# KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING HANDLING, STORAGE, AND PURIFICATION OF WATER AMONG PEOPLE LIVING IN A SEMI-URBAN COMMUNITY BEFORE AND AFTER THE INTERVENTION AT KARACHI, PAKISTAN

**Salima Farooq[1], Yasmin Parpio[2], Tazeen Saeed Ali[3], Nafeesa Dhalvani[4], Fazal Ather[5]**


## ABSTRACT

***Objective:*** *To assess the knowledge, attitude and practices (KAP) of the people regarding handling, storage, and purification of water, in a semi-urban community of Karachi, Pakistan before and after intervention trial.*

***Material and Methods:*** *This KAP study was conducted in Lalabad community located in Bin Qasim Town from October 2007 to December 2007. Forty permanent residents of the area who were willing to participate in the study were sampled through purposive sampling technique and administered a structured questionnaire comprising of 35 questions related to KAP of handling, storage, and purification of water. Questionnaire was filled before and after the provision of safe water supply (taken as intervention in this study) from government stake holder.*

***Results:*** *Out of the 40 participants, 29 (72.5%) were illiterate and 11 (27.5%) could read and write. All participants reported a scarcity of water resources in the community. This study showed that with the minimum level of intervention the overall situation of water supply, storage and safe drinking was improved. The area, showed a reduction in water shortage [P=0.000), improvement in water supply on daily and weekly basis [P=0.000] and in safe drawing of water from container [P=0.000] as well as regular cleaning of water container [P=0.020] after intervention.*

***Conclusion:*** *This study showed improvement in the knowledge, attitude and practices regarding handling, storage, purification and use of water in semi-urban community after the provision of safe water supply. Effective interventions in community regarding their education and empowerment are needed to promote healthy practices particularly water sanitation.*


***Key words:*** *Water Purification, Water Borne Diseases, Clean Water.*

*This article may be cited as:* Farooq S, Parpio Y, Ali TS, Dhalvani N, Ather F. Knowledge, attitude and practice regarding handling, storage, and purification of water among people living in a semi-urban community before and after the intervention at Karachi, Pakistan. KUST Med J 2011;3(1): 4-9

1 Instructor, School of Nursing, The Aga Khan University, Karachi, Pakistan
2 Senior Instructor, School of Nursing / Department of Community Health Sciences The Aga Khan University, Karachi, Pakistan
3 Assistant Professor, School of Nursing and Department of Community Health Sciences Stadium Road Karachi 74800, Pakistan P.O. Box 3500 and PhD student at Karolinska Institute, Stockholm, Sweden.
4 Registered Nurse, South City Hospital, Karachi.
5 Medical Officer, Epidemiologist, World Health Organization Eastern Mediterranean Regional Office, Sudan

**Address for Correspondence**
**Tazeen Saeed Ali**
Assistant Professor, School of Nursing and Department of Community Health Sciences
Stadium Road Karachi 74800, Pakistan P.O. Box 3500
Ph: +92-213 4865460
Email: tazeen.ali@aku.edu
**Date Submitted:** January 11, 2011
**Date Revised:** May 23, 2011
**Date Accepted:** June 7, 2011

## INTRODUCTION

In developing countries, diseases related to poor water sanitation are still a major public health concern. Lack of safe drinking water is a major cause of ill health in the developing world and the water-borne diseases are leading cause of mortality.[1] In 2003, it was estimated that 4% of the global burden of disease and 1.6 million deaths per year were attributable to unsafe water supply and sanitation, including lack of general hygiene.[2,3] More than one billion people (18%) of the world's population do not have access to improved resources of water and 2.4 millions do not have access to basic sanitation.[4] An estimated 1.3 billion people living in developing countries do not have access to safe drinking water.[5] This makes the problem of water-related diseases a multi-faceted as contaminated water contributes to outbreaks of diseases, but too little water makes it difficult to maintain the sanitary conditions that prevent contamination and are essential for controlling the endemic diseases.[6] This contributes to an increase in the incidence of diarrhea, dysentery, viral hepatitis, skin diseases, and worm infestation. It is estimated that over 230 000 children die ev-

ery year because of water-related diseases, such as diarrhea and typhoid in Pakistan.[7]

Millennium Development Goal (MDG) number 10 is to reduce the number of people without adequate water supply by the end of 2015 to half.[8,9] There are a wide range of interventions which could be adopted to improve the access to water and its sanitation. These include interventions at governmental level to improve the supply and storage of water and enhancing the sanitation services. Public resources alone are unable to solve this global problem and new demand-oriented approaches are needed.[10] Thus, the capacity of underserved populations to respond to this immense task plays an important role in overcoming this global challenge.[11] However, critical analysis of water supply programs in developing countries commonly points to community participation as a key to enhance efficiency and effectiveness of investment.[12] Water safety depends on quality of water storage and its handling in the community.[13] Therefore, the knowledge, attitude and practices of communities before and after intervention regarding water handling, storage and purification can greatly impact the incidence and prevalence of water-related diseases. Rose et al provided such an example in their study done in Tamil Nadu, India and found that the risk of diarrhea was reduced by 40% in children drinking solar disinfected water.[14] This shows the effectiveness of such a basic intervention in reducing the incidence of water-related diseases consequently, reducing the global burden of disease. Although studies from developing countries can be generalized to similar settings but there is a need to explore this important public health issue in our community as well. This study was conducted in order to explore the change of knowledge, attitude and practices of the people regarding handling, storage and purification of water before and after intervention, in a semi-urban community of Karachi, Pakistan.

## MATERIAL AND METHODS

This study was conducted in Lalabad community sub unit of Rehri and located in Bin Qasim Town in Karachi, Pakistan from October to December 2007. Forty participants were sampled (n=40) through purposive sampling method, before and after the intervention. The permanent dwellers of the area and those who were willing for the study were included in the survey. We excluded those, who were not permanent residence, those who refused to participate. The ethical approval was taken from the Community Health Nursing interest group of Aga Khan University, district health office and community leaders. Written and verbal consent was obtained before inclusion of participants in the study. This study used interventional design to make comparison of before and after proportions.

### *Sample size calculation*

Sample size calculation was done by specifying a power of 80%, for two dependent sample sizes by assuming that the use of water from unhygienic sources before intervention will be 71% and after intervention it will be reduced to 40% by having the alpha level of 5%, we required the sample size of 40 for pre and post assessment.

### *Intervention*

There were two interventions conducted in this study. First to develop the collaboration of the community activist and district health team, so that the water availability could be enhanced. Furthermore, at community level health education was given to the community about the importance of safe drinking water, water-borne diseases and their causation. The sessions were conducted at family and community levels.

### *Data management*

Data was obtained using a structured questionnaire before and after the intervention. The content and face validity was done, before the implementation of questionnaire. The questionnaire comprised of 35 questions related to pre and post intervention knowledge, attitude and practices of water sanitation in the community. The questionnaire was pre-tested on a random sample of 10 participants (n=10) to ensure its validity before using it for the study. The data was analyzed into SPSS software version 15.0. Chi square test was applied to compare proportions.

## RESULTS

Out of 40 respondents 29 (72.5%) were illiterate, while 11 (27.5%) were literate (could read and write, with intermediate as the highest education status). It was found that 25 (62.5%) participants had a monthly income below Rs. 7,500 and only 15 (37.5%) had an income range between Rs. 7,500 to Rs. 10,000 (Table 1).

Initially there was severe shortage of water, but after intervention it was reduced to 40% and availability of water was moderately increased to 27.5% [P-value: 0.000]. The frequency of water received both on daily

**DEMOGRAPHIC PROFILE OF THE PARTICIPANTS**

| Parameter | Frequency (%) |
|---|---|
| ***Education status*** | |
| Illiterate | 29 (72.5%) |
| Read and write (Intermediate) | 11 (27.5%) |
| ***Socio economical status*** | |
| Monthly income below RS. 7500 | 25 (62.5%) |
| Income range from 7500 to 10000 | 15 (37.5%) |

Table I

**RESPONSE OF STUDY SUBJECT PRE AND POST INTERVENTION WITH ITS CHI SQUARE P-VALUE**

| | Pre intervention | Post intervention | P value |
|---|---|---|---|
| | n (%) | n (%) | |
| **Scarcity of water** | | | **0.000** |
| Mild | 00 (0.0) | 13 (32.5) | |
| Moderate | 00 (0.0) | 11 (27.5) | |
| Severe | 40 (100) | 16 (40.0) | |
| **Frequency of water received** | | | **1.000** |
| daily basis | 5 (12.5) | 5 (12.5) | |
| weekly basis | 35 (87.5) | 35 (87.5) | |
| **Buying water** | | | **0.000** |
| Daily | 37 (92.5) | 0 (0.0) | |
| Weekly | 3 (7.5) | 31 (77.5) | |
| Monthly | 0 (0.0) | 9 (22.5) | |
| **Place of water storage** | | | **0.198** |
| underground method | 19 (47.5) | 19 (47.5) | |
| Cooler | 3 (7.5) | 0 (0.0) | |
| underground tank and cooler | 18 (45.0) | 21 (52.5) | |
| **Covering water container** | | | **0.556** |
| Yes | 39 (97.5) | 38 (95.0) | |
| No | 1 (2.5) | 2 (5.0) | |
| **Draw water from container** | | | **0.000** |
| Tap | 1 (2.5) | 26 (65.0) | |
| inserting utensils | 39 (97.5) | 14 (35.0) | |
| **Hand touch** | | | **0.000** |
| Yes | 1 (2.5) | 15 (37.5) | |
| No | 39 (97.5) | 25 (62.5) | |
| **Purifying water** | | | **0.064** |
| Yes | 11 (27.5) | 19 (47.5) | |
| No | 29 (72.5) | 21 (52.5) | |
| **Used for purifying** | | | **0.000** |
| Boiling | 6 (15) | 19 (47.5) | |
| Alum | 0 (0.0) | 3 (7.5) | |
| Filter | 5 (12.5) | 7 (17.5) | |
| **Time of water boiling** | | | **0.000** |
| 10 min | 4 (10.0) | 2 (5.0) | |
| 20 min | 1 (2.5) | 7 (17.5) | |
| **30 mins** | 1 (2.5) | 10 (22.5) | |
| **Cleaning water container** | | | **0.020** |
| Yes | 30 (75.0) | 35 (87.5) | |
| No | 10 (25.0) | 5 (12.5) | |
| **Frequency of cleaning water** | | | **0.000** |
| Daily | 0 (00.0) | 28 (70.0) | |
| once a week | 3 (7.5) | 4 (10.0) | |
| Once a Month | 37 (92.5) | 8 (20.0) | |

Table II

and weekly basis had neither increased nor decreased (i.e. 12.5% & 87.5%). There was a change in behavior of participants regarding buying water as it decreased on daily and monthly basis while increased on weekly basis (i.e. 77.5%) [P-value: 0.000]. The method of water storage remained the same i.e. underground method (47.5%) but volume of stored water in underground tank and cooler increased (52.5%) [P-value: 0.1900]. The participant's attitude of covering the water containers remained the same with respect to the participants who did not cover them (i.e. 95.0% & 5.0%). Method to draw water from container through tap increased after intervention (65.0%) a while inserting utensils into the container decreased (35.0%) [P-value: 0.000]. Touching water with hand, while drawing it from container, worsened after the intervention. After intervention Participants were more conscious about purifying water (47.5%, 52.5%) [P-value: 0.064]. Cleaning water container after intervention also improved [P-value: 0.020].

## DISCUSSION

Water-borne diseases have been a health issue, threatening the populations worldwide.[4,15,16] This complicates the efforts of developing nations to prevent water-related diseases. However, each community can make a difference in this struggle through their simple efforts towards better water-handling, storage and purification practices. Provision of safe drinking water to global community is one of the key missions of the governments and health care providers, which is why negotiation with government is required to be able to get access to safe water supply. This has been proven by this small scale study that if negotiations are done with water supply department, and the community empowered then scarcity of water can be prevented to some extent, as after intervention the frequency of buying water has been reduced on daily basis, which will also save their money. This study reiterates the fact that there is still lack of access to safe water supply in the area under study which represents hundreds of similar settings in Pakistan. The estimated Mortality from water related problems is 4.0% of all deaths and 5.7% of the total disease burden in DALYs (the disability-adjusted life years) occurring worldwide.[17] A previous study showed that the lower the proportion of home water service higher the hospitalization rates for pneumonia and influenza, skin or soft tissue infection, and respiratory syncytial virus as compared to high proportion of home water service regions.[18] Our study pointed out that the participants were at a higher risk for these diseases. This will put a lot of economical burden on the community, buying water on one hand and paying a lot of money on treatment of those water borne diseases on the other hand. An interesting finding was that 87.5% participants were receiving water from Municipal Corporation only once a week which shows lack of access and possibility of contamination.

Our results revealed that with minimum level of effort and a implementing a potentially life-saving intervention, by improving awareness through small health education sessions, the access to safe drinking water and ensuring minimum hand touch, may maintain the water pure. Before interventions about a quarter participants were purifying the water which after health education session and some availability of water improved to about half. The participants started drinking better purified water before and after interventions from 15% to 48% by using boiling method of purification. A study done in Karachi, to assess the water purification practices of people concluded that 58% of the study participants used boiling as the sole method to purify water, while 11% used filtration method which support the finding of our study as well. However, filtration is less effective method of purification, as shown in one study.[13] In another study 49% participants used both the methods to purify water[19] whereas in our study none of the participants were using dual methods of water purification before, which improved after intervention to some extent. According to a study the participants who were not purifying water, considered purification as expensive and a time consuming task. It shows that poverty can be one of the factors to hinder the water purification practices.[20] This is relevant to our study as 62.5% participants were from low socio economic group and had a monthly income of less than Rs. 7,500. Other reasons of non purification highlighted by this survey were change of taste and lack of awareness. Thus, it is imperative to raise awareness in the community regarding the water purification practices with appropriate methods, explaining the hazards of using unpurified water and making the community aware of the seriousness of the issue and simple steps that could be taken to prevent it. Similar results were shown in a study done in Manipur, India.[1] Both the studies indicate that some strategies are needed to ensure safe drinking water to the community and also point out lack of awareness as a major problem among communities.

In our study majority of participants before intervention, used underground method and as well as underground tank and cooler as in 45% (closed spaces) as storage space, this was improved after intervention but for using underground tank and water coolers as their water storage space to some extent as 53%. The study done by Luby et al in 1999 supports this finding as 58% of their study participants used plastic insulated utensils for storage of water[19] however use of underground storage tanks was not discussed in their study.

Almost all participants of our study dipped utensils into water reservoirs each time they retrieved it from the container which is a risk factor for increasing the contamination of drinking water a thus making it more hazardous for drinking purposes.[21] The participants who covered the water containers remained same with respect

to those who did not before and after intervention. Even after the intervention touching water with hand while drawing it from container worsened the situation. This is a modifiable factor which if controlled can reduce the chances of water-borne diseases. Illness can be prevented by ensuring that drinking water remains clean from the point of collection to the point of consumption and this is only possible by storing drinking water in clean, covered vessels and by using a ladle for taking the water out.[22] Therefore, safer practices such as using cups with long handles for drinking water must be encouraged.[13] The study conducted at Manipur also indicates that low literacy rate, low economic status, unavailability of portable drinking water; ignorance, poor hygienic and cultural practices associated with consumption of drinking water etc. were found to be the determinants of high incidence of morbid condition in the village.[1] It is noticed that many factors mentioned in the above study are like found in our survey thus exposing our community to higher risk of morbidity and mortality.

## CONCLUSION

This is concluded from the study that minimum level of intervention improved the knowledge, attitude and practices regarding handling, storage, purification and use of water in semi-urban community after the provision of safe water supply. It is therefore, recommended that such Effective interventions be conducted in future periodically in order to improve healthy practices particularly water sanitation and all the possible means of communication be used to disseminate the message.

### *Acknowledgments*

We would like to acknowledge the District local teams and colleagues who helped in data collection including Gideon Vistor, Ruksana yasmin, Sizna Mohammad and Dr. Nida Naeem for data editing and formatting.

## REFERENCES

1. Singh SJ, Devi HP. A study of water-borne morbidities of Thanga Village, Manipur. Journal of Human Ecology. 2006; 19(2): 103-5.
2. Hutton G, Haller L. Evaluation of the costs and benefits of water and sanitation improvements at the global level. Journal [serial on the Internet]. 2004 Date: Available from: WHO/SDE/WSH/04.04.
3. Dold C. Water and health, hand in hand for a day. Bull World Org. 2001; 79(5): 486.
4. WHO/UNICEF. Global Water Supply and Sanitation Assessment 2000 Report. Geneva: World Health Organization with UNICEF; 2000 Contract No.: Document Number|.
5. United Nations Development Program: Human development report 1996. New York: Oxford, Oxford University Press 1999. Contract No.: Document Number|.
6. Bartlett S. Water, sanitation and urban children: The need to go beyond “improved provision.” Environment and Urbanization. 2003; 15(2): 57-70.
7. Khan A. Water-borne diseases kill 230,000 children each year. The Nation. August 30, 2008.
8. Jenkins, Marion, Scott B. Behavioral indicators of household decision-making and demand for sanitation and potential gains from social marketing in Ghana. Social Science and Medicine 2007; 43(6): 1007-24.
9. United Nations 2002. Report of the World Summit for Sustainable Development, Johannesubrg, South Africa. 26, August to 4 September 2002. United nations, New York Contract No.: Document Number|.
10. Water Supply and Sanitation Collaborative Council (WSSCC) and World Health Organization (WHO). Sanitation and hygiene promotion programming guidence. Geneva, Switzerland: The World Health Organizatin; 2005 Contract No.: Document Number|.
11. Waterkeyn J, Cairncross S. Creating demand for sanitation and hygiene through community health clubs: A cost- effective intervention in two districts in Zimbabwe. Social Science and Medicine. 2005; 61: 1958-70.
12. Godfrey S, Obika A. Improved community participation: Lessons from water Supply programs in Angola. Community Development Journal. (2004); 39(2): 156-65.
13. Banda K, Sarkar R, Gopal S, Govindarajan J, Harijan BB, Jeyakumar BM, et al. Water handling, sanitation and defication practices in rural southern India: a knowledge attitude and practices study. Transactions of the Royal Society of Tropical Medicine and Hygiene. 2007; 101(11): 1124-30.
14. Rose A, Roy S, Abraham V, Holmgren G, George K, Balraj V, et al. Solar disinfection of water for diarrhoeal prevention in Southern India. Arch Dis Child. 2006; 91: 139-41.
15. Hinrichsen D, Robey B, Upadhyay UD. Solutions for a Water-Short World. Baltimore: Johns Hopkins School of PublicHealth; 1997 Contract No.: Document Number|.
16. Anderson Y, Bohan P, eds. Disease surveillance and waterborne outbreak. In Water Quality: Guidelines. edition no London: Lorna Fewtrell and Bartram J; 2001 p.
17. Pruss A, Kay D, Fewtrell L, Bartram J. Estimating the Burden of disease from water, sanitation and hygiene. Environ Health Perspect. 2002; 110(5): 537-42.
18. Hennessy TW, Ritter T, Holman RC, Bruden DL, Yorita KL, Bulkow L, et al. The Relationship between In-Home Water Service and the Risk of Respiratory Tract, Skin, and Gastrointestinal Tract Infections Among Rural Alaska Natives. Am J Public Health. 2008; 98(11): 2072-8.

19. Luby PS, Syed H, Atiullah N, Faizan MK, Fisher-Hoch S. Limited effectiveness of home drinking water purification Efforsts in Karachi, Pakistan. Int J Infect Dis. 2000; 4: 3-7.

20. Jalan J, Somanathan E, Chaudhuri S. Awareness and the demand for environmental quality: Drinking water in urban India. New Delhi 110 016, India: Indian Statistical Institute, Delhi; 2003 Contract No.: Document Number|.

21. Wright J, Gundry S, Conroy R. Household drinking water in developing countries: a systematic review between microbbbbbogical contamination between source and point-of-use. Trop Med and Int Health. 2004; 9: 106-17.

22. Facts for Life-A Communication Challenge. UNICEF India Country Office: United Nations Childrens' Fund [UNICEF], World Health Organization [WHO] and United Nations Educational, Scientific and Cultural Organization [UNESCO]; 1997) Contract No.: Document Number|.

**CONFLICT OF INTEREST**

Authors declare no conflict of interest

**GRANT SUPPORT AND FINANCIAL DISCLOSURE**

NONE DECLARED