0.001

Table 4: Effect of sensitization

	Exposure	Adequate	Inadequate	p-value	OR (95% CI)
Knowledge	Post sensitization	120	14	<0.001	7.11 (3.72 – 13.56)
	Pre sensitization	76	63		1
Practice	Post sensitization	89	45	0.019	1.84 (1.13 – 3.0)
	Pre sensitization	72	67		1

**Figure 1:** Framework of components leading to delayed care seeking(7) modified from Bouzid et al.