

RESEARCH ARTICLE

## Water, Sanitation and Hygiene Practice among Students in Secondary School, Ijebu Ode, Nigeria

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Received: 06 June, 2022, Accepted: 18 June, 2022, Published: 20 July, 2022

### Abstract

Studies have documented that poor WaSH is accountable for several cases of diarrhea globally, resulting in millions of unnecessary deaths each year, particularly among children, and most notably in underdeveloped countries where poor knowledge and practice of WaSH have been well documented. Therefore, the work prioritizes evaluation of WaSH practice among students in secondary school in Ijebu Ode, in light of the emergence of COVID-19, which has further highlighted the essence of WaSH practice, especially in our schools. A descriptive cross-sectional approach was adopted in the conduct of the investigation, wherein data was sourced from 60 students selected through random numbers from six randomly selected secondary schools (three public and three private), representing a total student population of 360. The data collected through structured questionnaire and personal interview were computed and analyzed descriptively using Microsoft Excel and Statistical Software for Social Scientist (version 20). Findings indicated that majority of the students in Ijebu Ode have adequate knowledge (78.9%) and inadequate practice (45.6%) on WaSH, and thus, concluded that whereas the participants have adequate knowledge on WaSH, it however did not translate into an actual practice. Hence, a need for an intensive effort that will facilitate adequate WaSH practices among the school students through the availability and accessibility of appropriate WaSH resources, with school and home schedules for WaSH practice.

**Keywords:** Hygiene; Practice; Sanitation; Students; Wash; Water

### Introduction

The right to foundational education for schoolchildren requires a safe and appropriate water supply and sanitation in schools (Mooijman 2012). For example, World Health Organization (WHO) and United Nation Children Fund (UNICEF) in 2015 reported that roughly one-third (31%) of schools worldwide do not have appropriate water supply, and many do not have proper sanitation (44%) (WHO/UNICEF, 2015). This is especially concerning in schools because children, who are considered a vulnerable group, have a increased risk of disease transmission (WHO/UNICEF, 2015; UNICEF, 1998). For example, poor WaSH have been documented to be responsible for 88 percent of diarrhea cases globally, resulting in 1.5 million unnecessary deaths each year, particularly among children (Prüss-Üstün et al., 2015), and most notably in developing countries where poor knowledge and practice have been well documented (Egbinola & Amanambu, 2015; Olukanni et al., 2014).

The attainment of Millennium Development Goals (MDG) on worldwide fundamental education, gender equality, and

infant mortality, as well as the Sustainable Development Goals, and in particular Goal 6 on safe water and sanitation by 2030, have all been linked to the provision of adequate water, sanitation, and hygiene (WaSH) facilities in schools (United Nations (UN), 2015). Nonetheless, WaSH deficits continue to constitute a problem in low and middle-income countries (LMICs) around the world (United Nations Children's Fund (UNICEF), 2020), particularly in Nigeria, which is party to the UN Pronouncement of the Fundamental Right to WaSH-related activities but is among the first three LMICs with poor WaSH amenities, practices, and education awareness (WHO, 2015). It is suggested that, unsafe water supplies, as well as poor sanitation and hygiene, are thought to be responsible for about 88 percent of diarrheal illness (WHO, 2004). Other preventable diseases such as polio, hepatitis, cholera, and typhoid have spread across Africa due to a lack of clean water and a lack of knowledge about good hygiene (WHO/UNICEF, 2004).

Academic studies have demonstrated that having proper WaSH activities in schools can help students improve their knowledge, practice, and health by lowering the number of days missed in school due to menstrual periods or giving them more time to complete learning objectives (Bowen et

al. 2007; Lopez-Quintero et al. 2009; Freeman et al. 2012; Jasper et al. 2012). The reduction of diarrheal illnesses among students is estimated to result in 1.9 billion school days achieved (Hutton & Haller 2004), while lack of sanitation is blamed for 272 million school days lost each year and for the intestinal worm infestation of an estimated 400 million children (Hutton & Haller 2004; Zomerplaaq & Moojiman, 2005). According to UNICEF, most of the world's schools lack clean bathrooms, drinking water, and hygiene education for students, particularly schools in rural areas, which either lack drinking water and sanitation facilities, or have infrastructure that is both insufficient in quality and quantity (UNICEF, 2004), creating high-risk situations where diseases can readily spread (WHO, 1997). Moreover, even with acceptable facilities and resources, students' knowledge and practice of hygiene have a significant impact on their hygiene activities. Studies have demonstrated that, WaSH school-based interventions, especially those focused on adequate knowledge and practice, can help to lower the occurrence of diarrhea, communicable diseases, and other vector-borne infections, as well as infant mortality rates, all over the world (Prüss-Üstün et al., 2008). Nonetheless, despite these advantages, a lack of funds, water quality standards, accountability, and a low priority for WaSH all contribute to failure to effectively create and maintain water and hygiene services (Montgomery & Elimelech, 2007), resulting in millions of preventable illnesses and deaths each year (Montgomery & Elimelech, 2007; WHO/UNICEF, 2004). For instance, while initiatives have considerably increased the portion of the populace with access to improved water sources and appropriate sanitation around the world since 1990, they have mostly concentrated on WaSH in the household or community, rather than at the institutional level (WHO/UNICEF, 2015). As a result, there are significant gaps in WaSH access, awareness, and practice, especially in school environments (WHO/UNICEF, 2015).

However, available studies and reports from development partners' concerted efforts suggest that long-term low access to adequate WaSH services and low awareness in rural schools across the country actually provide opportunities for affordable interventions on students' knowledge and practice of WaSH. This is especially true in the face of the emergence of COVID-19, which has highlighted the importance of sanitation and hygiene, particularly in our schools (Gammon & Hunt, 2020; Olukanni et al., 2014; World Bank, 2017; Mackinnon et al., 2019). For this reason, the study prioritizes assessing the knowledge of WaSH and practice in some selected secondary schools in Ijebu Ode as a part of the Sustainable Development Goals following the 2015 Millenium Development Goal deadline. Thus, the investigation was conducted to explore the knowledge of WaSH and practice among secondary school students in Ijebu Ode, as the findings would enable policy intervention

on school-based education on the promotion and implementation of WaSH practice.

## **Literature review**

### **Concept of wash**

Water and sanitation are critical components of a supportive atmosphere and high-quality education. In many impoverished countries, sanitary conditions in schools are appalling (Ana, 2008), and are either insufficient or unavailable, resulting in filthy latrines due to a shortage of water or a far distance from it. These conditions increase the risk of disease, which, according to Egbinola & Amanambu, (2015) is particularly prevalent among children aged 5 to 14, and can have a negative impact on cognition, growth, concentration, physical activities, and academic performance.

Moreover, despite the probable merits of adequate WaSH in educational institutions to students' health and educational performance, evidence reveals that these benefits are highly variable (Freeman et al. 2012), as they are reliant on the accessibility of vital materials and consumables including water, soap, and anal cleansing products (McMahon et al. 2011; Greene et al. 2012; Saboori et al. 2011). It has been suggested that the availability of an enabling environment, which includes government control and commitment, enough funds and a well-established supply line, defined roles and functions, monitoring, and answerability, is related to the effectiveness of sustaining these inputs (Saboori et al. 2011). More so, it has been identified that WaSH is crucial for girls' education, as inadequate water supply, sanitation, and cleanliness, which according to Lidonde (2004), have a role in the low retention of females in schools. Similarly, previous studies have demonstrated that a lack of sufficient water and sanitation facilities is a significant contributor to the significant impact on girls' enrollment and school leave in Africa's Sub-Saharan (Birdthistle et al., 2011; UNICEF/WaterAid (2013).

### **Impact of Poor WaSH**

Reports have indicated that satisfactory WaSH in educational institutions could prevent gastrointestinal and diarrheal infections (Lopez-Quintero et al. 2009; Jasper et al. 2012). Prüss-Üstün & Corvalán (2006) submitted that 94% of the causes of diarrheal diseases can be attributed to environmental influences, which include unwholesome drinking water and poor hygiene. For instance, in 2012, an estimated 502,000 and 280,000 deaths were ascribed to poor water and hygiene, respectively, out of the total 1.5 million diarrhea-related deaths reported (Prüss-Ustün et al. 2014). It has been reported that kids suffer from infectious, gastrointestinal, neurocognitive, and psychosocial problems as a result of insufficient WaSH in schools (Jasper, 2012).

Inadequate WaSH circumstances have been said to be connected to poor academic performance in children by contributing to absenteeism and reduced cognitive capacities (Alexander et al., 2013; O'Reilly et al., 2008; Bar-David et al., 2005; Bartlett, 2003; Benton & Burgess, 2009). In collaboration, Bartlett outlined the influence of filthy environments and diarrheal disease on child malnutrition as well as mental and social development, including school achievement levels, working memory, and behavioral issues (Bartlett, 2003). While a more recent literature review found ambiguous data on the subject, the standard of hygiene amenities in schools can affect girls' attendance rates, especially if they have started menstruating (Doyle, 1995; Birdthistle et al., 2011).

More so, there is some evidence to suggest that an absence of adequate WaSH may also lead to absenteeism from school (Pearson & Mcphedran, 2008), which is associated with low educational activities, interruptions in academic, a rate of school drop-out, and social development (Lamdin, 1996). WaSH and school absences are especially important for menstruating girls who require personal hygiene facilities (WHO/UNICEF, 2015; Pearson & Mcphedran, 2008; Freeman et al., 2012; Mooijman, 2012), and WaSH interventions in schools may thus help reduce gender disparities in school performance and attendance (Freeman et al., 2012).

However, some limited work has been published on the educational and health benefits of providing WaSH interventions in schools. For example, Vally et al. (2019) found that having an educational-based WaSH intervention increased students' awareness and hygiene activities, reduced absenteeism, and increased hand washing among household members in a study on the impact of school-based WaSH intervention on knowledge, practices, and diarrhea frequency in the Philippines. In contrast, Ahmed et al. (2021) found that academic attainment was significantly correlated with WaSH interventions or policies in a study conducted in Pakistan. Similarly, research has indicated that pupils at WaSH intervention schools have fewer cases of diarrhea and other sanitation-related disorders like respiratory sickness and soil-transmitted helminths (Migele et al., 2007; Freeman et al., 2012; Bieri et al., 2013; Trinies et al., 2016).

In addition, inadequate WaSH is a key concern in schools owing to the high chances for disease spread among school learners, who are considered to be a vulnerable group. However, improved knowledge and efficient hand-hygiene practices, particularly among school-children, can effectually decrease respiratory and gastrointestinal tract illnesses, the two global leading causes of childhood illness and death (Curtis & Cairncross, 2003; Mohammed et al., 2016). The above is supported by research that shows that schoolchildren who have a better understanding and practice of WaSH have fewer sick days and absenteeism, as well as higher grades (Vivas et al., 2010; Mohammed et al., 2016).

## **WaSH Services in LMICs**

In many developing-country schools, the situation is appalling. Sanitation is either non-existent or extremely poor, making it potentially dangerous and a source of a variety of diseases. According to reports, there is a substantial shortage of WaSH activities in LMICs in Africa's Sub-Saharan, with 300 million people lacking access to potable water and 700 million lacking access to enhanced hygiene facilities. It has been projected that 71 million people will remain without access to improved water and another 130 million will fail to satisfy sanitation standards set by the MDGs (World Bank, 2017). However, despite infrastructure investment and partnership with WHO and UNICEF among LMICs in Africa's Sub-Saharan, the availability and provision of WaSH facilities in schools in rural regions has remained a key concern. According to Morgan et al., 2017 only around 22 percent of schools in rural Uganda, Zambia, Kenya, Mozambique, Rwanda and Ethiopia satisfy WHO standards for WaSH facilities and adequacy.

Similarly, differences in wealth quantiles are mostly to blame for the rural/urban divide as wealthier households and greater economic power are more common in urban regions. As a result, there is less political will in rural areas to provide basic WaSH and social infrastructure (Ojima et al., 2020; Sinharoy et al., 2019). When compared to the urban poor, rural poor households were 29 times less likely to have access to better water and 25 times less likely to have access to improved sanitation facilities, according to another study that tracked progress in WaSH in Africa's Sub-Saharan (Armah et al., 2018). In addition, when compared to other rural households, wealthier households in these areas enjoy superior WaSH services (Chasekwa et al., 2018).

## **WaSH in Nigeria**

In Nigeria, like many other developing nations around the world, a lack of continuous, effective, and safe services is a typical occurrence, resulting in a high frequency of WaSH-related diseases, leading many people, particularly children, to become ill or even die (UNICEF, 1998). Despite efforts by government parastatals, non-governmental and non-profit organizations to improve access to safe water supply and sustainable sanitation in Nigeria's major cities, by supporting the provision of enhanced water sources and hygiene amenities in rural communities and schools, thus facilitating the realization of the national mark of 90 percent by 2015 and 100 percent by 2020 (UNICEF, 2007), huge figures of rural and urban schools and healthcare facilities remain the same. Nigeria is currently among the countries with sanitation coverage rates that are between 20% and 40% below the MDGs (Aremu, 2012; Banerjee and Morella, 2011). It has been reported that the majority of Nigerian

public secondary schools lack basic water and sanitation facilities, and hygiene teaching programs are frequently insufficient (Adam et al., 2009).

Studies have shown that the lack of basic school-WaSH services has been proven to be widespread in Nigeria, contributing considerably to youth and adolescent sanitation and hygiene practices (Egbinola & Amanambu, 2015; Wada et al., 2020; Wada & Oloruntoba, 2021). According to the World Bank, about 90% of rural Nigerians defecate in the open while 51% of rural communities lacked access to better water in 2017 (World Bank, 2017). In addition, improper sanitation and hygiene practices among Nigerian adolescents and youths have been linked to a lack of information and a negative attitude toward fundamental hygiene practise (UNICEF, 2015; Azuogu et al., 2016).

In a research to evaluate the WaSH in secondary schools in Ibadan, Nigeria, Egbinola & Amanambu (2015) found that W/C were used in just 24% of the schools, while pit toilets were utilized in 76% of the schools, with 88 percent of them being regular pit toilets and only 12% being VIP. But the study also showed that, in 77 percent of the schools, there were no wash basins, and in 88 percent of the ones that did have wash basins, there was no soap. A similar study on the WaSH program in public secondary schools in South-Western Nigeria, conducted by Olukanni in 2013, found that the majority of the schools lacked adequate WaSH practices. Of the 12 public secondary schools surveyed, only 3 (or 25%) had access to drinking water, and 40% of the schools lacked separate latrines for boys and girls. One (10%) of the schools had handwashing stations but no soap (Olukanni, 2013).

More so, An empirical study on hand-washing habits among secondary school pupils in Ebonyi, Nigeria, revealed a significant prevalence of infectious disorders including diarrhea among secondary schools, which was linked to dirty hands. The study found that washing hands with soap and water under flowing water stops the transmission of illnesses (Azuogu et al., 2016). Similarly, Ikogho & Igbudu's (2013) investigation into the accessibility and use of hand-washing facilities among primary school students in Ughelli North, Delta State, indicated that there are few facilities available, and usage is hampered by a lack of supplies and a poor maintenance culture. The study also suggested that if infectious infections were not controlled by practicing adequate handwashing, they could result in significant morbidity and mortality among schoolchildren as well as absenteeism.

However, with several Nigerians in school, prioritizing school-based intervention is critical for imparting appropriate sanitation and hygiene knowledge and practices in future generations (UNICEF, 2012).

## MATERIALS AND METHODS

### Study Area

[www.jescae.com](http://www.jescae.com)

The evaluation of WaSH practice among students in secondary school was conducted in Ijebu Ode, the second largest city in Ogun State, Nigeria, which is located some 60 kilometers north-west of Lagos and has an estimated population of 154,032 (National Population Commission, 2007). (See figure 1).

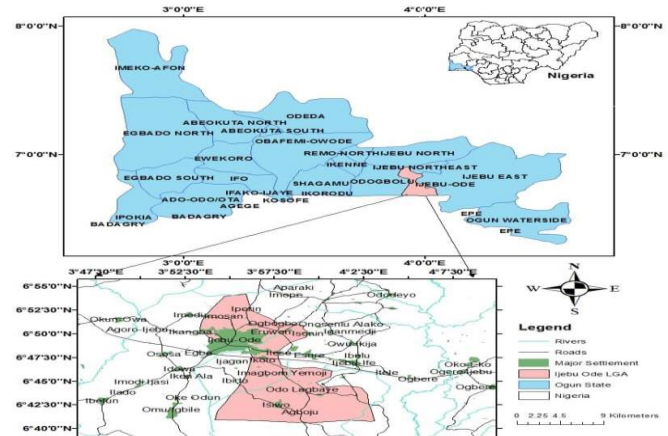


Figure 1: Ijebu Ode Spatial Map (Otto, 2022)

### Sampling, Collection and Analysis of Data

The study is based on primary data collected by the researchers between January and March 2022, and which involved the use of questionnaires, interviews, and personal observation to elicit information on the respondents' knowledge and practice of WaSH. The simple random approach was used, relying on random numbers to select sample schools from the list of schools in Ijebu Ode. A total of six (three public and three private) schools were selected from the 26 and 49 public and private secondary schools, respectively. An aggregate of sixty (60) students were selected through random numbers from the six randomly selected schools (three public and three private), representing a total student population of 360. The data, which was collected via structured questionnaire and observation were computed and analyzed descriptively using Microsoft Excel and Statistical Package for Social Scientist (version 20.0), and the result presented by using frequency tables, graphs, and charts.

### Classification of Levels of Knowledge and Practice of WaSH

The respondents' WaSH knowledge and practice were categorized as adequate, moderate, and low, respectively. Knowledge scores ranged from 0 to 15, and respondents who possessed adequate knowledge obtained scores of between 12 and 15 (more than 75%), moderate 8 to 11 (50–75%), while those with low knowledge had scores below 8



(less than 50%). Similarly, practice levels range from 0 to 14. Students with adequate practice obtained scores between 11 and 14 (more than 75%), and those with moderate practice had scores between 7 and 10 (50–75%), while students with low practice had scores below 7 (less than 50%). This was adapted from a previously published study (Kudavidanage et al., 2011; Wada et al., 2022).

### **Ethical Consideration**

An official approval was gotten from the Institutional Ethics Committee, and informed consent was secured from all the secondary schools and participants with the utmost assurance of confidentiality.

### **Results and discussions**

The present work was carried out to evaluate WaSH practice among students in secondary school, Ijebu Ode. The results of the analysis of students' knowledge of WaSH indicated that a good number of participants (78.9%) had adequate knowledge of WaSH (see table 1, figure 2). In contrast, these results are inconsistent with those of other studies that documented inadequate knowledge of WaSH (Gomathi et al., 2018; Wada et al., 2022). Our study suggests that adequate knowledge of WaSH is one of the prerequisites for effective WaSH practice, provided essential WaSH resources (water, soap, toilets, etc.) are available and accessible.

Moreover, analysis of data also reveals that 85% of the students understand that dumping of refuse in public drains can lead to flooding, while a similarly high number of them, 73.6%, are also knowledgeable that burning of waste is not a good waste disposal approach due to its environmental effects. Similar results were demonstrated by Safo-Adu & Hanson, 2019.

Further analysis indicated that 89.7% of the students knew that preserving water in a container with a tight-fitting cover is necessary to safeguard the water against potential physical or microbial contamination. These results agree with the findings of other studies that documented adequate knowledge by students on the importance of regular cleaning and proper covering of water containers (Shrestha et al., 2018; Vivas et al., 2011). Statistical results on simple treatment of water showed that 93.6% of students had an understanding that germs are killed during the boiling process of water. This result is consistent with Shrestha et al. (2018), who reported similar findings (95%) among students, but differs from the results of other research reports (Vivas et al., 2010; Vivas et al., 2011; Javaeed et al., 2018).

Additionally, approximately 69% knew that washing hands without soap after visiting the latrine is an unhygienic practice. Similarly, Dajaan et al. (2018) documented that 100% of Saudi school students understand the need for

handwashing with soap and water. The present finding was further corroborated by Shrestha et al. (2018) who reported that 84% of the students had good knowledge about the importance of hand-washing after defecation, but the finding was different in comparison to others (Vivas et al., 2010; Shilunga et al., (2018).

Moreover, most students 95% recognized that hygienic and clean surroundings are needed for good health and that dirty surroundings contribute to disease spread by 92.8%. Similarly, the majority of them (93.9%) attested that it is the responsibility of people in the households to clear bushes and weeds around their houses. Regrettably, about 26.9% never knew that allowing stagnant water in their surroundings was a bad sanitation and hygiene practice. In a similar observation, Mourad et al. (2019) found that 26.5% of students believe that draining stagnant water and removing bushes surrounding the house can help avoid malaria.

Nonetheless, a majority of 87.2% of the students agree that defecating in the open spaces can adversely affect the health of the people living within the area. In a recent study, Wada et al. (2022) in a recent work suggested that 83.4% of students recognize that open defecation in school could lead to the spread of disease, as did Javaeed et al. (2018) in a similar investigation. Contrarily, Shilunga et al. (2018) in a previous report identified that over half of the students (53%) did not know whether defecation in the open spaces or bush could lead to the spread of illness.

More so, results on students' practice on WaSH showed significant evidence of inadequate WaSH practices, with less than 50% shown to have adequate WaSH practice (see table 2, figure 3). The results from our work suggest that having adequate knowledge of WaSH does not necessarily translate into actual practice, and these are evidently attributable to several factors. Notwithstanding, the current finding is consistent with recent observation by Gomathi et al. (2018) who documented that only (14%) of students in Mangalagiri reportedly have adequate practices on WaSH. The result of the current investigation was, however, contrary to (Sibiya & Gumbo (2013).

Regarding hand washing with soap and water, 73.6% of the students always wash their hands after using the latrine, whereas 65.3% wash their hands before and after meals. In support of the results, Almoslem et al. (2021) recently revealed that roughly 86% and 87% of the students washed their hands after using the toilet and before meals. In addition, recent evidence suggests that 94.4% of learners reported always washing their hands before eating and after toilet use (Shilunga et al., 2018). Sibiya & Gumbo (2013) in a previous study reported that hand washing (65%) was mostly done before eating and after visiting the toilet. Our study suggests the relevance of hand-washing as an effective preventive measure against the spread of faeco-oral and helminthic infections (such as, diarrhea, typhoid, amoebiasis, ascariasis, etc.) and the recent emergence of the

novel COVID-19 has been reported by several researchers (Curtis & Cairncross, 2003; Ruan et al., 2011; Sheren, 2012; Lee et al., 2014; Alzyood et al., 2020; Zhang et al., 2016; Gammon & Hunt, 2020). Similarly, in concordance with the results of the present study, it has been documented that the two most important moments of hand-washing are after using the toilet and before eating (UNICEF, 2020).

Additionally, on the practice of open defecation, 13.6% of the students reported always defecating in open spaces and nearby bushes, which has severe implications for public health, especially surface and ground water contamination. In agreement with the present results, previous research has reported the practice of open defecation among students (Mourad et al., 2019; Wada et al., 2022). Regarding the students' performance, 86.4% of them reported always covering their drinking water containers at home, while 70.8% always clean the drinking water containers every day. However, a significant number of the students (93.6%) knew that boiling water kills germs and therefore renders it safe, but only 34.7% reportedly boil water meant for drinking, which is the simplest method of household water treatment that renders the water safe from disease-causing organisms.

Moreover, our findings have shown that, though most of the students 78.9% had adequate knowledge of WaSH, relatively few (less than 50%) actually practiced WaSH. This is in line with the study by Aswathy (2015) and Mohd

and Malik (2017), who reported that there was no relationship between respondents' knowledge and practice of hygiene. It is reasonable to assume that though the awareness of WaSH exists, the inadequacy of essential resources may negatively influence the effective practice of WaSH among the students. Although we did not collect data on the availability of resources in students' schools, the resources offered in schools are often lacking (Vivas et al., 2011; Sibiya & Gumbo, 2013; Wada et al., 2022; Jordanova et al., 2015; Shilunga et al., 2018; Weaver et al., 2016; Egbinola & Amanambu, 2015). According to a UNICEF survey done in Ethiopia, only around a third of schools have water points, and just 5% have hand washing facilities, none of which had soap (UNICEF 2009).

This current work therefore contributes to existing knowledge and practice on WaSH among students by adding to an increasing body of empirical evidence that will prove useful to donors, service providers, and policy makers in enhancing affordable but highly effective intervention programs that will significantly improve WaSH practices among students in diverse settings. This study was cross-sectional and did not capture changes in knowledge and practice of WaSH by the students, nor factors thought to influence these over time. A further study with more focus on the aforementioned is therefore suggested.

**Table 1: Knowledge of WaSH**

S/N	Knowledge Variables	YES		NO	
		F	%	F	%
1	Used items such as nylon bags, papers, metal scrap, cans, abandoned woods are all wastes	279	77.5	81	22.5
2	Dumping refuse in gutters, on open street and surroundings can lead to flooding	306	85.0	54	15.0
3	Burning of waste is not a good way of waste disposal and poses environmental effects	265	73.6	95	26.4
4	Burying of waste is not the right approach to dispose of refuse	286	79.4	74	20.6
5	Washing of hands without soap after using the toilet is a bad practice	250	69.4	110	30.6
6	Defecating in open spaces can affect people that are living in the area	314	87.2	46	12.8
7	The accurate way to preserve water meant for drinking is to in a container with a cover	323	89.7	37	10.3
8	Drinking water should be odorless, tasteless and colorless	329	91.4	31	8.6
9	Storing refuse in wastebin with no cover is not a good practice	303	84.2	57	15.8
10	It is the duty of people in house to cut weeds and clear bushes around their homes.	338	93.9	22	6.1
11	Presence of stationary water around the surroundings is good sanitation practice	97	26.9	263	73.1
12	Adults and kids should not be tolerable to defecate in open surroundings	323	89.7	37	10.3
13	A dirty surroundings contributes to disease spread	334	92.8	26	7.2
14	Hygienic surroundings is needed for good health	342	95.0	18	5.0
15	Boiling of water can kill the germs in it.	337	93.6	23	6.4

General Knowledge	
>75	78.9%
50 – 75	20.3%
<50	0.8%

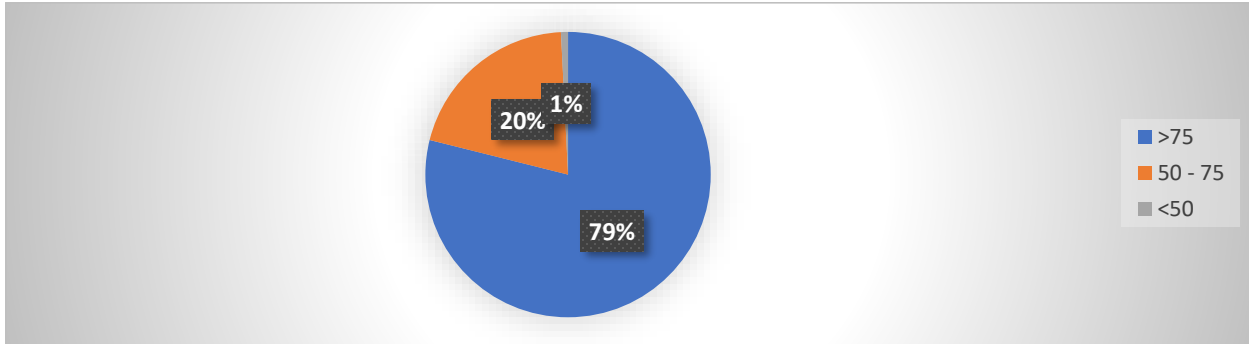
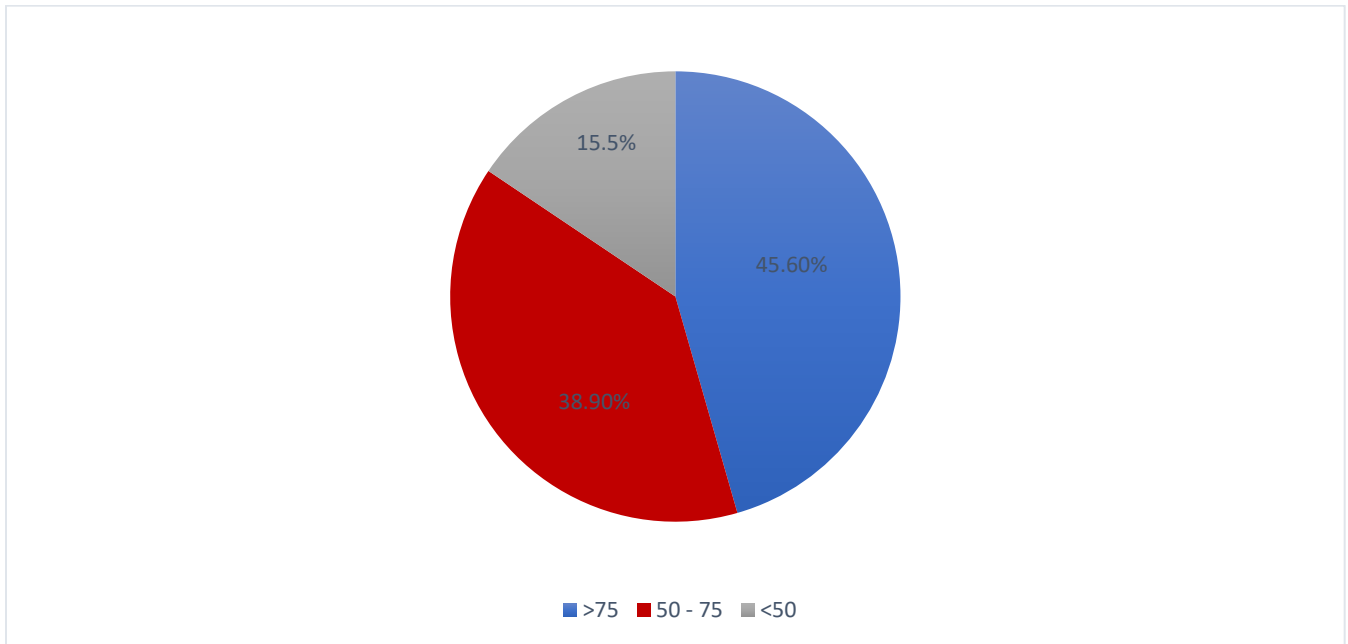


Figure 2: General Knowledge of WaSH

Table 2: Practice of WaSH

S/n	Practice Variables	Always		Sometimes		Never	
		F	%	F	%	F	%
1	I put waste into garbage sags and dump into gutters and on the street	79	21.9	79	21.9	202	56.1
2	When I finished using the toilet, I wash my hands with water and soap	265	73.6	91	25.3	4	1.1
3	I cover my dustbin after placing in waste	262	72.8	82	22.8	16	4.4
4	Accumulate refuse in house for one or two days before putting into the wastebin	101	28.1	125	34.7	134	37.2
5	I clear weeds and clean the household surroundings	221	61.4	127	35.3	12	3.3
6	I clean the latrine facility often	296	82.2	53	14.7	11	3.1
7	I defaecate in open spaces and nearby bushes	49	13.6	39	10.8	272	75.6
8	I allow the presence stagnant water around my surroundings	68	18.9	71	19.7	221	61.4
9	I get involved in community sanitation activities	183	50.8	137	38.1	40	11.1
10	I cover my drinking water storage at home	311	86.4	37	10.3	12	3.3
11	I wash hands properly before, and also after meals	235	65.3	83	23.1	42	11.7
12	I leave the refuse there each time I sweep	85	23.6	67	18.6	208	57.8
13	I boiled water before drinking	125	34.7	179	49.7	56	15.6
14	Clean drinking water storage everyday	255	70.8	82	22.8	23	6.4
<b>General Practice</b>							
>75		45.6%					
50 – 75		38.9%					
<50		15.5%					



**Figure 3: General Practice on WaSH**

**Conclusion**

This study provides insights into the level of knowledge and practice of students towards WaSH, in view of its health implications, vis-a-vis potential impact on disease promotion and prevention among school students. The findings of this study indicated that most of the secondary school students in Ijebu Ode have adequate knowledge (78.9%) and inadequate practice (45.6%) on WaSH, and thus, concluded that whereas the participants have adequate knowledge on WaSH, it however did not translate into an actual practice. Hence, a need for a concentrated effort that will facilitate adequate WaSH practices among the school students through the availability and accessibility of appropriate WaSH resources, with school and home schedules for WaSH practice.

**References**

Adam J., J. Bartram, Y. Chartier and J. Sims. (2009). Water, Sanitation and Hygiene Standards for Schools in Low Cost Settings. World Health Organization, Geneva, Switzerland.

Ahmed, J., Wong, L. P., Chua, Y. P., Hydrie, M. Z. I., & Channa, N. (2021). Drinking water, sanitation, and hygiene (WASH) situation in primary schools of Pakistan: the impact of WASH-related interventions and policy on children school performance. *Environmental Science and Pollution Research*, 1-19.

Ana, G.R.E.E., Oloruntoba, E.O., Stridhar, M.K.C. and Adekolu, A., (2008). Water and Sanitation problems in selected schools in Ibadan, Nigeria. In: *Proceedings of the 33rd WEDC International Conference: Ghana, Accra: Global Partnerships and Local Actions*, p.12.

Alexander, K.T.; Dreibelbis, R.; Freeman, M.C.; Ojony, B., Rheingans, R. (2013). Improving service delivery of water, sanitation, and hygiene in primary schools: A cluster-randomized trial in western kenya. *J. Water Health*, 11, 507–519.

Almoslem, M. M., Alshehri, T. A., Althumairi, A. A., Aljassim, M. T., Hassan, M. E., & Berekaa, M. M. (2021). Handwashing Knowledge, Attitudes, and Practices among Students in Eastern Province Schools, Saudi Arabia. *Journal of Environmental and Public Health*, 2021, 1–10. <https://doi.org/10.1155/2021/6638443>

Alzyood, M., Jackson, D., Aveyard, H., & Brooke, J.( 2020). COVID-19 reinforces the importance of handwashing, *Journal of Clinical Nursing*, vol. 29, no. 15-16, pp. 2760-2761. View at: Publisher Site | Google Scholar

Aremu A. S. (2012). Assessment of Sanitation Facilities in Primary Schools within Ilorin, Nigeria. *Journal of Applied Sciences in Environmental Sanitation*. 7(1): 29-33.

Armah, F. A., Ekumah, B., Yawson, D. O., Odoi, J. O., Afitiri, A.-R., & Nyieku, F. E. (2018). Access to improved water and sanitation in sub-Saharan Africa in a quarter century. *Heliyon*, 4(11), e00931. <https://doi.org/10.1016/j.heliyon.2018.e00931>



- Aswathy, S. K. (2015). Knowledge and practice regarding environmental sanitation and hygiene among general population. A cross sectional survey. *Global Journal for Research Analysis*, 4(11), 2277 – 8160.
- Azuogu, V. C., Cajetan, I. I., Ignatius, O. N., Benedict, N. A., & Chinagorom, O. (2016). Extent of hand washing practice among secondary school students in Ebonyi State, Nigeria. *International Journal of Education, Learning and Development*, 4(7), 11–22. <https://www.eajournals.org/wp-content/uploads/Extent-of-Hand-Washing-Practice-among-Secondary-School-Students-in-Ebonyi-State-Nigeria.pdf>
- Banerjee S. G. and Morella E. (2011). Africa's Water and Sanitation Infrastructure: Access, Affordability and Alternatives. The International Bank for Reconstruction and Development/ the World Bank, Washington DC, U. S. A.
- Bar-David, Y.; Urkin, J.; Kozminsky, E. (2005). The effect of voluntary dehydration on cognitive functions of elementary school children. *Acta Paediatr*, 94, 1667–1673.
- Bartlett, S. (2003). Water, sanitation and urban children: The need to go beyond “improved” provision. *Environ. Urban*, 15, 57–70.
- Benton, D. & Burgess, N. (2009). The effect of the consumption of water on the memory and attention of children. *Appetite*, 53, 143–146.
- Bieri, F.A.; Gray, D.J.; Williams, G.M.; Raso, G.; Li, Y.; Yuan, L.; He, Y.; Li, R.S.; Guo, F.Y.; Li, S.M. (2013). Health-Education Package to Prevent Worm Infections in Chinese Schoolchildren. *NEJM*, 368, 1603–1612. [CrossRef] [PubMed]
- Birdthistle, I., Dickson, K., Freeman, M., and Javidi, L., (2011). What impact does the provision of separate toilets for girls at schools have on their primary and secondary school enrolment, attendance and completion?: A systematic review of the evidence, London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London.
- Bowen, A., Ma, H., Ou, J., Billhimer, W., Long, T., Mintz, E., Hoekstra, R. M. & Luby, S. (2007). A cluster-randomized controlled trial evaluating the effect of a handwashing promotion program in Chinese primary schools. *The American Journal of Tropical Medicine and Hygiene* 76, 1166–1173.
- Chasekwa, B., Maluccio, J. A., Ntozini, R., Moulton, L. H., Wu, F., Smith, L. E., Matare, C. R., Stoltzfus, R. J., Mbuya, M. N. N., Tielsch, J. M., Martin, S. L., Jones, A. D., Humphrey, J. H., & Fielding, K. (2018). Measuring wealth in rural communities: Lessons from the Sanitation, Hygiene, Infant Nutrition Efficacy (SHINE) trial. *PLOS ONE*, 13(6), e0199393. <https://doi.org/10.1371/journal.pone.0199393>
- Curtis V, Cairncross S. (2003). Effect of washing hands with soap on diarrhea risk in the community: a systematic review. *Lancet Infect Dis*.3:275–81.
- Dajaan, D. S., Addo, H. O., Ojo L., et al., (2018). “Hand-washing knowledge and practices among public primary schools in the Kintampo Municipality of Ghana,” *International Journal of Community Medicine and Public Health*, vol. 5, no. 6, pp. 2205–2216. View at: Publisher Site | Google Scholar
- Doyle, B.A. (1995). Increasing Education and Other Opportunities for Girls and Women with Water, Sanitation and Hygiene. Available online: <http://www.ircwash.org/resources/increasing-education-and-otheropportunities-girls-and-women-water-sanitation-and-hygiene> (accessed on 20 May 2022).
- Egbinola, C. N., & Amanambu, A. C. (2015). Water supply, sanitation and hygiene education in secondary schools in Ibadan, Nigeria. *Bulletin of Geography*. <https://doi.org/10.1515/bog-2015-0023>
- Freeman, M.C.; Greene, L.E.; Dreibelbis, R.; Saboori, S.; Muga, R.; Brumback, B.; Rheingans, R. (2012). Assessing the impact of a school-based water treatment, hygiene and sanitation programme on pupil absence in Nyanza Province, Kenya: A cluster-randomized trial. *Trop. Med. Int. Health*, 17, 380–391. [CrossRef] [PubMed]
- Gammon, J., & Hunt, J. (2020). COVID-19 and hand hygiene: The vital importance of hand drying. *British Journal of Nursing*, 29(17), 1003–1006. <https://doi.org/10.12968/bjon.2020.29.17.1003>
- Greene, L. E., Freeman, M. C., Akoko, D., Saboori, S., Moe, C. & Rheingans, R. (2012). Impact of a school-based hygiene promotion and sanitation intervention on pupil hand contamination in Western Kenya: a cluster randomized trial. *The American Journal of Tropical Medicine and Hygiene* 87, 385–393. [CrossRef] [PubMed]
- Gomathi, S., Samitha, P. C., Kanaka Nishanth, B., Praveen Kumar, N., & Sireesha, K. (2018). A study to assess the knowledge and practices regarding WASH among school children in selected school, Mangalagiri, Guntur district, Andhra Pradesh. *International Journal Of Community Medicine And Public Health*, 6(1), 253. <https://doi.org/10.18203/2394-6040.ijcmph20185252>
- Houghton, F.; Gleeson, M.; Kelleher, K. (2003). The use of primary/national school absenteeism as a proxy retrospective child health status measure in an environmental pollution investigation. *Public Health*, 117, 417–423. [CrossRef]
- Hutton, G. & Haller, L. (2004). Evaluation of the Costs and Benefits of Water and Sanitation Improvements at

- the Global Level. Water, Sanitation, and Health, Protection of the Human Environment, World Health Organization.
- Ikogho, D.E. & Igbudu, U. (2013). Availability and Utilization; of Handwashing facilities among primary school pupils in Ughelli North L.G.A; of Delta State. *Academic Research International*. 4 (5)
- Jasper, C., Le, T.-T. & Bartram, J. (2012). Water and sanitation in schools: a systematic review of the health and educational outcomes. *International Journal of Environmental Research and Public Health* 9, 2772–2787.
- Javaeed, A., Tabbasum, T., Arif, U., Ghauri, S., Khan, S., & Wajid, Z. (2018). Knowledge, Attitude and Practice of Water, Sanitation and Hygiene of Students in Azad Kashmir. *Rawal Medical Journal*, 43(3), 536–539.
- Jordanova, T., Cronk, R., Obando, W., Medina, O., Kinoshita, R., & Bartram, J. (2015). Water, Sanitation, and Hygiene in Schools in Low Socio-Economic Regions in Nicaragua: A Cross-Sectional Survey. *International Journal of Environmental Research and Public Health*, 12(6), 6197–6217. <https://doi.org/10.3390/ijerph120606197>
- Kudavidanage, B. P., Gunasekara, T. D., & Hapuarachch, S. (2011). Knowledge, attitudes and practices on hand hygiene among ICU staff in Anuradhapura Teaching Hospital. *Medical Journal*; 1, 29-40. doi: <http://doi.org/10.4038/amj.v5i1.5781>
- Lamdin, D.J. (1996). Evidence of student attendance as an independent variable in education production functions. *J. Educ. Res.*, 89, 155–162. [CrossRef]
- Lee, M. S., Hong, S. J., and Kim, Y. T. (2015). “Hand-washing with soap and national handwashing projects in Korea: focus on the national hand-washing survey, 2006-2014,” *Epidemiology and Health*, vol. 37, Article ID e2015039. View at: Publisher Site | Google Scholar
- Lidonde, R., (2004). Scaling up school sanitation and hygiene promotion and gender concerns. In: *School Sanitation and Hygiene Education Symposium. The Way Forward: Construction is Not Enough!* In: *Proceedings of School Sanitation and Hygiene Education Symposium*, the Netherlands, Delft: WEDC, GWA. Available at: <http://www.irc.nl/page/13136>, DoA:13 December 2013.
- Lopez-Quintero, C., Neumark, Y and Freeman, P., (2009). Hand washing among school children in Bogota, Colombia. In: *Health American Journal of Public Health*, Vol. 99, No. 1, pp. 94-101.
- Mackinnon, E., Ayah, R., Taylor, R., Owor, M., Ssempebwa, J., Olago, D. i., Kubalako, R., Dia, T.A., Gaye, C., Campos, L.C., & Fottrell, E., (2019). 21<sup>ST</sup> Century Research in Urban WASH and Health in Sub-Sharan Africa; Methods and Outcomes in Transition. *International Journal of Environmental Health Research*. Vol 29, NO. 4, 457-478.
- McMahon, S., Caruso, B. A., Obure, A., Okumu, F. & Rheingans, R. D. (2011) Anal cleansing practices and faecal contamination: a preliminary investigation of behaviours and conditions in schools in rural Nyanza Province, Kenya. *Tropical Medicine & International Health* 16, 1536–1540.
- Migele, J.; Ombeki, S.; Ayalo, M.; Biggerstaff, M. (2007). Quick, R. Diarrhea prevention in a Kenyan school through the use of a simple safe water and hygiene intervention. *Am. J. Trop. Med. Hyg.*, 76, 351–353.
- Mohammed G, Nihar D, Bashayer A, Hiba I, Rasha A, Zaid A. (2016). Knowledge and Practice of Personal Hygiene among Primary School Students in Sharjah-UAE. *J Health Sci*.6(5):67-73.
- Mohd, G., & Malik, I. (2017). Sanitation and hygiene knowledge, attitude and practices in urban setting of Bangalore: Across sectional study. *Journal of Community Medicine and Health Education*. 7(4), 540 – 545.
- Montgomery, M.A.; Elimelech, M. (2007). Water and sanitation in developing countries: Including health in the equation. *Environ. Sci. Technol.*, 41, 17–24. [CrossRef] [PubMed]
- Mooijman, A. (2012). Water, Sanitation and Hygiene (WASH) in Schools. In *A Companion to the Child Friendly Schools Manual*; UNICEF: New York, NY, USA.
- Morgan, C., Bowling, M., Bartram, J., & Lyn Kayser, G. (2017). Water, sanitation, and hygiene in schools: Status and implications of low coverage in Ethiopia, Kenya, Mozambique, Rwanda, Uganda, and Zambia. *International Journal of Hygiene and Environmental Health*, 220(6), 950–959. <https://doi.org/10.1016/j.ijheh.2017.03.015>
- Mourad, K. A., Habumugisha, V., & Sule, B. F. (2019). Assessing Students’ Knowledge on WASH-Related Diseases. *International Journal of Environmental Research and Public Health*, 16(11), 2052. <https://doi.org/10.3390/ijerph16112052>
- National Population Commission (NPC), (2007). Population census and household data survey for Nigeria, Abuja: Federal Government of Nigeria.
- Ojima, Z.W., David, B. O., Temitope, D. A., Awe, O. O., & Iyanuoluwa, G. A. (2020). Prevalence of hypertension among rural adults and availability of management services in Abimbola Community, Ayedaade Local Government Area, Osun State, Nigeria. *Journal of Hypertension and Management*, 6(1), 10.23937/2474–13690/1510046.
- Olukanni, D. O. (2013). Assessment Of Wash Program In Public Secondary Schools In South-Western

- Nigeria. ARPN Journal of Engineering and Applied Sciences. 8(3), 7. ISSN 1819-6608
- Olukanni, D.O., Ducoste, J.J. & George, T.O. (2014). Creating Water, Sanitation and Hygiene(WASH) Program Awareness in Schools; A Tool towards the Success of Community WASH program. Proceedings of EDULEARN14 Conference, 7<sup>th</sup>-19<sup>th</sup> July, 2014. Barcelona, Spain. ISBN 978-84-6170-0557-3
- O'Reilly, C.E.; Freeman, M.C.; Ravani, M.; Migele, J.; Mwaki, A.; Ayalo, M.; Ombeki, S.;
- Hoekstra, R.M.; Quick, R. (2008). The impact of a school-based safe water and hygiene programme on knowledge and practices of students and their parents: Nyanza Province, western Kenya, 2006. *Epidemiol. Infect.*, 136, 80–91.
- Otto, E. (2022). Evaluation of Abattoir Practices in Ijebu Ode, Nigeria. *International Journal of Advances in Life Science and Technology*, 6(1), 12–23. <https://doi.org/10.18488/72.v6i1.3013>
- Pearson, J.; Mcphedran, K. (2008). A literature review of the non-health impacts of sanitation. *Waterlines*, 27, 48–61. [CrossRef]
- Prüss-Ustün, A., Bartram, J., Clasen, T., Colford, J. M., Cumming, O., Curtis, V., Bonjour, S., Dangour, A. D., De France, J. & Fewtrell, L. (2014). Burden of disease from inadequate water, sanitation and hygiene in low-and middle-income settings: a retrospective analysis of data from 145 countries. *Tropical Medicine & International Health* 19, 894–905.
- Prüss-Üstün, A.; Bos, R.; Gore, F.; Bartram, J. (2008). Others Safer Water, Better Health: Costs, Benefits and Sustainability of Interventions to Protect and Promote Health. Available online: <https://www.cabdirect.org/cabdirect/abstract/20083318172> (accessed on May 20, 2022).
- Prüss-Üstün, A. & Corvalán, C. (2006). Preventing Disease Through Healthy Environments. World Health Organization, Geneva.
- Ruan, F., Yang, T., Ma H. et al., (2011 ). “Risk factors for hand, foot, and mouth disease and herpangina and the preventive effect of hand-washing,” *Pediatrics*, vol. 127, no. 4, pp.e898–904,. View at: Publisher Site | Google Scholar
- Saboori, S., Mwaki, A., Porter, S., Okech, B., Freeman, M. & Rheingans, R. (2011). Sustaining school hand washing and water treatment programmes: lessons learned and to be learned. *Waterlines* 30, 298–311.
- Safo-Adu, G., & Hanson, R. (2019). Practices And Knowledge About Environmental Sanitation And Hygiene Among Urban Dwellers in Gomoa East District, Ghana. *European Journal of Earth And Environment*, 6(1), 11.
- Sheren, N. A. (2012). Knowledge and attitudes of pupils in some primary schools regarding personal hygiene in Erbil city, *Kufa Journal for Nursing Sciences*, vol. 2, no. 1, pp. 142–150,. View at: Google Scholar
- Shilunga, A. P. K., Amukugo, H. J., & Mitonga, K. H. (2018). Knowledge, attitudes and practices of primary schools learners on sanitation and hygiene practices. *International Journal Of Community Medicine And Public Health*, 5(8), 3197. <https://doi.org/10.18203/2394-6040.ijcmph20183051>
- Shrestha, M. V., Manandhar, N., & Joshi, S. K. (2018). Study on Knowledge and Practices of Water, Sanitation and Hygiene among Secondary School Students. *Journal of College of Medical Sciences Nepal*, 14(3), 160–165. <https://doi.org/10.3126/jcmsn.v14i3.21158>
- Sibiya, J., & Gumbo, J. (2013). Knowledge, Attitude and Practices (KAP) Survey on Water, Sanitation and Hygiene in Selected Schools in Vhembe District, Limpopo, South Africa. *International Journal of Environmental Research and Public Health*, 10(6), 2282–2295. <https://doi.org/10.3390/ijerph10062282>
- Sinharoy, S. S., Pittluck, R., & Clasen, T. (2019). Review of drivers and barriers of water and sanitation policies for urban informal settlements in low-income and middle-income countries. *Utilities Policy*, 60, 100957. <https://doi.org/10.1016/j.jup.2019.100957>
- Trinies, V.; Garn, J.; Chang, H.; Freeman, M. (2016). The Impact of a School-Based Water, Sanitation, and Hygiene Program on Absenteeism, Diarrhea, and Respiratory Infection: A Matched–Control Trial in Mali. *Am. J. Trop.Med. Hyg.*, 94, 1418–1425. [CrossRef] [PubMed]
- UNICEF, (2004). Life skills-based hygiene education. Available at: <http://www.wsp.org/Hygiene-Sanitation-Water-Toolkit/Resources/Readings/life%20skills%20Post%20ma.pdf>, DoA: 3 December 2013.
- UNICEF. (2012). Raising even more clean hands: Advancing learning, health and equity through WASH in schools. [https://www.unicef.org/wash/schools/files/Raising\\_Even\\_More\\_Clean\\_Hands\\_Web\\_17\\_October\\_2012.pdf](https://www.unicef.org/wash/schools/files/Raising_Even_More_Clean_Hands_Web_17_October_2012.pdf). Accessed 2 May 2019.
- UNICEF, (2013). Gender and water, sanitation and hygiene (WASH): Eastern and Southern Africa. Available at: [http://www.unicef.org/esaro/7310\\_Gender\\_and\\_WASH.html](http://www.unicef.org/esaro/7310_Gender_and_WASH.html), DoA: 12 November 2013.
- UNICEF, (2020). Evaluation of the UNICEF supported Federal Government of Nigeria Water, Sanitation and Hygiene Programme (2014-2017). Final

- Report. UK: International Organisation Development.
- UNICEF/IRC. (2007). Towards Effective Programming for WASH in Schools: A manual on scaling up programmes for water, sanitation and hygiene in schools. [http://www.unicef.org/wash/files/TP\\_48\\_WASH\\_Schools\\_07.pdf](http://www.unicef.org/wash/files/TP_48_WASH_Schools_07.pdf). Accessed 05/03/2012.
- United Nations Children's Fund. (1998). A Manual on School Sanitation and Hygiene. Water, Environment and Sanitation Technical Guidelines Series No. 5. New York, NY Available at [ww.irc.nl/](http://www.irc.nl/). Accessed 15/01/2012.
- United Nations Children's Fund. Water, Sanitation, and Hygiene Annual Report. [Accessed August 5, 2009]. Available at: [www.unicef.org/wash](http://www.unicef.org/wash)
- United Nations General Assembly (2015). Transforming Our World: the 2030 Agenda for Sustainable Development. United Nations, New York. <https://sustainabledevelopment.un.org/post2015/transformingourworld> (accessed 2 February 2017).
- Vally, H.; McMichael, C.; Doherty, C.; Li, X.; Guevarra, G.; Tobias, P. (2019). The impact of a school-based water, sanitation and hygiene intervention on knowledge, practices, and diarrhoea rates in the Philippines. *Int. J. Environ. Res. Public Health*, 16, 4056.[CrossRef]
- Vivas A, Gelaye B, Aboset N, Kumie A, Berhane Y, Williams MA. (2010). Knowledge, Attitudes, and Practices (KAP) of Hygiene among School Children in Angolela, Ethiopia. *J Prev Med Hyg.*;51(2): 73–9. (<https://www.ncbi.nlm.nih.gov/pubmed/21155409>).
- Vivas, A., Gelaye, B., Aboset, N., Kumie, A., Berhane, Y., & Williams, M. A. (2011). Knowledge, Attitudes, and Practices (KAP) of Hygiene among School Children in Angolela, Ethiopia. 16.
- Wada, O. Z., & Oloruntoba, E. O. (2021). Safe reopening of schools during COVID-19: An evaluation of handwash facilities and students' hand hygiene knowledge and practices. *European Journal of Environment and Public Health*, 5(2), em0072. <https://doi.org/10.21601/ejeph/9704>
- Wada, O. Z., Oloruntoba, E. O., Adejumo, M., & Aluko, O. O. (2020). Classification of sanitation services and students' sanitation practices among schools in Lagos, Nigeria. *Environment and Natural Resources Research*. <https://doi.org/10.5539/enrr.v10n3p55>
- Wada, O. Z., Olawade, D. B., Oladeji, E. O., Amusa, A. O., & Oloruntoba, E. O. (2022). School water, sanitation, and hygiene inequalities: A bane of sustainable development goal six in Nigeria. *Canadian Journal of Public Health*. <https://doi.org/10.17269/s41997-022-00633-9>
- Weaver, E. R. N., Agius, P. A., Veale, H., Dorning, K., Hlang, T. T., Aung, P. P., Fowkes, F. J. I., & Hellard, M. E. (2016). Water, Sanitation, and Hygiene Facilities and Hygiene Practices Associated with Diarrhea and Vomiting in Monastic Schools, Myanmar. *The American Journal of Tropical Medicine and Hygiene*, 95(2), 278–287. <https://doi.org/10.4269/ajtmh.15-0290>
- WHO, (1997). Primary school physical environment and health. WHO Global School Health Initiative. In: *WHO Information Series on School Health*, Document Two. Available at: [http://whqlibdoc.who.int/hq/1997/WHO\\_SCHOOL\\_97.2.pdf](http://whqlibdoc.who.int/hq/1997/WHO_SCHOOL_97.2.pdf), DoA: 31 January 2014 .
- WHO, (2004). Guidelines for drinking-water quality, 3<sup>rd</sup> ed. Recommendations, Vol. 1, Geneva:WHO.
- World Bank Group. (2017). Reducing inequalities in water supply, sanitation, and hygiene in the era of the sustainable development goals: Synthesis Report of the WASH Poverty Diagnostic Initiative. <https://openknowledge.worldbank.org/handle/10986/27831>
- World health organization (2015). Nigeria: Demographic and Economic Estimates, GLAAS, un-Water Global Analysis and Assessment of Sanitation and Drinking Water;WHO/FWC/WSH/1.579.
- WHO/UNICEF. (2004). Meeting the MDG Drinking Water and Sanitation Target: A Mid-Term Assessment of Progress; Joint Monitoring Programme for Water Supply and Sanitation: Geneva, Switzerland,.
- WHO/UNICEF. Progress on Sanitation and Drinking Water (2015). Update and MDG Assessment; World Health Organization: Geneva, Switzerland, 2015.
- WHO/UNICEF/WSSCC, (2004). Global water supply and sanitation assessment 2000 report, Geneva: World Health Organization/United Nations Children's Fund Water Supply and Sanitation Collaborative Council.
- Zhang, D., Li, Z. Zhang W. et al., (2016). Hand-washing: the main strategy for avoiding hand, foot and mouth disease, *International Journal of Environmental Research and Public Health*, vol. 13, no. 6, p. 610,. View at: [Publisher Site | Google Scholar](https://pubmed.ncbi.nlm.nih.gov/26711111/)
- Zomerplaag, J. and Mooijman, A., (2005). Child-friendly hygiene and sanitation facilities in schools: indispensable to effective hygiene education. In: *Technical Paper Series*, No. 47, New York: IRC International Water and Sanitation Centre, Delft and United Nations Children's Fund, pp 1-36.