

FULL-LENGTH ARTICLE

A comparative analysis of water, sanitation, and hygiene (WASH) situation among public and private schools in Kirkos sub-city, Addis Ababa Ethiopia

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ABSTRACT

Sustainable Development Goals aim at a universal access to water, sanitation, and hygiene (WASH), and inclusive and effective learning environments for all. With this intention, a comparative study was made between two public and two private schools in two woredas in Kirkos sub-city, Addis Ababa. A checklist-based WASH evaluation was made during study visits in the selected schools. A total of randomly-selected 298 schoolchildren were interviewed using a structured questionnaire on their knowledge, attitude and practice (KAP) in WASH facilities in their respective schools. Quantitative data were analyzed statistically. Results showed that drinking water points were inadequate and handwashing stations were without soap in public schools. Menstrual hygiene management facilities were poor because of shortage of running water within the toilets, particularly in public schools. School solid waste was collected by garbage collectors or burned in school compound. Over 80% of schoolchildren from both types of schools had a good knowledge about reasons for washing hands. Most schoolchildren in private schools (93%) and a lower proportion in public schools (55%-60%) practiced handwashing with soap, mainly because soap was made available by schools due to enforced COVID-19 precautions. More private schoolchildren (67%-77%) than those in public-schools had a more positive attitude towards use of running water for drinking and understood that quality of water affected health. Only students in one public school were not happy with toilet facilities in their school. In general, there were differences in WASH infrastructure and KAP between private and public primary schools.

Keywords: Adequacy; Availability; Hygiene; Sanitation; School; Water

INTRODUCTION

Appropriate Water, Sanitation, and Hygiene (WASH) facilities are required to address the sustainable development goals (SDG), namely Goal 4, to ensure inclusive and quality education for all and promote lifelong learning and Goal 6, to ensure availability and sustainable management of water and sanitation for all. The latter one is also important for satisfying the 'use and utilization' pillar of food security. Household Food insecurity and poor WASH practices are identified as key underlying causes of illnesses that could result in malnutrition (ENN, 2016). If drinking water is not safe, it causes parasitic and bacterial diseases such as diarrhea and also contaminates hands and food utensils that pass pathogens to food (Mills and Cummings, 2016).

Food- and water-borne pathogens cause diarrhea which leads to malnutrition through electrolyte loss, hampering of absorption of nutrients and loss of appetite, finally weakening the immune system (WHO, 2017). Weakened immunity renders a child

susceptible to diarrhea forcing it to go into the diarrhea-malnutrition-diarrhea vicious cycle (WHO/USAID/UNICEF, 2015). Unsafe sanitation and hygiene, and shortage of access to clean water create fertile ground for transmission of waterborne diseases (Mills and Cummings, 2016).

In Ethiopia, most schoolchildren have problems with access to clean water, sanitation, and hygiene in schools. According to UNICEF (2010), 30% of schools in Ethiopia did not have access to WASH and some of them had a toilet which were unclean, not comfortable to use and without proper handwashing facilities. In Addis Ababa also, there is a problem of inadequate access to WASH facilities in schools (Veenkant et al., 2018).

In many countries, school children are affected by health- and nutrition-related problems that constrain their ability to thrive and limit their ability to attain their education potential. These inadequate nutritional conditions, highly prevalent in several Ethiopian regions, are all believed to lead to impaired cognitive ability (MoH, 2017). These are mainly caused by problems that affect availability, adequacy and accessibility of clean water, sanitation, and hygiene in schools. When schoolchildren are affected by waterborne diseases, such as diarrhea, their nutritional status is hampered and they lose the ability to attend classes and follow lessons attentively. Girls face additional challenges in accessing usable and appropriate WASH facilities. WHO (2015) estimated that 50% of malnutrition was associated with repeated diarrhea or intestinal worm infection as a result of unsafe water, inadequate sanitation, or insufficient hygiene. The undesirable outcomes of poor access to WASH in schools goes beyond the school environment as infected schoolchildren also transmit the diseases to their families and also communities.

Water and sanitation services are inadequate in many schools around the world. As a result, teachers and schoolchildren are forced to teach and learn in potentially hazardous environments (Snel et al., 2000). Because schoolchildren are spending more of their time at school every day, the status of school WASH impacts the health of schoolchildren, affects educational status and dignity, especially for girls (UNICEF, 2020). Appropriate implementation of hygiene and education would supplement the provision of clean water and sanitation (Rahman et al., 2019).

Globally, school-based WASH measures are aimed at minimizing the incidence of diarrhea, increasing school enrolment and attendance, academic performance of schoolchildren, and influencing parent and sibling hygiene activities whereby schoolchildren serve as agents of change in their families (McMichael, 2018). Schools with sufficient WASH facilities provide a secure water supply, a system that offers clean and adequate water, especially for handwashing and drinking. Similarly, there should be enough toilets suitable for privacy. There should also be healthy, clean, cultural, and gender-appropriate water usage for schoolchildren and other staff, with sustained hygiene promotion (WHO, 2019).

As all school-age children are required to attend school in Ethiopia, increase in school enrolment has resulted in an increasing demand for clean water, sanitation, and hygiene facilities in the school. But a proportional increase in supply of clean water, sanitation and hygiene facilities remain as challenges (Seid and Kumie, 2013). According to

UNICEF (2007), in Ethiopia, there was a significant difference in access to WASH facilities between male and female schoolchildren. Latrine to student ratio was 1:170 overall, 1:164 for boys and 1:177 for girls. This was significantly less than the optimal student to lavatory seat ratio of 1:30 (MoH, 1996). According to recent data from the Ministry of Education (MoE, 2017), elementary schools with improved drinking water supply, upgraded latrines, and handwashing facilities with water and soap accounted for 38%, 38%, and 21%, respectively.

The majority of adolescent girls in most developing countries, including Ethiopia, reported a lack of secure, private, and clean toilets with washing facilities at their schools, which is critical for menstrual hygiene management (MHM) practices (Tamiru et al., 2015). Girls' school attendance and performance are negatively impacted during menstruation by MHM-related issues (Korir et al., 2018). Despite the increasing global recognition of MHM as a development priority for promoting girls' school attendance, research on it has been too scanty to influence policy and practice in Ethiopia (Tamiru et al., 2015). The aim of this study was, therefore, to make a comparative assessment of access to WASH facilities among public and private schools in a sub-city in Addis Ababa.

MATERIALS AND METHODS

Description of the study area

The study was carried out in two purposively selected woredas, Woreda 08 and 09 of Kirkos sub-city, Addis Ababa. Kirkos sub-city is one of the ten sub-cities of Addis Ababa which is located at the center of Addis Ababa. The sub-city covers a surface area of 1,472 ha and has a population size of about 220,991 (CSA, 2007) and consists of eleven woredas containing a total of 45 primary schools including 24 private and 21 public. It also has seven private and five public secondary schools. In Woreda 08 and 09, there are three public primary schools, three private primary schools, one public secondary school, and one private secondary school. YFPS, a public school, and BYA, a private school, are located in Woreda 08; BPS, a public school, and NGS, a private school, are located in Woreda 09.

The study employed both primary and secondary sources of data to achieve the objectives stated above. Primary data consisted of observational visits and questionnaire-based data on knowledge, attitude, and practices of schoolchildren in water, sanitation and hygiene (WASH) in school. These were used to assess availability, accessibility to all schoolchildren, and adequacy of drinking water facilities, toilets (in terms of types and cleanliness), and handwashing facilities, and removal of solid and liquid wastes from school compounds. Moreover, secondary information was also consulted from different reports and documents.

Study population, and sample size determination

The study was conducted in two purposively selected woredas based on logistic reasons. These are Woredas 08 and 09 of Kirkos sub-city, Addis Ababa. The study was conducted in two purposively selected woredas based on logistic reasons. These are Woredas 08 and 09 of Kirkos sub-city, Addis Ababa. Two primary schools with higher number of school children in each woreda (one public and one private school) were purposively selected. Schoolchildren from grades five to eight were randomly selected. The sample size was determined by using the simple random sampling formula of

Yamane (1967). Accordingly, 298 schoolchildren were recruited for this study. The sample size was proportionally distributed among schools, grades, and sexes (rounded off towards girls as they have a slightly higher number).

Data Collection and Analysis

Quantitative data were collected from the selected schoolchildren by using a structured questionnaire. Questionnaires included drinking water, sanitation and hygiene regarding accessibility, availability and quality. Data obtained therefrom were encoded on SPSS software version 26. Site observation was also made at schools to note the water and sanitation facilities and to see the sanitation status of the school environment. Descriptive statistics were used to describe means, percentages and frequencies. KAP of schoolchildren in water, sanitation and hygiene was classified using Bloom's cut-off points for KAP studies, as good ($\geq 80\%$), moderate (60%-79%) and poor ($< 60\%$) (Zelalem Destaw et al., 2021). The qualitative analyses were used for interpretations, comparisons, and arguments.

RESULTS AND DISCUSSION

Description of the sample schools

The descriptive statistics and sample size of the schools recruited to this study are illustrated below (Table 1)

Table 1: School names, types and study population by gender

School Name	School type	No of school children		
		Male	Female	Total
YFPS	Public	68	74	142
BPS	Public	42	41	83
BYA	Private	23	20	43
NGS	Private	12	18	30
Total	Both	145	153	298

Observation-based WASH status of sampled schools

The water, sanitation and hygiene status of the schools considered in this study were assessed during a study visit using checklist on the various facilities. The following were the findings of the observation.

Drinking water: All schools, in this study, got their water supply from the distribution system of the city's municipal water, which is chemically treated and is expected to meet the standards of potable water. In general, interruption of water supply from hours to days was common in all parts of the city. Thus, the schools considered in this study, had water tanks large enough to satisfy the needs of the school community. However drinking water was not available during the time of study visit in one public school (BPS) as water supply disruption through that particular distribution line occurred more frequently and for a longer period. Thus there were several days when water would not be available for hygiene and sanitation needs of the school community. Water was available in all schools in the two weeks prior to the study visit, but, in one public (BPS)

and one private school (BYA), there were times when water was not available throughout the school day. Unlike the situation in the whole city of Addis Ababa, water supply was never interrupted in one public school (YFPS), supposedly because it got water from an old distribution line which supplies water to the Palace. On the other hand, water was not available for less than 30 days in both private schools and for more than 30 days in the other public school throughout the school year. Schoolchildren in both private schools carried their own drinking water in plastic bottles from home. Most schoolchildren in public schools, who regularly used drinking water from school drinking stations, frequently faced drinking water shortages in the schools. Safe drinking water, in addition to its positive impact on the health of schoolchildren (Jasper et al., 2012), is also reported to reduce absenteeism (Hunter et al., 2014). In both private and public schools, access to drinking water points was not designed to accommodate schoolchildren with limited mobility and vision, although points of water source were accessible to lesser number of schoolchildren in all schools. There were varying amounts (21 to 54) of drinking water points (DWP) in the different schools. However, the ratio of drinking water points to schoolchildren was 1:8 or 1:9 in both private schools, almost similar to that observed in public primary schools in Nairobi, Kenya (Chali et al., 2018). In the case of public schools in this study, however, the proportion ranged from 1:12 to 1:53 (Table 2).

Handwashing facilities: All schools had several handwashing stations within the school. Handwashing stations were accessible to the smallest child in school, but not to schoolchildren with limited mobility or vision. During the time of this study, precautions against the COVID-19 pandemic were set as conditions for re-opening of schools. Therefore, the current sanitary and hygienic activities in schools might not reflect the case before the pandemic and, perhaps, the case after precautions are loosened in the future. Currently, however, handwashing facilities with water and/or soap were located at various sites within the compound of all schools (Table 2).

In private schools, liquid soap for handwashing was replaced immediately when exhausted, but in public schools soap was made available at handwashing stations every morning. Water supply interruption in one public school was so frequent that there were days that even water from storing tank was exhausted and all taps were without water. Other schools also had water storing tanks; moreover water supply interruptions were short term and tanks refilled. Thus, water was always available in the schools. Handwashing stations also served as drinking water spots in public schools. Schoolchildren from private schools carry their own bottled drinking water from home.

Covid-19 precautions have dictated the presence of handwashing stations at school gates and availability of soap at all handwashing station. This requirement was fulfilled in both private schools, whereas public schools did not have soap at handwashing stations near toilets. About 68% of schools in Ghana regularly had soap available for use (Appiah-Brempong et al., 2018).

Toilets: Toilets for student service in most schools were of the flush or pour-flush type, although one public school (YFPS) had pit latrines without slab. Number of toilets per school was 18 (BPS), 12 (YFPS), eight (BYA) and 17 (NGS). All toilets in all schools were in a functional state during the study visit. However, the ration of toilet to schoolchild ranged from 1:37 (YFPS) to 1:94 (BPS) in public schools and from 1:19

(NGS) to 1:36 (BYA) in private schools. Kotingo et al. (2014) observed that most of the primary schools they studied had a toilet to school child ratio of less than 1:40, but a report from primary schools in Dessie, Ethiopia, reported a ratio of 1:64 (Seid and Kumie, 2013). All schools, in this study, had separate toilets for girls and boys. Toilets in all schools were said to be cleaned, at least once, in a day. Observations during the study visit showed that toilets in both private schools were clean. However, those in public schools were either somewhat clean (BPS) or not clean (YFPS). It is believed that schoolchildren's toilet behavior is impacted significantly by the cleanliness of the toilet (Shao et al. 2021).

Table 2. Distribution of handwashing facilities in the sampled schools, Kirkos sub-city, Addis Ababa, 2018/19

School	Number of school children	Handwashing stations within school			
		Location	Number of water taps	Availability of soap	Tap:student ratio
BPS (Public)	670	At school gate	10	One soap	1:12
		At school kitchen (two stations)	10/station	One soap/station	
		At toilets	16	No soap	
		At different sites (3 stations)	1, 3, 14	No soap	
YFPS (Public)	1126	At school gate	4 (all non-functional)	No soap	1:45
		At toilet	12 (1 non-functional)	No soap	
		At school kitchen	10	One soap	
BYA (Private)	284	At toilet	32	Liquid detergent	1:6
		At school gate	3	One soap	
		At playing field	10	Liquid detergent	
NGS (Private)	328	At school gate	10	Liquid detergent and one soap	1:13
		In toilets in G+3 building, 2/floor (M/F)	16 (2/toilet)	Liquid detergent/toilet	

There was, at least, one useable toilet accessible to the smallest children in only one private school (BYA), but none had toilet designed for children of limited mobility or vision. Except in one private school (BYA), where toilets for schoolchildren were located within the school building, toilets were located within the school premises in the other schools. Only in the two private schools were anal cleansing materials available to all schoolchildren during the study visit. Both private schools had functional lighting in all toilets at time of the study visit. One public school (BPS) had functional lighting only in some toilets, but the other public school (YFPS) had no functional lighting in toilets at all. In all schools, latrines or septic tanks were emptied when they filled up. Schoolchildren in all schools were permitted to use the school toilets/latrines at all times during the school day. In general, handwashing and toilet facilities in the private schools were at a more acceptable state than those in the public schools considered in this study. Evidence from Kenya's primary school data suggested that the provision of school toilets was critical to reduce the gender education gap in developing countries, as well as to improve overall school attendance (Hyoungjong and Rhee, 2019).

Menstrual hygiene management: For the purpose of menstrual hygiene management, only water (but no soap), was available in girls' toilet cubicles in both private schools. In the public schools, there was even no water available in girls' toilet cubicles. All schools did not have covered bins in girls' toilets for disposal of menstrual hygiene waste. There were, however, other disposal mechanisms for such wastes in all schools. Menstrual pads were available in all schools except one private school (BYA) where only menstrual hygiene management (MHM) education was given. As schoolchildren attending private schools came from middle or high-income families, personal requirements by female schoolchildren are fulfilled by families. In a study on menstrual hygiene management in schools in Addis Ababa, it was reported that girls complained of lack of access to adequate resources, as well as lack of facilities and accurate information to manage their menstrual hygiene effectively at school (Biruk et al. 2018). Korir et al. 2018 reported that pubescent girls at school, particularly in developing countries, faced several challenges related to menstrual hygiene management. They often struggled at school and about 62% reported missing school each month for menstrual-related reasons (Biruk et al. 2018).

Solid waste disposal: Solid waste (garbage) was collected by municipal waste collection system in all schools, except in one public school (YFPS) where garbage was burned on school premise. In public primary schools in a state in Nigeria, all schools practiced open dumping and burning as their only method of refuse disposal (Alex-Hart and Akani, 2010).

KAP of students on School WASH

Knowledge in water sanitation and hygiene was assessed in terms of reasons to wash hands and actions that make water safe for drinking. Most respondents (80-84%) from public and private schools had a good knowledge about reasons for washing hands. Similarly, good knowledge in handwashing among primary schoolchildren was also reported from Hosanna town, Southern Ethiopia (Seyum et al., 2018) and Angolela, Central Ethiopia (Gelaye et al., 2010). However, less than 50% of schoolchildren in both public and private schools in our study did not know the correct actions that could eliminate harmful germs from drinking water. Total average knowledge among all schoolchildren in all schools was around 60% (Table 3).

Practice in hygiene and sanitation was evaluated in terms of using appropriate utensils for drinking water, appropriate hand washing and proper source of water in toilets. Over 90% of school children in public and private schools used appropriate utensils to drink water (Table 3). With regards to the practice of washing hands with soap, almost all schoolchildren (93%) in private schools washed their hands with soap. A similar high proportion of handwashing was reported from primary schools in South Africa (Sibiya and Gumbo, 2013) and Khartoum, Sudan (Hussein et al., 2021). A lesser proportion (55%-65%) of schoolchildren in public schools, in this study, used soap during washing hands. Considering the fact that this study was carried out while COVID-19 precautions in schools were in effect, and soap was, as a rule, made available for handwashing, the observed lower proportion might not be considered satisfactory. Poor practices in handwashing were reported from elsewhere in Ethiopia (Seyum et al., 2018; Eshetu et al., 2020; Gelaye et al., 2010). Toilets had proper source of water in one public (YFBS) and one private (NGS) schools.

Water for schools in Addis Ababa is distributed through municipal lines and is believed to be potable. The majority of private schoolchildren (67%-77%) had positive attitude towards its use for drinking than did the public school ones (43%-44%) (Table 4). Similarly a good proportion of school children going to private schools understood that quality of water affected health. Only students in one public school (BPS) were not happy with toilet facilities in their school. A very small proportion of schoolchildren (16%) in the same school believed that water facility in the school was not adequate to meet daily drinking requirement. A higher proportion of schoolchildren in Nairobi, Kenya said that drinking water supply was adequate (Chali et al., 2018).

A large proportion of schoolchildren from private schools (77%-88%) agreed that the school provided education on sanitation and hygiene. In general, schoolchildren in private schools had a moderately positive attitude towards hygiene and sanitation (around 70%). Good positive attitude towards handwashing was also reported from a primary school in Yirgalem town (Eshetu et al., 2020), and Hosana town (Seyum et al., (2018), both from Ethiopia.

Table 3. Total school WASH knowledge, attitude and practice among schoolchildren in public and private schools

KAP components	Public school		Private school	
	BPS (N=83)	YFPS (N=142)	NGS (N=30)	BYA (N=43)
Knowledge				
Reasons to wash hands	84%	80%	83%	84%
Action to take to make water safe for drinking	46%	45%	30%	35%
<i>Total average proper knowledge</i>	65%	63%	57%	60%
Attitude				
Quality of water at school is safe to drink.	41%	43.7%	66.7%	76.7%
Quality of water can affect health.	38.6%	35.2%	56.7%	83.7%
Drinking water facility at the school is more than satisfactory	61%	82%	80%	76.7%
Water facility in the school is adequate to meet daily drinking requirements	15.7%	50%	73.3%	55.8%
Toilet facilities on the school's premises are more than satisfactory	24.1%	34.2%	73.4%	52.8%
<i>Total average attitude</i>	36.1% %	49.2%	70.2%	69.1%
Practice				
Best practice to drink water	90%	88%	93%	91%
Wash hands with water and soap	55%	65%	93%	93%
Proper source of water in toilets	27%	74%	57%	40%
<i>Total average appropriate practice</i>	57%	76%	81%	75%

Table 4. Total attitude of school WASH among schoolchildren in public and private schools

	Public school		Private school	
	BPS (N=83)	YFPS (N=142)	NGS (N=30)	BYA (N=43)
Attitude	%	%	%	%
Drinking water is safe to drink	41%	44%	67%	77%
Quality of water can affect health	39%	35%	57%	84%
Toilet facilities in school are good	62%	83%	79%	78%
Water facility in the school adequate to meet daily drinking requirements	16%	50%	73%	56%
Soap is provided outside the toilets for washing hands	8%	3%	60%	35%
School provides education on water, sanitation and hygiene	48%	57%	77%	88%
<i>Total average positive attitude</i>	36%	45%	69%	70%

CONCLUSION

This study considered only two public and two private schools in Kirkos sub-city in Addis Ababa. This study showed that there were differences in WASH infrastructure and status between private and public primary schools. There is better practice in school sanitation and hygiene in private primary schools than in public schools. Efforts should be made to improve schoolchild sanitation and hygiene infrastructure and practices xx through meaningful investment in school WASH facilities. More studies to study WASH issues in all types of schools may generate useful data for improvement if WASH issues in schools in Ethiopia.

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