

Article

# Unveiling the status of WASH in secondary schools located in Saurashtra region of Gujarat-India

Eshwar Gupta<sup>1,\*</sup>, Dipesh parmar<sup>1</sup>, Monika Patel<sup>1</sup>, Jitesh Mehta<sup>1</sup> and Dhaval padaliya<sup>2</sup>

<sup>1</sup> Shri M. P. Shah Government Medical College Jamnagar, Gujarat, India.

<sup>2</sup> Urban Health Center, Jamnagar Municipal corporation, Gujarat, India.

\* Correspondence: eshwargupta61@gmail.com

Academic Editor: Augustine Ibegbu

Received: 30 April 2023; Accepted: 11 August 2023; Published: 14 November 2023.

**Abstract: Background:** In developing countries, Diseases related to inadequate water, sanitation, and hygiene are a huge burden. It is estimated that 88% of diarrheal disease is caused by unsafe water supply and inadequate sanitation and hygiene. The future generation of a nation spends most of its time in schools, and since the status of the WASH component in school is strongly linked to Learning and health. Therefore, **Objectives** of the study was to assess the status of availability, accessibility, functionality, usability, and quality of WASH standards in secondary schools located in a Municipal corporation area of Saurashtra region. **Methods:** The study was carried out in 34 secondary schools in the study city for a period of 18 months. Data was collected using a pre-validated, standard tool in the form of a questionnaire prepared by WHO and UNICEF and analysed. **Results:** Out of 34 schools, the majority (24) of the schools had piped water supply as their primary source of drinking water, 70.59% had hand washing stations available, but the availability of both soap and water was observed only in 3 government and 11 non-government schools. Menstrual hygiene management like Covered bins facilities were found only in 18 schools, with a higher proportion in non-government schools; 73.52% of schools had adequate distribution of students per toilet, but the norms for girls per toilet were only met in non-government schools. A wide gap was found between the availability of toilet facilities, usability, and functionality. **Conclusions:** While the availability of the structural component of WASH was satisfactory in most of the schools (with a better proportion in non-government ones), its functionality, usability, and quality were not uniform among schools.

**Keywords:** Hand hygiene; Menstrual hygiene; Safe drinking Water; School children

## 1. Introduction

**W**ater is the most precious global commodity, with its myriad uses for drinking, recreation, sanitation, hygiene, agriculture, and industry. However, one of the world's most urgent issues is the lack of safe water, sanitation, and hygiene. [1] Diseases related to inadequate water, sanitation, and hygiene are a huge burden in developing countries. It is estimated that 88% of diarrheal disease is caused by unsafe water supply and inadequate sanitation and hygiene. Over 801,000 children under the age of five die from diarrhea every year, primarily in underdeveloped nations. [2] It is estimated that if everyone in the world had access to a regulated piped water supply and sewage connection in their houses, Sustainable Development Goals (SDGs) related to safe water supply and sanitation would be achieved, and 1863 million days of school attendance would be gained due to less diarrheal illness. [2] Providing schools with clean drinking water, more sanitary facilities, and hygiene instruction that promotes the formation of healthy behaviors for life are some ways to do this. This strategic approach is Water, Sanitation, and Hygiene Education (WASH) in Schools. Many children acquire some of the most crucial hygiene lessons in school, and for many of them, this is where they first encounter cleanliness habits that may not be encouraged or possible at home. Schools provide youngsters with a vibrant learning environment and act as catalysts for change. Children are future parents, so everything they learn will be useful to them throughout the rest of their lives. If children are brought into the development process as active participants, they can become change agents within their families and a stimulus to community development. [3] In schools, WASH is captured in the Sustainable Development Goal

(SDG) framework within three targets. The words "universal" and "for all" in WASH Objectives 6.1 and 6.2 draw attention to the necessity of extending WASH monitoring from the household level to non-household contexts, like schools and healthcare facilities-target 4. A includes WASH in the school setting, explicitly, with an indicator of the "proportion of schools with...(e) basic drinking water, (f) single-sex basic sanitation, and (g) basic handwashing facilities. [4] An efficiently and effectively implemented WASH in Schools helps fulfill the universal right to education and health and meets its role in achieving the SDGs, thereby increasing access to primary education, reducing child mortality, advancing gender equality, and supporting national interventions to establish equitable, sustainable access to safe water and basic sanitation services in schools. [5] The 2011-12 District Information System for Education (DISE), India report highlighted that only 81.14% of schools had separate toilets for boys, 84.48% for girls, and 94.45% of schools had drinking water facilities. However, there is no mention of the existing services' actual usage and functionality. For example, whether the toilet is usable, locked, or defunct, whether it is cleaned regularly if a water source is usable, the purpose of the source (for drinking or washing), distance from the source to the toilet, yield, and months when the source is usable. Moreover, about 35% of children in India with disabilities remain out of Elementary school (DISE 2011-12), and the school drop rate amongst adolescent girls in India is as high as 63.5% due to lack of menstrual hygiene facilities. (MoSPI, 2012). [6] On 14th August 2015, the GOI declared 100% sanitation coverage in all schools in India. However, experiences from the field suggest that the construction of toilets alone may be insufficient to end open defecation and promote hygiene behaviors. While water and toilet facilities may exist in many schools, the functionality of such facilities and their sustained use by the student community must be examined to understand if targets have been achieved. Therefore, it is important to consider the achievements and key gaps regarding the availability, accessibility, functionality, usability, and quality of WASH standards in schools. In this context, more research studies are needed to assess the above issues at schools in Gujarat and India. Hence, this study aims to comprehensively understand and assess the implementation and functionality of WASH in schools of the study city.

## AIM

To get insight of WASH status in schools of the study city.

## Objectives of The Study

- To assess the availability & functionality of WASH infrastructure and facilities in the schools.
- To assess WASH accessibility to students in the schools.
- To investigate the sanitation status in the schools.
- To assess menstrual hygiene status in schools.
- Comparing WASH status between government and non-government schools.

## 2. Materials And Methods

This study was conducted to get insight of water, sanitation and hygiene status in schools of the study city.

### Study design

- It was a Cross sectional study

### Study setting

- Schools located in the Municipal corporation area of the study city

### Study duration

- July 2019 to December 2020

### Study participants

- Schools fulfilling the inclusion and exclusion criteria.

## Inclusion criteria

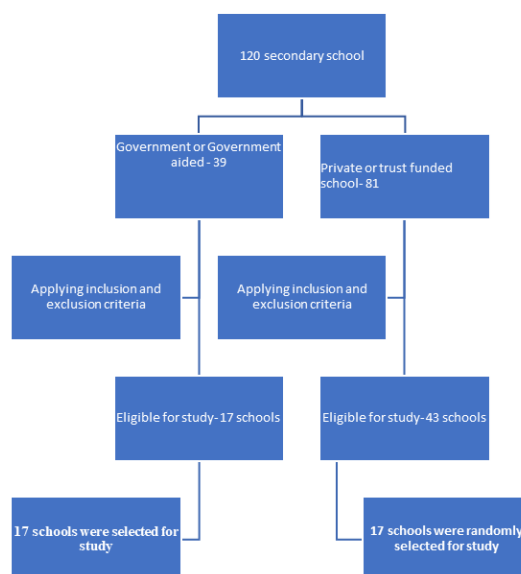
- Schools located in Municipal corporation area of the study city
- Secondary schools
- Co-educational schools
- School giving their consent

## Exclusion criteria

- Schools located outside municipal corporation area.
- Only boys or only girl specific schools.
- Primary and pre-primary only schools.
- Schools not giving their consent.

## 3. Selection of study sample

In the study area, there were a total of 120 secondary schools. Of these, 39 were government or government, and the rest were private or trust-funded schools (Non-government). Per our exclusion and inclusion criteria, out of 39, 17 government schools were eligible for our study. Of all private schools (81) located in the study area, 43 schools were eligible per our inclusion and exclusion criteria. Out of these, we randomly selected 17 schools for comparison purposes. Therefore, all eligible government schools in the study area were included in our study, which came to 17. Then, we took 17 schools randomly selected from eligible non-government schools for comparison. Hence, 34 schools (17 government and 17 non-government) were included in this study.



## Study period and tools used for data collection

This study was done for 18 months, from July 2019 to December 2020. A pre-validated standard tool was used as a questionnaire prepared by the WHO and UNICEF Joint monitoring program for WASH monitoring in schools. Both quantitative tools (i.e., observational checklist of WASH infrastructure) and qualitative tools (informal interviews with principals) were used for this purpose. Using a checklist, personal observations were used to collect information regarding school water supply sources, the status of hand washing areas, sanitation (toilets and urinals), and menstrual hygiene facilities at schools. Operational definitions for words like available, improved, functional, etc, mentioned in the result section are the same as those of the WHO/UNICEF JMP questionnaire. [4]

- **Improved:** An "improved" drinking water source is one that, by the nature of its construction, adequately protects the source from outside contamination, particularly fecal matter
- **Available :** There is water from the main drinking water source available at the school on the day of the survey or questionnaire.

## Data Processing and Analysis

The data was analysed using the MS Excel 2007 and appropriate test of significance like chi square and Fischer exact test has been used at 95% confidence interval. The findings has been presented in tables and graphs.

## Ethical Clearance

The study was approved by institutional ethics committee (ECR/6/INST/GUJ/2013) with ref.no.IEC/Certi/111/04/2019. In addition, informed consent from the sampled schools was sought. Study was initiated after taking permission from district education officer.

## 4. Result

We took 34 schools in the study, of which 17 schools were run by government sector and 17 by private sector. Schools had a total of 20197 students (8211-female, 11986-male) of which 111 were physically disabled (62-girls and 49-boys). The number of teachers in all the schools was 1315. Student to teacher ratio was better in non-government schools (13.09 students per teacher) than government schools (18.85 students per teacher). The student to teacher ratio observed in both government and non-government schools was better than student to teacher ratio at national level which is 27.44 students per teacher in 2017 according to UNESCO institute for statistics. [7] Table 2 shows that the majority of schools, 70.58% (24), had piped water supply into school buildings as the main source of drinking water. When asked about its scarcity, drinking water from the main source is typically available throughout the school year in 67.64% of the studied schools. Only 50 % (17) of the studied schools always took measures to make water safe to drink. 67.64% (23) of the schools had water facilities accessible to physically disabled children.

**Table 2.** Assessment of hygiene component of WASH

Hygiene component of WASH		Government	Non-Government	Total	p value
<b>Availability</b>					
Hand washing station available?	Yes	11 (64.70%)	13 (76.47%)	24	0.70*
	No	6 (35.29%)	4 (23.53%)	10	
Shop and water	Both shop and water	7 (41.18%)	10 (58.82%)	17	0.65*
	Only water	4 (23.53%)	3 (17.65%)	7	
<b>Accessibility</b>					
Accessibility to hand washing stations	To physically disabled	13 (76.47%)	15 (88.23%)	28	0.6*
	To the youngest child	15 (88.23%)	16(94.11%)	31	1*
Hygiene taught in the schools	Yes	15 (88.23%)	16(94.11%)	31	1*
	No	2 (11.7%)	1(5.89%)	3	

As shown in Table 2, the majority of the studied schools (70.59%) had hand washing stations available, with a higher proportion of non-government schools (76.47%) as compared to government schools (64.70%). However, the availability of both shop and water was observed only in 50.00% of the schools while only water was available for hand washing in 20.59% of the schools.

**Table 3.** Menstrual hygiene

		Government n=17 (%)	Non- Government n=17 (%)	Total	
Availability in private space for girls to manage menstrual hygiene?	Soap and water	3 (17.64%)	11 (64.71%)	14	0.01*
	Only water	12 (70.58%)	6 (35.29%)	18	
	Neither	2 (11.76%)	0 (0%)	2	
Menstrual hygiene management facilities at school	Covered bins for disposal of menstrual hygiene materials in girls' toilets	6 (35.29%)	12 (70.58%)	18	0.08*
	Disposal mechanisms for menstrual hygiene waste	2 (11.76%)	5 (29.41%)	7	

Table 3 shows that soap and water were available only in 41.17% of schools, while almost half of the schools had only water in the private space for girls to manage menstrual hygiene. A significantly higher proportion of non-government schools had availability of soap and water (64.71% Vs 17.64%). Covered bins for disposal of menstrual hygiene materials in girls' toilets were found only in 52.94% of the surveyed schools, which includes a higher proportion of non-government schools (70.58%) than government schools (35.29%),

Assessment of water component of WASH		Government N=17 (%)	Non-Government N=17 (%)	Total N=34 (%)
<b>Drinking water source</b>				
What is the main source of drinking water provided by the school?  water source available and functional in surveyed schools	Piped water into school building	8 (47.05%)	16 (94.11%)	24 (70.58%)
	Piped water to school yard/plot	4 (23.53%)	1 (5.88%)	5 (14.71%)
	Public tap/standpipe	5 (29.41%)	0	5 (14.71%)
	Available	17 (100%)	17 (100%)	34 (100%)
	Improved	17 (100%)	17 (100%)	34 (100%)
Functional	15 (88.23%)	16 (94.11%)	31 (91.17%)	
Available : from the main drinking water source available at the school on the day of the survey. An "improved" drinking water source is one that, by the nature of its construction, adequately protects the source from outside contamination, particularly faecal matter.				
<b>Availability</b>				
drinking water available throughout year	Mostly available (unavailable <30 days)	8 (47.05%)	15 (88.23%)	23 (67.64%)
	No (unavailable >30 days)	9 (52.95%)	2 (11.76%)	11 (32.36%)
<b>Accessibility</b>				
Is drinking water accessible to those with physically disabled and to the smallest children?	YES, To children with physical disability	10 (58.88%)	13 (76.47%)	23 (67.64%)
	YES, To the smallest children	15 (88.23%)	14 (82.35%)	29 (85.29%)
<b>Quality</b>				
Does the school do anything to the water from the main source to make it safe to drink?	Always	7 (41.17%)	10 (58.82%)	17 (50%)
	Sometimes	8 (47.05%)	4 (23.52%)	12 (35.29%)
	Never	2 (11.76%)	3 (17.64%)	5 (14.70%)

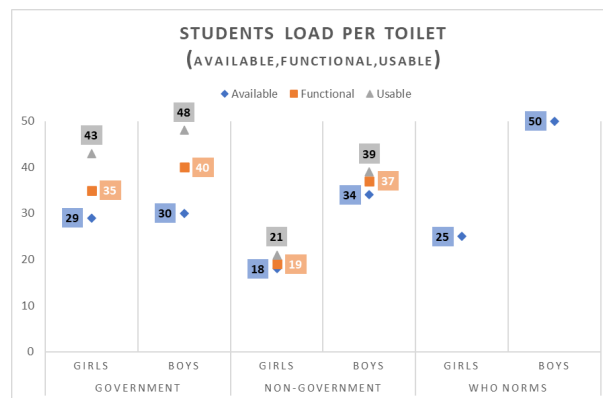
**Table 1.** Assessment of water component of WASH

and this difference is statistically significant. Disposal mechanisms could have been better in both types of schools.

**Table 4.** Assessment of sanitation component of WASH

		Government	Non-government	Total	p value	
<b>Availability</b>						
Distribution of sanitation facilities as per type of schools		Schools having separate toilet facilities for both gender	17 (100%)	17 (100%)	34 (100%)	1
		Schools having separate urinals for both gender	17 (100%)	17 (100%)	34 (100%)	1
		Teachers having their own toilet and urinal facilities	13 (76.47)	17 (100%)	30 (88.23%)	0.04
<b>Accessibility</b>						
Is there at least one usable toilet/latrine that is accessible to those with disability and younger children?		To children with physical disabilities	12(70.58)	14 (82.35%)	26 (76.47%)	0.6
		To younger children	17(100%)	17 (100)	22 (64.70%)	0.20*
		Within school building	10 (58.82%)	17 (100%)	27 (79.41%)	0.007*
		Outside building but on premises	7 (41.18%)	0 (0%)	7(20.59%)	
		Off premises	0 (0%)	0 (0%)	0 (0%)	

Assessment of the distribution of toilet facilities shows that both government and private schools had separate toilets and urinals for both sexes. Almost three-quarters of schools have access to handicap children physically. All private schools has toilets located within the school buildings, while only 58.82% of government schools have toilets located within the school buildings.



**Figure 1.** distribution of students load per toilet

## 5. Discussion

Individual health largely depends on adequate safe drinking water, sanitation, and hygiene. In developing countries like India, diseases related to inadequate water, sanitation, and hygiene are a huge burden. It is observed that lack of access to WASH services negatively affects children's health. Therefore, this study will be useful in highlighting the current state of WASH services in secondary schools, including government and non-government. In our study, almost three-fourths (70.58%) of studied schools had piped water into school building as the main source of drinking water, which include a higher proportion of non-government schools (94.11%) as compared to government schools (47.05%). This means almost half of the government schools had drinking water outside the building, which may affect water quality, usability, and acceptability among students. A similar result was observed in a cross-sectional study done by Rashmi hullalli et al. [8] in rural schools of Vijayapur district, Karnataka, India, where Majority (72%) of the schools had piped water supply as their source of water. A study by WaterAid [9] to assess the Status of School WASH two years after the Swachh Vidyalaya Abhiyan in 9 states of India reveals a different picture where they found that the primary source of water, including drinking water, in all nine states was a hand pump, followed by piped water supply and tube wells. This difference could be due to the inclusion of mainly poor states in the study done by WaterAid India [9]. In our study, we found that drinking water was accessible to disabled students in 23 schools out of 34 (67.64%) surveyed schools; this finding, if looked at as a whole, is better as compared to a study done by Rashmi Hullalli et al. [8] which found that none of the schools had water facilities that are accessible to physically disabled children. However, we still have to do a lot to improve accessibility as 40% (7) of the government schools and one-fourth (4) of non-government schools had water sources available to the site, directly inaccessible to children with physical disabilities. It may hamper the health of these children as they are bound to bring drinking water bottles with them, which can lead to increased infection due to possible contamination of bottles or bottles that may not fulfill daily water requirements, leading to dehydration-related complications, mainly in summer. In our study 14.7% of the schools never do anything to make water safe to

drink; a similar finding was observed in a study done by WaterAid India, 2016 [9] in which they found that 14.2% of schools still needed access to safe drinking water. These findings suggest that the mere availability of water sources could not guarantee safe drinking water for the children. Therefore, accessibility and quality issues can ultimately affect school attendance as well.

Burton et al. (2011). [10] show that handwashing with plain water and soap reduced bacterial load by 8%. In our study, out of the total studied schools, 70.59% of schools had hand washing stations available. However, the availability of both soap and water was observed only in 50.00% of the schools, which is an issue of concern since the availability of soap and water at the hygiene status is important for better health and for inculcating good hygiene practices among children. Lack of it may lead to an ignorant attitude regarding the importance of hand washing among children. Although our result is better as compared to findings of an assessment conducted in 540 schools in nine states in India Source: U-DISE, 2013-14, NUEPA, New Delhi [6] which reveal that only (51%) of the schools had a designated handwashing space and only 12% of schools had soap/detergent available at the handwashing space. This difference might be because this study considered poor states, and also, this was conducted a decade ago before watching Vidyalaya Abhiyan.

Menstrual hygiene is another topic that is more crucial but is undermined in India. Generally, if a female begins to practice good menstrual hygiene during adolescence, she will continue. The irony of the problem is that, even if girls wish to practice menstrual hygiene, it is less effective to teach girls the value of menstruation hygiene if schools need more infrastructure and resources for it. As evident from our study, only half (52.94%) of the schools have covered bins for disposal of menstrual hygiene materials in girls' toilets, which includes a higher proportion of non-government schools (70.58%) than government schools (35.29%) and this result is comparable to a survey in India by WHO/UNICEF JOINT MONITORING PROGRAMME FOR WATER SUPPLY, SANITATION, AND HYGIENE [4] which shows that the proportion of schools with bins with lids for the disposal of sanitary materials varies widely across states in India, from 98% in Chandigarh to 36% in Chhattisgarh.

We found that in private space to manage menstrual hygiene, soap and water were available only in approximately 17% (3) of government and 64% (11) of non-government schools. Another concerning finding is that only 20.58% of schools had menstrual hygiene disposal systems, comparable to WaterAid India's 2016 assessment [9] of school WASH infrastructure and hygiene behaviors in nine states. The above findings are a burning concern as the lack of proper menstrual hygiene facilities in schools impacts not only the school attendance of girls during menstruation but also the acceptability of the designated place to practice menstrual hygiene.

Core sanitation questions assess the availability of separate toilets and urinals for both genders. In our study, all schools had separate toilets and urinals. However, only 88.23% of the schools had separate toilets and urinal facilities for the teachers, which included 100% non-government schools and 76.47% of government schools. A similar result was obtained for toilet facilities from a study by Hullalli R et al. [8] in Karnataka, which revealed that all the schools (100%) had toilet facilities. However, the result for the availability of urinal facilities differs from our study as it found that only (42.8%) of schools had urinals. A study by Egbinola et al. in secondary schools in Ibadan, Nigeria [11] found that 30 percent of the surveyed schools had no toilets. An assessment of school WASH Infrastructure and hygiene behaviors in nine states by WaterAid India, 2016 [9] revealed that almost all schools assessed - 95% were found to have toilet facilities, and Separate toilets for teachers were found in 28% of the schools only. Our result is better in terms of availability than the above study. It might be because we have included only those schools located in urban areas.

Accessibility of toilets to younger children and the physically challenged is as essential as its availability. Almost three-fourths of all the schools surveyed in the present study (76.47) have at least one usable toilet/latrine that is accessible to children with physical disabilities. For younger children, all the schools had at least one usable toilet/latrine accessible to them. Our result shows a far better picture than what was revealed by studies like WaterAid India 2016 [9], which shows that Separate toilets for children with special needs (CWSN) were found only in 32% of schools, P. Antwi-Agyei et al. in Tanzania [12] which reveal that the Majority of the schools (74%) had no facilities accessible to students with physical disabilities and Hullalli R et al. [8] which reveals that no school had a toilet facility that was accessible to students with physical disabilities.

General accessibility to toilets depends not only on structural components but also on distance from the classroom. In the assessment of this component, we found that while toilets were constructed within school

buildings in all private schools, 41% of the government schools had toilets built outside the school building, though within premises. This may affect the acceptability, accessibility, and usability of toilets.

In our study, 73.52% of schools had adequate toilets per student, including a higher proportion of non-government schools (82.35% ) compared to government schools (64.71%). A higher load of students per toilet can hinder the usability and attitude of students regarding toilet use and sanitation. As per WHO WASH guideline [13], adequate distribution of toilets as per gender is one per 25 girls and one toilet plus one urinal (or 50 cm of urinal wall) per 50 boys, and as per Swachh Vidyalaya - The Essential Elements guidelines for Indian schools [6], adequate distribution of toilets per student is one unit for every 40 students. While availability norms for toilets and urinals are almost synchronous with WHO and swachh vidyalaya's norms, the real picture is quite different. The mere presence of a structural component couldn't guarantee adequate sanitation facilities, but its functionality and usability do. Hence, assessment in terms of functionality and usability is of utmost importance to see the actual load on toilets. As no studies have assessed these components, we found that in both government and non-government schools, norms for boys are met (1 usable toilet for 48 and 39 boys, respectively). However, for girls, only private schools fulfilled the norms (1 usable toilet per 21 girls). Government schools need to catch up to the norms, with (1 usable toilet per 43 girls). This picture might be worse in schools in rural areas. Therefore, monitoring and evaluation in terms of usability may give a more accurate picture of the ground-level realities of WASH in schools.

## 6. Conclusion

Our findings revealed that while the structural component of WASH like availability of safe water source, hand washing station, and toilets are satisfactory as compared to findings from other studies in both government and non-government schools; the quality, accessibility, functionality and usability component of WASH like accessibility to drinking water, schools doing any process to make water safe, presence of both water and soap at the hand washing stations, load on functional and usable toilets are not uniform among schools with slightly better findings in non-government schools as compared to government schools. Moreover, both type of school lack in one or the other component of adequate menstrual hygiene management which is a matter of concern. Hence, school's WASH facility clearly falls short of standards.

## Recommendations

As these findings are from an urban area of one of the developed states of India, we could only imagine the dire scenario of rural areas and other areas of poor states. Therefore, nation-wide assessment is needed to get current real picture of WASH status in schools as recent Covid pandemic and other WASH related diseases have clearly highlighted its importance in transmission, prevention and control of these diseases. Enabling WASH facilities need to be strengthened at the school level so that it can be inculcated in the community at large since children are agent of change as they are future parents and connecting link between school and community. To address these issues, not only a micro-scale policy for schools is required but also its monitoring and evaluation (M&E) is of utmost importance. Also the focus of M&E should be shifted from mere building and fulfilling the structural norms to its actual accessibility, functionality and usability.

**Acknowledgments:** We are grateful for the contribution of all school administrators.

**Author Contributions:** All authors contributed equally to the writing of this paper. All authors read and approved the final manuscript.

**Conflicts of Interest:** "The authors declare no conflict of interest."

## References

- [1] Kirschner, A. J. (2011). The human right to water and sanitation. *Max Planck Yearbook of United Nations Law*, 15, 445-487.
- [2] Water, S., & World Health Organization. (2004). Water, sanitation and hygiene links to health: facts and figures. Retrieved from <http://www.who.in> on March
- [3] Adams, J., Bartram, J., Chartier, Y., & Sims, J. (2009). *Water, sanitation and hygiene standards for schools in low-cost settings*. World Health Organization.



- [4] World Health Organization/United Nations Children's Fund. JMP Meeting Report. (2016): Expert Group Meeting on Monitoring WASH in Schools in the Sustainable Development Goals. WHO/UNICEF Joint Monitoring Programme for water supply and sanitation.
- [5] Right of Children to free and compulsory education Act, 2010. (April 8, 2010). Retrieved from [http://mhrd.gov.in/sites/upload\\_files/mhrd/files/RTI1.pdf](http://mhrd.gov.in/sites/upload_files/mhrd/files/RTI1.pdf). Rules. RTE 2010 p. 39. Ministry of Human Resources Development (Department of School Education and Literacy
- [6] Vidyalaya, S. B. (2014). A national mission. Clean India: Clean Schools handbook. MHRD. Retrieved from <http://mhrd.gov.in>
- [7] UNESCO Institute for Statistics. (2017). Retrieved from <http://uis.unesco.org> Retrieved October 2020
- [8] Hullalli, R., & Gudadinni, M. R. (2017). Water sanitation and hygiene in the schools of rural field practice area of Shri BM Patil Medical College, Vijayapur. *Int J Community Med Public Health*, 4(11), 4307-4309. <http://www.ijcmph.com.https://doi.org/10.18203/2394-6040.ijcmph20174849>
- [9] WaterAid India. (2016). An assessment of School WASH infrastructure and hygiene behaviours in nine states: Status of School WASH two years after the Swachh Vidyalaya Abhiyan.
- [10] Burton M, Cobb, E., Donachie, P., Judah, G., Curtis, V., Schmidt, W. P., ... Schmidt, W. P. (2011, January). The effect of handwashing with water or soap on bacterial contamination of hands. *International Journal of Environmental Research and Public Health*, 8(1), 97-104. <https://doi.org/10.3390/ijerph8010097>. Epub January 6, 2011. PubMed: 21318017, PubMed Central: PMC3037063
- [11] Egbinola, C. N., & Amanambu, A. C. (2015). Water supply, sanitation and hygiene education in secondary schools in Ibadan, Nigeria. In editors. Bulletin of Geography. Socio-Economic Series. *Nicolaus Copernicus University*, 29(29), 31-46. <http://doi.org/10.1515/bog-2015-0023>
- [12] Antwi-Agyei, P. et al. WASH in schools - A process evaluation of a Sanitation Campaign. *Journal of Water, Sanitation and Hygiene for Development* | 07.1, 2017.
- [13] Adams, J., Bartram, J., Chartier, Y., & Sims, J. Water, Sanitation and Hygiene Standards for Schools in Low-Cost Settings. Retrieved from <http://www.who.int> on July 2019



© 2023 by the authors; licensee PSRP, Lahore, Pakistan. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) license (<http://creativecommons.org/licenses/by/4.0/>).