Research Article

Examining Water Use and Sanitation Practices in Rural Schools of Chegutu District, Mashonaland West Province, Zimbabwe

Ezra Chipatiso[1]

1. Faculty of Science Education, Department of Geography, Bindura University of Science Education, Zimbabwe

Access to water, sanitation, and hygiene (WASH) in schools is integral to the well-being of children and their right to quality education. The study examines water use and sanitation practices in selected rural secondary schools in Wards 11 and 29 of Chegutu District in Zimbabwe. Data were collected using questionnaires, interviews, and published data. A total of 81 questionnaires investigating students' hygiene practices, as well as their perceptions of service delivery, were issued to students. The data collected were analyzed using tables, graphs, pie charts, and descriptive statistics. The study concluded that the present WASH practices in many of the schools were not adequate. The reasons for low water and sanitation coverage included a lack of a comprehensive policy and government will to effectively manage water and sanitation services, which to some extent affected the capacity of local authorities and schools to manage water and sanitation supply services in past years. Despite support from the community, civil society, and government, the impact of their contributions remains significant though insufficient. Inadequate capital to support and maintain WASH standards in schools, and a lack of monitoring systems, remain key challenges. Further support is required to meet international recommendations for healthy and gender-equitable schools.

Corresponding author: Ezra Chipatiso, echipatiso@gmail.com

1. Introduction

Water, sanitation, and hygiene (WASH) in schools contribute to better health and educational outcomes among students. Water, sanitation, and health are therefore very critical not only as a human right but

 doi.org/10.32388/W5DKO4

also as a step toward national development and poverty reduction. The World Health Organization has set a target of halving the proportion of people without safe access to improved water or sanitation by 2015 (UN, 2003).

The impact of WASH in schools is multi-faceted as it makes a crosscutting contribution to the achievement of the Sustainable Development Goals (SDGs) by impacting universal primary education, gender equality, and environmental sustainability. Although the world has progressed in the area of water and sanitation, more than 2 billion people still live without access to sanitation facilities, and some are unable to practice basic hygiene (UN World Water Development Report, 2023).

In developing countries, there is mounting pressure from international agencies for schools to institute Water, Sanitation, and Hygiene (WASH) facilities to reduce or eliminate waterborne diseases. Inadequate water supply and sanitation are largely responsible for the high levels of waterborne diseases in Southern Africa, where the majority of people live in rural areas and do not have appropriate sanitation systems (Hirji, 2001; Hirji, 2002). Not surprisingly, infectious waterborne diseases, such as dysentery, cholera, and hepatitis, are common in places where water is scarce. Providing drinking water free of disease-causing agents is the primary goal of all water supply systems (Faggle and Rabie, 1992). The inability of vulnerable populations to access safe water and basic sanitation has seen frequent diarrheal and cholera outbreaks in Zimbabwe. The 2008 cholera outbreak was unprecedented, affecting urban and rural areas in all ten provinces. Results from the 2009 Multiple Indicator Monitoring Survey (MIMS) indicate that the proportion of people in rural areas with access to safe drinking water declined from 70% in 1999 to 61% in 2009, due to unfavorable economic conditions in the country (Sisimayi and Masuku, 2010). The majority of the cholera cases (68.6%) were reported from the provinces of Mashonaland West, Harare, Manicaland, and Masvingo (Waddington et al., 2009). Poor water and sanitation provisions in areas of Chegutu District (Mashonaland West Province) gave the outbreak a distinct rural preponderance at its outset. Access to health services was a major challenge and one of the major reasons for the prolonged nature of the outbreak.

The programme component of WASH in schools supports countries in providing access to safe water and adequate sanitation for all in order to improve the health and well-being of the students, staff, as well as the community. WASH provides guidance and tools for the sustainability of water supply and sanitation facilities with a focus on: operation and maintenance, community management, participatory health and hygiene education transformation, as well as drinking water surveillance (WHO, 2012). WASH also assists countries in resource mobilization for the development of the water supply and sanitation sector. Since

1990, almost 2 billion people globally have gained access to improved sanitation, and 2.3 billion people have gained access to drinking water from improved sources (WHO Report, 2014). The report also highlights a narrowing disparity in access to cleaner water and better sanitation between rural and urban schools.

Southern African primary schools in rural areas are poor, linked to the high incidence of poverty, poor hygiene, and sanitation practices (Dube and January, 2011). A study conducted in six Sub-Saharan African countries comprising Ethiopia, Kenya, Mozambique, Rwanda, Uganda, and Zambia found that 1% of rural schools in Ethiopia and Mozambique to 23% of rural schools in Rwanda had improved water sources, improved sanitation, and water and soap on school premises. Fewer than 23% of rural schools in the six countries met the WHO's recommended student-latrine ratios for boys and girls (Morgan et al., 2017). It is important to note that apart from the family, schools are important and stimulating learning environments for children and have the potential to significantly alter the behavior patterns of students, leading to improved hygiene practices (UNICEF, 2009). According to Fewtrell et al. (2005), these hygiene behaviors include proper hand washing, regular bathing and laundering, safe disposal of waste, and proper use of toilets, which will help in enhancing effective learning, attracting large student enrollment in schools, and ensuring a reduced burden of diseases. Very few studies have been carried out, particularly in rural secondary schools, to assess sanitation practices carried out in these schools. It is against this backdrop that this study sought to establish the extent of water use and sanitation practices in ensuring sustainable implementation of hygiene practices, particularly in resettlement areas.

Results derived from the study provide a snapshot of the current status of water use and sanitation practices in rural schools of Chegutu District based on available local data and from research studies. This research seeks primarily to support raising the profile of WASH in schools by providing the current available data and a baseline from which progress in the sector may be tracked. The results from the study would be used by the Chegutu District Public Health Department and other related organisations that are involved in the prevention of diarrheal diseases to come up with appropriate diarrheal prevention interventions. The findings of the research help schools to allocate financial resources and time to areas of water use and sanitation practices, hence improving and reinforcing hygienic conditions. The study provides information for the development of better policy regarding implementation strategies for rural schools by the Government of Zimbabwe from the district to the national level.

2. Literature Background: Overview on Water and Sanitation

Human health depends on the quality of our immediate surroundings, in which water and sanitation services and their management have a key role. In September 2000, the United Nations General Assembly adopted a number of Millennium Development Goals (MDGs) that challenged the global community to reduce poverty and increase the health and well-being of all peoples. In September 2002, the World Summit on Sustainable Development in Johannesburg reaffirmed these goals and added specific targets on sanitation and hygiene (UN, 2003). By including sanitation and hygiene in the MDGs, the global community has acknowledged the importance of promoting sanitation and hygiene as development interventions and has set a series of goals and targets. These are to halve by 2015 the proportion of people without access to basic sanitation. Additionally, the MDGs also seek to improve sanitation in public institutions, as well as to strengthen existing information networks (UN, 2003).

However, the global statistics on sanitation hide the actual situation in some developing regions. According to UNICEF (2013), developing regions have an average coverage of 50%, that is, only one out of two people has access to some sort of improved sanitation facility. The regions presenting the lowest coverage are Sub-Saharan Africa (37%), Southern Asia (38%), and Eastern Asia (45%). Since the Global Joint Call to Action for WASH in Schools, "Raising Clean Hands," was published in 2010, the focus on school-based water, sanitation, and hygiene has increased but still lags behind targets for global and regional coverage, which is improving, but much too slowly (UNICEF, 2012b).

2.1. Water Supply and Sanitation Programmes in Developed Countries

Improved sanitation practices that produce the desired results have been studied in the developed world. WHO (2009) notes that, in the developed world, only the sanitation technologies that operate in an environmentally responsible manner are chosen. The implementation of eco-sanitation (eco-san) to manage excreta has been realized in Romania. Following the implementation of the eco-san toilet in Romania in 2003, aimed at improving school sanitation facilities, Ukraine adapted the eco-san toilet design to Ukrainian building standards in 2004 (Ukraine Country Report, 2013). The toilet consists of three double vault urine-diverting toilets, three waterless urinals, and two urine tanks of $2m^3$ each. Urine and faeces are properly separated, collected, and stored. After storage of the urine for six months and composting of the faeces for two years, it can be used as a fertilizer (Compost Toilets Practical Action Technical Brief, 2007). This new technology has been known as a good alternative to the traditional pit latrines for rural schools because it does not result in groundwater contamination and produces good

fertilizer. The success of the sanitation programmes was attributed to cooperation from the stakeholders, who made their contributions on what they expected to be done, with schools committing to conserving the environment and sticking to the laid-down school policies.

2.2. Legal Framework for Water and Sanitation in Schools in Zimbabwe

The 1976 Education Act, amended in 2006, made provision for WASH in schools among other requirements. It is a requirement that every school shall have at least two blocks of toilets, separate for girls and boys, and the number of toilets is further determined by enrolment in line with Ministry of Health and Child Welfare standards (MoHCW, 2011). Before a school is registered by the Ministry of Education, it is Government policy that officials from MoHCW inspect and certify as satisfactory the sanitary conditions at that school (GoZ, 2013). The national standards require an approved toilet facility for schools, that is, ventilated improved pits (VIP) for rural schools without a reticulated water supply; or water-borne sanitation where a reticulated water system is available, usually in urban areas. The ratio of pupils to toilets is 25:1 for boys and 20:1 for girls as a national policy (MoHCW, 2011). National standards on WASH in schools are specified in the Minimum Functionality School Standards designed by the Ministry of Primary and Secondary Education (Appendix A), while international standards for WASH in schools are specified by UNICEF Guidelines (Appendix B).

2.1.1. Impact of Inadequate WASH Facilities in Rural Schools

Although it is a worldwide trend to prioritise the provision of good quality drinking water over good sanitation, experience has shown that good health requires three essential components, that is, water, sanitation, and hygiene (Water Aid, 2012). Inadequate water and sanitation undermine immune functioning and increase vulnerability to infections. This is particularly significant given the prevalence of AIDS in Africa. Inadequate water and sanitation services in schools frequently result in the loss of privacy and dignity and increase risks to children's safety when toilets are placed at a distance from the schools' premises (Enviro Loo, 2010). This is particularly true for girls when it comes to menstrual hygiene management (MHM). Poor sanitation and unusable facilities in many schools may contribute to absenteeism and an uncongenial learning environment and are cited as important reasons why many girls drop out of school (UNICEF, 2002). Further studies can also look into the impact of sanitation aspects on girls' participation and attendance in schools since literature is still lacking.

Poorly designed sanitation facilities or inappropriate locations may lead to the migration of waste matter and contamination of local water supplies, putting the school and surrounding community at risk (MoHCW, 2011). Groundwater pollution problems associated with on-site sanitation systems have given rise to concern in terms of their potential negative impact on the environment in rural schools. In areas where the water table is high and pollution problems are very real, VIP latrines may not be considered (Enviro Loo, 2010), especially for schools in the Eastern and Western Cape in South Africa, and part of the Eastern Highlands of Zimbabwe where the water table is relatively high.

According to WHO (2009), cholera, dysentery, and trachoma are diseases spread by a combination of poor sanitation and poor hygiene practices associated with water scarcity and poor water quality, as well as a lack of education and understanding of how easily the infection can spread in public institutions and between people. Between August 2008 and May 2009, Zimbabwe suffered the most severe cholera epidemic ever recorded in Africa, resulting in 98,440 cases and 4,130 deaths (CARE, 2012). In response to the cholera crisis Zimbabwe has experienced, CARE International UK has implemented a successful project in Bikita district, one of the areas worst affected by cholera.

With funding from the Isle of Man Overseas Aid Committee, technical assistance from CARE, and the active involvement of government departments and local authorities, a project has been implemented to improve the WASH situation in schools and surrounding rural communities in Bikita (CARE, 2012). Alongside improving education around WASH issues, the project also saw the construction of latrines, handwashing facilities, and water points for a community in dire need. Affordable services should be promoted to ensure the broadest coverage within the shortest time frame. As a minimum basic requirement, sanitation services and potable water within 500m of a school should be provided and upgraded when feasible (UNICEF, 2011; MSS, 2013). In addition, good hygiene practices such as handwashing, safe water storage, and solid waste management should be promoted through the implementation of appropriate awareness campaigns. The research focuses on how such practices are being achieved in rural schools and the challenges being faced in service delivery.

Lack of facilities and poor hygiene affect both girls and boys, although poor sanitation conditions at schools have a stronger negative impact on girls. All girls should have access to safe, clean, separate, and private sanitation facilities in their schools (WSP, 2004). If there are no latrines and hand-washing facilities at school, or if they are in bad repair, many children would rather not attend school than use the alternatives (WHO, 2008). It is particularly important that girls who are old enough to menstruate have adequate facilities at school that are separate from those of boys. According to Sayed (2013), if facilities

are not separate, students, especially girls, may miss school monthly, finding it difficult to catch up, and ultimately being more likely to drop out of school altogether. A study conducted by Morgan et al. (2017) notes that fewer than 20% of the rural schools were observed to have at least four to five recommended menstrual hygiene services (separate sex latrines with doors and locks, water for use, and waste bin).

3. Methodology

3.1. Study Area

The study was conducted in Ward 11 and 29 of Chegutu District, Mashonaland West Province in Zimbabwe. The area falls under Agro-ecological Region 2B, where rainfall ranges from 750 to 1000 mm per year. The study area, which is located in the Selous resettlement area, was considered for the purpose of the study. Four secondary schools were selected, namely; Chengeta Secondary School, Naemoor Secondary School, Benbank Senior School, and Saruwe Secondary School (Figure 3.1). The schools were coded A, B, C, and D respectively, for confidentiality. The schools are dispersed throughout the study site area as shown in Figure 1.

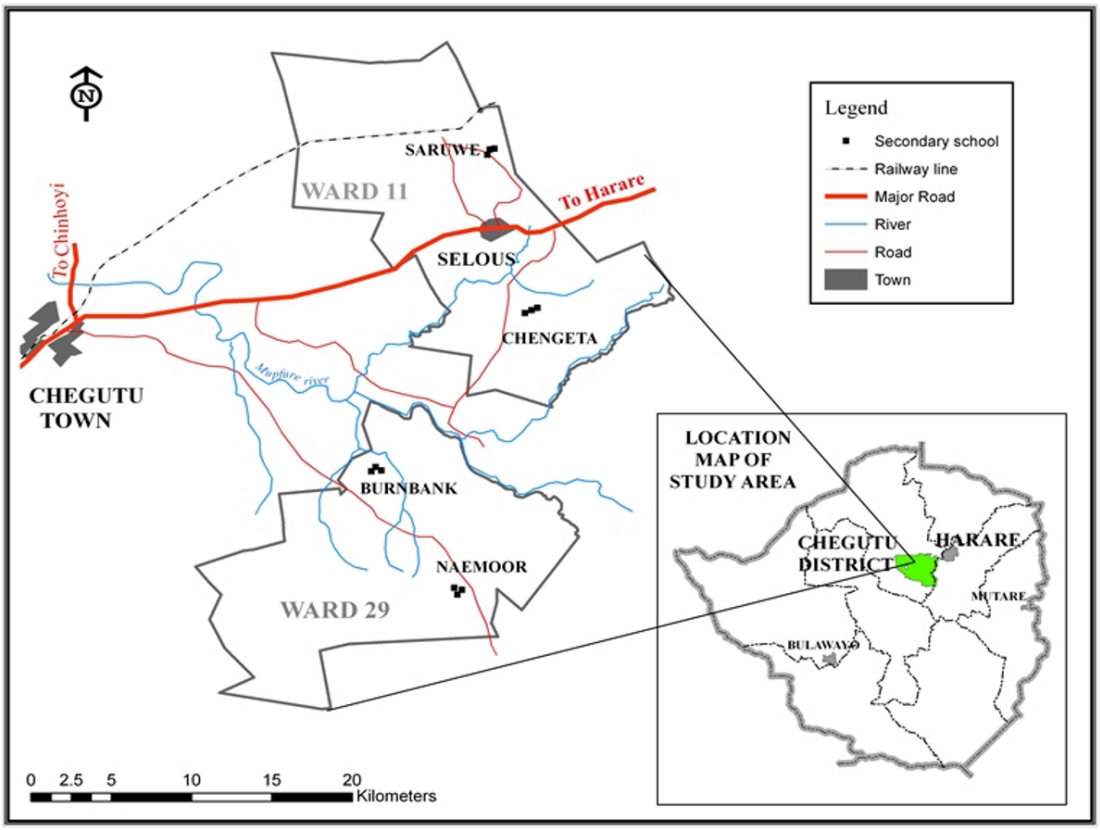

Figure 1. Map showing the location of the study area (Arc GIS Version 10.1)

3.2. Data Collection

Descriptive research was used to obtain information concerning the current status of WASH in order to describe what exists with respect to variables or conditions in school WASH. Both qualitative and quantitative (descriptive statistics) techniques were employed in this study. Although each method collects a specific type of data, the methods are complementary; one method confirms, verifies, and reinforces the findings obtained by the others (Mills et al., 2010).

Data collection techniques used in this study were self-administered questionnaires and interviews. The adoption of these techniques was meant to have these methods augment each other in soliciting data from different units of analysis. Combining these methods also facilitates verification of data.

3.2.1. Questionnaires

Questionnaires were distributed to students since they are the most affected by water supply and sanitary conditions in public schools. Questionnaires were used to collect data from respondents with cognizance

that the data would be easy to convert into figures for comparative analysis (Gray, 2009). Both closed and open-ended questions were used for respondents to express themselves where necessary. The questionnaires with simple-tick responses administered to students included a 5-point Likert scale seeking information on water, sanitation, and hygiene-related issues.

3.2.2. Interviews

Interview guides were used to solicit information from School Health Masters, School Development Committee (SDC) Chairpersons, Rural District Council, District Education Office, Ministry of Health (Chegutu District Hospital), and UNICEF coordinator in the district. The role of the school health master in the survey was to examine the consistency of the students' views concerning the state of WASH in their schools. The methodology was preferred for its strength in giving detailed explanations of a phenomenon (Babbie, 2008) and, in this case, an explanation of the progress of WASH in schools, challenges, and future plans. The above-mentioned authorities were interviewed to assess their contribution towards the attainment of WASH objectives in the district, including future plans.

3.3. Secondary data

Secondary data is data already collected for other purposes. The secondary data sources included WASH reading material, School Development Plan (SDP), records of enrolment from 2016 to 2022, Health education schedules, school WASH campaign schedules, as well as internet sources. This method was favourable for its lower costs compared to other methods that required more resources (Gray, 2009).

3.4. Sampling

Sampling is the process of taking any portion of the population as representative of that population (Otero, 1999). For this research, combinations of sampling techniques were used to gather data. These were purposive sampling and stratified-systematic random sampling. Purposive sampling was used to select schools in the geographical area under study. Schools from Ward 11 and 29 of Chegutu East Constituency were consciously and purposively selected to be representative of secondary schools in resettlement areas. Stratified-systematic random sampling was used to select students. The students were aggregated by gender (stratified sampling), and systematic sampling was used to select every second student using school registers. Stratified sampling permits the researcher to identify sub-groups within a population and create a sample that mirrors these sub-groups by randomly choosing subjects from each stratum (Babbie, 2008).

3.5. Study Sample size

According to Otero (1999), a sample is a set of data collected and selected from a statistical population by a defined procedure. Generally, a sample is a subset of the population. The study's sample frame comprised 81 students (40%) from a target population of 201 students. In all statistical analyses, the objective is to minimise error and maximise the true measure. Gay (1987) suggests 10% of large populations and 20% of small populations as minimum population samples. The sample that was chosen constituted 40% of the form four student populations. The population sample was set above the minimum of 20% suggested by Gay to minimise error. According to Gray (2009), as the sample size increases, the random extraneous errors tend to cancel each other out, leaving a better picture of the true measure of the population. The survey was carried out in the winter season, between the months of October and November 2022.

3.6. Data analysis

Data collected were compiled and analysed using descriptive statistics (graphs and tables). WASH components in schools were assessed using the Minimum Functionality School Standards designed by the Ministry of Primary and Secondary Education to promote WASH in schools, and UNICEF guidelines. The Minimum Functionality School Standards document draws information from various Government and Ministry instruments. Both documents set the basic measures or benchmarks of expected performance and achievement for effective teaching, learning, and institutional management of schools. The documents also specify expected standards for WASH in schools. The student-latrine ratios were also used to assess the adequacy of sanitation facilities in schools. It was obtained by dividing the number of students by the number of observed functional latrines per school.

4. Results and Discussion

Data collected from four school sites in Chegutu District were presented and analyzed. The researcher used the findings that had been reviewed in the literature section and those from the field survey. General characteristics of staff and student populations were also identified. Heads of schools and students responded to self-administered questionnaires. To assess water use and sanitation practices by students, a 5-point Likert scale (strongly agree, agree, neutral, disagree, and strongly disagree) was used to determine the level of agreement. Students were asked for their perceptions pertaining to services delivered to them. The schools from which data were acquired were coded as A, B, C, and D following the order of visits from day one. Coding was spurred by the idea of maintaining the anonymity of the

respondents. Health masters (one per school) and SDC chairpersons were interviewed on the assumption that some of them would not respond well to self-administered questionnaires and that the researcher required qualitative data from people directly involved in school WASH programmes. The findings revealed the actual sanitation practices in rural secondary schools of Chegutu District.

4.1. General Characteristics of Students and Staff Population

This section identifies populations of male and female staff, as well as trends in student enrolment statistics of schools A, B, C, and D, from 2017 to 2022. Figure 2 below shows staff categories in schools A, B, C, and D.

4.2. Staff Characteristics by Gender

The study revealed that all schools were headed by male acting heads, with 6 to 11 years of work experience. All school heads were holders of a Bachelor of Education degree in their subject area. From the schools visited, the number of male teachers ranged from 2 to 6, while females ranged from 3 to 5. On average, there were 4 male and 4 female teachers per school. Equal average numbers entail the need for equity in terms of water supply and sanitation to meet the needs of both male and female teachers. Research findings (Figure 2) show that there were more female (71%) than male (29%) teachers in school D. School C had equal numbers of male (50%) and female (50%) teachers. Schools A and B had more male than female teachers. Figure 2 below shows staff population classified by gender. The research revealed that both staff and students used the same water source. Sanitation facilities for staff were adequate, ranging from two to four toilets. The research showed that hand-washing facilities for teachers and washing water for female staff are still lacking in schools. The results showed that school D had more female staff, more than double the male teacher population. This condition implies that more washing water for female staff and the need for privacy are required.

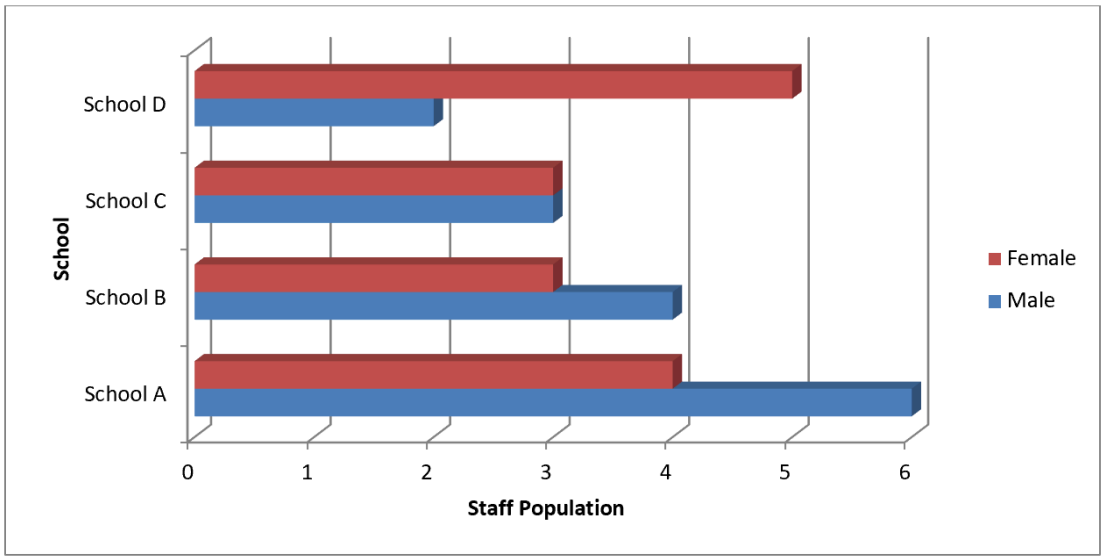

Figure 2. Staff Population by gender (Source: Research Findings)

4.3. School Enrolment Statistics from 2017 to 2022

Information on the student population was extracted from school registers. From 2017 to 2022, enrolment for schools A, B, C, and D increased, although school A showed a sharp increase from 130 to 200 students. The head of School A explained that the increase in enrolment was due to the presence of good sanitary facilities as well as classroom blocks. The other heads of schools indicated that the increase in student population was due to the migration of students from other schools. The increase in enrolment for schools C and D from 2017 to 2022 was due to the low fee structure ranging between US$20 and US$25 or the local currency equivalence (Zimbabwean dollars). The head of school C added that local people could not afford high fees; therefore, their children attended schools with affordable fees. Moreover, the student population for school A continued to rise up to 2022. The reason cited was that school A had a larger sphere of influence than all other schools, and the furthest distance travelled by students was close to 15 kilometers. School A has been characterized by good pass rates; as a result, new students have visited the school often. The reason for the drop in enrolment for school B was unclear; the head revealed that the school experienced quite significant numbers of dropouts from 2020 to 2022. Figure 3 shows a summary of student enrolment statistics from 2017 to 2022.

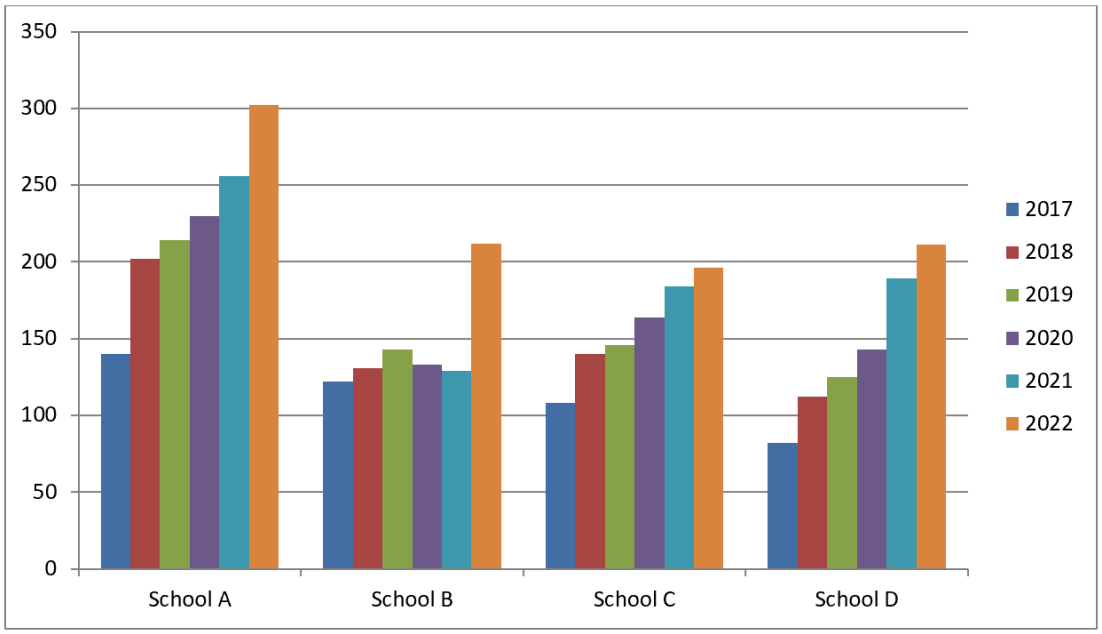

Figure 3. School enrolment statistics from 2017 to 2022. (Source: Research Findings)

The trends in figure 3 revealed that enrolment for schools A, C, and D was increasing each year from 2017 to 2022, except for school B, when it declined in 2020 and 2021, then rose sharply in 2022. Generally, enrolment for schools A, B, C, and D was higher in 2022 than in 2017 by 116%, 74%, 81%, and 157%, respectively, which suggests that the enrolment rate was on the rise.

4.4. Water Use in Schools

Among many factors that influence the quality of service delivery, water availability is one of them (UN, 2011). In order to assess the regularity of the supply of water in the schools under study, it was important to first identify the common water sources used. A student questionnaire was used to identify the main source of water in the schools. It was found that the majority of the students in all four schools are supplied with borehole water. It was noted that these sources of water do not go through any form of treatment before use, and this does not make it totally safe for drinking. Even though the majority of the students indicated that the water was safe for drinking (60%) as shown in figure 4, 34% disagreed. From the student assessment in school D, 96% of respondents said borehole water usually contained some visible suspended substances.

Supporting evidence through observations by the researcher revealed that suspended substances and rust were seen in borehole water during the morning when people start to fetch water. The school health

master from school D confirmed that students had raised concerns about the quality of water but had not investigated the issue to verify the sentiments. Students from school C also reported that the water had an unpleasant taste. To determine the significance of the responses, the researcher tested the water, and it had an unpleasant taste. The school health master, the head, and the SDC chairman also said the same thing and emphasised the need for a water test to ensure microbiological safety. However, borehole and tap water are considered acceptable provided they have undergone necessary treatment that meets national standards (UNICEF, 2014). Instead, microbial water tests by trained individuals at schools could provide more accurate information on water quality. While boreholes for schools C and D provided a needed source of potable water 4 and 5 years ago, respectively, they have not been maintained by experts, and no inspections have been done by Government health officials for the past 5 years. All heads of schools reported that neither Ward health officials nor the Chegutu Rural District Council have visited schools on WASH-related issues except for other reasons. This shows a lack of commitment on the part of the Ministry of Health and the Rural District Council despite the fact that the results from key informants interviewed indicated a lack of resources and overdependence on donor aid as the main challenges being faced by these institutions. However, there has been, to a larger extent, the intervention of the private sector and community in ensuring the availability of water in all schools. Increased resources or alternative actors for water quality monitoring should be addressed.

The majority of the students from school C indicated water scarcity as the main challenge in the school, especially when the borehole is not functioning. To handle such challenges, students bring their drinking water from home, while a few depend on water sold in school. The school in this category dedicates a day during the week to fetch water from boreholes on nearby farms and store it in large drums. Since the water supplied is not treated before storage, the majority of the students bring their drinking water from home. Figure 4 below shows the results on water-related matters from the students. It could be inferred that all schools had their water sources functional, as indicated by 77% of students. Despite similarities in terms of pumping out water, the states of boreholes were different due to age. Aging water systems are vulnerable to continued breakdown, burst pipes, and leaks, leading to contamination problems (DWAF, 2003b). Observations showed that boreholes in schools A and B were newer than those of other schools. The heads of schools and SDC chairmen also indicated that donor intervention and community involvement provided boreholes for schools A and B, respectively. The boreholes for these schools were replaced after a series of breakdowns due to the use of old equipment. In addition, students from these schools did not mention any problems related to water quality other than long queues and long waiting

times at water points during break and lunchtime. Figure 4 below shows students' responses on the provision of water services as well as hygiene practices by students.

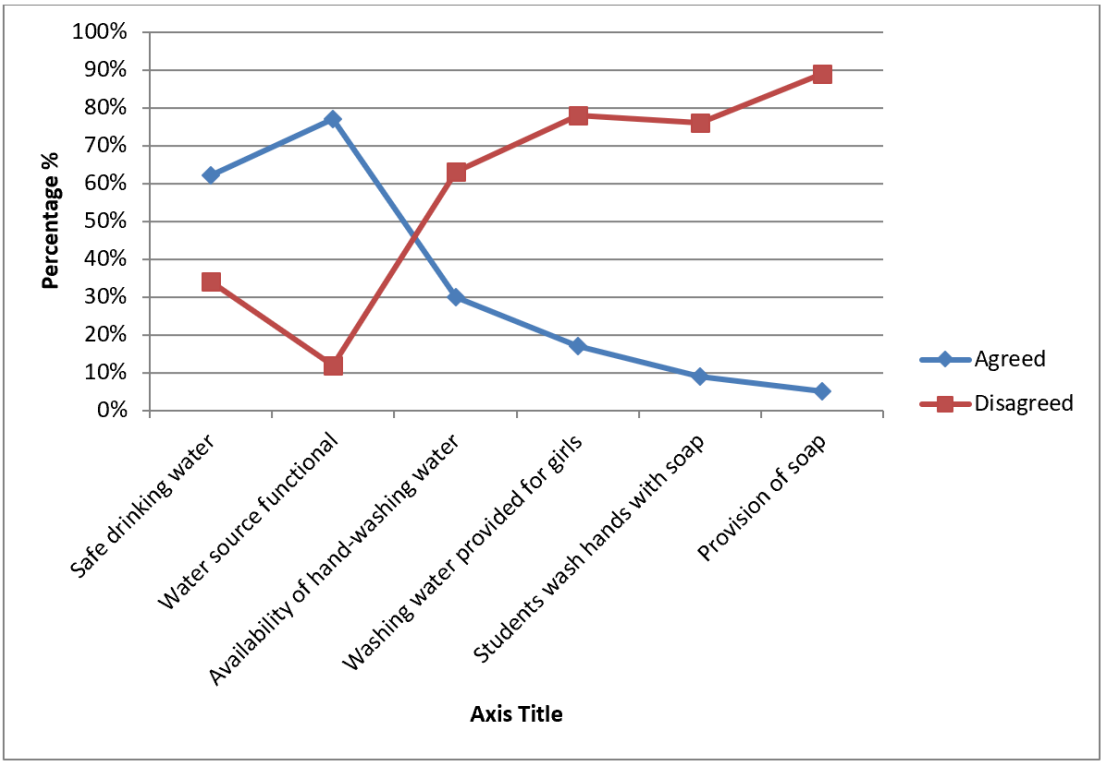

Figure 4. Students' responses on water use in schools (Source: Research findings)

The results showed a lack of investment in hand-washing facilities and soap among the schools studied. The majority of students disagreed on the provision of soap (89%) and the availability of hand-washing water (63%). Observations also revealed that there were neither hand-washing facilities nor soap during school visits. Only a few students indicated bringing soap for hand-washing to school. The majority of students (76%) indicated that they do not wash their hands with soap; this is a clear indication of a lack of commitment in terms of investment in school WASH components. The majority of students did not agree on the provision of washing water for girls (78%), while 17% agreed. Students also revealed that the lack of hand-washing facilities and soap made it difficult for them to practice hygiene at school. Washing water for girls was only provided in school B; water was stored in open drums, and a small bucket was used to fetch water. Open water is prone to contamination, and its use poses a potential health risk. According to MoHCW (2009), water quality is an important consideration in rating the performance of a water supply system. The quality of water required for either personal or domestic use must be safe, that

doi.org/10.32388/W5DKO4

is, free from micro-organisms and chemical substances that constitute a threat to a person's health. The need for clean, protected water for use by students should be considered seriously. Findings support the view that girls who are menstruating face numerous challenges when attending school, and these include a lack of appropriate disposal facilities for sanitary pads, inadequate water supply, lack of sufficient toilets, and little provision for hand washing (UNICEF, 2012).

4.5. Frequency of Water Use

Students were asked about the frequency of water use during school hours. Figure 5 below shows the frequency of water use by male and female students per day. The results showed that the frequency ranged from "once a day" to "four times a day." The majority of male students (40%) use the water source twice a day, followed by 29% using the water source three times a day. Sixteen percent and 14% of male students use the water source once a day and four times a day, respectively. The study also revealed that the majority of female students (52%) use the water source three times a day, followed by a significant number of 34% using the water source four times a day. From the study findings, it is noted that small percentages of female students use the water source once (5%) and twice (9%) a day. The results reveal that female students use the water source more frequently than male students; hence, renewed investments in school WASH need to consider the consistent provision of water for girls and all students in the long run. Water access and good latrine conditions at school were found to be important aspects of the school environment for menstruating girls in Tanzania, Kenya, and South Asia (Blanton et al., 2007). However, a recent study in Malawi found no impact of school WASH conditions on girls' absenteeism (RWSSI Project Briefs, 2014). A number of qualitative studies (UK Aid, 2014; UNICEF, 2011; WHO, 2014) provide reports of the adverse impact poor WASH conditions have on girls' privacy and comfort at school, and a lack of menstrual hygiene management (MHM) resources may affect girls' participation in school activities due to fear of leakage. Current findings reveal that insufficient resources are available for menstruating girls in rural schools of developing countries; however, reviews indicate insufficient research to clarify the impact of improved MHM on school or health parameters. Generally, there is a lack of privacy and places to wash or dry (reusable) sanitary materials, and a lack of water for washing.

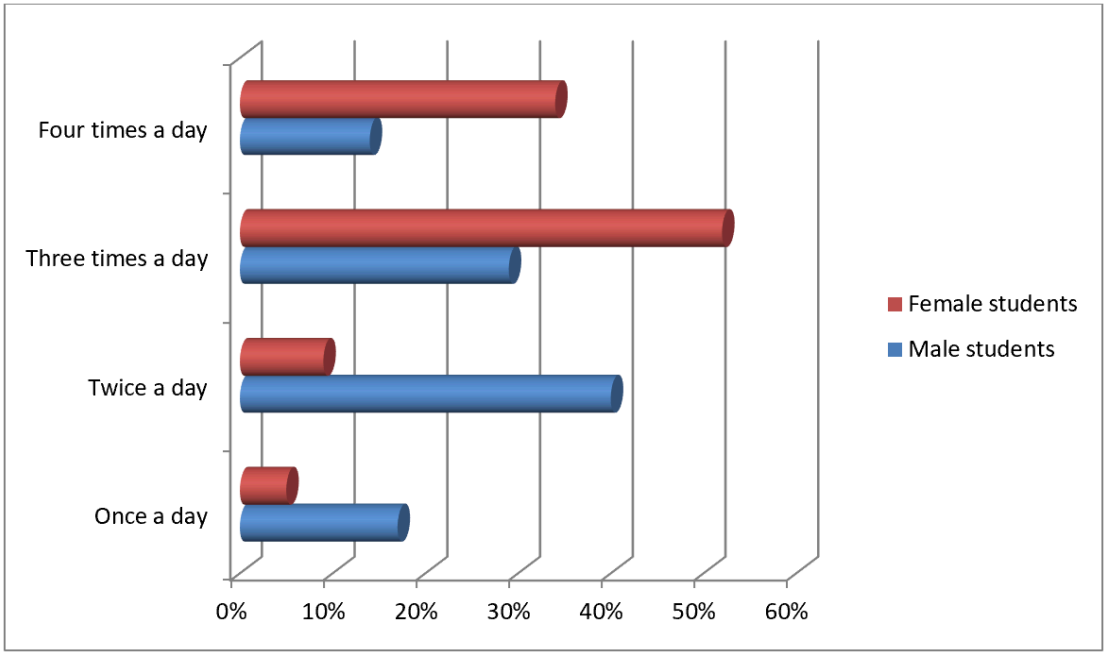

Figure 5. Water use by Male and Female Students per day. (Source: Research findings)

4.6. Sanitation Practices in Rural Schools

In the study area, all schools had improved functional sanitation structures (VIP toilets) on the premises. School directors reported that the facilities had waterless latrines, and all were functional. From Figure 6, the majority of the students (67%) reported a bad odour in the toilets, while 33% disagreed. Observations revealed that the toilets in schools C and D had a "bad smell" compared with the toilets in schools A and B, which were in good condition. Additionally, the study found that 40% of the students (majority from schools A and B) agreed that cleaning schedules were available in the schools, while a significant number also disagreed (38%). Observations showed that only schools A and B had cleaning schedules pasted on notice boards. The state of sanitation facilities in schools C and D is an indication that little is being done to ensure that the facilities are kept in good condition. To support that, 63% of students, with the majority from schools C and D, indicated that sanitation facilities were not cleaned and disinfected. It can be noted that there is a need for schools to put written schedules into practice in order to promote a healthy learning environment. This shows a lack of commitment on the part of the school staff. The research revealed that all heads of schools were holders of a Bachelor of Education degree, but they failed to embark on at least one fundraising project, yet they have the potential to design, plan, and manage income-generating projects.

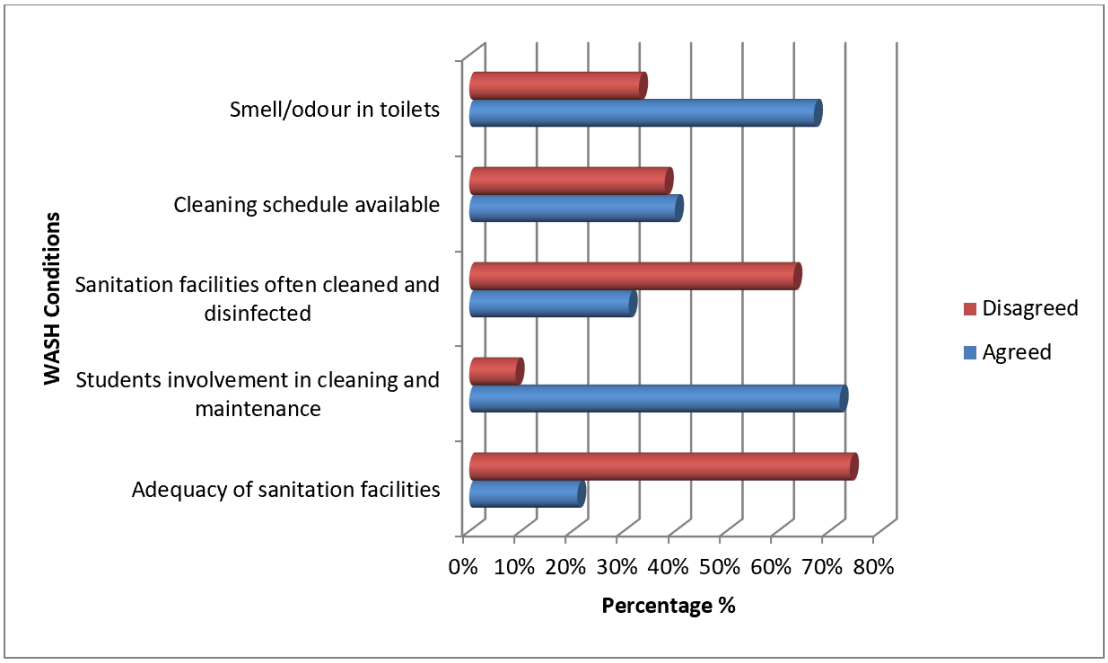

Figure 6. Sanitation Practices and Hygiene (Source: Research Findings)

Another issue that is crucial in the provision of sanitation in schools is the technical efficiency of the schools. According to the United Nations (2008), technical efficiency measures the ability of an organization (school) to use its resources productively to generate outputs (a healthy school environment). The study revealed that the provision and efficiency in the use of water and sanitation resources, as well as the financial management of the WASH budget, are still lacking in all schools. In the provision of water and sanitation, schools are expected to be technically efficient. According to the Water and Sanitation Programme (2011), only nine countries in the Eastern and Southern African region provide WASH facilities for students with physical disabilities, including policies and design standards that consider wheelchair access for toilets, including ramps and larger cubicles. Further studies can look into the effectiveness of current WASH programmes for students with physical disabilities in both rural and urban schools, locally and regionally. Considering students with physical disabilities in WASH promotes equality and social acceptance. School heads have plans to improve WASH conditions as outlined in School Development Plans (SDPs). Their plans include purchasing hand-washing facilities, building toilets and urinals, painting toilets, and electrifying the schools.

Although the conditions of the sanitation facilities of schools A and B were better than those of schools C and D, their adequacy remains an issue. Table 1 shows the current ratios of toilets to students for schools

A, B, C, and D.

School Code	Population of students		Number of toilet facilities	Ratio of toilet to students
A	Boys	180	5	1:36
	Girls	122	4	1:31
B	Boys	123	4	1:31
	Girls	89	3	1:30
C	Boys	106	3	1:36
	Girls	90	3	1:30
D	Boys	110	4	1:28
	Girls	101	3	1:34

Table 1. Current Ratio of Toilet to Students for Schools A, B, C, and D

Source: Research findings

It was observed that there were insufficient toilets in all the secondary schools. Latrine construction in all the schools had not kept pace with the increase in enrollment, which has resulted in schools having more than 25 pupils per drop-hole. The study revealed that for the past 5 years, no toilets were added to keep pace with the increase in enrolment. The population of the schools visited ranges between 196 and 302 students, with the number of toilet facilities ranging between 3 and 5 latrines. The ratio of toilet to students in all schools ranged from 1:28 for boys and 1:30 for girls to 1:36 and 1:34, respectively. The study also found that students find it difficult to use toilets, especially the female students, who require more privacy. Both female and male students prefer using the toilets before leaving their various homes and also at the close of the day since school toilets are not always clean, even though there were schedules for cleaning the toilets. The study revealed that the cleaning of toilets was done by students, as the schools under study were low-income schools and could not afford to employ ancillary staff, as specified by all heads of schools. Proper use of the toilet facility can only be possible when the toilet facilities are well cleaned and disinfected (UN, 2003). Some students could not use the toilets because they were always

dirty. No urinals are provided in any of the schools assessed. Through thorough observation and investigation, it was revealed that cleaning materials were only provided in schools A and B. Heads of schools C and D indicated that school cash inflow rates were not favourable, the reason being that only a few students were paying fees. They also added that most parents live in farm compounds, and their monthly wages are low, ranging between US$40 and US$60. As a result, the little income each school gets is channeled towards administrative issues and the purchase of teaching and learning materials for staff. In addition, the population of students served by these facilities is much more than the stipulated standard by UNICEF and the Government of Zimbabwe.

4.7. Information Access and Hygiene Education

Participation of staff, students, and the community in school WASH programmes is encouraged. The research revealed that only school B had a sanitation club, and the club functions fully during the third term when there are no sports. School B made an effort to allow students to participate in District WASH programmes in 2021 (table 2). The results show reluctance and a lack of technical efficiency in schools A, C, and D on the part of the school administration. School Health Clubs could be helpful in reminding students of the ethics of good sanitation (Adukia, 2013). From student responses in figure 7 below, 51% of the students disagreed that the schools provided information and hygiene education to students, while 38% agreed. The head of school A added that students are taught hygiene education once a term, and students have participated in awareness programmes at the school, cluster, and District levels. Schools B and D reported giving hygiene education twice per term. This shows that students' knowledge and perceptions of the WASH programme were shallow. Many of the students in all the schools visited were not enlightened on the importance of hygiene education and attitudes towards regular practices concerning water, sanitation, and personal hygiene.

Research showed that 69% of students were aware that students' health is mainly affected by their hygiene practices and by the school environment (71%), compared to 23% and 15% of students who disagreed, respectively. The majority of students (56%) disagreed that students have engaged in District WASH programmes, while 32% of students agreed. On the other hand, 76% disagreed and 7% of the students agreed that students have engaged in Cluster WASH programmes. Responses from a significant number of students showed that the provision of Health Education in all schools is still lacking. There is a need for schools to redesign schedules for Health Education embracing water, sanitation, and hygiene. It would be of great value if monitoring and evaluation were done in this area.

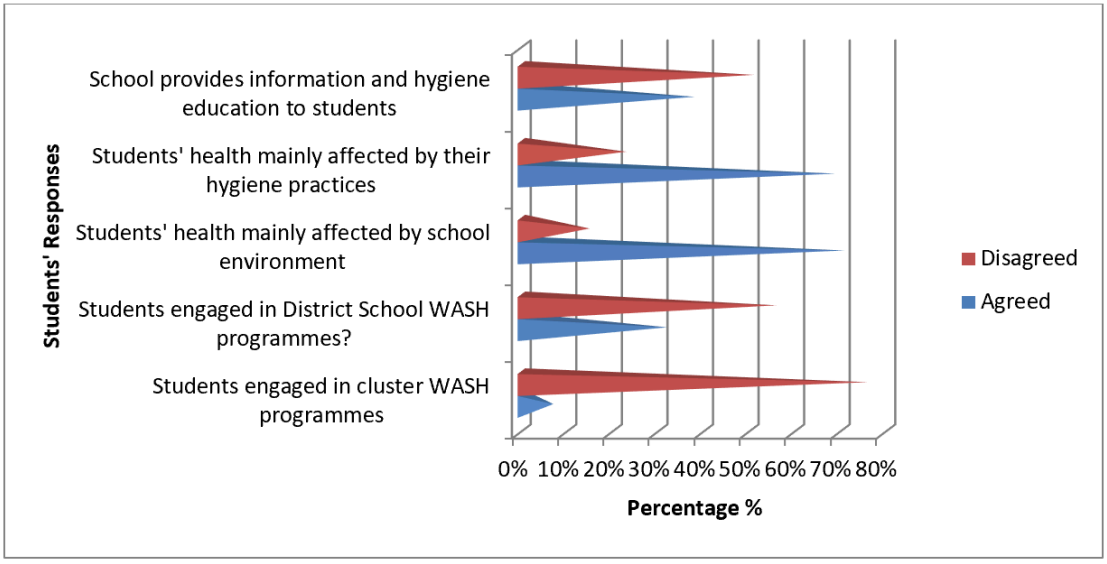

Figure 7. Students' Responses on Hygiene Education and Awareness. (Source: Research findings)

The study revealed that training WASH programmes at the district level were few in past years due to a lack of resources, as highlighted by the District Environmental Health Officer, and that the district is currently sourcing funds from stakeholders, including the government and NGOs. District WASH programmes were organized by the Ministry of Health and Child Welfare (MoHCW) with support from the Chegutu Rural District Council, the Ministry of Primary and Secondary Education, and UNICEF to raise hygiene awareness among students, school staff, and the community. The study findings revealed that only two schools attended WASH workshops at the District level. The school health masters also expressed that they were already teaching hygiene education in schools, but not in the context of WASH. Hygiene education in schools is very important since it promotes good health and improves learning ability (UNICEF, 2010).

Teachers from all schools emphasized the need for adequate learning materials on WASH. Table 2 below shows the participation of schools in WASH programmes at the District and local levels. Teachers from schools A and B participated in WASH programmes at the District level in 2022. School A participated twice, while school B participated once. Teachers in schools C and D were also not acquainted with the knowledge of ensuring an enabling environment and promoting continual awareness campaigns to the students. The teachers acknowledged that they had never participated in specialized training on sanitation and hygiene education except at colleges where they did hygiene education, but not in the context of WASH. None of the schools realized the importance of access to information, education, and

communication (IEC) materials that incorporate water, sanitation, and hygiene-related issues. Additionally, no information on WASH was displayed in classrooms, except for cleaning schedules in classrooms.

According to the survey results, Heads from schools A and B interviewed revealed that WASH workshops were designed for all schools to keep them abreast of modern trends in school environmental management and to ensure, according to Morgan (2006), that the need for inter-generational and intra-generational distribution of resources was understood.

Training / Awareness Program	Target	Level	Date	Duration
School A				
WASH Workshop	School heads, students, community members	District	February 2022	4 Hours
Environmental Health	Teachers, students, and community	Ward	July 2022	3 Hours
WASH Workshop	Health masters, Heads of schools	District	March 2022	6 Hours
Hygiene Education	Students	School	Once every term	At least an hour
School B				
WASH Workshop	Health masters, Heads of schools	District	March 2022	6 Hours
Hygiene Education	Students	School	Twice per term	1 – 2 Hours
Guidance and Counselling	Students	School	Once every week	30 minutes per lesson
School Health Clubs	Students and teachers	School	Functional 3rd term	2 Hours
School C				
WASH Workshop		District	None attended	---------- -
Health Club	Students and teachers	School	None	---------- -
Hygiene Education	Students	School	Once a term	30 minutes to 1 Hour
School Health Clubs		School	None	---------- -
School D				
WASH Workshop		District	None attended	---------- -

doi.org/10.32388/W5DKO4

Training / Awareness Program	Target	Level	Date	Duration
Hygiene Education	Students	School	Twice a term	At least 1 Hour
Health Club		School	None	---------- -

Table 2. Participation of Schools in Awareness Programmes at District and local levels

Source: Extracts from schools visited

The workshops were meaningful to the target groups who were trained to tackle the challenges they faced in their specific school environments. The WASH Coordinator from the District Education Office also highlighted the need for more workshops, support, and equal participation of schools in the District. Emphasis was also placed on the self-reliance of rural schools through engaging in fundraising projects, so as to finance WASH programmes at the school level.

Participation of schools in global campaigns is still lacking in all schools. The study showed that all schools participated in Hand-washing Day in 2022, and only School A participated in the 2021 Sanitation Week. Heads of schools also reported that preparations for the 2023 Hand-washing Day (15th October) were already underway, and the community had already pledged to improvise hand-washing facilities using low-cost plastic buckets. The researcher further discussed with all the school heads and school health masters the importance of participating in awareness campaigns and concluded that the involvement of the community in awareness campaigns could bring positive changes in the hygiene behaviour of students, staff, as well as the community. School heads and school health masters also highlighted the need to mobilize resources earlier in preparation for international WASH campaigns each year. It was also recommended that the District Education WASH coordinator encourage all schools to participate in global WASH campaigns.

4.8. WASH Documents in Schools

The research notes that only a few WASH documents were kept as sources of reference in schools. Filing systems were not prepared to ensure that the requisite documents were kept and that the important details were captured. Among the documents kept at the visited schools were the School Development

Plans (SDPs), MSS documents, and reports from workshops attended. School management, in this regard, should prepare enough documents to ensure the effective implementation of WASH in schools. WASH materials were also lacking in all schools, and schools should be encouraged to extract WASH material from the internet.

4.9. WASH Support from Stakeholders

The effectiveness of WASH in schools requires all-stakeholder commitment (Murinda, 2011). Most countries in southern Africa, such as Zimbabwe, South Africa, Malawi, Tanzania, Zambia, and Namibia, have embraced the philosophy of stakeholder participation in water and sanitation management (Morgan, 2006). According to the Chegutu Rural District Council, two different NGOs were reported to have worked in the District in recent years, and these are UNICEF and Mvuramanzi Trust, among others. All schools reported receiving support from UNICEF in the form of textbooks and full science kits only in the years 2019 and 2020; WASH-related materials were not provided. The Social Service Personnel Assistant from Chegutu Rural District Council also revealed that plans were underway to embark on a Rural Sanitation Programme in 28 Wards of Chegutu District, with support from UNICEF, Mvuramanzi Trust, and UK Aid, among others. The results also revealed that schools that received support from A2 farmers and the community had better sanitary conditions. No significant differences were observed for schools receiving assistance in terms of structural integrity, cleanliness, or latrine-student ratio.

The heads of all schools reported that costs for the repair and maintenance of water and sanitation facilities were covered by the schools, and currently, no external support under the Devolution Funds had been received from the Rural District Council. In the case of borehole repair, they would hire local people for a fee ranging from US$100 to US$200, depending on the magnitude of the repair. When schools are bankrupt, they enter into an agreement with a service provider and get the service on credit and pay later. The involvement of school staff, students, and the community in WASH has long-lasting benefits.

WASH in rural areas has not been spared from stagnation and deterioration in services. A Rural District Council Environmental officer revealed that rural capital subsidies have dried up, and that currently, they were operating below targets due to a lack of funds and support from donors, save for Devolution Funds from the Government, which could not meet their rural target. They added that rural water and sanitation in public schools were currently characterized by aging structures. They also highlighted that plans were underway to assist rural schools in resettlement areas to improve WASH in schools and to work towards the achievement of Sustainable Development Goals (SDGs).

A UNICEF representative revealed that much support has been given to primary schools in past years, and that rural secondary schools were receiving funding in the form of the School Improvement Grant (SIG). All heads of schools confirmed that the SIG sought to provide financially constrained schools with funding to address their most basic needs and to meet a minimum set of school functionality criteria with the aim of improving the quality of teaching and learning at the school level and reducing user fee costs for vulnerable children (UNICEF, 2013). The SIG is a component of the second phase of the Education Development Fund (EDF). The EDF is a multi-donor trust fund that enables donors to jointly support the Ministry of Primary and Secondary Education (MoPSE) in its activities, with UNICEF managing the funds and providing technical support. The UNICEF representative also acknowledged that the success of the School Improvement Grant (SIG) is dependent on strong project management at the Ministry of Primary and Secondary Education (MoPSE), reliable disbursement modalities, accountability, and strong monitoring and evaluation systems. Effective use of the grant also depends on well-trained and informed schools on the SIG, active School Development Committees (SDC), and quality School Development Plans (SDPs).

5. Conclusion

Sanitation practices in rural schools are not safe due to the lack of hand-washing facilities and inadequate water supply. The findings of this study are consistent with evidence on WASH in schools in other countries and highlight several common challenges regarding WASH in schools. This study provides evidence of low coverage in the schools' WASH programme in Wards 11 and 29 of Chegutu District. The analysis of WASH in schools data from resettlement areas of Chegutu District indicates that water supply and sanitation coverage were significantly lower across all schools. Conditions are likely worse than specified in the survey if schools do not improve water access and sanitation adequacy for students. For example, not all improved water sources are necessarily free of contamination, so access to safe water coverage may, in fact, be lower than reported in this survey since water quality testing was not conducted. Access to water services and the quality of water vary by season, and water quality is typically worse in the wet season. Stored water quality is generally much worse than water from the source, leading to further contamination that was not considered in this analysis. Because of the lack of a system of monitoring and surveillance, the government and donors may not have been aware of the low WASH coverage and rural disparity in the access to and quality of WASH in schools in the District that the survey revealed.

6. Recommendations

In order to improve the performance of schools in WASH programmes, there is a need to reinforce the strengths and improve on the shortcomings. The following recommendations are provided:

a. Schools should introduce orientation programmes at the beginning of every term, which will remind the students of the need to manage well the available sanitation facilities. In addition, an adequate number of well-designed and gender-segregated toilet facilities should be provided for students.
b. Health clubs should be encouraged in schools in order to ensure adequate campaigns on the importance of WASH in schools, and WASH materials must be pasted at conspicuous and strategic places on the school premises. Establishing effective school sanitation clubs and raising community awareness through education would strengthen sector collaboration on the relationships between education and WASH. Furthermore, the District Education Office should encourage all schools to allocate a budget towards Hand-washing Day and Sanitation Week each year.
c. Introduction of competitions and awards for the best schools with the best sanitation practices and school environmental management. Schools may also raise funds through income-generating projects in order to finance local awareness programmes.
d. Stakeholder involvement is recognized as an important factor in the successful implementation of water and sanitation plans, particularly when efforts are made to resolve competing and conflicting demands in schools facing water scarcity and poor sanitation (ZEWSP, 2006). Involving stakeholders enables a better understanding of different parties that have an interest in water and sanitation. The Ministry of Primary and Secondary Education, Ministry of Health, and Chegutu Rural District Council should set policies and guidelines on the accreditation of secondary schools to include effective WASH programmes and the provision of adequate facilities.
e. The Ministry of Health should provide quality, regular outreach services to public schools. School water, sanitation, and hygiene contribute to children's learning and school experiences in many ways, including improving cognitive function and attention, reducing days missed from school, providing more time for learning, and thereby increasing dignity and safety (MoHCW, 2011).
f. The national government, donors, international organizations, and community actors should prioritize investment in WASH resources for schools, particularly for the most marginalized schools in resettlement areas.

g. Monitoring and evaluation of ongoing activities and progress in schools, focusing on what has been done, is an essential WASH programme component. Episodic or periodic assessment of overall achievements in schools and supporting institutions in terms of water and sanitation is still lacking. Results of the analysis of monitoring data can be used for advocacy to appropriately allocate the District's resources and leverage the resources of donors and partners. The study findings showed that there was little information on WASH programming in schools, and these programmes must be evaluated based on an agreed set of indicators. Regular support, supervision, and monitoring should be done at all levels, that is, at the school, District, Provincial, and National levels.

6.1. Further researches

i. Similar studies could be replicated in other countries or sub-national regions where there is a lack of data on WASH in schools, so that problems can be identified and resources can be targeted to improve health and educational outcomes in students. In addition to one-time studies, efforts should be made by national governments, in Zimbabwe and other countries, to establish continuous monitoring systems to regularly track the needs and improvements of WASH in schools.

ii. Further research might look at water quality tests on sources of drinking water in schools to determine whether the water is contaminated or not. Escherichia coli or thermo-tolerant coliform bacteria should not be detectable in any 100-ml sample (Appendix A). Moreover, water should meet WHO Guidelines for Drinking-water Quality or National Standards and acceptance levels concerning chemical and radiological parameters.

iii. Future studies might use a random sample of public schools to spot-check and validate WASH conditions reported by questionnaires. One option could be to deploy rapid surveys, with fewer questions and a smaller sample size, as an alternative to long-format surveys, which can be used to study a specific research question in a smaller geographic area. Studies might also use mobile devices as monitoring instruments to collect geospatial data points. With geo-location, monitoring data can be linked to other data sets to provide additional covariates for analysis, which will provide further value and more robust analyses.

iv. Other studies specifically on female students can also be conducted to determine whether schools are meeting the needs of menstruating female students. From this study, the health, educational, and social effects of poor conditions for menstrual hygiene management are unclear, and additional research is needed in this area. The aims of such studies are to understand the acceptability, use, and

safety of various menstrual solutions within the context of the school environment, and to evaluate their potential impact on female students' schooling, health, and well-being.

Acknowledgements

The author wishes to thank teachers from Chegutu District for their contribution to making this research a success.

Funding

No funding was provided to conduct the research.

Potential Competing Interest

No potential competing interests to declare.

References

- Adukia, A. (2013). Sanitation and Education; Harvard University: Cambridge, MA, USA. http://scholar.harvard.edu/files/adukia/files/adukia_sanitation_and_education.pdf
- Advisory Board of Public Health, Ministry of Health and Child Welfare (MoHCW), (2011). Report of the First National Stakeholder Consultation on the Review of the Public Health Act. Harare.
- Babbie, E. (2008). Introduction to Research. (5th edition): Wadsworth, USA.
- Blanton, E.; Ombeki, S.; Oluoch, G.; Mwaki, A.; Wannemuehler, K.; Quick, R. Evaluation of the role of school children in the promotion of point-of-use water treatment and hand washing in schools and households—Nyanza Province, western Kenya, (2007). Am. J. Trop. Med. Hyg. (2010).
- CARE, (2012). Safe Drinking Water and Sanitation for School Children Zimbabwe: Final Report to the Isle of Man Overseas Aid Committee July 2011-April 2012, Executive Summary.
- Compost Toilets Practical Action Technical Brief, (2007).
- Dube, B. and January, J. (2011). Journal of Public Health in Africa 2012; Page Press, Italy.
- Enviro Loo, (2010). A safe, sustainable and modern solution to South Africa's sanitation crisis: Bringing forward the day when every person has access to sustainable sanitation facilities. http://www.enviro-loo.com

- Faggle, R.F. and Rabie, M.A., (1992). Environmental Management in South Africa. Juta Company, Cape Town.
- Fewtrell, L.; Kaufmann, R.B.; Kay, D.; Enanoria, W.; Haller, L.; Colford, J.M. (2005). Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: A systematic review and meta-analysis. Lancet Infectious Diseases; 5(1): 42–52.
- Flick, U. (2006). An introduction to qualitative research (third edition), Los Angeles: SAGE Publications.
- Gray, E. D. (2009). Doing Research in the Real World. London: SAGE Publication Ltd.
- Gay, L. R. (1987). Educational Research: Competencies for Analysis and Application, 3rd edition. Columbus, Ohio: Merrill Publishing Company, 101.
- Hirji, R. (2002). Environmental Sustainability in Water Resources Management in Southern Africa. SARDC.
- Hirji, R. (2001). Water Resources and Environmental Management: World Bank Environment Strategy Paper 2: World Bank Washington D.C.
- Joint Monitoring Programme (JMP), (2010). World Health Organization and United Nations Children's Fund: For Water Supply and Sanitation. Coverage estimates for 2010. http://www.who.int/mediacentre/news/notes/2014/jmp-report/en/Water
- Mills, A.J.; Durepos, G.; Wiebi, E. (2010). Encyclopedia of case study research.
- MOHCW, (2009). The National Health Strategy for Zimbabwe (2009-2013); Equity and Quality in Health, A People's Right. Government of Zimbabwe, Harare.
- MOHCW, (2011). White paper for the review of the Public Health Act; Mimeo, Harare.
- Morgan, P. (2006). Zimbabwe's Rural Sanitation Programme: An overview of the main events, Harare.
- Morgan, C., Bowling, M., Bartram, J. & Kayser, G. L. (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, Volume 220, Issue 6, pages 950-959. Available on: htttps://doi.org/10.1016/j.ijheh.2017.03.015
- Murinda, S. (2011). Comparative Assessment of Perfomance of Urban Water Supply Systems in Small Towns of Zimbabwe. Case of ZINWA and Local Council Water Supply Systems. University of Zimbabwe.
- Otero, M. (1999). The evolution of non-governmental organization towards financial intermediation.
- RWSSI Project Briefs, (2014): Water and Sanitation: Rural Water Supply and Sanitation Initiative (RWSSI). African Development Bank.

- Sayed, Y. (2013). Making education a priority in the post-2015 development agenda. In Report of the Global Thematic Consultation on Education in the Post-2015 Development Agenda; UNICEF: New York, NY, USA; UNESCO: Paris, France.
- Sisimayi, C., and Masuku, T. (2010). School Sanitation and Hygiene: Knowledge, Attitudes and Practices (KAP) Study. A Baseline Survey in Mashonaland Central and Manicaland Provinces of Zimbabwe (Mt. Darwin, Shamva and Chipinge Districts.Harare: UNICEF, Zimbabwe.
- Ukraine Country Report, (2013). Assessing Progress in achieving equitable access to Water and Sanitation.
- UN (2003). World Water Projects, Water for the People, Water for life: World Water Assessment Programme, UNESCO and Berghm Books.
- UN (2011). The Millennium Development Goals report 2011. New York: United Nations.
- UN (2013). The Millennium Development Goals Report 2013; UN: New York, NY, USA. http://www.un.org/millenniumgoals
- UNICEF, (1998). Water, Environment and Sanitation Technical Guidelines Series No. 5, September 1998. www.unicef.org
- UNICEF, (2000). "Global Workshop on School Sanitation and Hygiene Education." Workshop Report, March.
- UNICEF, (2004). Meeting the Millennium Development Goals, Drinking water and sanitation target: A midterm assessment of progress. New York.
- UNICEF, (2006). Water, Sanitation and Hygiene Strategies for 2006-2015. E/ICEF/2006/6: United Nations Economic and Social Council.
- UNICEF, (2008). An Inclusive Approach for School Sanitation & Hygiene Education: Strategy, norms & designs, Government of India and UNICEF, New Delhi, India.
- UNICEF, (2010). Raising Clean Hands: Advancing Learning, Health and Participation through WASH in Schools. New York: United Nations Children's Fund in partnership with CARE, Dubai Cares, Emory University, IRC International Water and Sanitation Centre, Save the Children, Water Advocates, WaterAid, Water For People and WHO.
- UNICEF, (2010). Progress on sanitation and drinking water. http://www.unicef.org
- UNICEF, (2011). WASH in Schools Monitoring Package: United Nations Children's Fund. http://www.unicef.org/wash/schools/files/wash_in_schools_monitoringpackage_.pdf
- UNICEF, (2012). Raising even more clean hands: Advancing health, learning and equity through WASH in schools. New York: United Nations Children's Fund.

- UNICEF, (2012a). Monitoring Results for Equity System (MoRES) and Country Programming Draft 3. New York: United Nations Children's Fund.
- UNICEF, (2012b). Water, sanitation and hygiene bottleneck analysis tool (WASH-BAT) Draft Manual. New York: United Nations Children's Fund.
- United Nations Educational, Scientific and Cultural Organization (UNESCO), (2011). Education for All Global Monitoring Report. World Health Organization; World Report on Disability. WHO, Geneva. http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/efareport
- UN-Water, (2010). UN-Water Global Annual Assessment of Sanitation and Drinking water supply: Targeting resources for better results. Geneva
- UN-Water, (2013). The Post-2015 Water Thematic Consultation Report. UN-Water, United Nations Children's Fund (UNICEF), United Nations Department of Economic and Social Affairs (UNDESA).
- Waddington, H. B.; Snilsteveit, H.; Fewtrell, W. L. (2009). Water and sanitation interventions to combat childhood diarrhoea in developing countries: International Initiative for Impact Evaluation (3ie).
- Water Aid, (2012). Growing up without WASH. Paper presented at the WASH in Schools. Eastern and Southern Africa Regional Workshop, Nairobi.
- Water and Sanitation Programme (WSP), (2004). The case of water and sanitation; Sector finance working papers no. 11.
- Water and Sanitation Programme (WSP), (2011). Pathways to Progress: Transitioning to Country-Led Service Delivery Pathways to Meet Africa's Water Supply and Sanitation Targets: World Bank Water and Sanitation Program, Africa Ministers' Council on Water, African Development Bank, United Nations Children's Fund and the World Health Organization.
- WHO, (2008). Safer water, better health: Costs, benefits and sustainability of interventions to protect and promote health. World Health Organization, Geneva.
- WHO, (2009). Water, Sanitation and Hygiene Standards for Schools in Low-cost Settings; Adams, J., Bartram, J., Chartier, Y., Sims, J., Eds.; World Health Organization: Geneva, Switzerland.
- WHO Report, (2012): Water, Sanitation and Hygiene. http://www.who.int/water_sanitation_health/publications/9789241563956/en/index.html
- WHO Report, (2014). Progress on drinking water and sanitation. The World Bank.
- World Bank, (2012). Economic assessment of sanitation interventions in Southeast Asia. Water and Sanitation Programme.
- World Conservation Union, (2000). Towards developing effective water demand management strategies for Southern Africa. Proceedings of the Regional Water Demand Management Conference;

23-25 March, 1999, Johannesburg, Republic of South Africa.

- World Bank, (2008). “Environmental health and child survival: epidemiology, economics and experience”. Acharya A, Paunio M and Ahmed K.: Washington DC.
- Zimbabwe Emergency Water and Sanitation Project (ZEWSP), (2006). Baseline Survey Report, Mangwe, Gwanda and Beitbridge District: Matebeleland South Province. World Vision.
- United Nations World Water Development Report (2023). https://www.unesco.org/reports/wwdr/2023/en/download

Declarations

Funding: No specific funding was received for this work.

Potential competing interests: No potential competing interests to declare.