



Assessment of Water Supply and Sanitation Facilities in Public Primary Schools in Calabar South Local Government Area, Cross River State, Nigeria

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Abstract: Poor sanitation, water scarcity, inferior water quality and inappropriate hygiene behaviour are detrimental to the health of children and are a major cause of mortality for children under five. These conditions put school children at high risk for Water, Sanitation and Hygiene (WASH) related morbidities. An estimated 400 children old in developing countries are affected by worm due to open defecation. The general objective of this study was to assess water supply and sanitation facilities in primary schools in Calabar South Local Government Area, Cross River State, Nigeria. It was a cross sectional descriptive study with a sample size of 430. A multistage sampling technique was employed in choosing respondents using a semi-structured, interviewer administered questionnaire and an observation checklist. The outcome of the study showed that 268 (62.4%) respondents had water, 33(7.6%), sometimes had water and 129 (30.0%) did not have water available in their school. The tap water was the only identified source of water. Respondents without water in their school looked for alternative means like 45(34.9%) from the staff quarters, 41(31.8%) from the school canteen and 43(31.3%) from outside the school. The availability of sanitation facilities in primary schools was 427(99.5%) and water system at 412(95.9%) was the most identified type of sanitation facility while the other was the pour flush at 15(4.1%). About 215(30.3%) respondents had 3-4 toilets in their schools and 387(90.2%) respondents had water source close to their toilets. From direct observation, it was noted that all the school's water systems were not functional as pupils improvised by getting water outside for flushing. However, at the time of observations, no cleaning materials were seen and toilets were seen in poor sanitary conditions and unhygienic. Water supply and toilets facilities in primary schools were grossly inadequate in quality and quantity. This requires urgent attention by all relevant stakeholders, to prevent health hazards or outbreak of disease to school children, staff and even the general public.

[Simon Alain Inah, Vivianne Ephraim Ntekim, Elizabeth Libuo-Beshel Nji, Darlington Egbe Egbonyi, Fredrick Elemi Mboto. **Assessment of Water Supply and Sanitation Facilities in Public Primary Schools in Calabar South Local Government Area, Cross River State, Nigeria.** *N Y Sci J* 2020;13(7):43-51]. ISSN 1554-0200 (print); ISSN 2375-723X (online). <http://www.sciencepub.net/newyork>. 5. doi:[10.7537/marsnys130720.05](https://doi.org/10.7537/marsnys130720.05).

Keywords: Assessment, Sanitation facilities, Improved water supply, Toilet facilities, Calabar South

1. Introduction

Access to water supply and sanitation is a fundamental need and a human right, it is vital for the dignity and health of all people. Safe and adequate water supply and sanitation facilities in schools are pre-requisites for the right to basic education for school children (Mooijman, 2012). Sufficient and wholesome water supply is the most essential and important prerequisite for the sustenance and maintenance of healthy living. Improvement in water supply brings about the corresponding improvement in the health of the public (Inah, *et al.*, 2020). Promoting the health of children involves different stakeholders working together at all levels (Durosaro, 2008). An

estimated 400 million children and 47% of 5-6 years old in developing countries are affected by worms. Due to open defecation, worm cysts are easily transmitted to their human host leading to chronic infestation in affected areas. Children are vulnerable as they walk and play barefooted in their surroundings. They represent an estimated 400 million (about one-third) of the global soil transmitted helminth burden.

Poor sanitation, water scarcity, inferior water quality and inappropriate hygiene behaviour are detrimental to the health of infants and young children and are a major cause of mortality for children under five (Mooijman, 2012). These conditions put school aged children at high risk for water, sanitation and

hygiene (WASH) related morbidities including soil transmitted helminths and trachoma, this age group experiences over 2.8 billion cases of diarrhoea annually (Trinies, *et al.*, 2016). Poor environmental sanitation practice has been strongly linked to high malaria transmission, morbidity and mortality rates especially in low and middle income countries (Inah, *et al.*, 2017). Diarrhoeal diseases contributes to about 10% of global disease burden due to lack of sanitation and 2.6 billion people in the world lack adequate sanitation- the safe disposal of human excreta (Mara, *et al.*, 2010). An ideal learning environment should have adequate water, sanitation and hygiene (WASH) facilities with functional and reliable water supply sufficient for all the school's needs, especially for hand washing and drinking. It should have sufficient number of toilet facilities for pupils and teachers that are safe, clean, ensure privacy and gender segregated (United Nations Development Programme, 2006).

Toilets and sanitation facilities cater for one of the most basic human functions. Inadequate facilities access and poor knowledge of urinary or bowel activities have wide implications for physical, emotional and psychological health. It affects all children badly especially those with disabilities or additional needs, children with bladder conditions or even children who are bullied (Burton, 2013). In some cases, lack of cleanliness or poor toilet hygiene and usage represents a specific risk of transmitting infections and diseases which can cause short term illness and absence from schools. In others, it contributes to conditions that will persist beyond school and may be manifested in some serious forms in later life (Trinies, *et al.*, 2016). Poor hygiene can cause girls in developing countries miss classes, especially when they are menstruating, in order to ensure privacy in communal toilets. School pupils may seek privacy outside the school building may encounter snakes or other dangers. Reluctance to use dirty, smelly or inappropriate facilities can lead to major short and long term health implications. Both boys and girls may respond by limiting their intake of water during the day to reduce the need to use toilet or suppress any physical urge, contributing to psychological problems in eliminating waste effectively (Burton, 2013).

Almost 37 percent of the world's population still lack access to adequate sanitation, that is, 2.6 billion people. Open defecation, one of the main causes of diarrhoea has resulted in the deaths of more than 750,000 children under five years every year. Every 20 seconds, a child dies as a result of poor sanitation (United Nation -water 2015). Millions of children in the developing countries go to schools which do not have drinking water and clean latrines. Every child has the right to be in a school that offers safe water,

healthy sanitation and hygiene education. These poor conditions not only affect the health, safety and quality life but also claim lives of an estimated 1.5 million children under the age of five each year due to water and sanitation related diseases (Joint Actions, 2010).

Nigeria has 12 million people without access to safe water and another 40 million people without access to improved sanitation than it had in 1990. Nearly 65 million of the estimated population of 150 million people does not have access to safe water. Over 100 million people have no access to improved sanitation like toilets, and a large population practice open defecation. It is not sufficient to provide communities with a supply of safe water and latrines, however hygiene promotion is crucial if people are to use facilities properly and avoid water and sanitation related diseases. By adopting basic hygienic practices like hand washing with soap which can reduce diarrhoeal diseases in children by as much as 44 per cent (UNICEF Nigeria, 2010). Better sanitation facilities and services reduces hygiene related diseases and help curb the 272 million school days missed each year due to these diseases (Joint Actions, 2010). It encourages the development of healthy behaviors for life (UNICEF Nigeria, 2010). It also protects girl's right to education as girls are reluctant to continue their schooling when toilet and hand washing facilities are not private or simply not available (Joint Actions, 2010).

Diseases related to water and sanitation is one of the major causes of death in children under five. Every day, over 800 children under age five die from preventable diarrhoea related diseases caused by poor water and lack of access to sanitation and hygiene. A vicious cycle exists between diarrhoea and under nutrition, especially for children. They are less able to eat and absorb nutrients from their food in turn they become more susceptible to diarrhoea when exposed to human waste. In 2014, 159 million children under five were stunted; that's 1 in 4 children worldwide (UNICEF, 2010). Diarrhoea deaths in children under five years had reach 525,000 and children global diarrhoea cases was 1.7 billion each year (WHO/UNICEF, 2015). In the last decade, global diarrhoea was 1.7 million deaths per year among children under five years. Many cases were from low and middle income countries in Africa and part of Asia (Walker, *et al.*, 2013). Also, a total of 842,000 diarrhoeal deaths resulted from poor water, sanitation and hygiene (WASH), 46% from contaminated water, 26% from sanitation and 28% from hand hygiene (Mills & Cummings, 2016). WASH can prevent the deaths of 361,000 children under the age of five, or 5.5% of mortalities in that age group as disease transmission route and probable barriers are reduced (Clasen, *et al.*, 2014). Millions of other children are

made sick, weakened or are disabled by other water and sanitation related diseases and infections including cholera, typhoid, malaria, dysentery, poliomyelitis, worm infestation and acute respiratory infections.

During school period, school children spend 5 hours for pre-school and 8 hours for upper classes as set by the Ministry of Education. Hence, the availability and access to sanitation facilities such as toilet and water supply are importance for their health and well-being. Apart from providing adequate toilet and water supply, the availability of water and soap for proper hand washing helps to reduce diarrhoeal diseases and respiratory infections. There was 30% in reduction in diarrhea cases when hand washing was practiced in primary schools and day care centres and also respiratory infections like pneumonia which is 25% the highest of child mortality (Ejemot-Nwadiaro, *et al.*, 2015). In Nigeria, the introduction of the Universal Basic Education (UBE) in September 1999 has led to an increase in primary school enrolment over the years. Water supply and sanitation have become insufficient in schools to cope with the increase, resulting in exposure of pupils to the risks of diseases (UNICEF, 2008). Impaired cognitive learning and performances in schools are long term outcome while short term consequences include infections and diseases (Gottfried, 2010). Girls and boys are affected in different ways contributing to unequal learning opportunities. Sometimes, girls are more affected because the lack of sanitation facilities means that they cannot attend school during menstruation (World Health Organization, 2009). Absenteeism in attendance is a predictive factor for poor academic success for primary school pupils. For example, a sick child may not perform well in his or her course work and suffer academically (Lau, *et al.*, 2012). The economic impact of poor sanitation and hygiene cost the Nigerian economy the equivalent of almost 1.3 percent of gross domestic product, conflict and natural disasters makes the situation worse (UNICEF Nigeria, 2018).

Providing adequate levels of water supply, sanitation and hygiene in schools is of direct relevance to the United Nations (UN) Millennium Development Goals (MDGs) of achieving Universal primary education, promoting greater equality and reducing child mortality. It is also supportive of other goals especially those on major diseases and infant mortality (WHO, 2009). This explains the objectives of this study with a view to create awareness on the importance of water supply and sanitation facilities in primary schools in Calabar South Local Government Area, Cross River State. Therefore, the aim of this study was to assess water supply and sanitation facilities in public primary schools in Calabar South, Local Government Area, Cross River State, determine

the source and availability of water supply in selected public primary schools in the area, assess the type and availability of sanitation facilities in the study area and to determine the functionality and sanitary conditions of the sanitation facilities in the study area.

2. Materials and Methods

2.1 Study setting

The study setting was Calabar South Local Government, Cross River State, Nigeria. Its headquarters is located at Anantigha. It has an area of 264km² and a population of 191,630 as at the 2006 census. It was created from the former Calabar Municipality Local Government and has twelve wards. The local government is headed by a local council chairman as chief executive with 12 councilors representing each of the 12 political wards.

The Efik and Efut are the main indigenes in Calabar South. It is a Christian town with a few religions. It has numerous public and private owned schools, standard hotels and resorts, a cultural centre, churches, mosques, relaxation centres and several health centers and private clinics. Majority of the people are public servants in government establishments while some are business men and women.

2.2 Study Design

A cross sectional descriptive study design was used for the study to assess water supply and sanitation facilities in public primary schools in Calabar South Local Government Area. The sample size used for this study was determined using Cochran (1963) formula as cited in Singh and Masuku (2014) below:

$$n = Z^2pq/d^2$$

n = Desired sample size
 Z = For 95% desired confidence interval (1.96)
 p = Estimated proportion in the target population of poor water supply and sanitation facilities which is 50%
 q = Proportion of non-occurrence (1-p) (1-0.5 = 0.5)
 d = Margin of Error (5%) (0.05)

$$n = \frac{(1.96)^2 \cdot 0.5 \cdot 0.5}{0.05^2}$$

$$n = 0.9604/0.0025$$

$$n = 384.16 = 384$$

To account for non-response, the sample size is increased by 10%.

$$N = \frac{n}{1 - \text{non-response Rate}}$$

Where n = sample size
Non-response rate = 10% (0.1)

$$\frac{384}{1-0.1} = \frac{384}{0.9} = 426.67 = 430$$

2.3 Instrument for Data Collection

A semi structured, interviewer administered questionnaires and a direct observational checklist was used for collecting data. The questionnaires consisted of four (4) sections: A- Information on socio-demographic characteristic of respondents; B - Information on water supply and C - Information on sanitation facilities.

2.4 Data collection procedure

Data were collected with the aid of trained research assistants. The research team consisted of the research and two trained research assistants. A one day training was organized to teach the research assistants how to approach and interview respondents and understand the questionnaires. The observation checklist was used in assessment hence data was collected using the checklist and the semi structured, interviewer administered questionnaires.

2.5 Method of data analysis

Data was analyzed using the statistical package for social sciences (SPSS) version 20.0 and was presented using descriptive tables and figures.

2.6 Ethical consideration

A letter of introduction was gotten from the Department of Public Health, University of Calabar, Calabar and presented to the Head teachers of the selected schools. A letter of ethical clearance was also obtained from the ethical committee, Department of Public Health, University of Calabar, Calabar. The researcher informed respondents of what the study was about, and went further to inform them that their participation was voluntary and were free to opt out at any time without fear, assured them of confidentiality as a priority and also obtained their verbal consent. The researcher ensured that all literature was properly cited.

3. Results

3.1 Socio-demographic characteristics of respondents

As shown in table 1, there were 232 male and 198 female school children who were part of the study, representing 54.1% and 45.9% of the sample size. The dominant age of respondents was 8-10 years with 226 (52.7%) followed by those aged between 11-13 years, 190(44.3%) and 13 respondents were above the age of 13 years, (3.0%). Analysis of the class/level

of respondents revealed that 156(36.3%) respondents were in primary 4, about 133(30.9%) in primary 5 and 141(32.8%) respondents were in primary 6 (Table 1).

3.2 Availability and Source of water supply in Primary schools.

It is shown from table 2 that 268(62.4%) respondents said that water is always available in their school, 33(7.6%) said that water is sometimes available while 129(30.0%) respondents reported that water is not always available in their school. Water tap was the identified source of water supply to primary schools by 301(70.0%) respondents and 129(30.0%) stated that there is no water supply to their schools. Among those who have no water supply source in their schools, 45(34.9%) indicated that they get water from the University staff quarters, 41(31.8%) stated that they fetch from their school canteen while 43(33.3%) respondents fetch water outside the school compound.

Furthermore, 286(95.9%) respondents stated that water flows from their school tap, 2(0.7%) respondents said that water does not flow from school tap while 10(3.4%) respondents stated that their school tap is sometimes functional. In terms of distance from school toilet to water source, majority of the respondents, 387(90.2%) stated that the distance from their toilets to water source is close while 43(9.8%) respondents noted that the distance is far (Table 2).

3.3 Type and availability of sanitation facilities in Primary schools

As revealed in Table 3, about 427(99.5%) respondents have toilets in their schools while 3(0.5%) respondents indicated they do not have school toilets. Analysis of the toilet types present in schools revealed that 412(95.9%) respondents have water systems in their school while about 15(4.1%) respondents have pour flush toilets in their schools.

Furthermore, 215(50.3%) respondents have 3-4 toilets in their school, 129(30.2%) respondents have 5-6 toilets in their school, about 43(10.1%) respondents have more than six toilets while 40(9.4%) have 1-2 toilets in their schools. About 410(95.9%) respondents stated that toilet tissue is always available in their school toilets, 6(1.4%) indicated that toilet tissue is 'sometimes' available in their school toilets while 11(2.7%) respondents stated that tissue is not always available in their school toilets.

In addition, 420(98.3%) respondents stated that there are separate toilets for boys and girls in their school while 7(1.7%) indicated that there are no separate toilets for boys and girls in their schools (Table 3).

Table 1: Socio-demographic data of respondents (n=430)

Characteristics	Frequency	Percentage
Sex		
Male	232	(54.1)
Female	198	(45.9)
Age (years)		
8-10	226	(52.7)
11-13	190	(44.3)
Above 13	13	(3.0)
Class		
Primary 4	156	(36.3)
Primary 5	133	(30.9)
Primary 6	141	(32.8)

Table 2: Availability and sources of water supply in primary schools (n=430)

Variables	Frequency	Percentage
Water is always available		
Yes	268	(62.4)
Sometimes	33	(7.6)
No	129	(30.0)
Water supply source in school		
Water tap	301	(70.0)
Well		
None	129	(30.0)
If none, how is water gotten		
Fetch from outside the school	43	(33.3)
From school canteen	41	(31.8)
From staff quarters	45	(34.9)
Water flows out of the school tap		
Yes	286	(95.9)
Sometimes	10	(3.4)
No	2	(0.7)
Distance from toilet to water source		
Far	43	(9.8)
Close	387	(90.2)
Others		

Table 3: Type and availability of sanitation facilities in public schools (n=430)

Variables	Frequency	Percentage
Have toilets in school	427	(99.5)
Yes	3	(0.5)
No		
If no, what alternative is available*		
Prefer not to say	3	(0.5)
If yes, type of toilet in school		
Water system		
Pour flush toilet	412	(95.9)
Others	15	(4.1)
Number of toilets in schools		
1-2		
3-4	40	(9.4)
5-6	215	(50.3)
More than 6	129	(30.2)
	43	(10.1)
Toilet tissue is always available in toilets		
Yes		
Sometimes	410	(95.9)
No	06	(1.4)
	11	(2.7)

3.4 Functionality and Sanitary conditions of sanitation facilities in primary schools.

Table 4 reveals that about 341(79.9%) respondents stated that the toilets in their schools are not clean; however, 86(20.1%) respondents indicated that their schools are dirty. About 298(69.7%) school children use their school toilets whenever they need it while 129(30.3%) respondents said they don't use their school toilets when they need it. Analysis of why school children do not use toilets when they need it showed that 87(67.4%) noted that their toilets are always dirty while 42(32.6%) stated that their school toilets are always locked.

Majority of the students, 258(60.4%) indicated that 'toilet attendants' cleans their school toilets. Analysis of how often school toilets are cleaned revealed that 341(79.8%) students indicated

that their school toilets are cleaned every day, 57(13.3%) stated that their toilets are cleaned once in a week while 29(6.8%) noted that their school toilets are not cleaned at all (Table 4).

Figure 1 shows analysis of the sources of water supply in primary schools. It can be deduced from the chart that tap water was the source of water, and some had no source of water, representing 301(70.0%), and 129(30.0%) respectively.

Figure 2 shows the number of toilets in primary schools in Calabar South Local Government Area. It can be inferred from the chart that most schools had between 3-4 toilets, 215(50.3%) and 5-6 toilets were in some schools, 129(30.2%). Also, 40(9.4) respondents had 1-2 toilets in their schools while 43 primary school children had more than 6 toilets present in their schools.

Table 4: Functionality and sanitary conditions of sanitary facilities in public schools (n=430)

Variables	Frequency	Percentage
Sanitary condition of school toilet*		
Dirty	86	(20.1)
Clean	341	(79.9)
Other		
Use toilet whenever I need it		
Yes	298	(69.7)
No	129	(30.3)
If no, give reasons		
Always dirty	87	(67.4)
Usually locked	42	(32.6)
Who cleans school toilet (s)		
Toilet attendants	258	(60.4)
Teachers		
School children	83	(19.4)
Nobody	86	(20.2)
How often toilets are cleaned		
Everyday	341	(79.8)
Once a week	57	(13.3)
Not cleaned at all	29	(6.8)

*Excludes those who have no toilets in school

Figure 3 shows how often sanitation facilities in primary schools are cleaned and maintained. It is shown from the figure that 341(79.8%) respondents indicated that their toilets are cleaned daily, 57(13.3%) said that their school sanitation facilities are cleaned weekly while 29(6.8%) respondents indicated that their school toilets are not cleaned at all.

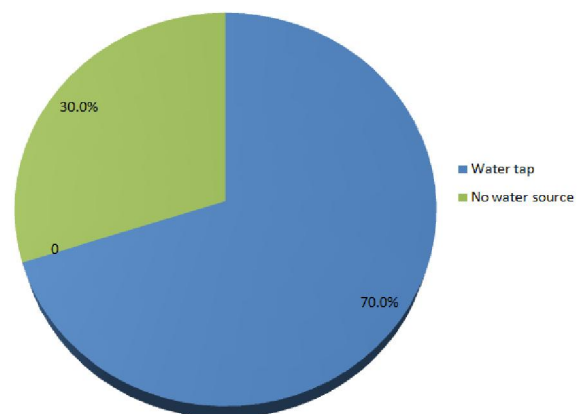


FIG. 1: Sources of water supply in primary schools

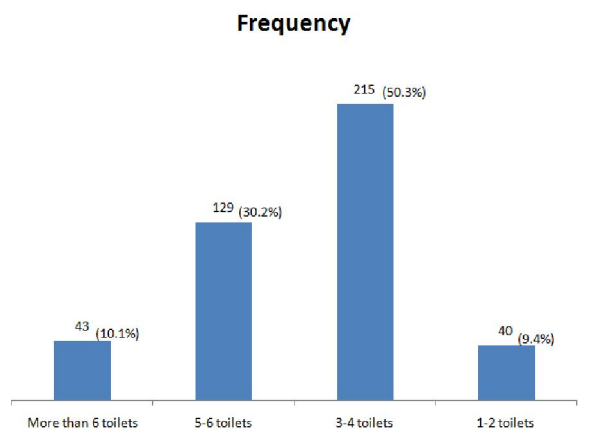


FIG. 2: Number of sanitation facilities in primary schools

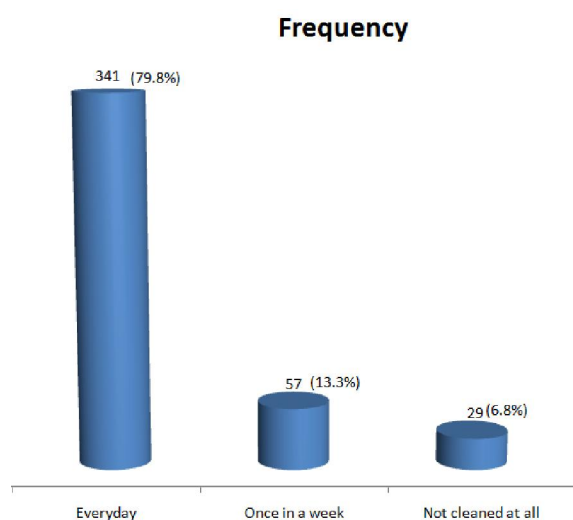


FIG 3: Analysis of how frequent sanitation facilities in primary schools are cleaned.

4. Discussion

This study was a cross sectional descriptive study used to assess water supply and sanitation facilities in primary schools. Data was collected using the semi-structured, interviewer administered questionnaire and an observation checklist from 430 respondents in 10 schools. Pupils in the senior classes (primary 4, 5 and 6) of selected schools were used.

4.1 Availability and source of water supply in primary schools.

The study revealed that 268 (62.4%) respondents had water available in their schools, 33 (7.6%) respondents sometimes had water while 129 (30.0%) respondents did not have water in their schools. Basically, this put a child at the risk of dehydration and water related morbidities. Based on observation, the only source of water supply in primary schools was tap water. These findings were in contrast with Islam, et al., (2013) that 96% of water point was found

to function where only 4% was found inactive. Also, the findings from Hatim & Waled (2015) revealed in their study that the schools had different types of water sources such as hand pumps, vendors and tap water was the most common type of water sources used by the schools.

Furthermore, findings showed that respondents who did not have water available in their schools used alternative means of getting water such as fetching from the school canteen at 41 (31.8%), staff quarters (residential area) at 43 (34.9%) and outside the school at 43 (33.3%). This could bring unnecessary risks on the child as they could be exposed to certain factors (such as road accidents, abduction etc) which could be detrimental to their health. These findings were in line with Hatim & Waled, (2015) were 7.1% got water from vendors.

Also, findings shows that 387 (90.2%) respondents indicated that the distance from toilets to water source is close and this was in support with researcher's observation as most toilets (that is 7 out of 10) were located at least 15 meters away from water source while the remaining had their water source not close to the toilet.

4.2 Type and availability of sanitation facilities in primary schools

Findings from this study showed that 427 (99.5%) have toilets in their schools while 3 (0.5%) did not. The researcher observed that water system was the major type of sanitation facility in most primary schools, (9 out of the 10 selected schools) while others had pour flush toilets (1 out of the 10 selected schools). About 40(9.4%) have 1 – 2 toilets, 215 (50.3%) have 3 – 4 toilets, 129 (30.2%) have 5 – 6 toilets and 43 (10.1%) have more than 6 toilets. The researcher observed that all the selected primary schools had at least, two toilets present. The number of sanitation facility present in schools should be determined majorly by the number of students and staffs available. However, schools inadequate toilets will imply that pupil may tend to use bush method around schools or in the streets. These findings were in line with Hatim & Waled (2015) study as 54.5% of toilets in schools were not sufficient for the number of students and led to defecation around toilet buildings.

On the issue of tissue paper, findings from the study indicated that 410 (95.9%) respondents have tissues available in their school, 6 (1.4%) sometimes had while 11 (2.7%) did not. Based on direct observation, schools with tissues in their schools were basically kept by the class teachers and given on request to the pupils. This may imply that pupils may be limited to the use of tissue and resort to other means like the use of paper which could further result in littering of the toilets. This findings were in line with Rachel & Brendan (1990) study were essential

toilet items were not always available and toilet tissues were kept with the attendants.

Furthermore, direct observation revealed that they were separate toilets for boys and girls with average privacy and ventilation. However, one school out of the ten investigated had just two toilets which one was used by the staff and the other for pupils (boys and girls). These findings were in support with Islam, Rahaman & Sarker (2013) study were 55% of schools had separate facilities for pupils and teachers.

4.3 Functionality and sanitary condition of sanitation facilities in primary schools

The findings from this study revealed that 341 (79.9%) respondents had clean toilets in their school and 86 (20.1%) have dirty toilets. In schools with toilets, 298 (69.7%) had access to use it while 129 (80.3%) did not. Most respondent indicated that the toilets were always dirty at 87 (67.4%) while others said it was usually locked at 42 (32.6%). From direct observations, few of the school toilets were clean while majority were in poor sanitary conditions and unhygienic offensive odour, litters, urine and water on the floor, unflushed toilets, presence of schools on toilet seat, cracked doors, absence of wash basins, dirty windows etc were observed.

Furthermore, the researcher noted that all the water systems were not functional as school children were improvising, using buckets to fetch water from tap outside whenever in need to use toilets. This leads to unnecessarily pouring of water on the floor and unflushed toilets as some school children may not be able to keep up. Also, there were absence of wash basins and soaps in all school toilets. This means that school children were not washing their hands properly after toilet use. Some school toilets were unusable due to poor states. The finding from Ebere (2014) was better as 91% of the school toilets were functional and 21% had facilities no longer in use.

In addition, 258 (60.4%) respondents revealed that their school sanitation facilities are cleaned by toilet attendants, others said the cleaning was done by them at 83 (19.4%) while 86 (20.2%) said the toilets was cleaned by nobody in particular. However, in assessing how often the toilet is being cleaned, 341 (79.8%) respondents indicated every day and 57 (13.3%) said once in a week. These findings were not in support with the researcher observation as few toilets were cleaned while majority were uncleaned. At the time of observation, a total of 2 attendants were seen in just 2 schools out of the selected schools.

5. Conclusion

In assessing water supply and sanitation facilities in primary schools in Calabar South, findings revealed that although tap water was available it was not properly maintained. Researcher observed that there

was no provision of drinking water in classrooms and some of the school children brought water in 'water bottles' to school. The study also showed that toilet facilities available in primary schools were grossly inadequate in quantity and quality. There were poor utilization practices of the available toilets; due to poor sanitary conditions being locked, lack of cleaning material etc. Findings revealed that school children were cleaning the toilets; this could be a source of infection or disease outbreak in the school if nothing is done. Water supply and toilet facilities in primary schools require urgent attention by all relevant stakeholders.

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7/24/2020