COMPARATIVE ANALYSIS OF SCHOOL BASED WASH FACILITIES, IMPLICATIONS ON CHILDREN BEHAVIOR AND HEALTH COUPLED WITH POLICY FRAME WORK FOR ENHANCING COGNITIVE LEARNING IN CHILDREN

Abstract

United Nations Sustainable Goals. 06 emphasis on unbiased and even access of water and basic water sanitation and health sciences (WASH) facilities but, relentless reality is polar opposite where a stellar portion especially children are devoid of basic necessity facilities, especially in Pakistan. The most vulnerable group i-e children deprived of WASH facilities. The main objective of the study was, a WASH survey was conducted in two school settings i.e., Mehran and Sindh primary schools, using 100 forms comprising 21 Closed-ended questions directly linked with WASH facilities. The response was gathered from both boys and girls to maintain equity. Survey questionnaires are drafted as per international guild lines. The survey focused mainly on four dimensions: Handwashing, toilet, drinking water facilities, and Hygiene practice showing average (%) responses of boys to girls as 17.4:20.3, 29:14.6, 33.6:21, and 20.6:25.8, respectively showed the condition of mentioned dimensions improved in Mehran School rather than that of Sindh School. Bacteria were observed in water samples under a Fluorescence microscope that confirmed the presence of various bacteria species namely: *Shigella, Escherichia coli, Vibrio, Salmonella, Cryptosporidium, Staphylococcus spp.* Conclusively, there is a dire need to upgrade the WASH policy parallel to current scenario and need of society to lessen the severity of the problems, especially children facing in developing country like Pakistan.

Keywords: SDGs, Water, Sanitation, Hygiene, Primary schools, WaSH policy

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INTRODUCTION

Water is a most vital element for life and a major constituent of the earth's hydrosphere. In the 21st century, water scarcity and lack of clean drinking water are the utmost challenges faced by one-third of the world population which will be raised by 2050 (Mishra, Kumar, Saraswat, Chakraborty, & Gautam, 2021). However, safe and clean water is an essential commodity for sustaining the entire ecosystem including the survival of human beings on this planet. On the other hand, there is only 2.7 % of freshwater (1.4×10^{18} m^3) among 96.54% of total water resources on earth. This little percentage shows that fresh water is the only potential drinking water source for the survival of human beings (Szewzyk, Szewzyk, Manz, & Schleifer, 2000). Being a neglectful source and burgeoning anthropogenic activities, water resources are highly susceptible to contamination around the globe (Kannan, Prashanth, & Maliyekkal, 2020). Moreover, the World Health Organization (WHO) and United Nations Children's Fund (UNICEF) are estimated about 1.1 billion people in rural communities do not have access to clean and safe drinking water in developing countries (Keys & Falkenmark, 2018). According to the world health organization (WHO) report 2018, 3 out of 5 people and 1 out of 4 people do not have basic facilities of sanitation and safe drinking water, respectively. In addition to, climate change, burgeoning population, and rapid urbanization contribute to numerous challenges along with depletion of resources (Abedin, Ray, Kibria, & Shaw, 2020).

In developing countries, diarrheal disease is one of the leading causes of children dying under the age of 5 years. About 95% of diarrheal disease occurs in south Asian regions and sub-Saharan regions where the children mortality rate of under 5-6 years old is 28%. Globally, around one in every five child deaths are due to diarrhea. Currently, Pakistan is in 6th position right after Ethiopia in the global ranking of cause-specific deaths of children under the age of 5 due to diarrhea (23).Various studies and research showed that
poor WASH facilities and polluted environments contribute to the most of health issues in children. Due to inadequate and unsafe water, unimproved sanitation, and poor hygiene practices among people particularly children drag them into infectious disease resulting in more than 2-3 million death every year. Primary Schools are hotspot for the spread of infection due to poor WASH practices (11).

UNICEF initiated the WASH (water, sanitation, and hygiene) Programme in school under auspicious efforts of the united nation framework (2008-2015) under emblem “to promote sustainability and harmony, peace and security in school “(Evaluation of WASH in schools, 2013). WASH (water sanitation and hygiene) promotion in school to provide basic facilities

to children who must have adequate water, sanitation, and hygiene, safe and sufficient water supply, proper handwashing facilities, improved toilet services for boys and girls separately. WASH facilities in the school are an integral part and vision of UNICEF and WHO in world for all children who want to go to schools and get an education, so that our children in the future could grow, learn, and thrive in a competitive world [1]. Similarly, in
Pakistan WASH facilities are not up to the mark and adequate for school children especially in co-education where there is a dire need for separate washrooms and basic facilities for girls. Furthermore, according to an estimation, every day 680,000 children miss their school due to illnesses that are directly or indirectly related to water. This term project will analyze challenges and barriers in primary school coordination for WASH in primary School, Jamshoro also determines the responsible factors to implement and inspect WASH services (12). The purpose of this project is to design a model for the provision of WASH service in
Schools and aware the stakeholders to improve coordination at the national and local levels. Additionally, this term project intends to catalyze to increase collaboration for innovation, cost-effectiveness, and sustainability of WASH in Schools keeping the monitoring and evaluation compulsory. There are some basic indicators used are to measure the WASH facilities at schools (18).

PERSONAL HYGIENE

The lifelong foundation's concern for the maintenance of personal hygiene is put down in childhood, which is essential for a well-being childhood, for a healthy maturity, and the growth of optimistic values about health and the use of health service area (Sarkar, 2013). In a recent study, a significant association between intestinal parasitic infections and poor hygiene is validated which indicates the efficacy of WASH practices in the prevention of those infections (Tambunan & Panggabean, 2021).Children's hygiene is the best tool to be considered for improving community strategy and intervention practice to handle many infectious and communicable diseases (Albashtawy, 2015). Personal hygiene affects the children during the growth period and its development (2; Oyibo, 2012; Sarkar, 2013; Vivas et
al., 2010). Infections to school children are considered to be one of the major problems. The major causes of infections are inadequate and contaminated water and unimproved sanitation poor hygiene practices. Skin, gastrointestinal, dental diseases all are directly or indirectly associated with poor personal hygiene. (2; 6;Oyibo,
2012). Children's hygiene contains regular clean uniform, good oral care, hand washing,

trimming, and clean nails and hair, etc must be practiced. It should be maintained under maternal supervision and controlled at school by the school's dedicated staff.

CLEAN WATER AND IMPROVED SANITATION

A report by WHO & UNICEF directs that more than 663 million individuals lack access to safe drinking water and 159 million people depend on surface water for consumption. (Supply & Sanitation Monitoring, 2015). According to UNICEF report 2016, only 57% of schools in the under developing countries had adequate drinking water facilities (Unicef & World Health, 2018). Until now primary schools in many developing countries have lacked WASH services, with potentially harmful effects on school children's health. There is a need to separate the feces from the water sources, therefore decreasing the risk of fecal pollution [4].
Contaminated water causes gastrointestinal diseases such as
diarrhea which turn out to be a major health concern. Diarrhea is silent one of the silent killers of children under the age of five (W. H. O. Unicef, 2013). The WHO/UNICEF report state that a school with improved sanitation, adequate water, and hygiene (WASH) has a sufficient and appropriate number of latrines that are safe, clean, private, and gender-separated; hand-washing facilities with soap and water; and hygiene awareness in the school are mandatory (Unicef, 2016).

TOILET FACILITIES

Toilets must be clean, with sufficient handwashing and water facility at schools. A cleaning and maintenance routine must be operational all the time (8).
The cleanliness of the toilets is linked with acceptance or refusal by the students. The poor school toilet quality is linked with toilet refusal or postponement in children which leads to symptoms of bladder and bowel dysfunction (BBD) (20). Toilets must be open to the whole school, including children & teachers
keeping separation and privacy intact, and distance must not be greater than 30 meters from all classes and offices. Open defecation, which directly impacts human health by increasing exposure to fecal pathogens. Children need to remain fit and healthy. For this, they need to drink 8 to 10 glasses of water daily during the whole day along with proper excretion and oral care(ERIC). Scarce liquid intake and scarce toileting services can lead to problems like constipation, urinary tract infections (Meadow, 1988).

HANDWASHING FACILITIES

Hand washing's goal is to clean the hands and avoid cross-spread (21; Larson & Committee, 1995; Rotter, 1999).Handwashing without soap is correlated with increased incidents of diarrhea [3]. Good hand hygiene is significant in infection control that varies from person to person, whose absence can be a reason for the spread of gastrointestinal and respiratory infectious diseases (14). 12% of all hospitalized children aged 0–14 years are due to infections disease (13). Hand hygiene is important in primary schools to avoid the spread of infectious disease and is a key to controlling contagious diseases like plague, influenza, etc (9). Highlighting hand hygiene to lower the spread of infectious disease could improve the attendance of teachers and children in schools, and might also possibly prevent secondary infectious disease in the public, decrease health facility costs and lower the financial burden on families (23).
The exercise of handwashing positively impacts an individual's health and his role in society as well (16; 17).

KEY CHALLENGES IN PAKISTAN REGARDING WATER SANITATION AND HYGIENE (WASH)

Water sanitation and hygiene (WASH) are pivotal for human existence on this special blue planet. WASH, directly and indirectly, caters to all spheres of life ranging from health, nutrition, and sustainable human development to the progress of a country (Zaidi, Mohmand, Hayat, Acosta, & Bhutta, 2013). A tool to manage and provide adequate services and facilities of WASH that is a "comprehensive WASH policy" is missing. Pakistan is one of the third world countries which is confronted with a variety of nutritional health hazards and water-related issues and a list of water-based, water washed, water-borne diseases still prevails in the country which is eradicated in the developed countries (7). Countless WASH-related diseases like Poliomyelitis, Dengue, Cholera, Ebola, etc. are peculiar to underdeveloped countries hindering the progress of our country since its inception. Plenty of water is available but hunger and poverty make the country incapable to utilize it (19).

LITERATURE ON A SURVEY OF WATER, SANITATION, AND HYGIENE (WASH)

Table1 shows are some of literature review or studies which already have done in previously for survey and intervention purpose in school with different sample size and key finding.

TABLE 1. LITERATURE ON A SURVEY OF WATER, SANITATION, AND HYGIENE (WASH) AMONG SCHOOLS

S/No	Study Design	Country	Sample Size	Key Findings	Author
1	**Descriptive survey**	Nigeria	300 primary schools	Improved WASH (water sanitation and hygiene) facilities can be achieved through proper intervention and learning development among children's.	(Sarkingobir, Sharu et al. 2019)
2	**Cross-Sectional Study**	Tanzania	84 primary schools	Poor planning, low technical capacity and poor funding are main reason for barrier in WASH facilities.	[5]
3	**Cross-sectional study**	Nigeria	428 pupils	Adequate WASH resources may have positive impacts on maintenances of WASH facilities in schools.	24
6	**Cross sectional survey.**	Nigeria	12 public school	There are 8 WASH variables considered in this study which concludes that negative WASH practices are associated with combination of both chronic and acute malnutrition.	(11)
7	**Cluster-randomized trial**	Ethiopia		The main finding of this survey is to reduce the chlamydia infection among children by providing comprehensive hygiene education.	(Wittberg, Aragie et al. 2021)

8	**Cross-Sectional Survey**	Nicaragua	526 schools	One time cross sectional studies conducted in government school where efforts should be made to regularly check the WASH facilities	(19)
9	**Cross-sectional survey**	Nepal	-	For children health and well-being, Provision of WASH awareness in communities is best way to curb with disease	(Shrestha, Sharma et al. 2017)

10	**Cross sectional survey**	Ghana	300 children	There is dire need of basic hand washing education among children through curriculum	(10)

METHODOLOGY

STUDY DESIGN

The study was a cross sectional study. The purpose of this study was to assess the effect of school-based WASH facilities and their impacts on children learning. In Fig1 provides a main objectives of this WASH intervention.

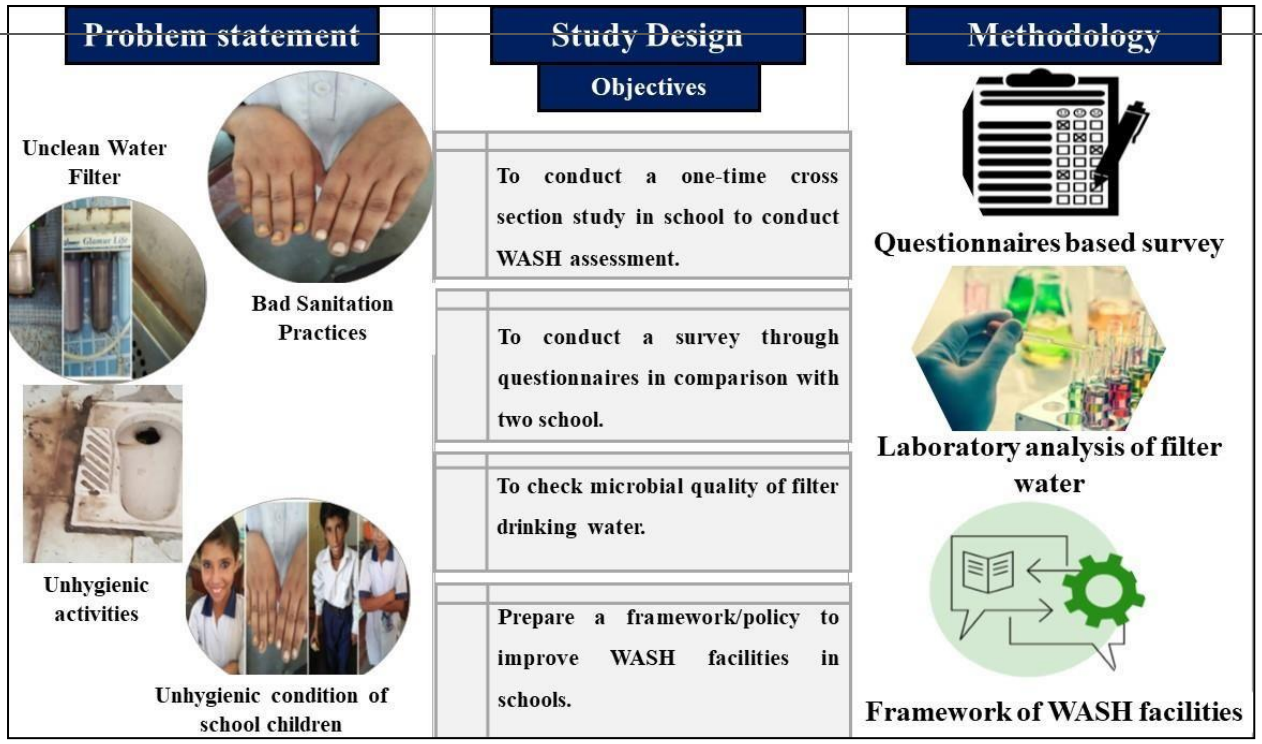


Figure.1 the study design of school-based wash facilitates and its key objectives

Study area and participants

The Assessment of Water, Sanitation, and Hygiene (Wash) Facilities in secondary schools of Jamshoro (Sindh) was conducted on 9 august 2021. The study consist of a questionaries' based survey with random analysis, from 9th, 10th grade. The study areas are Mehran and Sindh

campus school by the proper authoritative signature of documents for entry in school by Dr. Jamel Ahmed. We recruited a total sample of school children in the target age range (12–15 years) because at that age children have more sensibility regarding answers either true or false.

Sample size and analysis technique

The sample size is randomly chosen 100 children in both schools. Analysis was based on three types as shown in fig2 as observational, experimental, and theoretical study.

Survey based questionnaires

The survey consists of a total 21 Closed-ended questions, out of them, 20 questions directly linked to enquire the provision of WaSH facilities in the school. Total 100 forms containing Survey questionnaires are made by following the WHO, UNICEF, and international guild lines to gather the respective responses of boys and girls. The aim of questionnaires is to collect the core data to check the presence of WASH facilities in the school. This data might prove instrumental for formulation of a comprehensive WASH policy and its implementation in Sindh Schools. The survey questionnaires conveying the commitments of SDGs relevant to WASH with Several SDG targets contain WASH commitments or rely on the availability of WASH facilities, including targets under SDG 3 (good health and well-being), SDG 4 (quality education), and SDG 6 (clean water and sanitation). SDG 6 expresses commitment to water and sanitation for all (SDG targets 6.1 and 6.2), while indicators relating to SDG target 4. Education facilities have associated indicators for the provision of WASH facilities in schools.

Laboratorial Analysis of Water

The sample of drinking was collected from each school's filtering machine to check the efficiency of the filter plants. Some physiochemical parameters and microbial analysis were conducted through APHA standard methods (WEF) and Hach kits. According to the water quality monitoring guidelines of water pollution act describes that parameter for quality for drinking water that is to be used in society (Ustaoğlu, Taş, Tepe, & Topaldemir, 2021).

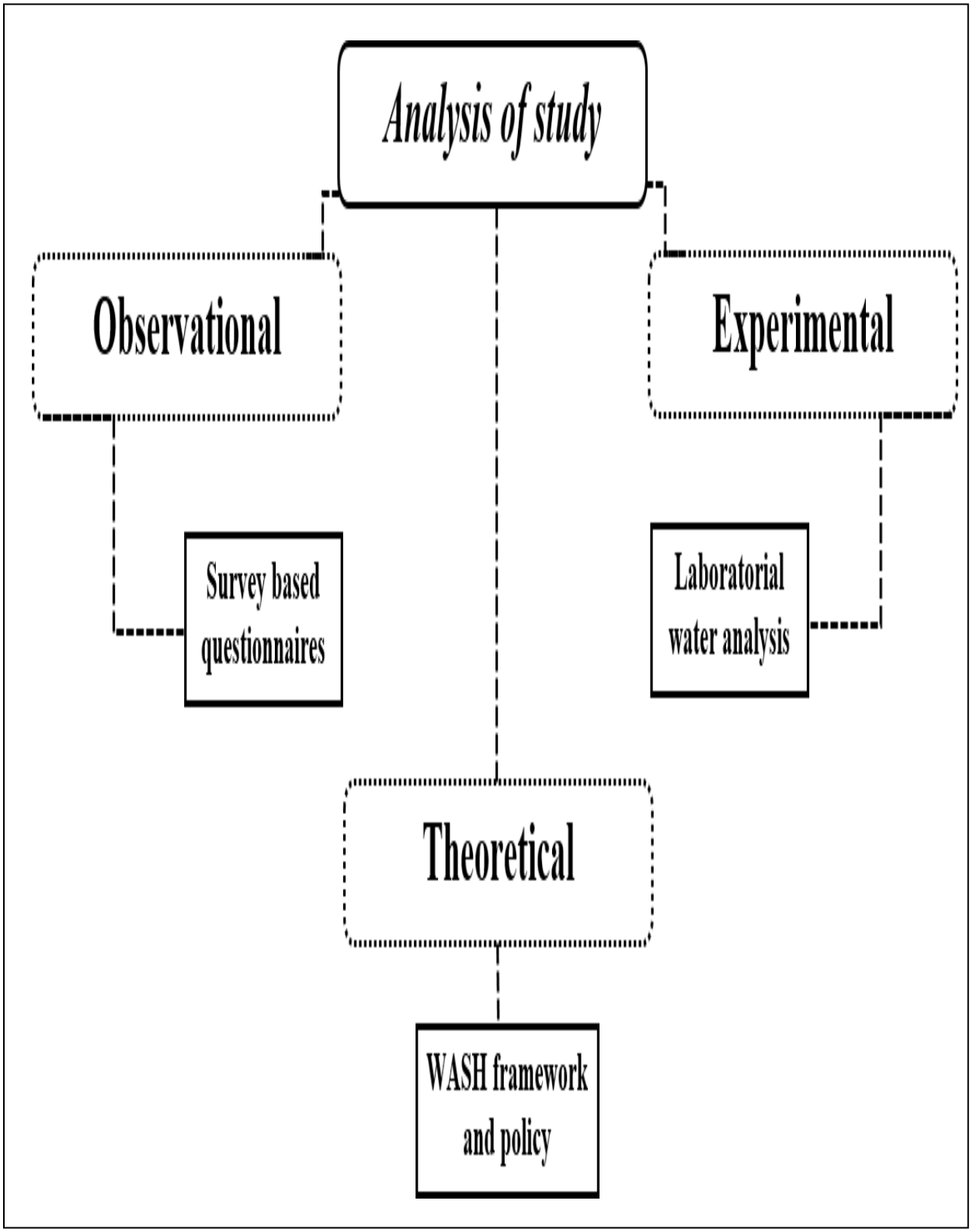
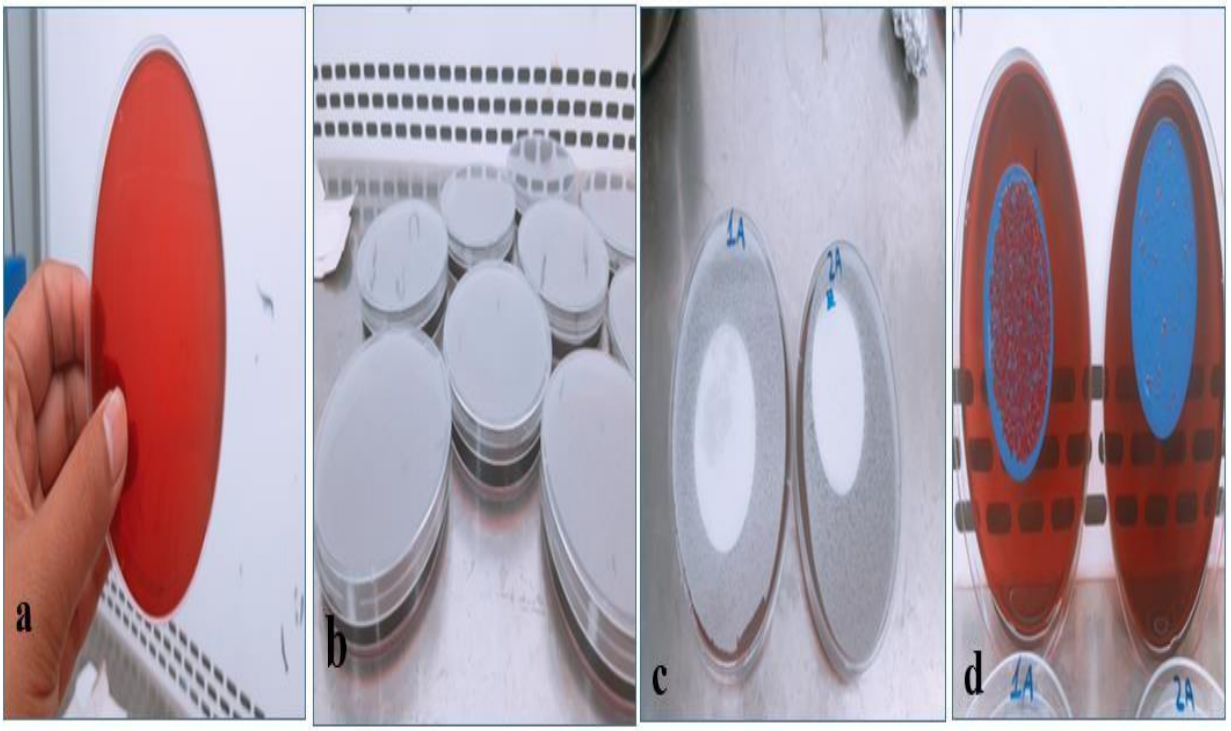


Figure 2. Analysis of Study based on Observational, Experimental, and Theoretical.

Microbial Analysis

The collected water sample was used to analyze the bacterial contamination. The Eosin Methylene Blue (EMB) agar used particularly for staining of Gram-negative bacteria. EMB contains dyes that are toxic to Gram-positive bacteria. Fig3 describe the overall procedure where sample was passed through 0.45 micrometer filter paper so the bacteria are left on it and then place this filter paper on EMB agar for 24 hours for incubation at 37^{o}C to check the growth of different harmful bacteria which are found in drinking water.



(a) Eosin Methylene Blue (EMB) agar in (b) petri plates in (c) sample 1A (Mehreen school) and 2A (Sindh school) with its (d) 24 hour growth on filter paper

Figure.3 Laboratorial analysis of drinking water sample

RESULTS AND DISCUSSION

Below the Table2 shows the socio demographic characteristics of overall study design. With the questionnaire, we also took photos for the support of our documentation. Along with the survey, laboratory analysis of filter water was also done in the USPCASW laboratory to check the parameters of drinking water at schools settings.

TABLE. 2 SOCIAL DEMOGRAPHIC CHARACTERISTICS OF THE STUDY POPULATION

District: Jamshoro **Taluka:** Kotri	**Mehran Secondary School:** 25.4084° N-Latitude **Sindh Secondary Campus School:** 68.2605° E-Longitude		
Variables	**Population in Target schools**	**Mean (N)**	**Population (%)**
1. Mehran secondary school	Boys : 787 Girls : 853 Total = 1640	Mehran : 820 N	Boys: 47.98 Girls: 52.01
2. Sindh secondary school	Boys : 1101 Girls : 789 Total= 1890	Sindh : 945 N	Boys: 58.25 Girls: 41.74
3. Total children interviewed	**Mehran secondary school** Boys = 25 Girls = 25 **Sindh secondary school** Boys = 25 Girl =25		

TABLE. 3. WATER SANITATION AND HEALTH SCIENCES (WASH) BASED SURVEY QUESTIONNAIRES

Survey Questionnaires settings	**Mehran school**				**Sindh school**			
Gender	**Boys**		**Girls**		**Boys**		**Girls**	
Responses %	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
1. Handwashing facilities								
Do you wash your hands after attending the toilet?	12	87	17	75	13	77	18	78

Is there separate facility of toilets for both genders?	9	85	12	81	14	85	12	81

Does toilets have proper wash basins??	20	67	35	56	35	67	35	69
Is there soap available to for handwashing?	9	87	5	84	12	87	35.5	90
Does sufficient tap and shower connections present in school's vicinity?	5	88	10	78	13	88	1	95.4
2. Toilet facilities								
Are the toilets at your school clean?	40	56	13	80	9	67	5	78
Do you wash your hands after returning from school??	35	46	5	87	27	61	10	78
Are there sufficient people to clean and maintain toilet?	45	55	35	55	34	51	16	76
Does the toilet contain adequate light connections and ventilation?	23	45	19	32	30	45	29	39
Do you use sanitizer after washing hands whenever you attend toilet?	2	89	1	91	4	79	3	61
3. Drinking water facilities								
Does the school have sufficient filtering plants of drinking water?	65	20	15	74	20	72	29	62
Does the water source away from toilet etc. in order to avoid any contamination?	40	60	28	65	30	62	25	60
Do you think that water is clean and safe to drink?	59	13	61	15	58	9	63	17
Do you know about the water-borne diseases?'	3	79	2	83	2	79	4	69

Do you think that unavailability of clean water and toilet increases absenteeism?	1	89	1	81	3	92	2	88
4. Hygiene practice								
Do you trim your nails regularly?	10	70	18	71	12	75	23	61
Do you wash your hands and use sanitizer after any activity at school?	15	85	25	55	21	57	42	35
Are you familiar with the term “personal hygiene”?	4	85	6	76	5	78	8	79
Do you brush your teeth twice a day?	49	13	45	15	32	13.5	49	25
Does your teacher aware you about the importance of handwashing and using sanitizer?	25	45	35	47	32	49	26	61

However, Table 4 presents the physiochemical parameters of both school filters alongwith its permissible values of described in WHO and US-EPA guidelines for drinking water. These parameters need to be analyzed for the determination water quality that is best to use in schools. The various physico- chemical and biological parameters are related to each other and the overall quality of water depends upon the deviation from the permissible range. So, the turbidity in Mehran and Sindh School is 10.7 and 9.0 respectively which is higher from permissible limit, same as for color.

TABLE.4 PHYSIOCHEMICAL ANALYSIS OF FILTERED DRINKING WATER

S.no	Parameters	Unit	Mehran campus secondary school	Sindh campus secondary school	WHO Permissible range	US-EPA Permissible range
1	**pH**	-	8.28	8.30	6.5-8.5	6.5-8.5
2	**Turbidity**	NTU	**10.7**	**9.0**	5	4
3	**DO**	Parts per million (ppm)	0.001	0.007	5.005	1
4	**Color**	Pt-Co	**58**	**68**	15	Unobjectable
5	**EC**	S/m	1590	1379	1660	1055
6	**TDS**	Milligrams per liter (mg/l)	760	810	1000	500

7	**Salinity**	g / kg	0.6	0.9	0.6	1.0

TOILET FACILITIES

Improved toilet facilities is one of prerequisite and fundamental right of children in school settings. Washing hands specially after attending toilet is compulsory for personal hygiene. As far as the situation regarding handwashing facilities is concerned, it is improved in Mehran School as compare to Sindh School as proved through the conducted response.Fig4.a the average response of boys as "yes" against toilet facilities at Mehran School is 29 whereas response of the same in Sindh School is 20.8 in Fig4.b. The average response of boys in "no" against toilet facilities at Mehran School Jamshoro is 58.2 whereas response of the same in Sindh School is 60.6. The average response of girls in "yes" against toilet facilities at Mehran School Jamshoro is 14.6 whereas response of the same in Sindh School is 12.6. The average response of girls in "no" against toilet facilities at Mehran School Jamshoro is 69 whereas response of the same in Sindh School is 66.4.

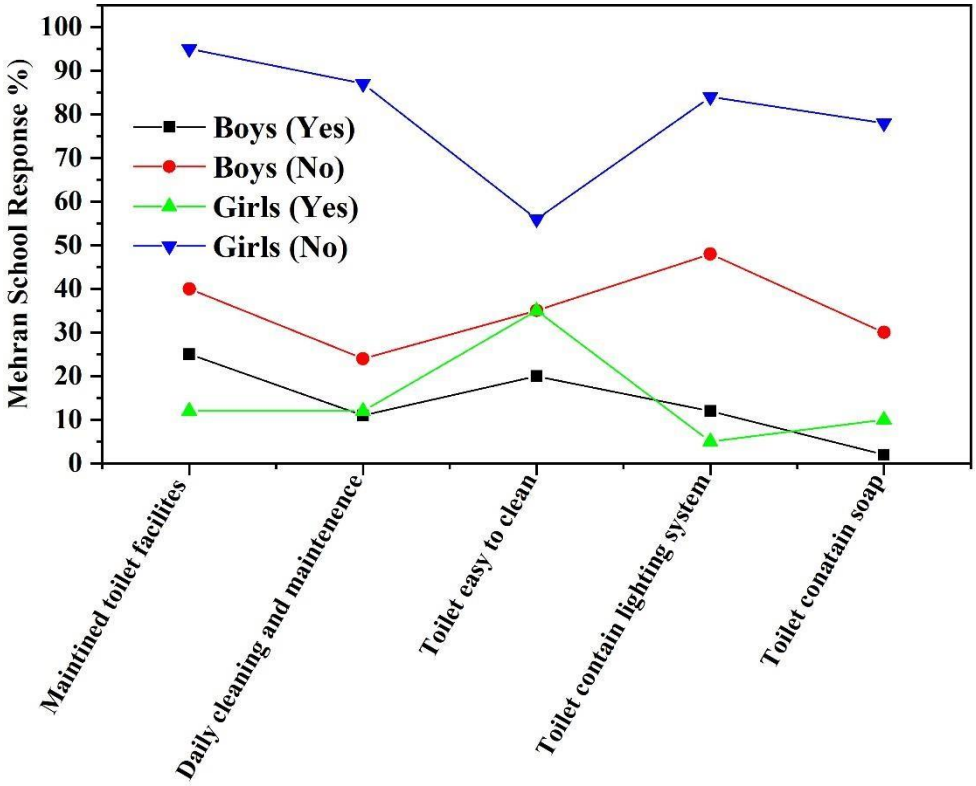


FIG.4A SHOWING MEHRAN SCHOOL TOILET FACILITIES

1.1

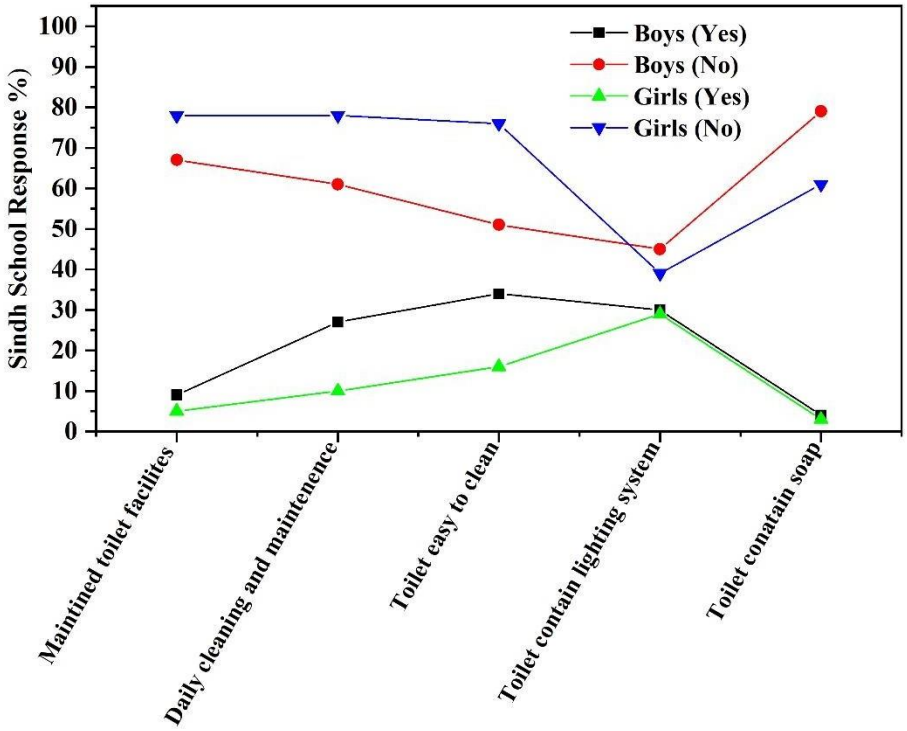
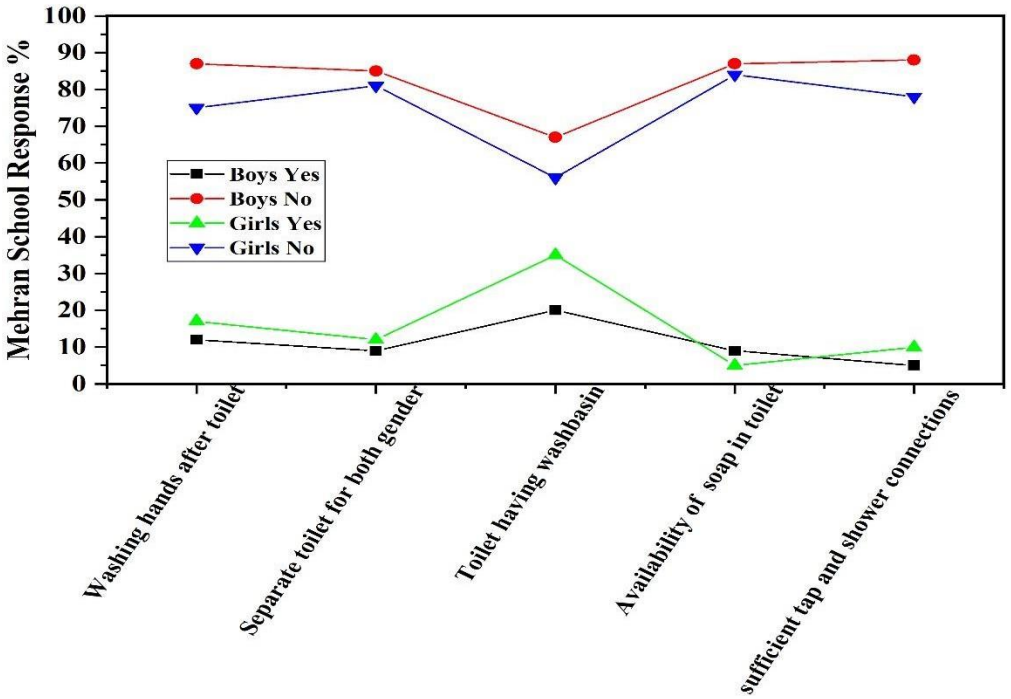


FIG 4B SINDH SCHOOL TOILET FACILITIES.

1.1 HANDWASHING FACILITIES

Hand-washing with soap has proved to be an effective preventive measure to fight against the infectious diseases, respiratory infections and gastrointestinal diseases. Poor access to water, sanitation, and handwashing (WASH) facilities has found to be the biggest reason behind stunting and wasting in children. When hand washing facilities are analyzed then following statistical data is acquired in order to compare the condition of both schools. Fig 5a and 5b explain the average % response of boys in “yes” against hand washing facilities at Mehran School Jamshoro is 11 whereas response of the same in Sindh School is 17.4 .The average response of boys in “no” against hand washing facilities at Mehran School Jamshoro is 82.5 whereas response of the same in Sindh School is 80.8. The average response of girls in “yes” against hand washing facilities at Mehran School Jamshoro is 15.8 whereas response of the same in Sindh School is 20.3.The average response of girls in “no” against hand washing facilities at Mehran School Jamshoro is 74.8 whereas response of the same in Sindh School is



1.1 FIG.5A SHOWING MEHRAN SCHOOL HANDWASHING FACILITIES

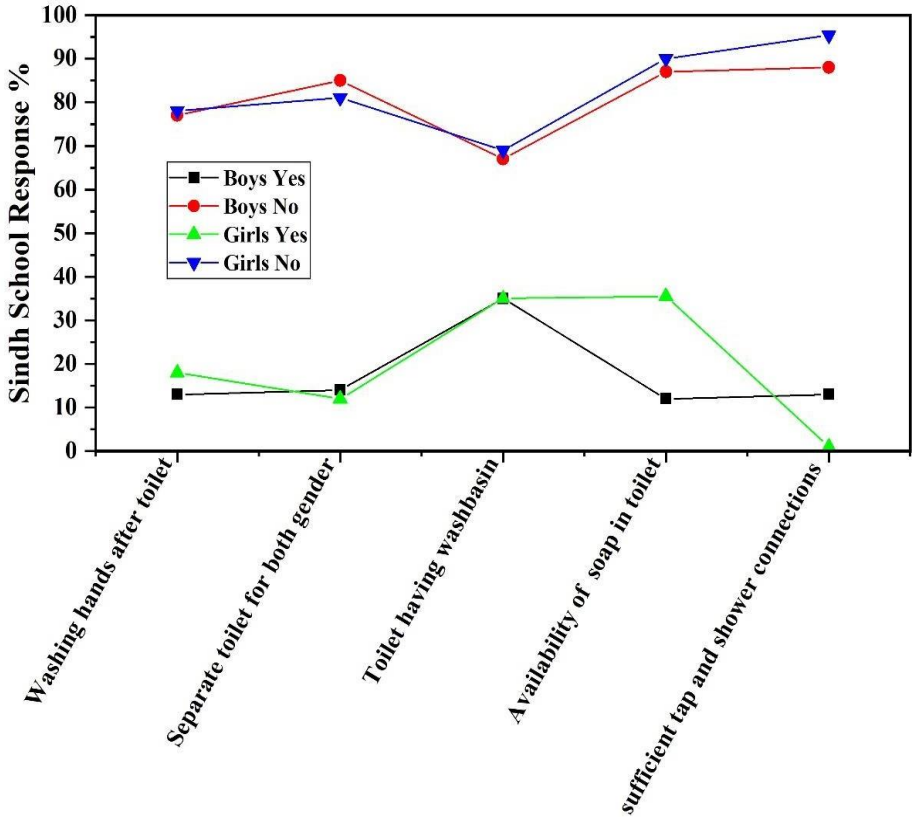
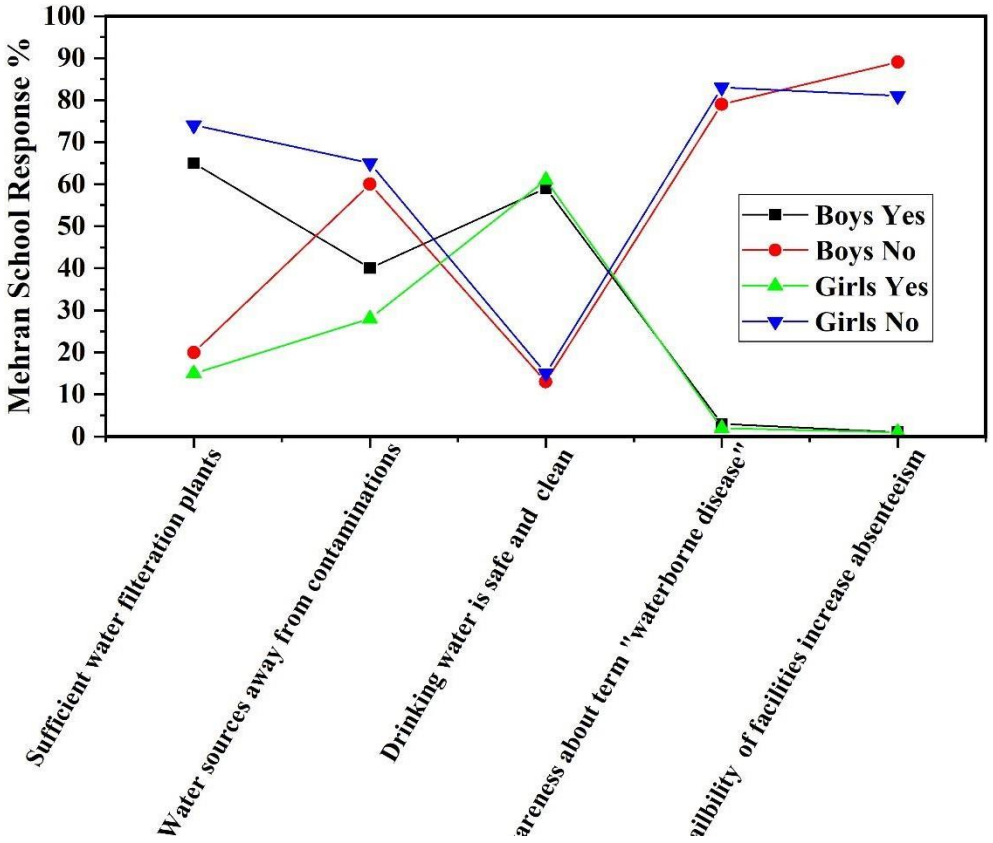


Fig 5 (b) Sindh School handwashing facilities

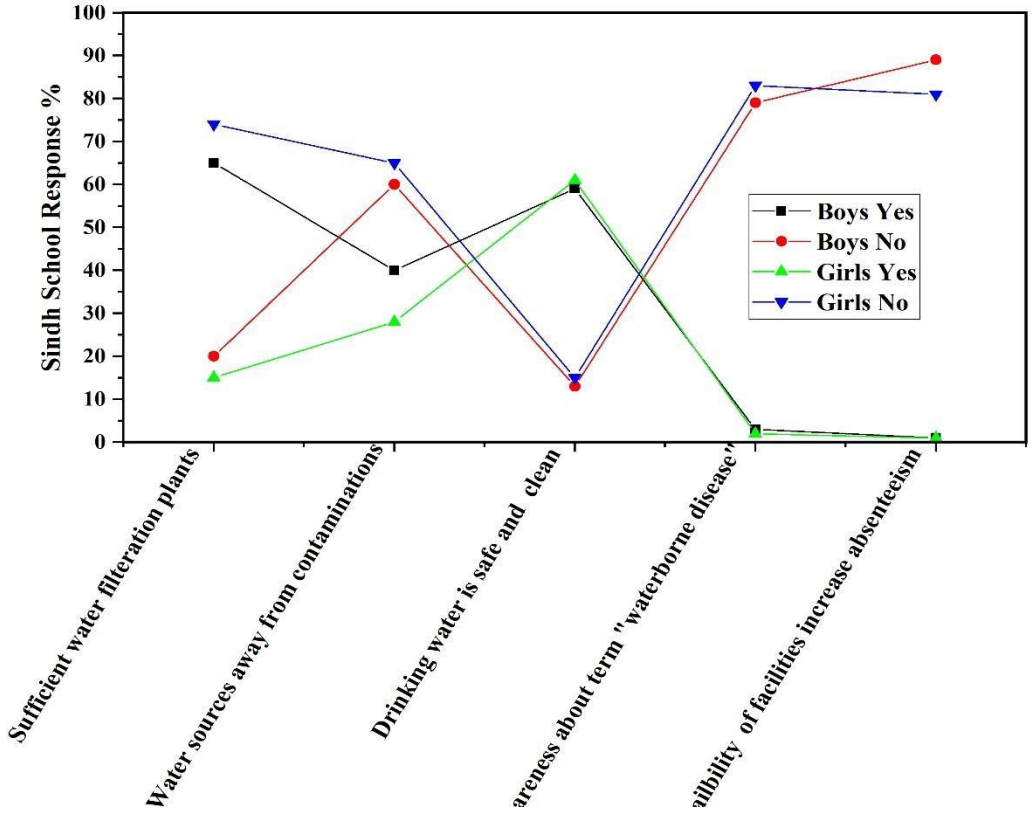
DRINKING WATER FACILITIES

Drinking water quality affects directly human health. Assessment of water quality is crucial for prevention of water-borne diseases, especially for children. Fig 6.a and 6.b shows the average response of boys in “yes” against drinking water facilities at Mehran School Jamshoro is 33.6 whereas response of the same in Sindh School is 22.6.The average % response of boys in “no” against drinking water facilities at Mehran School Jamshoro is 52.2 whereas response of the same in Sindh School is 62.8.The average response of girls in “yes” against drinking water facilities at Mehran School Jamshoro is 21.4 whereas response of the same in Sindh School is 24.6. The average response of girls in “no” against drinking water facilities at Mehran School Jamshoro is 63.6 whereas response of the same in Sindh School is 59.2.



1.1 FIG.6 A SHOWING MEHRAN SCHOOL DRINKING WATER FACILITIES

1.2



HYGIENE PRACTICES

Poor hygiene practice is a major health concern mainly in developing countries where resources are less to cater the needs of huge population and is a leading factor behind absenteeism of school going children. Fig**7**.a and 7.b shows the average % response of boys in "yes" against Hygiene practice at Mehran School Jamshoro is 20.6 whereas response of the same in Sindh School is 20.4.The average response of boys in "no" against Hygiene practice at Mehran School Jamshoro is 59.6 whereas response of the same in Sindh School is 54.5.The average response of girls in "yes" against Hygiene practice at Mehran School Jamshoro is 25.8whereas response of the same in Sindh School is 29.6.The average response of girls in "no" against Hygiene practice at Mehran School Jamshoro is 52.8whereas response of the same in Sindh School is 52.2.

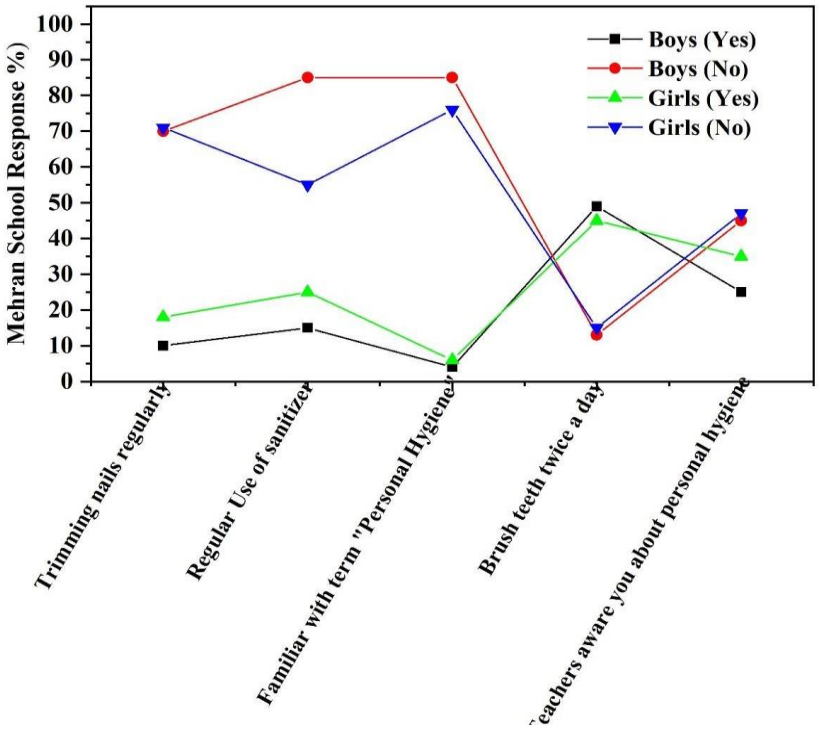


FIG.7. A SHOWING MEHRAN SCHOOL PERSONAL HYGIENE

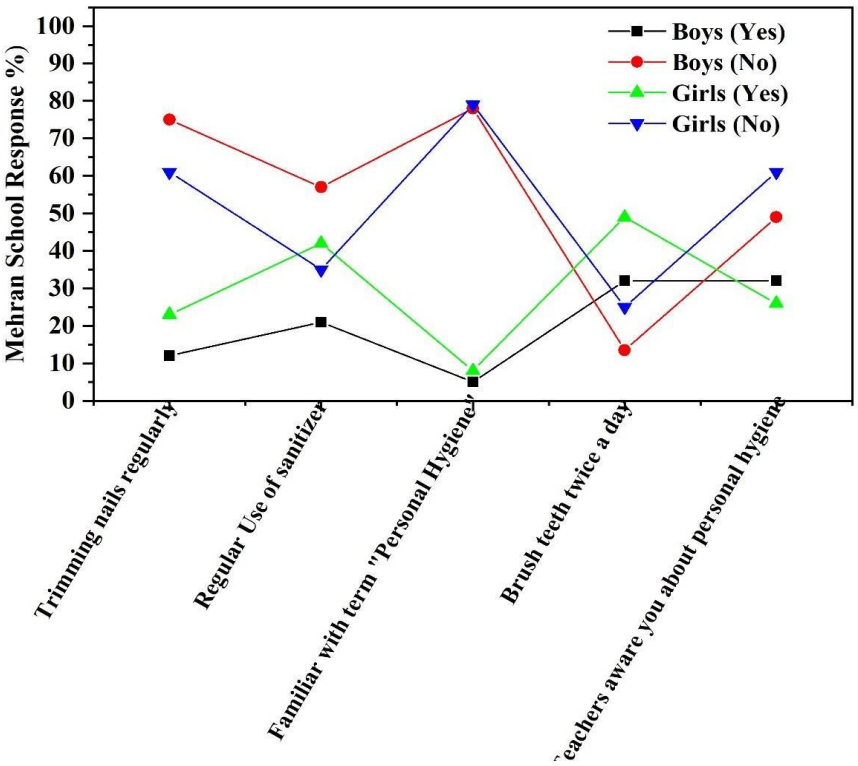
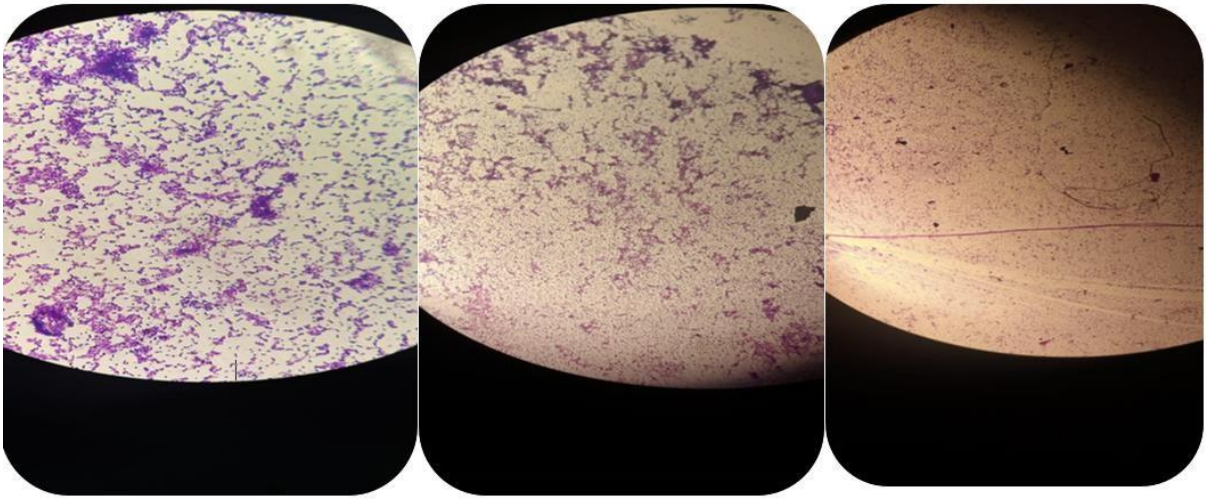


Fig 7.b Sindh School personal hygiene facilitie

Fluorescence Microscope Analysis

The grown sample of bacteria was check through the Fluorescence microscope. Table 5 shows the observed characteristics and morphology was match with details provide in Benson's Microbiological Applications, Laboratory Manual in General Microbiology 2016.Fig 8 shows the florescence microscopic image of bacterial species in Mehran School. Same as for Sindh school in Fig 9.



1.1 FIGURE. 8 SAMPLE 1A: MEHRAN SCHOOL DRINKING WATER CONTAIN BACTERIAL SPECIES

FIGURE. 9 SAMPLE 2A: SINDH SCHOOL DRINKING WATER CONTAIN BACTERIAL SPECIES

Conclusion

Public health is a tool to gauge the progress of the any country. This study provided a comprehensive overview of the existing WASH facilities in primary school settings and its impact on children learning and behaviours. Findings from this study describes the precarious situation of WASH facilities through survey and lack of national WASH policy in educational institutes. Clean water, improved sanitation and hygiene, and a healthy environment is everyone's innate right. Sindh has hundreds of primary and secondary schools, one of the leading cause of absenteeism is poor health due to unimproved water and malnutrition. Children are vulnerable from acute to chronic diseases like flu, fever, diarrhea, malaria, dengue, teeth & bone problems, and several gastrointestinal issues.

1.2

1.3 RECOMMENDATION FOR POLICY FRAMEWORK

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b) To formulate a comprehensive document which will be used as a tool to address the water-related issues and diseases that are endemic in Pakistan; more specifically in Sindh's schools.
c) Carefully assess the root causes of malnutrition in children under five years to suggest the cure and preventions accordingly.
d) Recommended policy framework could be a used as milestone to improve WASH conditions and to develop a partnership between stakeholders at different levels to bring and maintain integrity and sustainability.
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   b) To promote WASH, make it an integral part of the curriculum at least at the primary level.

c) A special inspection committee is suggested to formulate from national to local levels to inspect the WASH facilities.
d) Constitution of a team in the supervision of health ministry is suggested to make which will work on policy framework particularly and make amendments when needed.
e) Rules and regulations of WASA, WAPDA, and other organizations are needed to revise.
f) Technical expertise are needed to be fully utilized for the sake of water treatment at a sustainable level especially in remote areas where potable water is only a dream now.
g) To ensure WASH for all, a vertical integration and feedback loop is suggested to promote the health facilities and to curb water-related diseases.
h) The state is suggested to grant a special percentage in the budget to ensure WASH facilities and its expansion to make it more advanced with the time.
i) There is a soft suggestion to use social media, billboards, etc. especially dedicated to WASH awareness to normalize the importance and inclusion of WASH in daily life.

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MEHREEN RAZA: Help in Experimental work, sample testing.

Sikandar Bakhat: Data compilation, Writing – review & editing.

Zaryab Raza: Data compilation, Writing – review & editing.

Dr. JAMIL AHMED Formal analysis, and interpretation, Writing review & editing. Funding acquisition, Permission for school visits.

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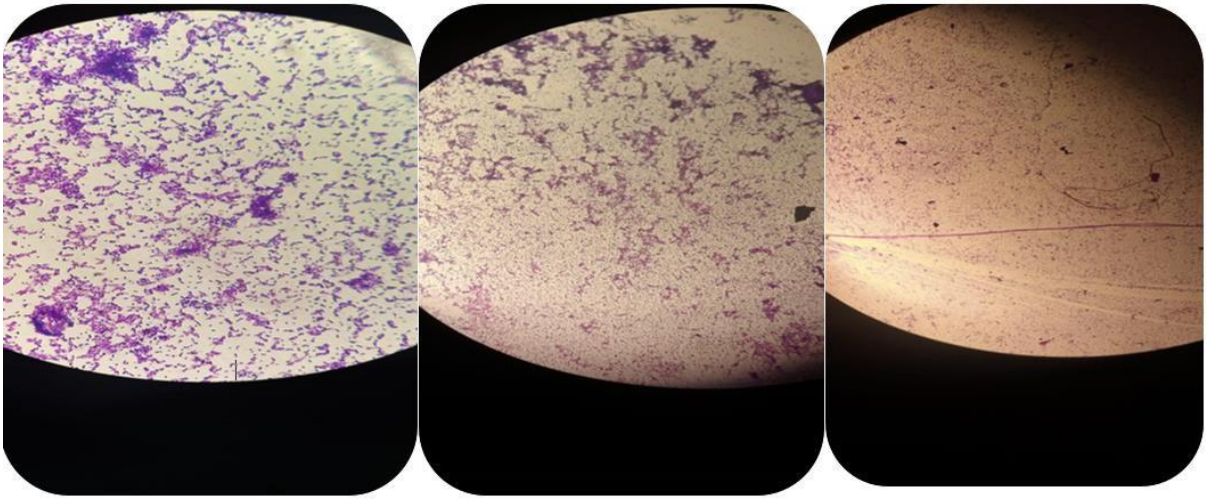
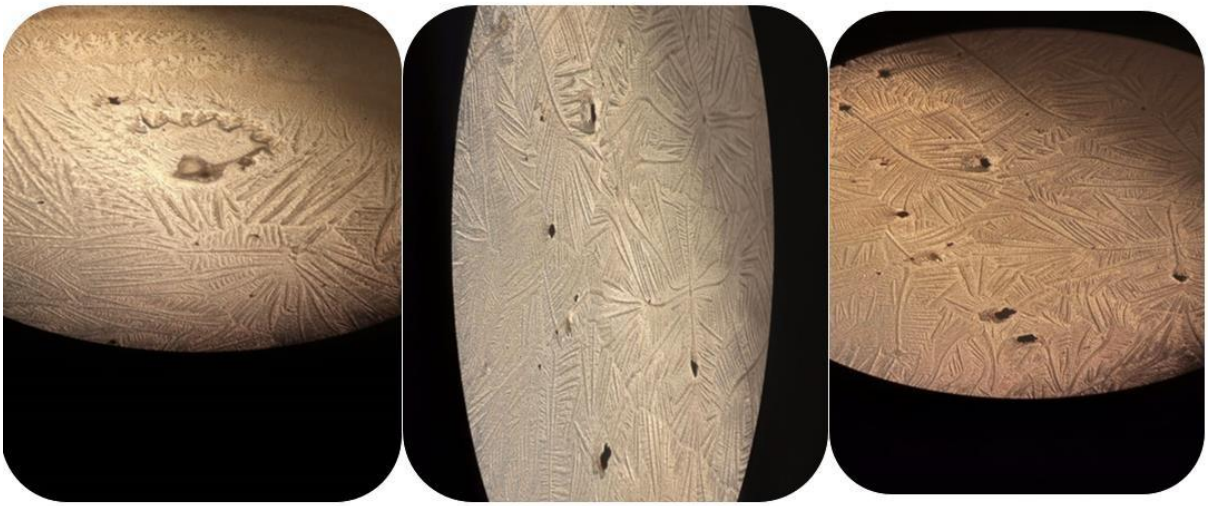
Fluorescence Microscope Analysis

The grown sample of bacteria was check through the Fluorescence microscope. Table 5 shows the observed characteristics and morphology was match with details provide in Benson's Microbiological Applications, Laboratory Manual in General Microbiology 2016.Fig 8 shows the florescence microscopic image of bacterial species in Mehran School. Same as for Sindh school in Fig 9.



1.9 FIGURE. 8 SAMPLE 1A: MEHRAN SCHOOL DRINKING WATER CONTAIN BACTERIAL SPECIES



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1.11 FIGURE. 9 SAMPLE 2A: SINDH SCHOOL DRINKING WATER CONTAIN BACTERIAL SPECIES

Conclusion

Public health is a tool to gauge the progress of the any country. This study provided a comprehensive overview of the existing WASH facilities in primary school settings and its impact on children learning and behaviours. Findings from this study describes the precarious situation of WASH facilities through survey and lack of national WASH policy in educational institutes. Clean water, improved sanitation and hygiene, and a healthy environment is everyone's innate right. Sindh has hundreds of primary and secondary schools, one of the leading cause of absenteeism is poor health due to unimproved water and malnutrition. Children are vulnerable from acute to chronic diseases like flu, fever, diarrhea, malaria, dengue, teeth & bone problems, and several gastrointestinal issues.

1.12

1.13 RECOMMENDATION FOR POLICY FRAMEWORK

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