Explanatory Factors for Low Access to Water, Hygiene, and Sanitation in Schools in Kinshasa, DR Congo

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Abstract

Background: Kinshasa's urban and peri-urban areas have limited access to water, hygiene, and sanitation. SDG 6 calls for universal and equitable access to WASH by 2030. This situation predisposes pupils to the risk of infection and a drop in their educational performance.

Methods: An analytical cross-sectional study was conducted from May 2024 to Dec. 2024 in the educational provinces of Mont-Amba, Lukunga, and Tshangu, with 149 schools selected using 3-stage probability sampling. The data were analyzed using STATA V17.

Results: This study showed that 32% of the schools had a budget for WASH and a hygiene committee. Ninety percent implemented hygiene and sanitation promotion strategies and policies. Only 5.47% of the schools received WASH intervention. 54% of the schools had a water point, with 73% in urban areas and 23% in peri-urban areas (P =0.000). The study also showed that 96.88% of schools had latrines.

Conclusion: This study focused on identifying the factors that explain low access to WASH services. Only the status of schools and the lack of a budget explained the low access rate to WASH.

Keywords: Water Sanitation Hygiene, WASH, School, Kinshasa

Introduction

Water, Sanitation, and Hygiene (WASH) is among the most basic human health needs. Equitable access to these three elements was recognized in 2010 by the United Nations General Assembly as a human right, and this decision was reaffirmed in the same year by the Human Rights Council. However, numerous studies have shown that access to these amenities is still inadequate (Nlunda et al., 2023) in many countries. According to the Sustainable Development Goal (SDG) 6.2, by 2030, equitable access to adequate sanitation and hygiene should be ensured, and open defecation should end, with particular attention to the needs

of women, girls, and people in vulnerable situations. However, the data compiled by the Joint Monitoring Program (JMP) reveals the progress made and highlights the inequalities that persist in the sanitation sector (Compact, 2018; Garn et al., 2014; OMS & UNICEF, 2020). According to the WHO/UNICEF Joint Program on Water and Sanitation 2023 report, 2.2 billion people, or 28% of the population of developing countries, lack basic sanitation facilities, and more than 115 million people still drink untreated surface water. Nearly two billion people lack access to sanitation, with thousands of children dying every day from diarrheal diseases and other waterborne illnesses caused by poor sanitation and hygiene (WHO & UNICEF, 2023).

An estimated 1.9 billion school days could be saved if the Millennium Development Goals for safe water supply and sanitation were met and the incidence of diarrheal diseases was reduced (Blanton et al., 2010; Morgan et al., 2021; UNICEF, 2012). The rural population changed little between 2000 and 2022 (from 3.3 billion to 3.4 billion) (USAID, 2020; WHO & UNICEF, 2023).

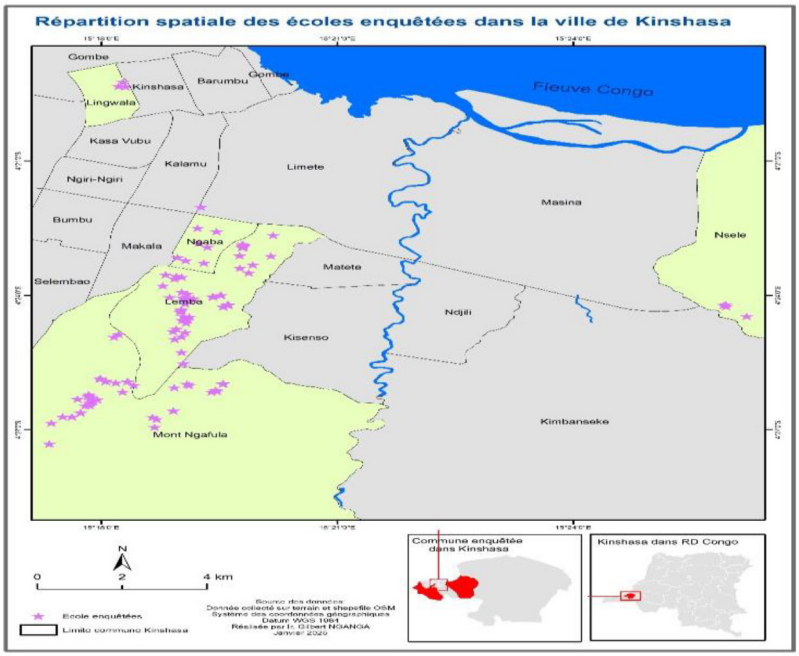
The results of the 2006 JMP study showed that 19% of schools had no drinking water supply (no improved water point or no water point), and almost 570 million pupils had no basic drinking water supply in their schools. Less than half of the schools in Oceania and only two-thirds in Central and Southeast Asia had basic drinking water services. Nearly half of the schools in Sub-Saharan Africa and over a third of Small Island Developing States schools had no drinking water supply. The coverage of basic drinking water services was lower in rural schools than in urban schools in almost all countries with disaggregated data. One in four elementary schools and one in six secondary schools had no drinking water supply (OMS/UNICEF/JMP, 2006). Investments in the WASH sector are direct investments in public health and well-being, contributing to a happier and healthier population, increased productivity, job creation, and socioeconomic development (USAID, 2020).

As of 2015, the Democratic Republic of Congo (DRC) had a 36% coverage rate for improved water points connected to schools. Globally, 287 million students lack access to water services in their schools, with the DRC shouldering a significant burden of 18 million students. In 2019, 63% of schools worldwide had basic sanitation services, but the level of coverage varied greatly by region (Appiah-Brempong et al., 2018; Luxembourgeoise et al., 2002; OMS & UNICEF, 2020). Since 2006, the DRC has undertaken sectoral reforms that have paved the way for improvements in the delivery of public services. Access to WASH infrastructure in rural and peri-urban areas is supported by the National Rural Hydraulic Service and government partners such as UNICEF, USAID, UK aid, and Oxfam through the National Sanitized Schools and Villages Program (NSSVP), a joint program of the National Ministries of Health and Education. In Kinshasa, the supply of and access to drinking water

are characterized by numerous disparities and inequalities based on insufficient connections to the industrial water distribution network in central areas. In contrast, peri-urban areas remain poorly connected to industrial water-distribution networks (Nlunda et al., 2023).

Figure 1

Map of Surveyed Schools in the Kinshasa Province



A study by Nlunda et al. (2023) in Kinshasa showed a water point coverage of 10.9% in schools and a latrine coverage of 98.2%, of which 3.6% was considered hygienic, with an average urinal coverage of 13.9%. The same study revealed that laundry coverage was 2.4%, menstrual hygiene management facilities for girls had coverage of 7.2%, and handwashing facilities had coverage of 43%. Poor sanitation contributes, directly or indirectly (through contaminated drinking water and contaminated hands), to an estimated 830,000 deaths and the loss of more than 49 million disability-adjusted life years due to diarrheal diseases as well as to many other disorders and diseases, including those resulting from inadequate wastewater management practices, malnutrition, geo-helminthiasis, trachoma, schistosomiasis, and lymphatic filariasis (OMS & UNICEF, 2020). There is a growing body of documented evidence demonstrating the positive impact of WASH services in schools not only on children's health but also on their education (e.g., absenteeism, school results, etc.) (Blanton et al.,

2010; Habtegiorgis et al., 2021; Trinies et al., 2016). It is estimated that 1.9 billion school days are lost annually in developing countries when WASH targets are unmet (Dieudonne, 2016). According to 2019 data, in Africa, 34% of schools lack water services, 23% lack sanitation services, and 46% have no access to water or basic hygiene facilities (USAID, 2020).

This situation prompted us to conduct a study that could answer the following research question: What factors explain the low level of access to water, hygiene, and sanitation (WASH) in schools in the provincial city of Kinshasa in DR Congo? Therefore, the primary goal of this study was to identify the factors contributing to low access to water, hygiene, and sanitation in schools across Kinshasa Province.

Methods

The study was conducted in Kinshasa in schools in five Educational Sub-Provinces (ESP): Lemba, Ngaba, Lingwala, Mont-Ngafula, and N'sele, as shown in Figure 1. Kinshasa is the capital of the DRC and is divided into five Educational Provinces (EP): Funa, Tshangu, Mont-Amba, Lukunga, and Plateau. Each EP is further divided into educational subprovinces (ESP).

Study Design

A cross-sectional analytical study was conducted between June and December 2024 in the Educational Provinces in Kinshasa Town.

Sample Size Determination

The following formula was used to calculate the sample size:

$$\mathbf{n} \geq \frac{Z^2 \alpha\, pq}{d^2}$$

where n is the desired minimum sample size when the study population is greater than 1000, Z is the confidence coefficient with a 95% confidence interval, and Z^2 1.96; p is the proportion of schools with an improved water point at the time of the survey in the city of Kinshasa (Nlunda et al., 2023), which is 10.9; d^2 is the degree of accuracy desired (d= 0.05).

$$\mathbf{n} \geq \frac{1{,}96^2 x 0{,}10.9 x 0{,}891}{0{,}05^2} = 149 \text{ Schools}$$

Study Population and Sampling

The study population consisted of all schools selected by systematic sampling in the educational sub-provinces of the city of Kinshasa. The respondents were the heads of schools or their delegates. We carried out a three-stage probability sampling, which consisted of the first step aimed at dividing the educational sub-provinces into clusters; we divided the sub-provinces into two clusters, the first consisting of educational sub-provinces in urban areas and the second of educational sub-provinces in peri-urban areas.

Selection of educational sub-provinces per cluster: Three educational sub-provinces were selected using simple random sampling from the ballot box for the urban cluster. Two educational sub-

provinces were selected for the peri-urban cluster, using simple random sampling.

Selection of schools by educational sub-province: The 149 schools were distributed in proportion to the number of schools in each sub-province. Schools were selected for each sub-province using systematic sampling.

Data Collection Procedure

Data was collected using a survey questionnaire and observation grid adapted from the UNICEF data collection instrument (WHO/UNICEF, 2019). The questionnaire, deployed on an Android phone using the KoboCollect application, was administered to school leaders or their delegates in five educational sub-provinces, three urban areas, and two peri-urban areas. Furthermore, Direct observations of the WASH-related infrastructure were made. These observations focused on assessing the current state of water supply, hand hygiene, sanitation systems (toilets, drinking water points, and handwashing facilities), and menstrual hygiene kits available in schools. The survey questionnaire was pre-tested in one school in the educational sub-province that was not selected for the study prior to data collection. During this pretest, we evaluated the participants' reactions to the procedure, the data collection instruments, the interviewers' competence, and the time required for each interview.

Study Variables

Response Variables

Access to drinking water was defined for a school with access to drinking water from an improved source (tap in the schoolyard, standpipe, well, borehole, protected well, improved spring) on school premises, capable of covering the minimum daily requirement of 5l/day/pupil at the time of the survey.

Access to sanitation was defined for all schools with hygienic latrines (connected to a septic tank with manual or mechanical flush, VIP latrine, and double-cabin latrine) separated by gender and taking into account living persons with disability needs, if necessary, with a latrine ratio of one toilet for every 30 girls and 60 boys.

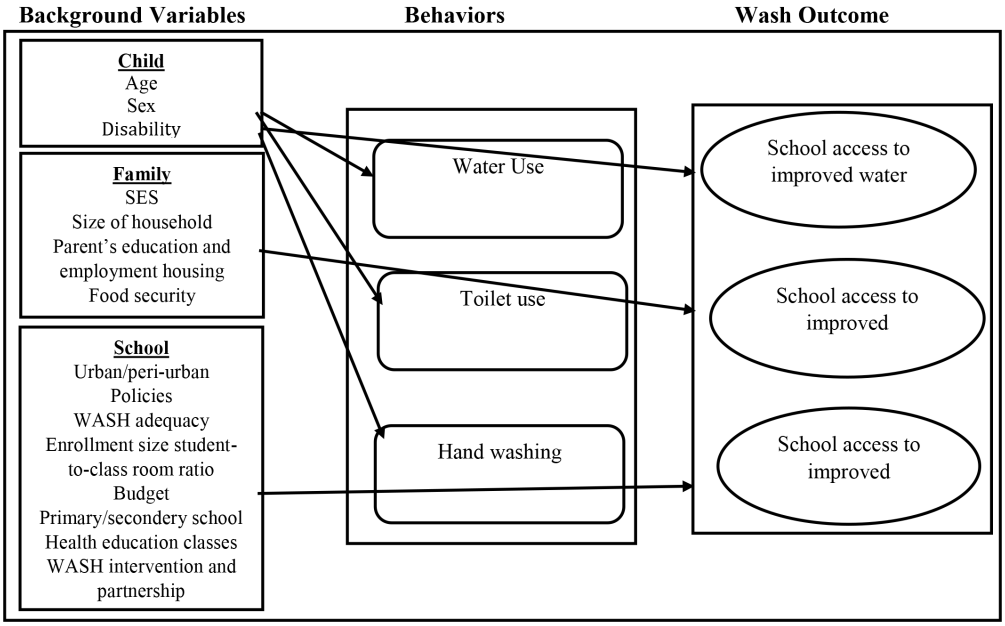
Access to Hygiene was considered for a school to have a reliable handwashing facility with soap or alcohol-based hand cleansers available at every critical point (at the entrance to or inside latrines, at the entrance to classrooms, and at the entrance to the school canteen) (Girmay et al., 2023).

Explanatory Variables

The predictor variables of this study were the sex of the school directors, ownership of the schools, hygiene and environmental health clubs or WASH clubs, budget line designated for WASH, type of school, and at least one weekly lesson on WASH services. The explanatory variables in this study were chosen based on earlier research (Girmay et al., 2023). Figure 2 also shows the conceptual framework of the study.

Figure 2

Conceptual Framework for Water, Sanitation, and Hygiene (WaSH) in Schools



Adapted from Sangalang et al. 2019 (Sangalang et al., 2021).

Data Analysis

After rigorous quality control, the databases collected in the schools were extracted from the server in Excel format and cleaned. The data were exported to STATA (version 17.0). The normality of the quantitative variables was checked using the Kolmogorov-Smirnov test. Levene's test for the equality of variance was also performed. Descriptive statistical analyses were used to describe existing WASH facilities in schools. Relationships between the main variables, proportions, and differences in means or medians between educational provinces were determined using Student's t-test, Kruskal-Wallis test, and chi-square test. Differences were considered significant when the p-value was less than 0.05. Associations between categorical variables were checked using the chi-square homogeneity test, and multivariable binary logistic regression analyses were used. To measure the level of WASH services in schools, we used Table 1, which is used by the WHO and UNICEF in their JMP reports.

Table 1

JMP Ladders for Water, Sanitation, and Hygiene Services in School Facilities

Service level	Definition
Drinking-water service ladders	
advanced service	Additional criteria may include quality, quantity, continuity, and accessibility to all users
Basic service	The proportion of schools (including pre-primary, primary, and secondary) with drinking water from an improved water source available at the school
Limited service	Drinking water from an improved source, but water is unavailable at the school at the survey time
No service	Drinking water from an unimproved source or no water source at the school
Hygiene service ladders	
advanced service	Additional criteria may include hygiene education, group handwashing, menstrual hygiene materials, and accessibility to all users
Basic service	During the survey, handwashing facilities with water and soap were available at the school
Limited service	Handwashing facilities with water but no soap available at the school at the time of the survey
No service	No handwashing facilities available or no water available at the school
Sanitation Service Ladders	
advanced service	Additional criteria may include student per toilet ratios, menstrual hygiene facilities, cleanliness, accessibility to all users, and excreta management systems
Basic service	Having improved sanitation facilities at the school that were single-sex and usable (available, functional, and private) at the survey
Limited service	Improved sanitation facilities at the school that are either not single-sex or not usable at the survey time
No service	Unimproved sanitation facilities or no sanitation facilities at the school

(Ashu et al., 2021)

Results

Sociodemographic Characteristics of the Schools

One hundred twenty-eight head teachers and their delegates participated in the survey, resulting in an 85.90% response rate. The survey included 75 schools (58.59%) from urban educational subprovinces (Lemba, Ngaba, and Lingwala) and 53 schools (41.41%) from peri-urban educational subprovinces (Mont-Ngafula and N'sele).

Table 2 shows that 95% of the schools did not receive any intervention in this area from their WASH partners. In addition, 67% had no budget allocated for WASH activities. The average number of boys and girls in the schools surveyed was 177±99 and 221±155, respectively, with a minimum of 0 and a maximum of 629 for boys and 27 to 1,150 for girls.

Table 2

Sociodemographic Characteristics of the Schools

Variables		**n**	**(%)**
Sex of the head of the schools			
Male		115	89.86
Female		13	10.16
Ownership of the schools			
Public schools		13	10.16
Private schools		71	55.47
Denominational schools		44	34.88
Budget line for WASH-related activities			
Yes		42	32.81
No		86	67.19
Having hygiene and environmental health club			
Yes		42	32.81
No		86	67.19
Hygiene promotion strategies			
Yes		116	90.63
No		12	9.38
Hygiene and sanitation promotion method			
Posters		7	5.47
Courses		40	31.25
Extracurricular activities		51	39.84
Awareness		22	17.19
Other		1	0.78
Have received WASH intervention			
Yes		7	5.47
No		121	94.53
Average number of pupils	**Mean**		**Min-Max**
Total	399.26± 231.67		39-1618
Mean number of girls students	177.43±99.38		0-629
Mean number of boys students	221.76±155.74		27-1150

Access to WASH Services in Schools

Figure 3 shows that 22% of the schools had access to basic drinking water, 10% to basic sanitation, and 33% to basic hygiene. However, 66% had limited access to drinking water, 26.56% had limited access to hygiene, and 60.16% had limited access to sanitation.

Figure 3

Access to Basic WASH Services Among School Facilities of Kinshasa Town

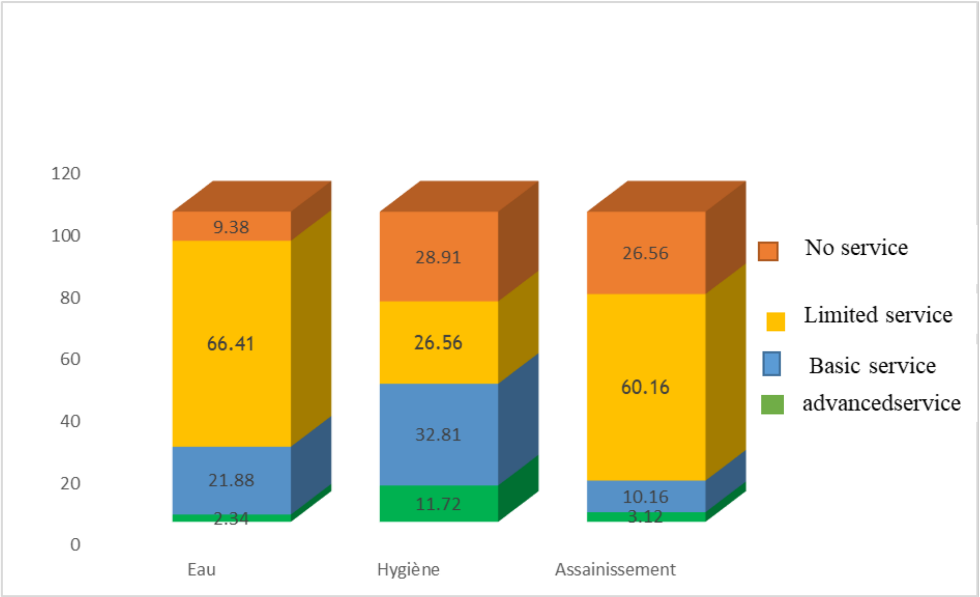


Table 3 show that most urban schools have a water point inside, unlike suburban schools, where most obtain water outside. Regarding drinking water treatment in urban settings and peri-urban schools, an average of 7% of the schools treated their drinking water. Regarding water collection in schools, 42% of urban schools and 33% of suburban schools used workers. Male students were assigned to water collection in 1.33% of the schools in urban settings and 1.89% in suburban settings.

School Characteristics in Relation to Access to Water

Table 3

Distribution of Schools by Access to Water Service

Variables	Urban setting		Peri-urban setting		p-value
	N=75	%	N=53	%	
Availability of water point					
Yes	55	73.33	14	26.41	**<0.01***
No	20	26.66	39	73.58	
Source of water supply					
REGIDESO	52	69.33	2	3.77	**<0.01***
Drilling	39	52.00	47	88.67	**<0.01***
Rainfall	31	41.33	48	90.57	**<0.01***
Well	3	4.00	31	58.49	**<0.01***
Bottles	24	32.00	4	7.55	**<0.01***
Water supply system					
No supply system	1	1.33	9	16.98	
Water point inside school	24	32.00	30	56.60	**<0.01***
Water point outside school	50	66.67	14	26.24	
Water quantity per pupil					
Sufficient (≥5l/student/day)	1	1.33	0	0.00	1.000
insufficient (≥5l/student/day)	74	98.67	53	100.00	
Water treatment practice					
Yes	4	5.33	5	9.43	0.487
No	74	94.66	48	90.56	
Water quality control					
Yes	5	6.67	0	0.00	0.076
No	70	93.33	53	100.00	
Water collection					
Yes	39	52.00	36	67.92	0.072
No	36	48.00	17	32.07	
People who collect water					
Manual workers	32	42.11	18	33.96	**<0.01***
Male students	1	1.33	1	1.89	
All sexes combined	1	1.33	0	0.00	
Pupils punished	0	0.00	1	1.89	
Third-party purchases	5	6.66	16	30.18	

** The difference is statistically significant. P < 0.05.*

Hygiene-Related Characteristics of Surveyed Schools

The data in Table 4 show that only 5.47% of the schools had handwashing facilities next to the latrines in both settings. Only 16.41% of the schools had soap next to handwashing facilities. 24% of schools in urban settings and 56% of schools in suburban settings did not have water in their handwashing facilities. The girl/toilet and boy/toilet ratios in urban settings and suburban schools were 129 girls per latrine in urban settings versus

86 girls per latrine in suburban settings and 114 boys per latrine in urban settings versus 76 boys per latrine in suburban settings.

Table 4

Distribution of Schools with Access to Hand Hygiene in the City of Kinshasa

Study variables	Urban setting		Peri-urban setting		p-value
	N=75	%	N=53	%	
Hand washing devices					
Yes	64	85.33	30	55.60	**<0.01***
No	11	14.67	23	43.39	
Water supply to handwashing basin					
Yes	57	76.00	22	41.51	**<0.01***
No	18	24.00	31	58.49	
Soap availability					
Yes	18	24.00	3	5.66	**<0.01***
No	57	7600	50	94.34	
Using hydro-alcoholic gel	N=38	M	N=27	%	
Yes	0	0.00	1	3.85	0,415
No	38	100.00	26	96.29	
Handwashing device next to latrine					
Yes	6	7.69	1	1.89	0.238
No	69	88.46	52	98.11	

*The difference is statistically significant. $P < 0.05$

Distribution of Surveyed Schools in Relation to Access to Sanitation

Table 5 shows that 95% of school latrines were functional at the time of the survey. In terms of latrine type, the majority of schools had latrines connected to septic tanks. With regard to the number of latrines, the table shows that 99% of schools had an insufficient number of latrines for girls, and 84% of schools had an insufficient number of latrines for boys in urban settings and 66% in suburban settings.

Table 5

Distribution of Surveyed Schools in Relation to Access to Sanitation

Study variables	Urban setting		Peri-urban setting		P-value
	N=75	%	N=53	%	
Presence of latrine at time of survey					
Yes	71	94.67	53	100.00	0.141
No	4	5.33	0	0.00	
Functional latrines					
Yes	71	94.67	51	96.23	1.000
No	4	5.33	7	3.77	
Separate latrine					
Yes	69	92	46	86.79	0.337
No	6	8.00	7	13.21	
Latrine for people with disabilities					
Yes	4	5.33	1	1.89	0.403
No	71	94.67	52	98.11	
Ratio girls/latrine					
Sufficient (30 girls or less/latrine)	1	1.33	1	1.89	1.000
Insufficient (more than 30girls/latrine)	74	98.67	52	98.11	
Ratio boys/latrine					
Sufficient (60 boys or less/latrine)	12	16.00	18	33.96	**0.018***
Insufficient (More than 60 boys /latrine)	63	84.00	35	66.03	

Distribution of surveyed schools by number of latrines

	Urban setting N=75		Peri-urban setting N=53		p-value
	Mean	(95% CI)	Mean	(95% CI)	
Total	6,82±3.24	(6.07;7.58)	4.94±0.28	(4.39 ;5.49)	<0.01*
Number girls latrines	2.41±0.28	(1.85; 2.98)	1.81±0.09	(1.62 ;2.01)	<0.01*
Number boys latrines	2.03±0.10	(1.82; 2.23)	1.60±0.81	(1.38 ;1.83)	<0.01*
Number men latrines	1.08±0.97	(0.86; 1.31)	0,64±0.59	(0.48 ;0.80)	<0.01*
	1.31±1.25	(1.02; 1.60)	0,88±0.37	(0.96 ;1.30)	0.018*
Ratio Girl/latrine	129.21±98.32	(106.28;152.15)	85.87±30.70	(77.32; 94.42)	0.003*
Ratio of boys to girls	113.63±77.70	(95.23 ;132.01)	75.66±25.44	(68.11 ;83.218)	0.002*

**: The difference is statistically significant. P < 0.05*

Table 6 shows the significant association between two explanatory factors (school status and having a budget line specifically for WASH) and the provision of basic hygiene and sanitation services. With regard to access to water, only the possession of a budget line specifically for WASH showed a significant association with the provision of basic water services, with an Odd Ratio of 0.27 (0.08;0.89) and a p<0.05 (0.031).

Multivariate Analysis of Explanatory Factors for WASH Services in Schools

Table 6

Multivariable Logistic Regression Analysis (n = 128)

Study variables	Wald	Odd ratios	CI	p-values
Basic hygiene service				
Sex of the head of the schools	0.00	0.99	(0.25 ;3.94)	0.994
School statutes	5.81	0.61	(0.41 ;0.91)	**0.016***
Water point	2.82	0.44	(0.17 ;1.15)	0.093
WASH Intervention	1.79	3.69	(0.60 ;22.85)	0.161
Hygiene and environmental health club (WASH club)	3.68	2.75	(0.98 ;7.76)	0.055
Having a budget line specifically for WASH	10.75	0.17	(0.06 ;0.49)	**0.001***
Hygiene policies and guidelines	0.41	0.64	(0.17 ;2.49)	0.521
Basic sanitation service				
Sex of the head of the schools	0.33	0.69	(0.19 ;2.48)	0.567
School statutes	2.06	0.77	(0.54 ;1.10)	0.152
Water point	0.01	0.96	(0.39 ;2.40)	0.934
WASH Intervention	1.06	2.52	(0.43 ;14.64)	0.303
Hygiene and environmental health club (WASH club)	3.30	2.48	(0.93 ;6.62)	0.069
Having a budget line specifically for WASH	6.51	0.27	(0.10 ;0.74)	**0.011***
Hygiene policies and guidelines	0.37	1.52	(0.40 ;5.87)	0.541

**: The difference is statistically significant. P < 0.05*

Discussion

SDG 6 calls for universal access to water, sanitation, and hygiene by 2030. The inadequacy of these services in schools hampers the achievement of this goal (Compact, 2018). In general, the levels of drinking water, hygiene, and sanitation services in schools in the city of Kinshasa are below the levels reported in the JMP report for schools worldwide, which was 63% in 2019 (WHO/UNICEF, 2019). With regard to the description and evaluation of WASH actions, the results of this study show that approximately 32% have a budget line allocated to services, including 67% in private schools and 31% in religious schools.

These results are slightly higher than the 24% reported by Girmay et al. (2023) in the town of Bishoftu in Ethiopia (Girmay et al., 2023), while the study conducted by Nlunda et al. (2023) showed that 15% and 63% of schools before and after COVID-19, respectively, have a budget line for WASH infrastructure (Nlunda et al., 2023). This study shows that 32.81% of schools have hygiene and environmental health clubs (WASH clubs), including 69% of private schools, while Girmay et al. (2023) found 36% of schools with hygiene committees in the same study (Girmay et al., 2023). Our study showed an association between possession of a budget line and access to

water, hygiene, and sanitation services (OR=0.166 [0.05; 0.486]; p=0.001), which corroborates the findings of Girmay et al. 2023 (Girmay et al., 2023). The study revealed that 116 schools (90.63%) had hygiene and sanitation promotion strategies and policies. Only 5.47% of the schools had received an intervention to support access to WASH services, which proves that stakeholders and partners attach less importance to accessing WASH services in schools. However, the USAID reports that partnership is the key to the successful impact of WASH activities (USAID, 2016).

The results showed that 47% of schools had no indoor water supply, and 73.33% of these schools were in urban settings, compared with 26.41% in suburban settings (p=0.000). With regard to water supply sources, Table 2 shows that 69.33% of schools in urban settings were supplied by REGIDESO, compared to 3.77% in suburban settings. This situation is explained by the fact that suburban settings in Kinshasa do not benefit from all basic social services such as drinking water supply. These results are slightly higher than those found in the study carried out in the commune of Zé et Lalo in Benin in 2019, which revealed that 47.37% of schools had a water point, and 66.67% of these water points were improved (Christian, 2019). In Cameroon, a similar situation was presented by Nounkeu et al., with 48.3% of the schools serving drinking water utilities (UNICEF, 2023). In terms of quantity, only 2.34% of schools had a volume capable of covering the requirement of three liters per pupil per day in day schools, according to the minimum standard of the sphere manual (Sphère, 2018).

Our study showed that 73.44% of the schools had handwashing facilities, with 85.33% in urban settings and 55.60% in suburban settings (p=0.000). These considerable disparities between Urban and Suburban settings are justified by the fact that most schools in suburban settings do not have water points, making handwashing facilities unnecessary. Of the schools with handwashing facilities, 61.72% had water at the time of the survey, with a significant difference between Urban and Suburban settings, with 76.00% and 41.51%, respectively (p=0.000). Of the schools that had water for handwashing, only 16.41% had soap available at the time of the survey, including 24% in urban and 5.66% in suburban settings. This low percentage of schools with adequate handwashing facilities is another factor that makes it more difficult to combat transmissible pathogens in Kinshasa schools.

These data are relatively lower than those obtained in Mali, which revealed that approximately 82% of schools in rural settings and 90% in urban settings had handwashing facilities as part of the national surveys on access to WASH in the 2017 edition (Ministere de l'Education Nationale, 2017). However, our results showed a slight improvement in the situation prior to COVID-19 when we found that 26% of schools in Kinshasa had handwashing facilities (Nlunda et al., 2023). With regard to the availability of soap and water, the results

differ from those found in Ethiopia by Girmay and Nlunda in Kinshasa in 2023, which shows that around 38% of schools had handwashing facilities with soap and water during COVID-19. This slight improvement can be explained by the retention of habits acquired during COVID-19 (Girmay et al., 2023; Nlunda et al., 2023).

Regarding access to sanitation, most schools surveyed had at least one latrine, and around 76 were gender-segregated. These results contrast with those reported by Tsige et al. in Ethiopia, who noted that only 29% of latrines were gender-segregated (Tsige et al., 2019). Our results are similar to the 100% coverage reported in a study conducted in South Africa (Sibiya & Gumbo, 2013).

Although latrine coverage in the schools surveyed was close, it should be noted that 95% of latrines were usable at the time of the survey, with approximately 97% of schools having an insufficient number of latrines compared with the sphere norms, which call for 30 girls to one latrine and 60 boys to one latrine. The results of this study show a ratio four times higher than the norm (129.21 girls:1 latrine) in urban settings and approximately twice as high in suburban settings (85.87 girls:1 latrine) with a p-value of 0.003. The results showed an average of 114 boys per latrine in urban settings and 76 boys per latrine in suburban settings (p=0.002). These results are almost identical to those of Ntiama found in Masina II educational sub-province schools, where the ratio was 98.5 girls to one latrine and 83.5 boys to one latrine. Our results contrast with those obtained by Nlunda et al., who reported a ratio of 58 girls to one latrine. This may be explained by the increase in pupil numbers due to the introduction of free education in 2020, which has not been accompanied by an increase in the WASH infrastructure (Ntiama, 2020).

The results of our study reveal that less than three-quarters of schools in the provincial city of Kinshasa are concerned with menstrual hygiene. Approximately 66.41% of schools took steps to manage their pupils' menstruation. A 2023 study does not lend credence to this assertion but shows that only 16% of schools in Ethiopia have taken steps to manage menstrual hygiene (Girmay et al., 2023). Moreover, unlike the results found in Ethiopia, which showed an association between the gender of the head teacher and access to hygiene, particularly menstrual hygiene, our data did not demonstrate this relationship ($x2= 2.66$, $p=0.103$).

However, menstrual hygiene management is necessary to ensure good health, human dignity, and quality of life (Sommer et al., 2024). According to the school authorities interviewed, schools generally require parents to bring single-use sanitary tape at the start of the school year. Sommer *et al.* advocated the development and dissemination of global guidelines for MHM in schools, with minimum standards, indicators, and illustrative strategies for adaptation,

adoption, and implementation at the national and sub-national levels (Sommer et al., 2024).

Study Limitations

This study presents the status of the WASH schools in Kinshasa. It offers scientific evidence to policymakers and programmers to enhance access to water, hygiene, and sanitation, thereby improving the health and education of students. This study identified only the factors that accounted for schools' low access rates to water, hygiene, and sanitation. Due to limited resources and time, we were unable to analyze the quality of drinking water consumed in schools or episodes of diarrheal disease resulting from the consumption of water of poor bacteriological quality.

Conclusion

This study aimed to determine the factors that explain the low access to water, hygiene, and sanitation in schools in Kinshasa. Based on the results obtained, we can conclude that the status of the school and the non-existence of a WASH budget line were explanatory factors for the low rates of access to water, hygiene, and sanitation in schools in the educational provinces of Mont-Amba, Lukunga, and Tshangu. Access to water, hygiene, and sanitation in urban and peri-urban schools in educational provinces is a major public health problem that requires urgent intervention.

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