International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Factors Associated with Access to Basic Water, Sanitation and Hygiene (Wash) Services in Schools of Rutsiro District, Rwanda:

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ABSTRACT

Access to safe water, sanitation and hygiene (WASH) services in schools is central to child health, dignity and learning. In Sub-Saharan Africa, over 40% of schools lack basic drinking water and over 50% lack adequate sanitation, and in Rwanda only 65% of schools have access to safe water and 59% comply with minimum sanitation standards. District-level, function-based evidence for rural Rwanda remains limited. This study determined the prevalence of basic WASH services in schools of Rutsiro District, Rwanda, identified the school-level factors associated with schools meeting all three basic services, and explored school administrators' perceptions of the barriers to WASH access.

Methods: A mixed-methods cross-sectional study was conducted during the 2025/2026 academic year. Of 56 schools selected by stratified random sampling from the 127 schools in the district, 53 (94.6%) provided data through a structured questionnaire and an observation checklist. Basic drinking water, sanitation and hygiene services were classified following WHO/UNICEF Joint Monitoring Programme conventions, and the outcome was meeting all three basic services. Prevalence was reported with 95% confidence intervals (CI). Associations were assessed with chi-square and exact tests and with Firth's penalized logistic regression, reporting crude (COR) and adjusted (AOR) odds ratios. Semi-structured key informant interviews were analysed thematically.

Results: Basic drinking water was available in 67.9% of schools (95% CI: 54.5-78.9), basic sanitation in 54.7% (95% CI: 41.5-67.3) and basic hygiene in 43.4% (95% CI: 31.0-56.7), but only 13 of 53 schools (24.5%; 95% CI: 14.9-37.6) met all three. Fewer than half of the schools met the WHO student-to-toilet ratio for boys (41.5%) or girls (37.7%). After adjustment, schools that delivered hygiene education (AOR = 38.09; 95% CI: 3.30-5468.70) and schools with a written WASH policy (AOR = 16.98; 95% CI: 2.51-210.65) had higher odds of meeting all three basic services, while urban schools had lower odds than rural schools (AOR = 0.04; 95% CI: <0.01-0.54). The very wide intervals reflected the small number of schools that met the outcome. Government-funded schools met all three services more often (75.0%) than NGO-funded (15.4%) or community-funded (8.3%) schools in bivariable analysis, but funding source was not retained after adjustment. Interviews showed that water shortages were mainly seasonal, that maintenance was delayed by recurrent funding gaps, and that menstrual hygiene facilities were often only partly functional.

Conclusion: Most schools in Rutsiro District had some WASH facilities, but only one in four had all three basic services working together. Hygiene education and a written school WASH policy were the factors most consistently associated with complete basic WASH services. The Ministry of Education, Rutsiro District authorities and development partners should adopt composite, function-based WASH monitoring,

institutionalize school WASH policies and hygiene education, and plan recurrent maintenance financing beyond project handover.

Keywords: WASH in schools; basic services; menstrual hygiene; Firth logistic regression; mixed methods; Rwanda

1. Introduction

Globally, current estimates indicate that around 703 million individuals lack access to appropriately managed drinking water services, while 1.5 billion individuals do not have basic sanitation facilities (UNICEF, 2023). Educational institutions are substantially affected as inadequate WASH services infringe upon children's rights to health and education, result in increased absenteeism, and exacerbate challenges for girls during menstruation (UNICEF, 2023).

The worldwide education monitoring report indicates that inadequate WASH infrastructure in schools exacerbates gender inequities, hinders student concentration, and negatively impacts learning outcomes, particularly in low- and middle-income countries (UNESCO, 2023). These worldwide challenges highlight the need for evidence-based strategies to ensure equitable access to WASH services in educational institutions (UNICEF, 2021).

Notwithstanding advancements achieved under the Sustainable Development Goals (SDGs), educational institutions in Sub-Saharan Africa (SSA) continue to face significant challenges regarding Water, Sanitation, and Hygiene (WASH). The World Bank (2024) reported that over 40% of schools in Sub-Saharan Africa lack access to basic drinking water, and over 50% are deficient in adequate sanitary facilities. Empirical research validates these institutional reports. A recent cluster-randomized controlled trial in Addis Ababa, Ethiopia, shown that school-based WASH treatments, including handwashing stations and water filters, resulted in a 16% reduction in respiratory illnesses and improved attendance (Bick et al., 2024). A further Ethiopian study revealed that girls' academic performance deteriorated markedly in the absence of adequate menstrual hygiene facilities. A significant correlation existed between inadequate WASH and diminished performance in public schools (Assefa et al., 2025). A quasi-experimental study demonstrated that school-based WASH programs can reduce the incidence of soil-transmitted helminth infections in children (Tadesse et al., 2024). Despite these advancements, millions of school children in Sub-Saharan Africa still lack access to safe water and sanitation facilities suitable for both genders (World Bank, 2024).

Research in Ethiopia indicates that WASH initiatives are effective, although they do not reach all individuals in need. The One WASH program reported that, as of 2024, 39% of schools lacked sanitary facilities and 76% lacked improved water supply (World Bank, 2024).

The East African region provides many experiences that enhance the SSA narrative. Research on the Kisumu East WASH program in Kenya indicated that schools receiving assistance from the program experienced fewer instances of diarrhea and possessed superior latrines compared to schools that did not receive assistance (Omwami et al., 2022). A recent analysis indicated that infrastructure issues persist, with certain schools reporting a student-to-latrine ratio exceeding the national requirement (Kenya National Bureau of Statistics [KNBS], 2025). The KOICA-UNICEF WASH in Schools initiative in Karamoja, Uganda, successfully engaged 100 educational institutions. It reduced the incidence of diarrhea from 15% to 10% and enhanced enrolment and retention rates, particularly among girls (UNICEF Uganda,

2024). Nonetheless, deficiencies in sanitation persist. Over 750 schools benefited from hygienic programs yet still lacked sufficient toilets (The Standard, 2021).

In Kenya, policy modifications have heightened awareness of WASH in education; nonetheless, implementation gaps persist, particularly in rural regions (KNBS, 2025). The consistency of these findings among East African countries suggests a pattern of gradual progress alongside significant disparities, particularly in rural and disadvantaged areas. In Rwanda, substantial efforts have been made to enhance access to WASH, however challenges persist, particularly in rural educational institutions. The Rwanda Education Board (REB, 2023) indicates that urban schools often have superior access to water and sanitation, whilst rural regions lag behind. Schools in Rutsiro District report insufficient latrines and inconsistent water supplies. A recent report from World Vision International Rwanda (2023) indicated that over 1 million individuals benefited from WASH programs; however, there was insufficient data regarding school kids, suggesting that monitoring did not adequately differentiate across groups. The National Institute of Statistics of Rwanda (NISR, 2024) indicates disparities within districts, with certain schools lacking the necessary gender-responsive facilities to effectively manage menstrual hygiene. The Health Development Initiative (HDI, 2025) emphasized the necessity of implementing behavior change programs in educational institutions due to the continued usage of latrines and unhealthy water storage practices.

The data indicate that Rwanda has advanced considerably in delivering WASH services; nonetheless, substantial disparities persist, particularly in rural regions such as Rutsiro District. In addition, much available data is institutional and quantitative, with limited peer-reviewed research exploring the qualitative perspectives of students, educators, and communities regarding access hurdles. This lack of descriptive cross-sectional study utilizing both quantitative and qualitative approaches limits policymakers' ability to develop complete policies that consider not only infrastructure needs but also behavioural, cultural, and socio-economic issues.

2.1 Prevalence of Water Sanitation and Hygiene Facilities in Schools

Globally, there has been inconsistent achievement in providing school Water Sanitation Hygiene (WASH). In 2024, the WHO/UNICEF Joint Monitoring Programme (JMP) for Water, Sanitation and Hygiene reported that approximately 23% of schools globally did not have basic sanitation services, while one in three schools lacked basic hygiene services, specifically handwashing facilities with water and soap. Rural schools and those in low-income countries experienced significant deficits, with gaps in menstrual health management remaining a critical barrier to girls' education (WHO & UNICEF, 2024). A systematic review conducted by Melaku et al. (2023) established that in many low-resource settings, the prevalence of WASH is below global targets, with hygiene practices (specifically soap and water) frequently lagging behind water and sanitation efforts.

Across Sub-Saharan Africa, a multi-country assessment of schools in Ethiopia, Kenya, Mozambique, Rwanda, Uganda and Zambia found low WASH coverage overall, with Ethiopia and Mozambique exhibiting the lowest levels (Morgan et al., 2017). Bick et al. (2024) reported that prior to an intervention, less than 50% of schools in Addis Ababa, Ethiopia, had a reliable water supply. Ssemata et al. (2023) reported that more than 60% of secondary schools in the Wakiso and Kalungu districts of Uganda exhibited inadequate sanitation and insufficient menstrual hygiene facilities. In Tanzania, Magwe (2025) reported that merely 40.6% of rural schools in Iringa met basic WASH standards, in contrast to 87.5% of urban schools, pointing to a continued rural disadvantage. Mureithi Mureithi Njeru et al. (2023) found that

in Kenya, while 80% of schools possessed latrines, a minimal number adhered to the national student-to-latrine ratios, and handwashing facilities were predominantly lacking.

Rwanda has achieved significant progress in enhancing WASH services in educational institutions; however, challenges persist.

The UNICEF Rwanda (2023) situation analysis indicates that 65% of schools had access to safe water; however, a smaller proportion had consistent access to soap and gender-separate toilets. Niwemukiza et al. (2025) conducted a study in Gakenke District, revealing that while the majority of girls had access to latrines, less than 50% had access to private, adequately equipped menstrual hygiene facilities. The Rwanda Education Statistical Yearbook (MINEDUC, 2023) indicated gradual improvements in WASH coverage; however, it reported that merely 59% of schools achieved the minimum sanitation standards. World Vision Rwanda (2024) indicated that, despite the establishment of new latrines and water points in numerous schools, issues of functionality and equitable access persist. Rutsiro, characterized as a rural and hilly district with logistical challenges, likely exhibits a lower prevalence of fully functional, gender-responsive WASH facilities compared to the national average, pointing to the need for district-specific empirical data.

2.2 Factors Associated with Water Sanitation Hygiene (WASH) Facilities Availability in Schools

Facility availability worldwide is influenced by infrastructure development, financing mechanisms, governance structures, and maintenance systems. The JMP (2024) report highlights that ongoing funding for consumables, defined accountability for maintenance, and reliable water sources are critical factors influencing facility sustainability. Melaku et al. (2023) found that schools lacking clear operation and maintenance plans or consistent supply chains rapidly lost functional services, even when infrastructure was present. In East Africa, evidence indicates a range of consistent factors. Bick et al. (2024) identified leadership commitment and maintenance routines as key determinants of functional facilities in Ethiopia. Tadesse et al. (2024) demonstrated that the seasonality of water supply substantially affects WASH availability.

Mureithi Njeru et al. (2023) reported that in Kenya, schools exhibiting greater parental involvement and improved resource mobilization possessed more adequate facilities. Research conducted in Uganda (Ssemata et al., 2023) indicated that schools receiving external donor support and having active parent-teacher associations demonstrated a higher likelihood of maintaining functional sanitation. Magwe (2025) identified that the distance to reliable water sources, rural location, and lack of budget allocation for consumables were predictors of inadequate facilities in Tanzania.

In Rwanda, various empirical studies indicate comparable factors. Niwemukiza et al. (2025) found that the socio-economic status of households, teacher involvement, and school type were predictors of menstrual hygiene facility availability in Gakenke. A mixed-methods study on ecological sanitation in Burera District indicated that material quality, user acceptability, and the availability of technical support are predictors of utilization (Banamwana et al., 2022). The UNICEF (2023) analysis of Rwanda indicated that inadequate maintenance systems and lack of recurrent funding limited the functionality of facilities. WaterAid Rwanda (2023) reported that schools with significant community involvement had a higher number of functional latrines and water points than those dependent exclusively on government funding.

The findings indicate that factors such as remoteness, local leadership, donor support, and socio-economic conditions are likely essential determinants of WASH facility availability in Rutsiro.

2.3 Perceptions and Barriers to WASH Access among School Administrators

School administrators worldwide acknowledge the importance of WASH for student health and attenda-

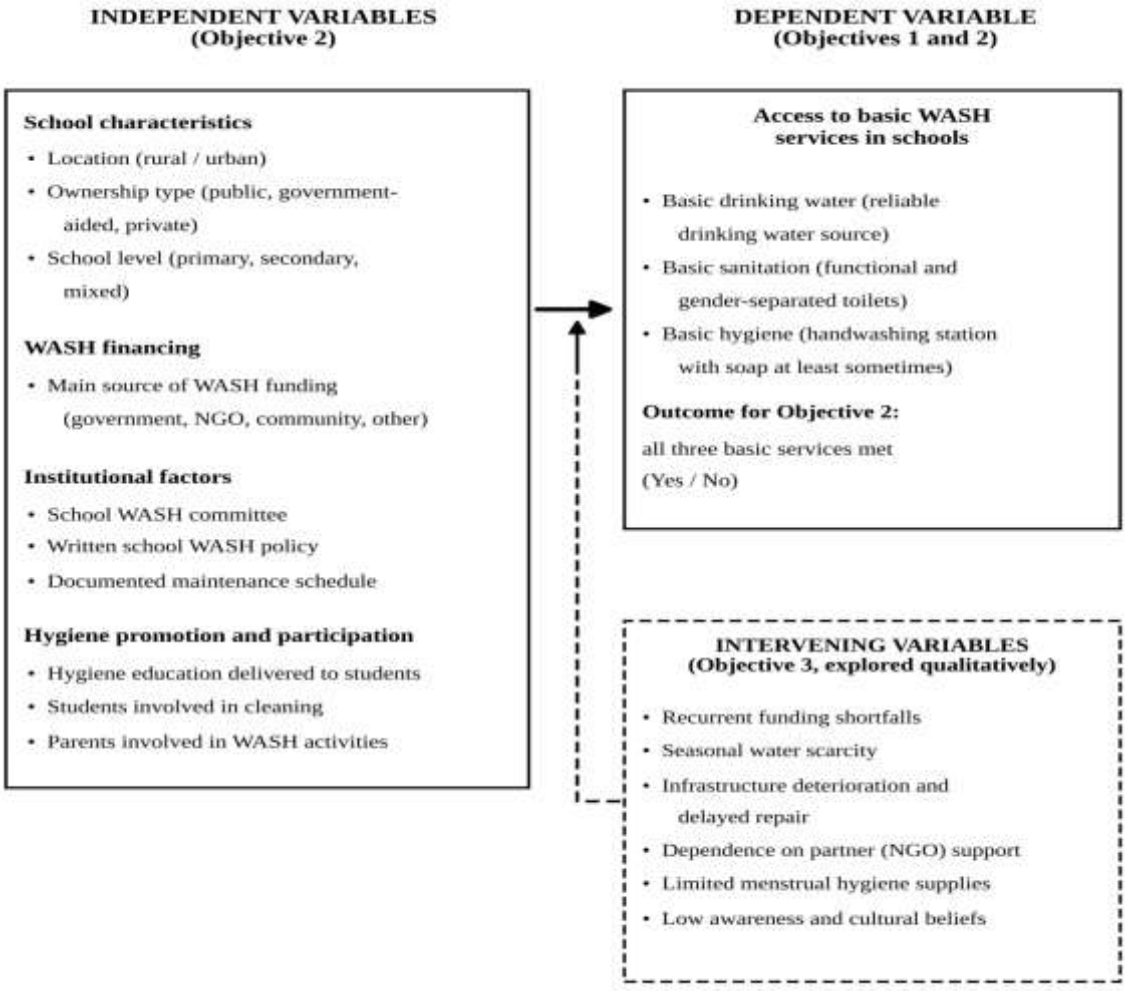
nce, yet they often encounter financial and operational challenges. The JMP (2024) identified the absence of a recurrent budget, inadequate training, and cultural stigma surrounding menstruation as significant constraints. Systematic reviews of WASH in low-income countries indicate that administrators frequently perceive challenges in sustaining hygiene consumables, such as soap and water, as well as in maintaining infrastructure (Melaku et al., 2023).

In East Africa, administrators consistently identify funding gaps and operational challenges. Farine et al. (2025) identified that school leaders in Uganda often cited filled latrines, insufficient funds for repairs, and reliance on NGOs as significant barriers. Mureithi et al. (2023) identified the lack of budget for consumables and insufficient maintenance personnel as significant barriers perceived by head teachers in Kenya. Magwe (2025) identified barriers reported by Tanzanian administrators, including seasonal water scarcity, insufficient soap supply, and inadequate government follow-up. Ethiopian administrators, as reported by Bick et al. (2024), expressed initial enthusiasm for new facilities; however, this enthusiasm waned in the absence of adequate financing and accountability structures.

This points to the need for incorporating their perspectives in empirical research.

2.4 Conceptual Framework

The conceptual framework of the study is presented in Figure 2.2. It shows only the variables that were measured or explored in this study and links each group of variables to the specific objective that it addresses.



3.1 Study Design

The study used an analytical cross-sectional design with a convergent mixed-methods approach (Sileyew, 2022; Dawadi et al., 2021). Quantitative and qualitative data were collected during the same period of the 2025/2026 academic year. The design combined a descriptive component (Objective 1), which estimated the prevalence of basic WASH services, an analytical component (Objective 2), which examined associations between school-level factors and meeting all three basic services, and a qualitative descriptive component (Objective 3), which explored administrators' perceptions of barriers through key informant interviews. A cross-sectional design was suitable because the objectives required a snapshot of WASH service status and its correlates at one point in time, it was feasible within the time and resources available, and it allowed every sampled school to be visited once (Wang & Cheng, 2020). Because the factors and the outcome were measured at the same time, the design could identify associations but could not establish temporal or causal relationships, and the findings were interpreted accordingly.

3.2 Study Setting

The study was conducted in primary, secondary and mixed (primary and secondary) schools in Rutsiro District. At the time of the study, the district had 127 schools: 58 primary schools, 56 mixed schools (groupes scolaires offering both primary and secondary levels) and 13 secondary schools, under public, government-aided and private ownership. Schools were the settings in which participants were identified: school administrators completed the questionnaire, the research team observed WASH facilities on the school compound, and key informants were drawn from school staff, parent-teacher associations, and sector and district education offices.

Rutsiro District is situated in the Western Province of Rwanda. It is primarily rural and mountainous, with an estimated population of over 324,000 people (NISR, 2023), and is administratively divided into 13 sectors, 62 cells and 493 villages. The steep terrain considerably affects water accessibility, infrastructure development and service delivery. Many schools are located in remote areas, where water supply systems experience seasonal variation and sanitation infrastructure is inadequate. According to the Rwanda Education Board (REB, 2023), schools in Rutsiro exhibit significant disparities in WASH access relative to urban institutions, including inadequate latrine-to-student ratios, restricted access to safe drinking water, and insufficient menstrual hygiene facilities for girls. Rutsiro District was therefore chosen because it represents the challenges faced by rural, mountainous districts of Rwanda in providing school WASH services, and its results may serve as a benchmark for other rural districts facing similar difficulties.

3.3 Source and Study Population

The source population comprised all 127 registered primary, secondary and mixed schools in Rutsiro District, together with the administrators, WASH staff and education officers responsible for them. The study population for the quantitative component comprised the 56 eligible schools selected through stratified random sampling, of which 53 provided data and formed the analytical sample; the unit of analysis was the school. The study population for the qualitative component comprised key informants purposively selected from participating schools and from sector and district education offices, namely head teachers, WASH coordinators and teachers, school accountants, parent-teacher association representatives, a student representative, and sector and district education officers.

3.4 Sample Size Determination and Sampling Procedure

3.4.1 Sample Size Determination

The sample size was considered separately for each objective, and the largest relevant requirement was

adopted.

3.4.1.2 Objective 1: Estimating a Proportion

Objective 1 required the estimation of proportions, namely the prevalence of basic WASH services. Because no district-level prior estimate of the combined outcome was available, an expected proportion of 50 percent was assumed, as this gives the maximum variance and therefore the most conservative sample size. With a 95 percent confidence level and an absolute precision of plus or minus 10 percentage points, the sample size was calculated using Yamane's (1967) formula for a finite population:

$n = N / [1 + N(e)^2]$

where n is the required sample size, N is the number of schools in Rutsiro District (127) and e is the desired precision (0.10).

$n = 127 / [1 + 127(0.10)^2] = 127 / 2.27 = 55.9$, rounded to 56 schools

Yamane's formula assumes simple random selection, a 95 percent confidence level and a proportion of 0.5, and it is equivalent to Cochran's formula for a proportion followed by a finite population correction (Cochran, 1977). As a check, Cochran's formula gave $n0 = (1.96^2 \times 0.5 \times 0.5) / 0.10^2 = 96.04$ schools, and applying the finite population correction gave $n = n0 / [1 + (n0 - 1) / N] = 96.04 / [1 + 95.04 / 127] = 54.9$, or 55 schools, which confirmed the Yamane estimate. The finite population correction was appropriate because the sample represented a large fraction (about 44 percent) of the 127 schools in the district. No design effect was applied because schools, the units of analysis, were selected individually rather than in clusters. No separate allowance for non-response was added to the calculated sample. In practice, 53 of the 56 schools (94.6 percent) provided data, and with 53 schools the achieved precision for a proportion of 50 percent, after the finite population correction, was plus or minus 10.3 percentage points, very close to the planned precision.

3.4.1.2 Objective 2: Assessing Associations

Objective 2 was not powered separately, because the finite number of schools in the district limited the attainable sample and the 56 schools required for Objective 1 was the largest feasible requirement. Its implications were assessed instead. With about 26 schools in each of two comparison groups, a two-sided test at the 5 percent significance level had 80 percent power to detect only large differences in the proportion of schools meeting all three basic services, for example 10 percent compared with about 42 percent. Smaller associations could therefore have been missed, and because only 13 schools met the outcome, the multivariable model had to be parsimonious (section 3.7.2).

3.4.1.3 Objective 3: Qualitative Sample

The qualitative sample size was not determined by a statistical formula. Key informants were selected purposively for their direct responsibility for, or experience of, school WASH management, so that each role relevant to WASH provision at school, sector and district level was represented (Campbell et al., 2020).

3.4.2 Sampling Procedure

The sampling frame was the list of the 127 registered schools in Rutsiro District, grouped by school category into three strata: primary schools (58), mixed primary and secondary schools (56) and secondary schools (13). Stratified random sampling (Iliyasu & Etikan, 2021) was used so that each school category was represented in the sample. The 56 schools were allocated to the strata in proportion to stratum size, and within each stratum schools were selected by simple random sampling from the stratum list. Cluster or multistage sampling was not used, because schools were selected directly and all data for each school were collected at that school.

3.4.2.1 Calculation of Stratified Allocation

Proportional allocation ensured that each school category was represented in proportion to its share of the 127 schools in the district. The number of schools sampled from each stratum was calculated as follows:

$n_h = n \times (N_h / N)$

where n_h is the number of schools sampled from stratum h, n is the total sample (56 schools), N_h is the number of schools in stratum h, and N is the total number of schools in the district (127). Table 3.1 shows the resulting allocation.

Table 3.1: Proportional Allocation of the Sample by School Category

School category (stratum)	Schools in district (N)	Share of frame (%)	Exact allocation	Schools sampled (n)
Primary	58	45.7	25.6	26
Mixed primary and secondary (GS)	56	44.1	24.7	24
Secondary	13	10.2	5.7	6
Total	127	100.0	56.0	56

Source: Researcher's calculation based on the 127 registered schools in Rutsiro District.

The exact allocations were 25.6, 24.7 and 5.7 schools for the primary, mixed and secondary strata respectively. They were rounded to 26, 24 and 6 so that the total equalled the calculated sample of 56 schools; the mixed stratum was rounded down because rounding all three strata to the nearest whole number would have given 57 schools. Data were obtained from 53 of the 56 selected schools (94.6 percent). The distribution of participating schools by school level recorded during data collection (20 primary, 18 secondary and 15 mixed schools) differed from the planned allocation; the implications of this difference are discussed in section 4.3.4.

For the qualitative component, purposive sampling was used to select key informants with relevant experience in school WASH management. Purposive sampling was justified because Objective 3 required information-rich accounts from people responsible for WASH provision rather than statistically representative estimates (Campbell et al., 2020). Its implication is that the qualitative findings are not statistically representative of all schools or staff in the district; they were used to explain and contextualize the quantitative results rather than to estimate prevalence.

4.0 Introduction

This chapter presents the findings of the study and discusses them in relation to the three specific objectives: the prevalence of basic WASH services in schools (Objective 1), the school-level factors associated with meeting all three basic services (Objective 2), and school administrators' perceptions of the barriers to WASH access (Objective 3). Quantitative results are presented first, followed by the qualitative findings, and the two are integrated in the discussion. Of the 56 schools selected, 53 provided data, a response rate of 94.6 percent; all percentages use the 53 schools as the denominator unless another denominator is stated. The distribution of participating schools by school level differed from the planned stratified allocation, with secondary schools over-represented, and this is considered among the limitations in section 4.3.4.

4.1 Demographic Characteristics of the Schools Studied

A total of 53 schools participated in the study. Table 4.1 summarizes their background characteristics, including location, ownership type, school level, enrolment, and toilet provision.

Table 4.1: Background Characteristics of Participating Schools (n = 53)

Characteristic	Category	Frequency or value	Percent (%)
Location	Rural	34	64.2
	Urban	19	35.8
Ownership type	Government-aided	19	35.8
	Private	19	35.8
	Public	15	28.3
School level	Primary	20	37.7
	Secondary	18	34.0
	Mixed (primary and secondary)*	15	28.3
Total enrolment per school	Mean (SD)	734.0 (270.4)	-
	Median (IQR)	632 (541-949)	-
Students with disabilities per school	Median (IQR)	7 (4-10)	-
Boys' toilet stances per school	Median (IQR)	11 (6-16)	-
Girls' toilet stances per school	Median (IQR)	12 (6-16)	-
Year of establishment	Median (IQR)	1986 (1967-2007)	-

*SD = standard deviation; IQR = interquartile range. *Includes three schools recorded as offering both primary and secondary levels. Source: Primary data (2025/2026).*

Three schools originally coded as "both" (offering both primary and secondary levels) were combined with the "mixed" category during data cleaning, since both labels described the same underlying school structure.

The 53 schools enrolled a combined total of 38,902 students (19,457 boys and 19,443 girls), with 374 students identified as living with a disability. The near-equal split between boys and girls across the sample means that any gender gap observed later in sanitation or menstrual hygiene facilities cannot be explained by an imbalanced student population; it reflects genuine differences in how facilities are provided or maintained for each sex.

4.2 Presentation of Findings

4.2.1 Prevalence of Basic WASH Services (Objective 1)

Table 4.2 presents the prevalence of each WASH facility and management indicator, with its 95 percent confidence interval.

Table 4.2: Prevalence of Core WASH Facilities and Services (N = 53)

Indicator	Yes n (%)	No n (%)	95% CI for Yes (%)
Reliable drinking water source	36 (67.9)	17 (32.1)	54.5-78.9
Functional toilets	39 (73.6)	14 (26.4)	60.4-83.6
Gender-separated toilets	35 (66.0)	18 (34.0)	52.6-77.3
Handwashing stations present	34 (64.2)	19 (35.8)	50.7-75.7
Menstrual hygiene management (MHM) facilities	35 (66.0)	18 (34.0)	52.6-77.3
School WASH committee	35 (66.0)	18 (34.0)	52.6-77.3
Documented maintenance schedule	25 (47.2)	28 (52.8)	34.4-60.3
Written school WASH policy	28 (52.8)	25 (47.2)	39.7-65.6
Hygiene education delivered	30 (56.6)	23 (43.4)	43.3-69.0

CI = confidence interval (Wilson score method). Source: Primary data (2025/2026).

Table 4.2 shows that a majority of schools reported having each individual WASH element, but no single indicator reached full coverage, and roughly one in three schools lacked a reliable water source (32.1 percent), gender-separated toilets (34.0 percent) or handwashing facilities (35.8 percent). This mattered clinically because a school that had toilets without handwashing facilities, or water without functioning toilets, did not break the faecal-oral transmission pathway for diarrhoeal disease and soil-transmitted helminths; partial coverage of individual components did not translate into a protective effect unless the components were present together. To capture this, the individual indicators were combined into the JMP-style basic service measures defined in Table 3.2, summarized in Table 4.3.

Table 4.3: Composite JMP-Style Basic WASH Service Coverage (N = 53)

Composite indicator	Schools meeting indicator n (%)	95% CI (%)
Basic drinking water (reliable drinking water source)	36 (67.9)	54.5-78.9
Basic sanitation (functional and gender-separated toilets)	29 (54.7)	41.5-67.3
Basic hygiene (handwashing station with soap available always or sometimes)	23 (43.4)	31.0-56.7
All three basic services met simultaneously	13 (24.5)	14.9-37.6

CI = confidence interval (Wilson score method). Source: Primary data (2025/2026).

As Table 4.3 shows, when the water, sanitation and hygiene indicators were combined, only 24.5 percent of schools (13 of 53; 95% CI: 14.9-37.6) met all three basic service definitions at the same time. Basic hygiene was the weakest link (43.4 percent), followed by basic sanitation (54.7 percent) and basic drinking water (67.9 percent). The gaps did not fall on the same schools: of the 36 schools with basic drinking water, only 21 also had basic sanitation, and of these only 13 also had basic hygiene. The combined figure is therefore considerably lower than any single-indicator percentage in Table 4.2, and it is the more

clinically meaningful number: three out of four schools (40 of 53) had at least one broken link in the water-sanitation-hygiene chain, the configuration associated with continued exposure to diarrhoeal pathogens even where individual facilities exist. For public health practice, this means that facility counts reported in isolation, as is common in routine school inspection reporting, can overstate how protected students actually are, and district health and education authorities should track the combined indicator when prioritizing schools for intervention.

Sanitation adequacy was also assessed against the WHO (2009) recommended student-to-toilet ratios of one toilet stance per 30 boys and one per 25 girls. Only 22 of 53 schools (41.5 percent; 95% CI: 29.3-54.9) met the WHO ratio for boys, and 20 of 53 (37.7 percent; 95% CI: 25.9-51.2) met it for girls. Figure **4.1 shows the distribution of the ratios in the 53 schools against these standards.**

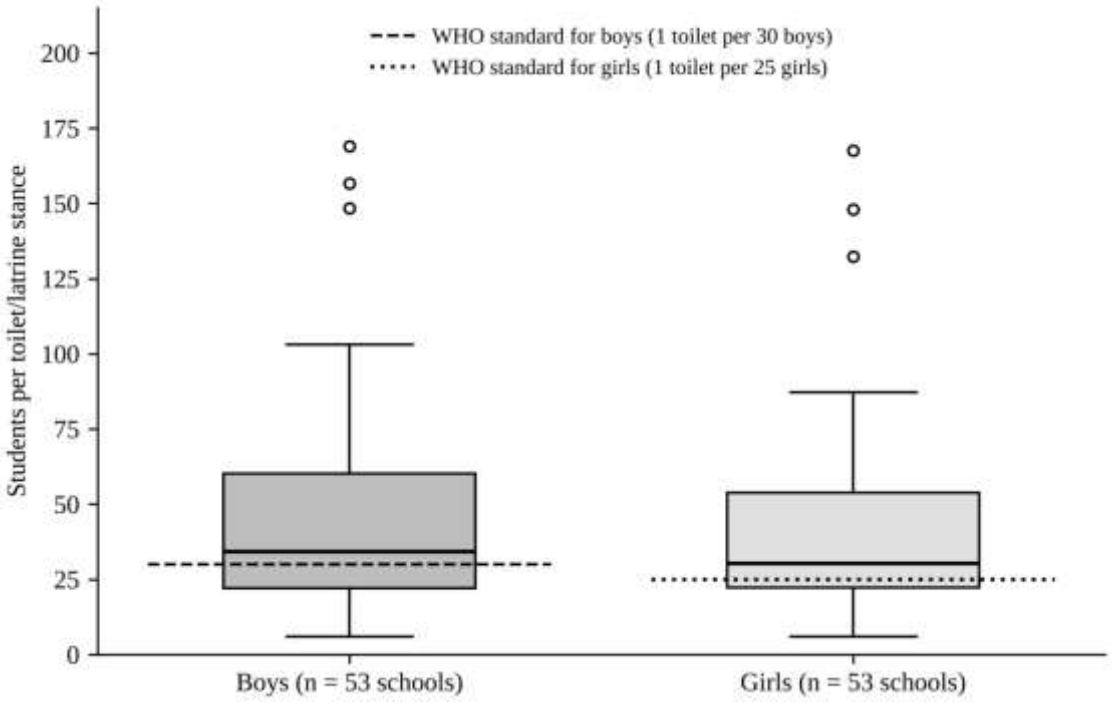


Figure 4.1: Students per Toilet Stance in Participating Schools Compared with WHO (2009) Standards (n = 53)

Source: Primary data (2025/2026).

Figure 4.1 shows that the median school had 34 boys (interquartile range 22-60) and 30 girls (interquartile range 22-54) per toilet stance, and that a minority of schools were far more crowded, with one school exceeding 160 boys and one exceeding 160 girls per stance. Overcrowded latrines are clinically relevant beyond discomfort: queuing and heavily used stances increase contact with faecal matter and reduce the likelihood that students use the facility at all, which in turn feeds open defecation or urination and elevated diarrhoeal and helminth risk in the school environment, consistent with the transmission pathway described in Chapter Two. For policy, this confirmed that infrastructure investment in Rutsiro could not be judged by whether a school "had toilets" but had to be judged against a ratio standard, and the gap was wide enough that new stance construction, not only rehabilitation of existing units, was likely required in a large share of schools. Because the ratios were based on the reported number of stances rather than the number confirmed to be functional, they may understate the true level of crowding.

Menstrual hygiene management (MHM) facilities were reported in 35 of 53 schools (66.0 percent; 95% CI: 52.6-77.3), but the specific items needed to make those facilities usable were inconsistently available even within that subgroup, as Table 4.4 shows.

Table 4.4: Availability of Specific MHM Items Among Schools Reporting MHM Facilities (n = 35)

MHM item	Available n (%)	95% CI (%)
Sanitary pads provided	24 (68.6)	52.0-81.4
Disposal bins	22 (62.9)	46.3-76.8
Private changing room	22 (62.9)	46.3-76.8
Water supply for MHM purposes	21 (60.0)	43.6-74.4

CI = confidence interval (Wilson score method). Source: Primary data (2025/2026).

Among the 35 schools reporting MHM facilities, sanitary pad provision was the most commonly available item (24 of 35 schools, 68.6 percent; 95% CI: 52.0-81.4), while water supply specifically for MHM purposes was the least available (21 of 35, 60.0 percent; 95% CI: 43.6-74.4); disposal bins and private changing rooms were each available in 22 of 35 schools (62.9 percent). In practice, this meant that even a school counted as having "MHM facilities" in a simple yes or no indicator could still lack water at the point of need, the item most directly tied to hygienic management of menstruation and to preventing the embarrassment and school avoidance described in the qualitative data below. For adolescent girls' school attendance and dignity, this was a policy-relevant gap that a simple facility count would miss.

4.2.2 Factors Associated with Meeting All Three Basic WASH Services

Table 4.5 presents the bivariable association between each of the ten school-level factors and meeting all three basic WASH services. The percentages are row percentages, showing the prevalence of the outcome within each category, so each row sums to 100 percent. The Pearson chi-square statistic and its degrees of freedom are shown for each factor; because some expected cell counts were below five, p-values were obtained from Fisher's exact test for two-category factors and from a Monte Carlo exact test for factors with more than two categories.

5.1 Summary of Findings

The study set out to determine the prevalence of basic WASH services, identify the school-level factors associated with schools meeting all three basic services, and explore school administrators' perceptions of the barriers to WASH access in 53 schools across Rutsiro District. On prevalence, individual WASH indicators such as functional toilets (39 of 53, 73.6 percent) and a reliable drinking water source (36 of 53, 67.9 percent) appeared reasonably common when examined one at a time. However, when the indicators were combined into basic service measures consistent with WHO/UNICEF Joint Monitoring Programme conventions, basic drinking water was available in 67.9 percent of schools, basic sanitation in 54.7 percent and basic hygiene in 43.4 percent, and only 24.5 percent of schools (13 of 53; 95% CI: 14.9-37.6) met all three basic services together. Fewer than half of the schools met the WHO-recommended student-to-toilet ratio for boys (22 of 53) or girls (20 of 53), and among the 35 schools with menstrual hygiene facilities, water for MHM purposes was available in only 60.0 percent. The gap between single-indicator and combined coverage was the most important prevalence finding of the study.

On the factors associated with access, hygiene education delivered to students, a written school WASH policy and rural location were independently associated with meeting all three basic services after

adjustment, although the confidence intervals were wide. The presence of a WASH committee, a documented maintenance schedule, the main source of WASH funding, parental and student involvement, and ownership type were associated with the outcome only in bivariable analysis, and school level was not associated with it. The source of WASH funding showed the largest bivariable contrast: three in four government-funded schools (9 of 12, 75.0 percent) met all three basic services, compared with about one in seven NGO-funded schools (2 of 13, 15.4 percent) and fewer than one in ten community-funded or otherwise funded schools (1 of 12 and 1 of 16 respectively). This contrast was largely explained by the higher prevalence of written policies and hygiene education in government-funded schools.

On perceptions and barriers, school administrators and staff described water unreliability as primarily seasonal rather than absolute, maintenance as delayed chiefly by recurrent funding shortfalls rather than one-off repair costs, and menstrual hygiene facilities as present in name more often than they were fully functional in practice, particularly regarding water and pad supply. Respondents' own suggestions, more government investment specifically earmarked for WASH maintenance, routine district-level monitoring, and stronger parent and community involvement, anticipated the recommendations set out below rather than needing to be prompted by the researcher, which strengthens confidence that these recommendations are grounded in the lived management realities of schools in this district.

5.2 Conclusions

In relation to Objective 1, the study concluded that access to basic WASH services in schools of Rutsiro District was low when the three services were considered together. About two-thirds of schools had basic drinking water and just over half had basic sanitation, but fewer than half had basic hygiene and only about one in four met all three, while most schools also fell short of WHO toilet ratios and many lacked complete menstrual hygiene provision. In relation to Objective 2, the delivery of hygiene education and a written school WASH policy were the factors most strongly and consistently associated with meeting all three basic services, and urban schools were less likely than rural schools to meet them; other institutional, financing and participation factors were associated only before adjustment. Because the design was cross-sectional and few schools met the outcome, these findings show associations rather than causal effects, and their magnitude is uncertain. In relation to Objective 3, administrators attributed the gap between installed and functioning facilities mainly to seasonal water scarcity, recurrent funding shortfalls and the end of partner support, and they saw dedicated maintenance funds, routine monitoring and parental involvement as solutions.

Taken together, the findings answer the study problem: the main barrier to WASH access in Rutsiro District schools was not the complete absence of facilities but their incomplete and poorly sustained functioning, and schools that had embedded WASH into routine governance, through a written policy and regular hygiene education, were the ones that more often sustained complete basic services. Facility-count monitoring, as currently practised, is not sensitive enough to detect this gap and should be complemented by combined, function-based indicators. Given the size and composition of the sample, these conclusions apply to schools in Rutsiro District and should be confirmed in a larger sample before they are generalized to other districts.

ACKNOWLEDGMENTS

The authors acknowledge Rutsiro District, Schools of Rutsiro district, District leaders, Head teacher for facilitating data collection and thank all participants for their time and contributions.

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