

Access to Safe Drinking Water and WASH Facilities in Schools of District Chiniot, Pakistan and Awareness on Waterborne Diseases among Teachers and Students

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Abstract: This study assessed the situation of safe drinking water, health and hygiene conditions, and knowledge about waterborne diseases among the teachers and students of 153 selected government and private schools in District Chiniot, Pakistan. The methodology relied on questionnaires and discussion with the school teachers and students. In the survey sample, a total of 153 schools of Tehsil Lalian, District Chiniot, were included. While, total 306 Head Teachers and students of the selected schools including 153 head teachers (males 34 and females 119) and 153 students (boys 62 and girls 91), were interviewed for data collection. The quantitative and qualitative data on the issues related to safe drinking water, WASH (water, sanitation and hygiene) facilities, and waterborne diseases were collected and analyzed using SPSS (Statistical Package for the Social Sciences). The study revealed that the main sources of drinking water in the schools were hand pumps (73%) and about 80% schools have sufficient quantity of available water throughout year. More than 90% head teachers and 92% students reported that water has no smell and color but it has a specific taste. About 86% head teachers and 38% students were not satisfied with existing drinking water services. As reported by 100% respondents, schools have toilets, while 95% students confirmed that students waste water in the schools. Students were asked about the disposal of used water in their schools and in their homes. In response, 23% students said that used water was properly disposed in their schools, while only 10% students told that used water was properly disposed in their homes. 100% teachers and students have knowledge about the diseases caused by drinking unsafe water, but sometimes they don't take care in using water. About 68% head teachers told that no water treatment methods were used by the people in the area. Lack of knowledge and affordability were the main reasons for not using the water treatment methods. The need for promotion of knowledge among the teachers and students on use of safe drinking water and to improve health and hygiene conditions in schools and homes was also emphasized.

Keywords: Safe drinking water, wash facilities, schools of district Chiniot, Pakistan, awareness of waterborne diseases.

Introduction

Provision of safe drinking water, adequate WASH and personal hygiene facilities at homes, schools and other private and public places are vital for the sustainable environmental conditions and reducing the incidence of waterborne diseases. Despite its importance, provision of safe drinking water and WASH facilities is a neglected sector in Pakistan.

According to a recent study, Pakistan is one of the top 10 countries with the lowest access to clean water (Water Aid, 2018). Pakistan ranks number 9 in the list of top 10 countries with the lowest access to clean water where 21 million out of the total population of 207 million do not have access to clean water. India, Ethiopia, and Nigeria are the top three countries without safe water (Jamal, 2018). Only 39 per cent of Pakistanis have access to safe drinking water and the levels of safety also vary from region to region (Ashraf, 2018).

A survey by the Pakistan Council of Research in Water Resources (published in 2012) reveals that 88% of the functional water supply schemes in Pakistan provide

water which contains microbial contaminations (PCRWR, 2012).

Increased arsenic, nitrate and fluoride contamination was detected in drinking water in various localities in Pakistan (GoP, 2004). The Pakistani Ministry of Water and Power reported in 2002 that only 1% of the domestic and industrial wastewater receives treatment (GoP, 2002). While in rural areas, waste water treatment is nonexistent, leading to pollution of surface and groundwater (Pakistan Water Gateway, nd). The Pakistan Social and Living Standards Measurement Survey of 2010-11, reports that the main sources of drinking water are given in Table 1.

Table 1 Sources of Water.

#	Sources of Water	%
1	Tap water	32%
2	Hand pump	28%
3	Motor pump	27%
4	Dug well	4%
5	Other sources	9%
6	Total	100%

[†]This paper was presented in Symposium on Water Contamination Issues and Treatment Techniques, (February, 2018) Abdus Salam School of Sciences, Nusrat Jahan College, Rabwah, Chiniot, Pakistan.

Assuming that other sources are identical to unimproved water sources, access to an improved water source was 91%, almost identical to the 2010 figure estimated by the JMP (PSLSMS, 2011).

For sanitation, the survey estimates that 66% had a flush toilet, 15% a non-flush toilet, and 18% had no toilet at all. If all toilets were considered to be a form of improved sanitation, access according to this estimate would be 81%, much higher than the JMP estimate of 48% (PSLSMS, 2011).

As reported by UNICEF, in Pakistan, about 74% of girls and 48% boys in primary schools have adequate toilets and 81% of girls and 75% of boys at primary schools have access to drinking water. According to some estimates every day, some 670,000 children miss school due to illnesses that are mostly water-borne (UNICEF (2012).

Chiniot is one of the districts of the Punjab province, of Pakistan, where issues related to the provision of safe drinking water, health and hygiene and WASH facilities are of a serious nature and need to be studied. The district is located on the left bank of the Chenab River on the Sargodha to Faisalabad road and it has 3 tehsils: 1- Chiniot 2- Bhawana 3- Laliyan (Government of Punjab, 2018).

The population of District Chiniot, as reported in 2017 Census was as given in Table 2.

Table 2. Population of District Chiniot.

	Rural	Urban	Total
Population	947202	422538	1369740
Male	484076	216525	700601
Female	463093	205964	669057
Transgender	33	49	82
Household	150625	67982	218607

Average annual growth rate in District Chiniot has been 1.86% during 1998 to 2017 (GoP, 2017).

This research paper is based on the partial findings of an ongoing study conducted by the Nusrat Jehan College (NJC), Rabwah. The NJC is conducting a Survey on the Situation Analysis of Safe Drinking Water, WASH facilities and Health and Hygiene conditions in the government and private schools of Chiniot District. The research team is conducting interviews with the Head Teachers and students of the 450-500 selected schools of the Chiniot District, by using structured questionnaires, to collect quantitative and qualitative data on the issues related to the safe drinking water, WASH facilities, and health and hygiene situation in the selected schools. So far, survey has been completed in 153 schools of Tehsil Laliyan of District Chiniot. The main issues and themes covered in the study include the following: main sources, availability, quantity and quality of drinking water in the schools, sanitation facilities available in the

schools, knowledge about waterborne diseases among teachers and students, behavioral issues related to the treatment of water and use of safe drinking water, and practices regarding health care and hygiene.

Materials and Methods

In total, 153 schools for boys and girls were selected from Tehsil Laliyan for the study. Out of these 126 were government schools and 27 were private schools/madrassas. Location-wise 25% were located in urban areas and 75% were located in the rural areas; by ownership, 83% were government schools and 17% were private schools, while gender-based composition of schools included 23% boys' schools, 50% girls' schools and 27% co-education schools respectively. Types and locations of the selected schools have been given in Table 3.

Table 3. Types and locations of selected schools.

Types of Educational Institutions/Schools	No. of Schools Surveyed 153*	
	Urban*	Rural
Government High Schools for Boys	14%	86%
Government Middle Schools for Boys	17%	83%
Government Primary Schools for Boys	23%	77%
Private High Schools for Boys	75%	25%
Government High Schools for Girls	33%	67%
Government Middle Schools for Girls	8%	92%
Government Primary Schools for Girls	8%	92%
Private High Schools for Girls	83%	17%
Private Middle Schools for Girls	-	-
Government Primary school (combine)	8%	92%
Private Primary Schools (combine)	100%	0
Madrassas for Boys	100%	0
Madrassas for Girls	100%	0
Total	26%	74%

*All the percentages have been calculated out the total number of 153 schools; which have been surveyed in the urban and rural areas during the study.

The primary data on the safe drinking water, health and hygiene and WASH facilities was collected from 306 Head Teachers and students of the selected schools, including 153 head teachers (males 34 and females 119) and 153 students (boys 62 and girls 91).

Permission was sought for and granted by the District Department of Education, to carry out the survey. The individual school authorities were also approached to obtain their consent to carry out the survey. Lastly, the consent of teachers and students was also obtained, first after explaining the purpose of the study and that they were not obliged to answer any questions which they did not like or were free to terminate interview at

any given time. No personal identifiers of respondents were recorded.

The tools for data collection of the survey were two separate structured questionnaires for teachers and students. A pilot survey was conducted at the selected schools to test the research tools and questionnaires were finalized on the basis of received feedback. Questionnaires were designed to elicit responses on the main water supply sources, WASH facilities, the knowledge, and behavior of teachers and students on use of safe drinking water, personal health and hygiene, waterborne diseases, water supply, and sanitation facilities.

A guideline for conducting in-depth interviews was designed taking into consideration the socio-cultural situation of the society and selected area. Research Team was oriented in the appropriate norms and methods of conducting interviews and to manage the customs and difficulties that may hinder the data collection process.

In order to ensure the quality of the data, each completed questionnaire coded on was manually checked before it could be tabulated on MS Excel. The data was analyzed using the SPSS (Statistical Package for the Social Sciences), at a significance level at 95% confidence interval and relative risks (RR). The procedure based on MS Excel was used to determine the confidence interval for proportions at 95% margin of error.

Results and Discussion

Among interviewed, from rural schools there were 22% male teachers and 78% female teachers, while teachers in urban schools included 25% male teachers and 75% female teachers.

Interviewed students in the rural schools included 31% boys and 69% girls and in urban schools included 40% boys and 60% girls. Grade-based composition of boys in rural schools was 66% from primary schools, 17% from middle schools, and 17% from high schools and grade-based composition of girls in schools of rural areas was 78% from primary schools, 15% from middle schools, and 7% from high schools. On the other hand, grade-based composition of girls in urban area schools was 62% from primary schools, 9% from middle schools, and 29% from high schools and grade-based composition of boys in urban schools was 68% from primary schools, 17% from middle schools, and 25% from high schools. Age-based composition of girls in schools in rural areas included 78% of 8-10 years of age, 15% of 11-13 years of age and 7% of 14-16 years of age and age-based composition of girls in urban areas schools included 62% girls from 8-10-year age group, 9% girls from 11-13-year age group and 29% girls from 14-16-year age group. Age-based composition of girls in urban area schools included 62% girls from 8-10-year age group, 9% girls from 11-

13-year age group and 29% girls from 14-16-year age group and age-based composition of boys in schools of urban areas included 68% were of 8-10 years of age, 17% were of 11-13 years of age and 25% were of 14-16 years of age.

The study indicated that the main available sources of drinking water in the schools were hand pumps, electric motors, and supply by the Municipal Corporation or Town Committees respectively. Summary of the responses is given in Table 4 and a comparison is shown in Fig. 1.

Table 4. Drinking water sources in schools

Water sources	Head Teachers	Students
Hand Pump	73%	73%
Electric Motor	45%	57%
Supply	24%	24%

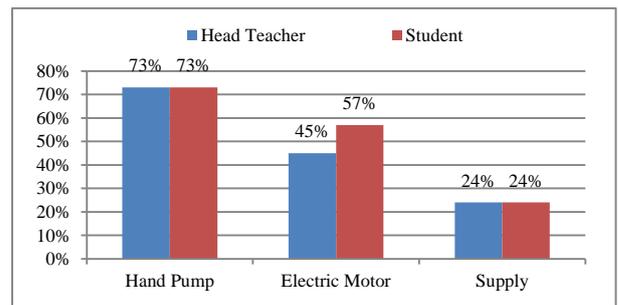


Fig. 1 Main sources of water supply in schools.

Sufficient quantity of water was available in the schools, as reported by 86% head teachers and 80% students. According to 79% head teachers, water was available throughout the year, while on the other hand only 5% students confirmed that water was available throughout the year. Those who said that water was not available throughout the year included 21% head teachers and 95% students respectively, (Table 5, Figs. 2, 3).

Table 5. Water quantity and availability.

Water quantity and availability	Head teachers		Students	
	Yes	No	Yes	No
Quantity of water receive is adequate	86%	14%	80%	20%
Water available throughout the year	79%	21%	5%	95%

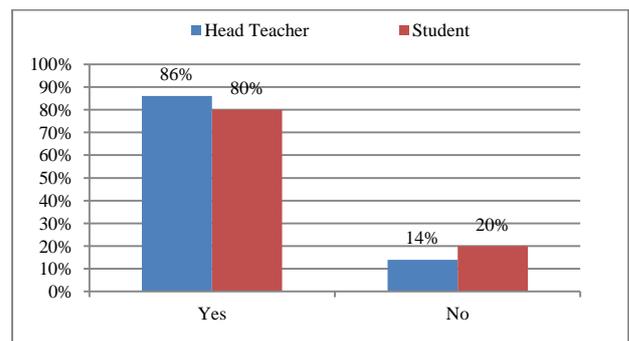


Fig. 2 Water Availability.

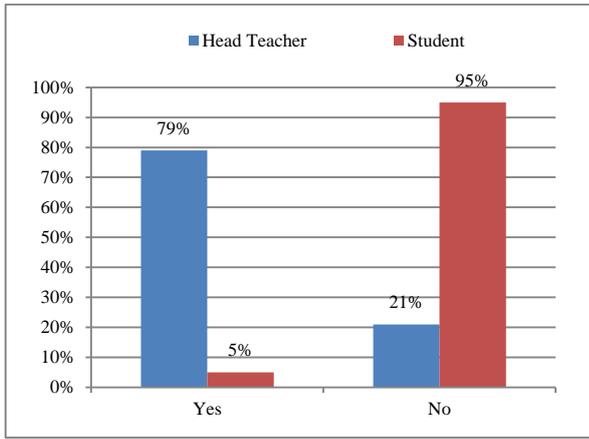


Fig. 3 Duration of availability.

No standard tests to check the water quality have been carried out during this study. The following results are based on the reported quality of water.

According to 94% head teachers and 92% students reported that the available drinking water has no smell, and on the other hand 6% head teachers and 8% students said that the available water has a foul smell. Furthermore, 100% head teachers and students told that drinking water has no color, (Table 6, Fig. 4).

Table 6. Smell and color of water.

Smell of water	Head Teachers	Students	Water color	Head Teachers	Students
No smell	94%	92%	Clear	100%	100%
Foul smell	6%	8%	Cloudy	0%	0%

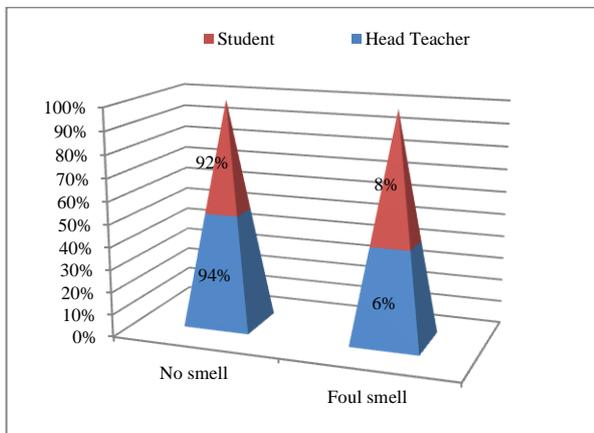


Fig. 4 Smell of drinking water.

Commenting on the taste of the drinking water, 90% head teachers and 25% students told that it has a specific taste but 10% head teachers and 75% students told that it was taste-less, (Fig. 5).

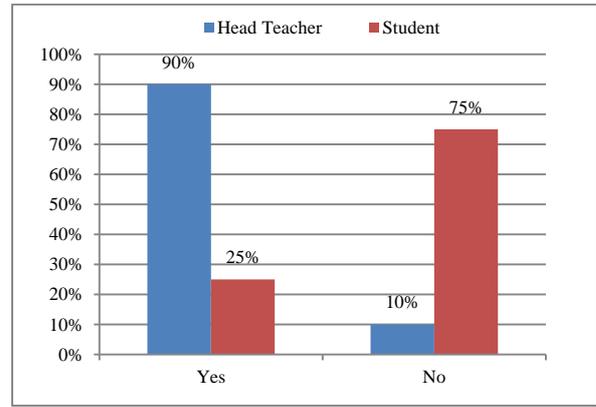


Fig. 5 Taste of drinking water.

A large number of teachers (86%) and 38% students were dissatisfied with the existing water services, while 14% head teachers and 62% students expressed their satisfaction with the existing water supply services. Details are given in Table 7 and Fig. 6.

Table 7. Level of satisfaction with water services.

Responses	Head Teachers	Students
Satisfied	14%	62%
Dissatisfied	86%	38%

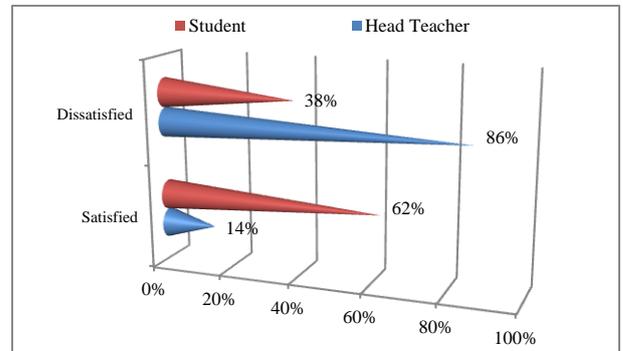


Fig. 6 Satisfaction with water supply services.

Following reasons for dissatisfaction with the existing water supply services were indicated by the respondents:

- Unavailability of water.
- Lesser number of water taps and points, which are not sufficient for teachers and students.
- Due to rush of water-drinkers some issues emerge during break time.
- Delays in repair of the water pumps or hand pumps, mostly in Government schools.
- Water supply shortage as compared to the required quantity of drinking water.
- Bad smell of drinking water.
- Bad and salty taste of drinking water

Discussing the availability of sanitation facilities and practices in the sample schools, it was reported by all the teachers and students that toilets were available in 100% schools.

As reported, students waste water at schools. 95% students confirmed that students waste water, while only 5% students said that students do not waste water in the schools.

The attitudes and practices on the proper disposal of used standing water in schools and at homes were very poor among the majority of students. Only 23% students told that used water was properly disposed in their schools, while 77% students said that used water was not disposed properly in their schools. About disposal of the used water at homes, only 10% students confirmed that used water was properly disposed in their homes, while 90% students told that the used water was not properly disposed in their homes. (Table 8).

Table 8. Disposal of used standing water.

Responses	Schools	Homes
Disposed properly	33%	10%
Not disposed properly	77%	90%

The study shows that 100% teachers and students have knowledge about the diseases caused by drinking unsafe water. The respondents, in their multiple responses, specified following diseases which are caused by drinking unsafe water:

- Diarrhea
- Cholera
- Dysentery
- Typhoid

The research indicates that 100% students and teachers have awareness about the benefits of use of safe drinking water. The head teachers told that only 9% teachers have high level knowledge about the benefits of use of safe drinking water, while 91% teachers have moderate knowledge about the benefits of use of safe drinking water.

Majority of the people in the area do not use any water treatment methods, as reported by 68% head teachers. while, 26% head teachers said that people use boiling and filtration methods to treat the drinking water and 6% head teachers said that only boiling method was used for water treatment in this area. For details see Table 9 and for comparison see Fig. 7.

Table 9. Water treatment methods used.

Methods used	Confirmed by Head Teachers
Boiling & Filter	26%
Boiling	6%
No method	68%

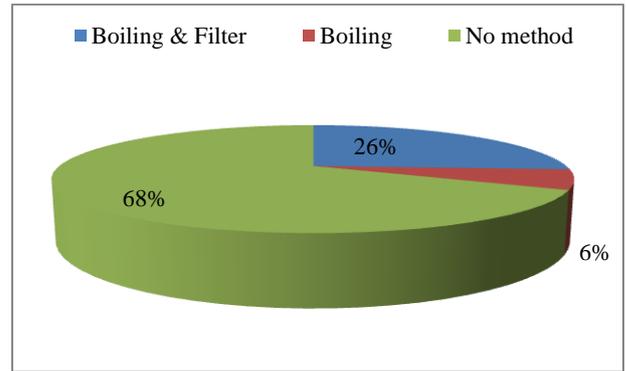


Fig. 7 Teachers response on water treatment methods.

Following common barriers were identified by the head teachers due to which people do not adopt use of water treatment methods.

- Low self- efficacy to prevent diseases
- No perceived need
- Lack of affordability
- Lack of dissemination of treatment technologies
- Dislike and mistrust of chemicals
- Perceived consequences of interrupting the practice
- Competing priorities, like, poverty and unemployment
- Lack of support for women from male members of the household
- Dislike of taste and smell of water treated with PUR faucet water filters.
- Lack of products and equipment at local level
- Lack of information and promotion of water purifiers
- Lack of information

Initiatives for Promoting the Use of Safe Drinking Water

The responding head teachers suggested that following initiatives may be taken for promoting the use of safe drinking water among the people of this area.

1. Contents about the use of safe drinking water should be included in curriculum
2. Orientation sessions for teachers should be arranged
3. Orientation sessions for students should be arranged
4. Community awareness campaign should be launched

5. Provision of safe drinking water should be assured by Local Government

During the survey, some of the questions regarding the practices of health care and hygiene methods and keeping the surroundings clean in school and home were asked only from the students. Responding to these questions the students gave the following answers.

- 100% students try to keep the surroundings of their schools and homes clean.
- 100% students have awareness about the germs on their dirty hands.
- Only 16% students wash their hands before drinking water, while 84% do not wash their hands before drinking water.
- Only 15% students wash their hands with soap before eating food, while 85% do not wash their hands before eating food.
- 100% students wash their hands after using latrine.
- Only 35% head teachers and 37% students told that students wash their hands with soap after using latrine. While 65% head teachers and 63% students said that students do not use soap for washing hands after using latrine.
- As for soap availability in schools, 92% head teachers and only 20% students said that soap was available in schools.
- 100% students do not have any knowledge about the steps of hand washing method. 63% students confirmed that they drink water from the water taps by putting their hands on the taps, while the rest of 37% said that they do not do that.

Conclusion

The study findings highlight a number of problems regarding availability and use of safe drinking water and poor washing and sanitation facilities in many schools of Tehsil Laliyan of District Chiniot, which need to be addressed immediately by the Local Government, Education Department, and also by the owners of the private schools.

In addition to that the study indicates that the knowledge and awareness regarding the use of safe drinking water and to adopt health care and hygiene practices among the communities, teachers and students need to be made aware and assisted in improving the situation.

It is suggested that a vigorous initiative should be launched to educate the communities, teachers, and students to create awareness on the use of safe drinking

water and to improve the behavior and practices of using toilets and washrooms and to maintain the health and hygiene standards by adopting appropriate water treatment methods and other required cares to maintain a clean and healthy environment in schools and homes.

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