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Research Article

Water Availability, Sanitation and Hygiene Practices in Primary Schools in the Buea Municipality, Cameroon: A Cross-sectional Study

Asu Carine Ndum[1], Simon Eyongabane Ako[1, 3], Epey Felicite Ngale[1], Tendongfor Nicholas[2, *]

[1]Department of Public Health and Administration, Biaka University Institute of Buea, Buea, Cameroon

[2]Department of Public Health and Hygiene, University of Buea, Buea, Cameroon

[3]Centre for Research on Emerging and Re-emerging Diseases (CREMER), Institute of Medical Research and Medicinal Plants Studies (IMPM), Yaoundé, Cameroon

Abstract

Background: The provision of Water, Sanitation, and Hygiene (WASH) services are important to protect the health of the public against infectious diseases. The challenges of inaccessible WASH services along with the COVID-19 pandemic and cholera epidemics can lead to devastating health problems. The objective of this study was to assess the water availability, sanitation, and hygiene practices in primary schools in the Buea municipality. *Methods:* A cross-sectional school-based study was conducted between April to May 2022 in 26 primary schools selected in the Buea municipality. An observational checklist and a structured questionnaire were used to collect data on water availability and sanitation in schools and the hygiene practices of class five and six pupils. A total of 923 pupils were included in the study. Data were analyzed using SPSS version 25. *Results:* Of the 26 primary schools surveyed, 5 (19.2%) had good water availability and 11(42.3%) had practiced good sanitation. Only 48(5.2%) of the pupils practiced good hygiene at school. Hygiene practice was associated with school types (χ^2 = 46.44, p<0.001), gender (χ^2 = 3.96, p=0.047), availability of a water source (χ^2= 27.13, p<0.001) and source of water (χ^2= 10.04, p=0.002). Reasons for the poor hygiene practice of pupils were: water scarcity, lack of hand-washing facilities, forgetfulness, distant tap, and unavailability of soap. *Conclusion:* Water was available in a few schools in the Buea municipality. Hygiene practices among the pupils were very poor. This study provides baseline data to inform a public health intervention by the Ministry of Basic Education to enforce implementation of WASH practices in primary schools in the Buea Municipality.

Keywords

Water Availability, Sanitation, Hygiene, Primary Schools, Buea Municipality

*Corresponding author: ntendongfor@gmail.com (Tendongfor Nicholas)

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1. Introduction

Access to safe and reliable water, sanitation and hygiene (WASH) is a critical precondition/pre-requisite for providing a safe school environment that supports equal opportunities for high-quality education and healthy development of children [1]. Adequate access to water, sanitation, and hygiene (WASH) in schools impact health, school attendance, educational outcomes, and gender disparities [1-3]. Sustainable Development Goal 4 on quality education and Goal 6 on clean water and sanitation, call~~ing~~ upon countries to ensure universal access to safe and equitable WASH services [4] and a safe and inclusive environment in schools [1].

Children who do not have access to safe water and convenient sanitation facilities are exposed to diarrheal diseases and respiratory infections, which deprive them of nutrients, leading to stunted growth, illness, and frequent absence from school classes [5].

Schools have repeatedly been implicated in the spread of infectious diseases which is high among primary school children [6]. Hand washing is especially important for children, as they are the most prone or vulnerable to infections gained from unwashed hands [6]. The highest proportions of infections among children are a result of poor WASH [7].

Statistics reveal that only 66% of schools worldwide have access to water [8]. Diseases related to inadequate water are a huge burden in developing countries [9]. An evaluation by UNICEF found that only 51% of schools in low and middle-income countries had access to adequate water sources [10].

More than half of the global population does not have access to safe sanitation [11]. And around 2.4 million deaths (4.2% of all deaths) could be prevented annually if everyone had good, reliable drinking water and practiced good hygiene and sanitation [12]. It was reported that more than half of ~~all~~ primary schools in developing countries have inadequate water facilities, and nearly two-thirds lack single-gender bathrooms [13]. More than 40 percent of diarrhea cases in school children result from transmission in schools rather than homes [13]. Each year, children lose 443 million school days because of water-related illnesses among which 272 million are lost due to diarrhea alone [13].

In Cameroon, previous studies reported that most schools are not adequately equipped with WASH facilities [14]. Another study reported inadequate water supply, poorly managed toilet facilities, and poor hygiene practices [15]. A study conducted in some primary schools within the Bamenda municipality showed that none of the schools met WHO standards with regard to WASH, and the gap between toilet usage and hand washing after defecation was very significant [15]. In another study carried out in 92 primary schools in Dschang, access to water and sanitation in primary schools was very limited and predisposed school children to high morbidity of WASH-related diseases [16]. Inadequate water supply, poor sanitation, and hygiene practices were also reported in secondary schools in the Buea Municipality [17].

The Buea municipality for years has been facing a serious water crisis to support human needs. The capacity of the main water supply authority CAMWATER (Cameroon Water Utilities Corporation) is insufficient to cater to the over 300,000 inhabitants [18]. With this scarcity of water in the Buea municipality, coupled with the swearing population influx due to the Anglophone crisis, the COVID-19 pandemic, and the reoccurrence of cholera epidemics, there is little data on the level of implementation of WASH in primary schools in the Buea municipality. This study was carried out to assess the WASH facilities and practices in primary schools in the Buea municipality.

2. Materials and Methods

2.1. Study Area

This study was carried out in the Buea Municipality, which is the headquarter of the South West Region of Cameroon. The study was conducted in 26 primary schools selected in the Buea Municipality. The municipality has a total of 145 primary schools, of which 33 government schools, 89 lay private schools, and 23 mission schools [19]. The schools included in the study were 9 mission schools (CBC Bolifamba, CBC Great Soppo, CS Small Soppo, CNPS Wokoko, PS Bomaka, PS Buea Town, St Andrews Catholic School Muea, CS Bolifamba, and St Pius Catholic School Buea Station), 4 lay private schools (CRC Remedial, Graceland International Bilingual Nursery and Primary School, Gratia Plena and Lady Bird Nursery and Primary School) and 13 government schools (GPS Bomaka, GPS Muea I, GPS Muea II, GS Bokoko Bonduma I, GS Bokoko Bonduma II, GS Bolifamba, GS Buea Town I, GS Buea Town II, GS Bwiyuku, GS Great Soppo I, GS Likoko Membea I, GS Likoko Membea II and GS Small Soppo).

2.2. Study Design and Population

The study was a school-based cross-sectional study involving 923 class 5 and 6 pupils. An observational checklist and a questionnaire were used to collect data on water availability, hygiene, and sanitation practices in selected schools. The number of pupils that were included in the study was determined using Cochran's formula for sample size determination. Table 1 shows the distribution of pupils enrolled in each school. Included in the study were Class 5 and 6 pupils in selected schools who gave assent. Pupils that were busy with other activities study at the time of data collection (e.g. common entrance examination) were excluded from the study. Only selected schools that the headmasters/mistress gave authorization were included in the study.

Table 1. *Distribution of pupils enrolled per school.*

Primary schools	Frequency (n)	Percentage (%)
CBC Bolifamba	30	3.3
CBC Great Soppo	13	1.4
CNPS Wokoko	14	1.5
CRC Remedial Nursery and Primary School	65	7
CS Bolifamba	16	1.7
CS Small Soppo	50	5.4
GPS Bomaka	33	3.6
GPS Muea I	37	4
GPS Muea II	47	5.1
Graceland International Bilingual Nursery and Primary School	41	4.4
Gratia Plena	14	1.5
GS Bokoko Bonduma I	17	1.8
GS Bokoko Bonduma II	75	8.1
GS Bolifamba	9	1
GS Buea Town I	43	4.7
GS Buea Town II	22	2.4
GS Bwiyuku	13	1.4
GS Great Soppo I	25	2.7
GS Likoko Membea I	31	3.4
GS Likoko Membea II	30	3.3
GS Small Soppo	69	7.5
Lady Bird Nursery and Primary School	53	5.7
PS Bomaka	53	5.7
PS Buea Town	44	4.8
St Andrews Catholic School Muea	45	4.9
St Pius Catholic School Buea Station	34	3.7
Total	923	100

CBC: Cameroon Baptist Convention, CNPS=Catholic Nursery and Primary School, GS=Government School, CS=Catholic School, PS=Presbyterian school, GPS=Government Primary School

2.3. Sampling Technique

The list of all operational primary schools in the Buea Municipality was obtained from the inspectorate of basic education. The schools were divided into government, missionary, and lay private. Twenty-six (26) primary schools were systematically selected out of the 145 primary schools in the Buea Municipality and data collection was carried out in these selected schools. That is out of 33 primary government schools, 13 were systematically selected. Out of 89 lay private primary schools, 18 were selected but only 4 schools gave permission. Out of 23 mission primary schools, 9 were systematically selected.

A systematic sampling technique was used to select the pupils that were included in the study. The number of pupils selected per school was based on the size of the school.

2.4. Data Collection

Data was collected using an observational checklist and a structured questionnaire from selected primary schools. The questionnaire was administered to class 5 and 6 pupils in the English language. Data collection was done by distributing questionnaires to pupils, reading out the questions one after the other, and giving them time to answer. The check list was used to collect data on water availability, practice of sanitation in schools (cleanliness of the school environment and state of toilets).

2.5. Statistical Analysis

Data was entered into Kobo collect, cleaned in MS Excel and analysed in SPSS version 25. Water availability was scored on a total of 3. Primary schools that scored <2 were considered to have a poor water availability while primary schools that scored ≥2 were considered to have a good water availability.

Eighteen questions were used to assess hygiene practices by pupils. Those who scored ≤9 were considered to have a poor hygiene practice while those who scored >9 were considered to have a good hygiene practice.

For sanitation practices, 38 questions were used, schools that scored ≤19 were considered to have a poor sanitation practice while schools that scored >19 were considered to have a good sanitation practice.

The sanitation state of the school toilets was graded on a total score of 6 points and toilets that had a score of ≤3 were considered to have a bad sanitation state while toilets that had a score of >3 were considered to have a good sanitation state.

The Chi-square test was used to determine the association between proportions. Results were presented in tables and charts. P<0.05 was considered significant.

2.6. Ethical Consideration

An ethical clearance for the study was obtained from the Institutional Review Board (IRB) of the Faculty of Health Sciences, University of Buea. Administrative clearances were gotten from the South West Regional Delegations of Public Health and Basic Education. Verbal permission was obtained from the head masters/mistresses of each primary school selected for the study.

3. Results

3.1. Demographic Characteristics of the Pupils Enrolled in the Study

Of the 923 pupils enrolled in the study, 526 (57%) were female, 451(48.9%) were from government schools and 173 (18.7%) were from lay private schools. Their ages ranged from 8 to 17 years with mean age of 11.33 ± 1.52 with 533(57.7%) within the age group 11-13 years. A large proportion of 562(60.9%) was recruited in class 5 (Table 2).

Table 2. *Demographic characteristics of the pupils enrolled in the study.*

Variable	Level	Frequency (n)	Percentage (%)
Gender	Female	526	57.0
	Male	397	43.0
	Total	923	100
Age group	8 - 10	311	33.7
	11 - 13	533	57.7
	14 - 17	79	8.6
	Total	923	100
Class	Class 5	562	60.9
	Class 6	361	39.1
	Total	923	100
School type	Government	451	48.9
	Mission	299	32.4
	Lay private	173	18.7
	Total	923	100

3.2. Water Availability in Primary Schools in the Buea Municipality

Of the 26 primary schools surveyed, 15 (57.7%) had a water source of which 14(93.3%) had a tap while 1(6.7%) had a borehole. Out of the 15 primary schools with a water source, 5(33.3%) had water at the time of the visit and the state of the water was clean.

A majority of 458(78.8%) pupils reported that the water supply was not constant.

Figure 1 shows the perceived quality of water as reported by pupils. Most of the pupils 481 (80%) said their water was always looking clean while a few, 3 (0.5%) of them said their water source was always dirty (Figure 1).

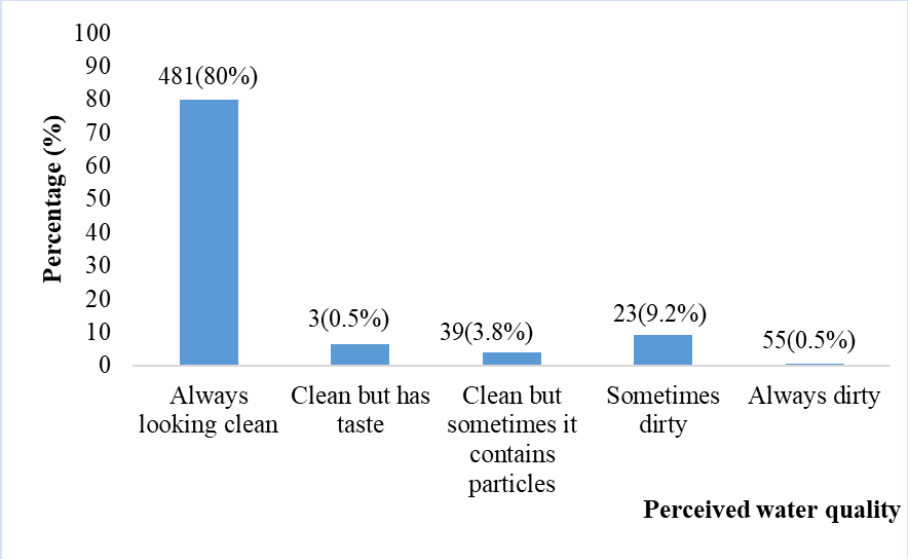

Figure 1. *Perception of pupils on the quality of water used at school in the Buea Municipality.*

3.3. Hygiene Practices in p Rimary Schools in the Buea Municipality

With regards to the hygiene practices of pupils, 719(77.9%) did not wash their hands before eating during the break, 831(90.2%) washed their fruits before eating during the break, and 189(30.5%) washed their hands after using the toilet. Also, 687(84.6%) of them washed their hands with water only while 5(0.6%) said they used water, soap, and disinfectant. Furthermore, 700(75.9%) washed their hands only when they come back from school, while 2(0.2%) washed their hands after shaking hands with friends and 2(0.2%) washed their hands after sneezing. A majority, 907(98.3%) of the pupils said they had bathed before coming to school, meanwhile, 920(99.7%) brushed their teeth before coming to school (Table 3).

Table 3. *Hygiene practices of pupils in schools in the Buea Municipality.*

Variable	Level	Frequency (n)	Percentage (%)
Washing of hands before eating during break	No	719	77.9
	Yes	204	22.1
	Total	923	100
Washing of fruits before eating	No	90	9.8
	Yes	831	90.2
	Total	921	100
Washing of hands after visiting the toilet	No	189	30.5
	Yes	431	69.5

Variable	Level	Frequency (n)	Percentage (%)
What pupils use to wash their hands	Total	620	100
	Disinfectant	14	1.7
	Soap and water	106	13.1
	Soap, water and disinfectant	5	0.6
	Water	687	84.6
Circumstances when pupils wash their hands	Total	812	100
	After shaking hands with people	2	0.2
	After eating	310	33.6
	After playing	255	27.7
	When my hands are dirty	507	55
	After cleaning my nose	272	29.5
	After touching rubbish	598	64.9
	After sneezing	2	0.2
	After picking up anything from the ground	28	3
	When I come back from school	700	75.9
	Total	2674	290
Bathing before coming to school	No	16	1.7
	Yes	907	98.3
	Total	923	100
Brushing of teeth before coming to school	No	3	0.3
	Yes	920	99.7
	Total	923	100

Hygiene practices by pupils were scored on a scale of 18 points. Overall, it was observed that, 875(94.8%) practiced poor hygiene, while 48(5.2%) practiced good hygiene (Figure 2).

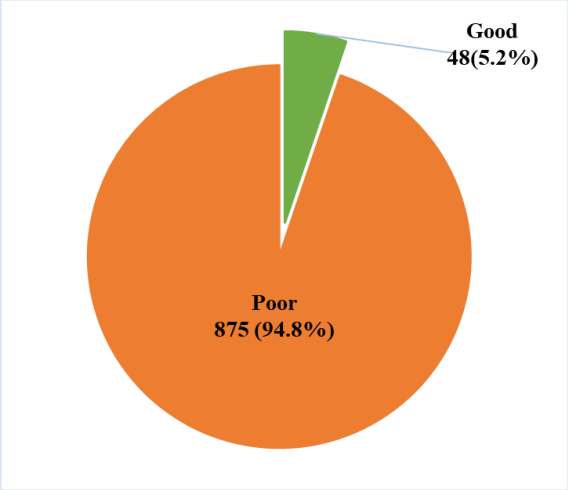

Figure 2. *Overall hygiene practices of the pupils in the Buea Municipality.*

3.4. Sanitation Practices in Primary Schools in the Buea Municipality

A checklist was used to assess sanitation practices in primary schools. It was observed that all schools had toilet facilities with only 15 (57.7%) hand washing facilities. Also, 18(69.2%) schools did not have separate boys'/girls' toilets. Twenty-three (88.5%) of the schools' toilets were dirty. The majority of 22(84.6%) of the schools did not practice open defecation. More so, 17(65.4%) of the schools had waste littered around the school premises. Eighteen (69.2%) of the classrooms were dirty. Waste disposal by burning was observed in 11(42.3%) schools. School canteens were available only in 5 (19.2%) schools of which 3(11.5%) were nasty (Table 4).

Table 4. Sanitation state in primary schools in the Buea municipality.

Variable	Level	Frequency (n)	Percentage (%)
Presence of toilets in school	Yes	26	100
Hand washing facilities are inside, next to, or very near latrines	No	8	53.3
	Yes	7	46.7
	Total	15	100
School has separate boys/girls' latrines	Yes	8	30.8
	No	18	69.2
	Total	26	100
Hygiene state of toilet	Clean	3	11.5
	Dirty	23	88.5
	Total	26	100
Practice open defecation	No	22	84.6
	Yes	4	15.4
	Total	26	100
Waste is lithered around the school premises	No	9	34.6
	Yes	17	65.4
	Total	26	100
State of the classroom	Clean	8	30.8
	Dirty	18	69.2
	Total	26	100
Method of waste disposal	Burnt	11	42.3
	Dumped in waste bin	5	19.2
	Dumped in school yard	10	38.5
	Total	26	100
Hygienic condition of canteen or area where food is sold in school	Clean	2	7.7
	Dirty	3	11.5
	No school canteen	21	80.8
	Total	26	100
Sanitation state of pupils' toilet	Visible fecal residues	44	84.6
	Urine present on the floor of the toilet	30	57.7

Variable	Level	Frequency (n)	Percentage (%)
	Toilet filled with flies	12	23.1
	Water on the floor of the toilet	34	65.4
	Toilet smells	43	82.7
	Anal cleaning material lithered in or around the toilet	25	48.1
	Total	188	361.6

All the pupil's toilets were pit toilets. It was observed that 43(82.7%) of the pupils' toilets smelled with 29(60.4%) showing water on the floor visible faecal residue on the floor, wall, door, or around the hole of the toilet, and 34(65.4%) had liquid waste on the floor; 17 (35.4%) urine present on the floor. Only 9 (18.8) toilets inspected showed faecal residues (Table 5).

Table 5. *Sanitation state of the primary schools in the Buea municipality.*

Variable	Level	Frequency (n)	Percentage (%)
Sanitation state of pupils' toilet	Visible fecal residues	44	84.6
	Urine present on the floor of the toilet	30	57.7
	Toilet filled with flies	12	23.1
	Water on the floor of the toilet	34	65.4
	Toilet smells	43	82.7
	Anal cleaning material (tissue paper) lithered in or around the toilet	25	48.1
Sanitation state of staff toilet	Visible fecal residues	9	18.8
	Urine present on the floor of the toilet	17	35.4
	Toilet filled with flies	4	8.3
	Water on the floor of the toilet	29	60.4
	Toilet smells	31	64.6
	Anal cleaning material lithered in or around the toilet	7	14.6

Regarding the state of the toilets in primary schools, all the pupils' toilets had roofs. Twenty-four (92.3%) of the toilets had no tissue present. Twenty-one (80.8%) of the toilets had a hand-washing point with soap beside the toilet. Also, 25(96.2%) of the toilets had washable floors. Eighteen (69.2%) of the toilets had doors with locks for privacy. All the toilets did not have a basket for dumping wiping material. Also, 17(65.4%) of the schools had trashcans on the school campus (Table 6).

Table 6. *Sanitation state of the primary schools in the Buea municipality.*

Variable	Level	Frequency (n)	Percentage (%)
Structural state of the pupils' toilet	Window present	23	92

Variable	Level	Frequency (n)	Percentage (%)
	Door present	21	84
	Door locked	9	36
	Have roof	25	100
	Have roof but it's leaking	1	4
	Total	79	316
	Window present	22	88
	Door present	23	92
Structural state of the staff toilet	Door locked	16	64
	Have roof	23	92
	Total	84	336
	Absent	24	92.3
Presence of tissue in the toilet	Present	2	7.7
	Total	26	100
	Absent	21	80.8
Presence of a hand-washing point with soap beside the toilets	Present	1	3.8
	Present but without soup	4	15.4
	Total	26	100
	No	1	3.8
Latrines have washable floors	Yes	25	96.2
	Total	26	100
	No	18	69.2
Latrines have doors with locks for privacy	Yes	8	30.8
	Total	26	100
Presence of a basket for dumping of used wiping material	No	26	100
	Absent	9	34.6
Presence of trash can/ waste bin in the school campus	Present	17	65.4
	Total	26	100

Overall sanitation practice in the schools was assessed on a scale of 38 points. Schools that scored ≤19 were considered to have poor sanitation practices while schools that scored >19 were considered to have good sanitation practices. Overall, of the 26 primary schools, 15 (57.7%) had poor sanitation practices while 11(42.3%) schools had good sanitation practices.

The overall sanitation state of the school toilets was graded on a total score of 6 points and toilets that had scores ≤3 were considered to have a poor sanitation state while toilets that had a score >3 were considered to have a good sanitation state. It was observed that 18(69.2%) of the pupils' toilets and 13(50%) of the staff toilet were in a poor sanitation state (Figure 3).

3.5. Association Between Demographic Factors and the Practice of Hygiene and Sanitation in Primary Schools in the Buea Municipality

The pupil's practice of hygiene was significantly associated with school type (χ^2 = 46.44, p<0.001) and gender (χ^2=3.96, p=0.047) (Table 7). There was no significant association between sanitation practices in primary schools and any of the predictors.

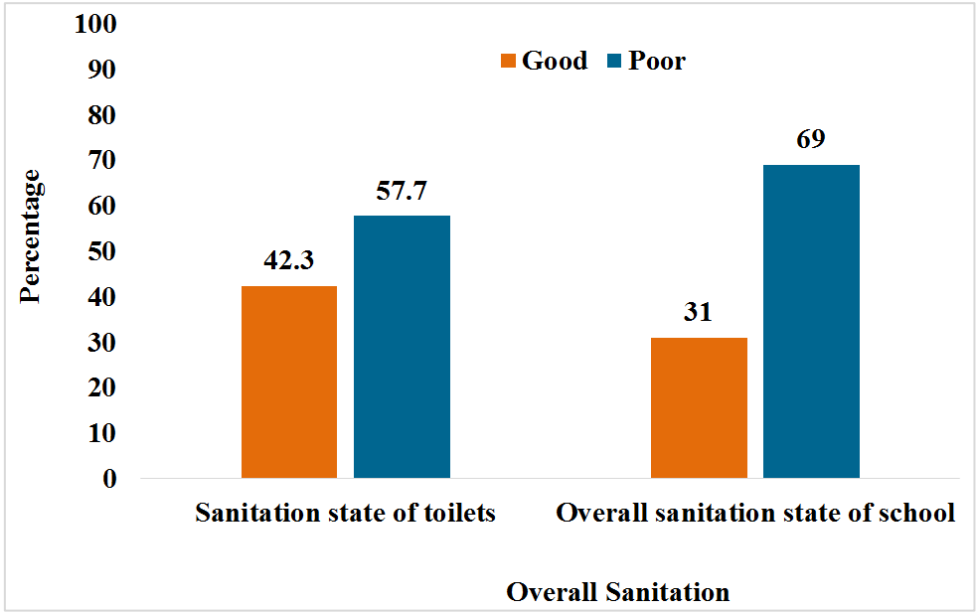

Figure 3. *Sanitation state of the primary schools (overall sanitation practice and sanitation of school toilets) in the Buea Municipality.*

Table 7. *Association between hygiene practices and demographic characteristics of pupil's in in primary school in the Buea Municipality.*

Variable	Level	n	Practice categories		Chi-square	P-value
			Good	Poor		
School type	Government	451	23(5.10)	428(94.90)	46.439	<0.001
	Mission	299	0(0.00)	299(100)		
	Lay Private	173	25(14.45)	148(85.55)		
	Total	923	48(5.20)	875(94.80)		
Gender	Female	526	34(6.46)	492(93.54)	3.960	**0.047**
	Male	397	14(3.53)	383(96.47)		
	Total	923	48(5.20)	875(94.80)		
Age group	11 _ 13	533	34(6.38)	499(93.62)	5.434	0.069
	14 _ 17	79	5(6.33)	74(93.67)		
	8 _ 10	311	9(2.89)	302(97.12)		
	Total	923	48(5.20)	875(94.80)		
Level of educational	Class 5	562	28(4.98)	534(95.02)	0.139	0.709
	Class 6	361	20(5.54)	341(94.46)		
	Total	923	48(5.20)	875(94.80)		

Regarding the association between the pupils' hygiene practices and water availability, there was a significant association between availability of a water source (χ^2= 27.128, p<0.001) and source of water (χ^2= 10.042, p=0.002) (Table 8).

Table 8. Association between pupils' hygiene practices and water availability.

Variable	Level	n (%)	Practice categories		Chi-square	P-value
			Good	Poor		
Availability of a water source	No	322(34.89)	0(0)	322(34.89)	27.13	<0.001
	Yes	601(65.11)	48(5.20)	553(59.91)		
	Total	923(100)	48(5.20)	875(94.80)		
Source of water	Borehole	44(7.32)	9(1.50)	35(5.82)	10.04	0.002
	Tap	557(92.68)	39(6.49)	518(86.19)		
	Total	601(100)	48(7.99)	553(92.01)		
Constant water supply	No	477(79.37)	41(6.82)	436(72.55)	1.17	0.280
	Yes	124(20.63)	7(1.16)	117(19.47)		
	Total	601(100)	48(7.99)	553(92.01)		

3.6. Reasons for Poor Hygiene Practice Among Pupils

With regards to reasons for the poor hygiene practice by pupils, water scarcity 434(61.4%), lack of hand-washing facilities 105(55.9%), forgetfulness 339(47.9%), distance to the tap 81(11.5%) and lack of soap 59(8.3%) were the main reasons given by pupils. The main reasons for not washing their hands after using the toilets were water scarcity145 (77.1%), lack of hand washing facilities 105(55.9%), forgetfulness 36 (19.1%) and others (distant taps, lack of time) (Table 9).

Table 9. Reasons for poor hygiene practice among pupils in primary schools in Buea municipality.

Variable	Level	Frequency (n)	Percentage (%)
Reasons for pupils not washing their hands before eating during break	Lack of Hand-washing facilities	169	23.9
	Soap is not available	59	8.3
	Distant taps	81	11.5
	Lack of time	26	3.7
	Forgetfulness	339	47.9
	Water scarcity	434	61.4
	Crowded tap	11	1.6
	No need	23	3.3
	Dirty Hand-washing facilities	17	2.4
	Total	1159	163.9
Reasons for the pupils not washing their hands after toilet use	Distant tap	19	10.1
	No hand-washing facility	105	55.9
	Lack of time	9	4.8
	Forgetfulness	36	19.1
	Water scarcity	145	77.1

Variable	Level	Frequency (n)	Percentage (%)
	Total	314	167

4. Discussion

The aim of this study was to assess water availability, sanitation, and hygiene practices in primary schools in the Buea Municipality.

4.1. Water Availability in Primary Schools

Regarding water availability in primary schools, 15 of the schools had a water source of which water was available only in 5 schools at the time of the study. These findings depict the scarcity or unavailability of water in primary schools in the Buea Municipality. The presence of water sources in schools did not correlate with the availability of water. This lack of water could be attributed to the water crisis in the Buea Municipality as reported by ERuDeF [18]. These findings are in line with those of Manjong-Kofete et al., [15] that reported water shortage in most educational institutions in Cameroon. Our findings are in contrast with the 22% and 16% water source reported by Ateudjieu's study in the Dschang Health District [16] and Appiah-Brempong, et al., in Ghana [20].

In terms of water availability, our findings are in line with a similar study conducted in Ghana which reported that 37.9% of primary schools had access to potable water [21]. Our findings are in contrast with a study carried out in Tanzania which revealed that a greater proportion (53%) of primary schools had a reliable water supply [22].

4.2. Hygiene Practices in Primary Schools

Hygiene practices in primary schools surveyed were poor with only 5% of pupils practicing good hygiene. This low hygiene practice observed in this study is a call for concern, especially during the COVID-19 pandemic [23] period and the recurrent epidemics of cholera in the South West region of Cameroon [24, 25]. Reasons for the poor hygiene practice in schools could be due to scarcity of water since only 5 schools had water available at the time of the survey. Other reasons advanced by pupils were forgetfulness, lack of hand washing facilities in schools, and distance of water source. In a study carried out in Southern Ethiopia, only 30.4% of pupils practiced good hygiene [26]. Our findings are in contracts with those of Assefa et al., who reported good hygiene practice in 61.7% of primary school pupils [27].

It is therefore important for the school administration to improve WASH facilities in schools and to enhance the hygiene practice of primary school children through hygiene education in primary schools.

It was observed that a small proportion of pupils (22.1%) washed their hands before eating during the break. This is in line with a study carried out by Admasie et al., in Damote Woide District, South Ethiopia which reported that 25.8% of the pupils washed their hands before meals [28]. Our findings are in contrast with those of Vivas et al., in Ethiopia which showed that most students reported hand washing before meals (99.0%) [29]. In our study, 69.5% of pupils washed their hands after visiting the toilet which is a good practice to encourage in school. Ohaka et al., in Owerri, Imo State in Nigeria reported that 73% of the pupils always washed their hands after using the restroom [30]. A study conducted in Bamenda municipality also reported a gap between toilet usage and hand washing after defecation [15].

Only 13.1% of the pupils washed their hands using water and soap. Vivas et al., reported that 36.2% of pupils used soap during hand washing [29]. Another study carried out in Nigeria reported that only 30% of the pupils practiced hand-washing with soap and water while at school [31]. Even though some fraction of pupils washed their hands before eating or after using the toilet their hands are not properly washed which still predisposes them to infectious diseases. Even though the overall hygiene practice of the pupils was poor, some aspects of the hygiene practice were good including brushing their teeth and bathing before coming to school.

4.3. Sanitation Practices in Primary Schools

Overall, a greater proportion of primary schools had poor sanitation practices. This could be due to the lack or scarcity of water as well as poor implementation of sanitation practices by the schools. Our findings are in line with those of Stanley et al., in Nigeria who reported an unsatisfactory sanitation practice in schools [32].

With regards to the sanitation state of the school toilets, the pupils' toilets were in a poorer sanitation state compared to the staff toilets. It was reported in previous findings that most of the educational institutions in Cameroon have poorly managed toilet facilities [15]. A study carried out in Nigeria also reported poor sanitation practices in primary schools [32].

4.4. Association Between Hygiene and Sanitation Practice in Primary Schools in the Buea Municipality

The hygiene practice of the pupils was significantly associated with their school type, availability and the source of water, and gender. Pupils attending mission schools had the

poorest hygiene practice followed by pupils in government schools. It is probable that the implementation of sanitation measures was neglected in such schools. Also, males had poorer hygiene practice compared to females. It is obvious that pupils in schools with available water had better hygiene practices compared to those without a water source since water availability is one of the key components of WASH. Lack of water can greatly compromise the implementation of WASH in schools.

5. Conclusions

The availability of water in primary schools in the Buea Municipality was poor. The hygiene and sanitation practices of pupils in primary schools in the Buea Municipality were poor and might expose pupils to poor hygiene-related diseases. The major factors that influenced the hygiene and sanitation practices of pupils in primary schools in the Buea Municipality were: school type, gender, availability of a water source, and source of water. This study provides baseline data to inform a public health intervention by the Ministry of Basic Education to enforce implementation of WASH practices in primary schools in the Municipality.

Abbreviations

COVID-19	Corona Virus Disease-19
WASH:	Water Sanitation and Hygiene
WHO	World Health Organization
CAMWATER	Cameroon Wa ter Utilities Corporation
ERuDef	Environment and Rural Development Foundation
CBC	Cameroon Baptist Convention
CNPS	Catholic Nursery and Primary School
GS	Government School
CS	Catholic School
PS	Presbyterian School
GPS	Government Primary School
UNICEF	United Nations Children's Fund

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Author Contributions

Tendongfor Nicholas: Conceptualization, Formal Analysis, Methodology, Supervision, Validation, Writing - review & editing

Carine Ndum Asu: Conceptualization, Data curation, Formal Analysis, Methodology, Resources, Validation, Writing - original draft, Writing - review & editing

Epey Felicite Ngale: Data curation, Validation, Writing - review & editing

Simon Eyongabane Ako: Supervision, Validation, Writing - review & editing

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Conflicts of Interest

The authors declare no conflict of interests.

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