POST COVID-19 SITUATIONAL ANALYSIS OF WATER SANITATION AND HYGIENE IN PUBLIC PRIMARY SCHOOLS IN KIAMBU COUNTY, KENYA

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ABSTRACT

Increased enrolment of children in public schools since the inception of free primary education in Kenya has been attributed to the progressive pressure on the existing water, sanitation, and hygiene (WASH) facilities in schools. The main objective of this study was to assess the status of WASH services in Kikuyu sub-county primary schools post Coronavirus Disease (COVID-19) outbreak. The study applied a cross-sectional study design to collect data for both qualitative and quantitative analysis. The target respondents were students in grades 5 through 8 and the head teachers. At the same time, the key informants were the environment teachers and the sub-county director of education. The study involved all thirty- two (32) public primary schools in Kikuyu Sub-County where 393 respondents were selected through a multistage stratified sampling technique involving both boys and girls from different schools in the sub-county and simple random sampling in the selection of the respondents per grade. A structured questionnaire, a Key Informants Interview guide, and a structured observation checklist were used in data collection. This study found that that Kikuyu Water Company served the largest population of schools, 64.5 percent as the main source of water for schools in Kikuyu sub-county. However, some schools (48.4 percent) relied on shallow wells and a few (9.7 percent) were connected to the community water project/schemes. Water storage capacity in a majority of schools (56.3 percent) ranged between 30,000 and 60,000 litres, while 34.4 percent had less than 30,000 litres water storage and only 9.4 percent of the schools had a capacity of more than 60,000 litres. It was established that most of the schools, 77.4 percent used treated drinking water while the rest, 23.6 percent did not. This study established that since the onset of COVID-19, a majority of schools developed and improved a significant number of WASH facilities in their respective schools. However, when this study was undertaken, a majority of schools (25, 78 percent) were still rated as having limited water supply service. Availability of sanitation facilities had moderately improved since 53 percent of the schools were rated as having limited sanitation services. This calls for strategic resource mobilization to equip schools with more WASH facilities to reach WHO and MoE standards to support primary education. Future researchers should explore further to identify the suitable funding models for WASH services development in schools and the best practices in the operation and maintenance of WASH facilities in public primary schools.

Keywords: Water Supply Situation, Sanitation Conditions, Level of Knowledge, Attitude, and Hygiene Practices.

INTRODUCTION

Infectious diseases still trouble most of the undeveloped nations due to a lack of water sanitation and hygiene (WASH) infrastructure especially among school-going children (Chard *et al.*, 2018). Research shows that diarrhea disease and pneumonia contribute to about 90% of child mortality in most of the poor and highly populated developing countries (Gawai *et al.,* 2016). Proper handwashing is recognized as a useful exercise in promoting the good health of school-age children and lowering the incidence of diarrheal diseases by 50% (Jennifer and Param, 2014). These interventions particularly those that promote the provision of clean drinking water, enhanced sanitation infrastructure, and hygiene education as per the United Nations Children's Fund (UNICEF) are essential for young school-age children's wellbeing and effective school days (UNICEF, 2020).

It is estimated that only 32% of schools across the globe are provided with the basic sanitation facilities and 407 million school-going children do not have access to a toilet (Muximpua & Nhampossa, 2020). Sub-Saharan Africa is regarded to have the lowest levels of access to sanitary facilities and clean water in the entire world (Akunga, 2009). Kenya has benefited from the UNICEF Action 2014–2022 program, which has improved the availability of public water, sanitation facilities, and hygiene services (UNICEF, 2020).
A majority of Kenya's public peri-urban schools, including those in Kikuyu Sub-County have no adequate documentation of the status of their WASH facilities. In comparison to less populated schools, highly populated schools are likely to have a higher risk of infectious diseases including the Corona Virus Disease (COVID-19) pandemic (WHO, 2020). Improved sanitation and hygiene practices can significantly reduce these risks (Gawai *et al.*, 2016). Given this context, this study assessed the state of WASH services in the public primary schools within Kikuyu Sub-County.

Statement of the Problem

Due to steadily rising enrollment, public primary schools in Kikuyu Sub-County have had difficulty providing WASH services since Kenya launched free primary education (FPE). The inadequate WASH facilities are under more strain as a result of the rising enrollment of kids in public schools. Reports show that the development of new WASH facilities in schools has faced limited funding and disparities (Negassa, 2018; Mansour *et. al.,* 2017). For instance, in an institution, the acceptable ratio of students to toilets is 20:1 for females and 30:1 for males (UNICEF, 2021), but there is limited research work, data, and information on WASH services in schools across the country. Previous studies undertaken in Kikuyu have shed some light on the issues contributing to disparity in the enrolment of boys and girls in primary education (Beldina, 2012). However previous studies have shown less attention on the effectiveness and sufficiency of WASH services in schools.

Since the onset of COVID-19, many public places including schools were required to improve availability and accessibility of WASH services under the new WHO and Ministry of Health Protocols. After the onset of Corona Virus Disease (COVID-19), this study sought to determine the current condition of WASH services in public primary schools in Kikuyu Sub-County. The assessments were done to ascertain the quality and quantity of WASH services under the new WHO and the Ministry of Health (MoH) protocols to combat the COVID-19 pandemic.

Empirical Review

Around the world, 1.1 billion people lack access to improved water, and 2.6 billion do not even have access to improved sanitation (WHO and UNICEF, 2020). Over two million people every year die from diseases brought on by an inadequate supply of water, poor sanitation, and poor hygiene, most of whom are children (Mason *et al.*, 2013). Studies show that adequate water supply, improved sanitation, and hygiene education (Mason *et al.*, 2013), and practices are key to supporting menstruating girls and minimizing the risk of waterborne diseases (Sommer *et al.,* 2013; World Bank, 2022).

Countries with the highest access rates to unclean water and inadequate sanitation bear the largest burden of waterborne diseases (UNICEF and WHO, 2020). India reportedly had the most waterborne illness outbreaks worldwide in 2009, with 675,000 cases reported there. Approximately 732 million people lacked access to a functional toilet at home, and 163 million people never had consistent access to clean water (Kanungo *et al.,* 2010). According to a UNICEF and WHO report in 2020, a majority of schools in sub-Saharan Africa, Central and East Asia, and Southern-South Eastern Asia had inadequate access to piped water in 2018 (UNICEF and WHO, 2020).

The national government has established numerous programs to manage population growth and national development to improve WASH services in peri-urban areas (Munga *et al.,* 2014). Since 2012, new policies have been introduced in Kenya to enhance the standard of living for Kenyans. One such policy is the Sessional Paper No. 3 of 2012 (National Council for Population and Development, 2012). Kenya Vision 2030, Kenya Health Policy 2014–2030, and the Kenyan Constitution are additional legal documents that define and support the provision of WASH services to Kenyan citizens.

Most schools find it challenging to implement WASH programs due to the National School Health Policy and National School Health Guidelines, which were issued in 2009 but were poorly implemented due to inadequate government funding and other issues (Talaat *et al.,* 2011; Mansour *et. al.,* 2017). The Kenyan government established the Sanitation & Hygiene Interagency Coordinating Committee (ICC) in 2010, however, there hasn't been much success in raising the quality of WASH facilities in primary schools. Due to donor abandonment of WASH projects as

a result of corruption and poor budget management, the availability of WASH facilities in schools has decreased.

Studies show that it is nearly impossible to maintain sanitary infrastructure, especially in informal settings, all over the world, including Kenya (Alexander *et al.,* 2014; Munga *et al.,* 2014). According to published reports, middle- and upper-class inhabitants can receive water and sanitation at a lower cost than those living in peri-urban areas in the twenty-first century (UNICEF, 2020). The risk of disease spreading due to the problem of open defecation is also common in the informal settlements hence the need for improved sanitation (Mason *et al.,* 2013).

Sanitation and hygiene in schools have also become topics of interest in several international development agendas. The school environment is considered a potential hotspot for disease transmission among children, especially post the COVID-19 pandemic (Bah and Li, 2020). It has been shown that good structural and educational advancements in sanitation and hygiene can help in reducing the risk of child mortality from water-borne illnesses and limiting the spread of communicable diseases (Alexander *et al.,* 2014).

The WHO and UNICEF through a Joint Monitoring Program publish annual progress in WASH services globally for countries, schools, and healthcare institutions. for the years 2017, 2018, 2019, and 2020 respectively (WHO and JMP, 2020). However, the onset of coronavirus disease (COVID-19) has been a game changer and has greatly affected how the whole society deals with the common contagious diseases. Several initiatives and funding across the globe have been introduced to support the provision and improvement of WASH facilities in schools (Simiyu *et al.,* 2020).

According to the most current assessment, maintaining adequate WASH services in schools is essential to reducing inequality and enhancing student and staff safety post the COVID-19 epidemic (WHO & JMP, 2020). Through a joint monitoring program, UNICEF and WHO provide a service ladder for assessing the upkeep and provision of WASH services in schools (UNICEF and WHO, 2020). The service ladder is used to show the level of progress that a school has achieved in terms of the provision of water for cleaning and drinking purposes, availability of sanitation and handwashing plus the level of hygiene knowledge in schools. According to UNICEF and WHO, a particular WASH service is classified as a "Basic service" if it is available on the school premises and in an improved condition. When the WASH service is not functional or in a state that makes it not usable, it is classified as Limited Service". When the WASH services are completely unavailable in a school or an unimproved state, the service is classified as "No service" (UNICEF and WHO, 2020).

RESEARCH METHODOLOGY

This study included both quantitative and qualitative data and was conducted using a descriptive cross-sectional research methodology. The study area was Kikuyu Sub-County in Kiambu County, which is approximately 175.8 square kilometers in size (KNBS, 2019). The population for this study was pupils in Kikuyu Sub-County's primary schools. Kikuyu Sub-County has 32 public primary schools with a combined enrollment of 21,395 students, according to the County Integrated Development Plan (2018-2022). The target population included the head teachers or their deputy heads, the teachers in charge of environmental activities in the schools, and the pupils in the upper-primary levels (grades 5, 6, and 8). A multistage stratified selection method was used to select representative pupils from grades 5 through 8 in each of the selected schools. To include boys and girls from upper primary, a total of 393 respondents were chosen and distributed proportionally with the student population in 32 schools (grades 5, 6, & 8). Slovin's formula was used in the sample size of this study. To collect primary data, a questionnaire, Key Informant interviews, and an observation checklist were employed. A pre-test study was conducted in Kiambu Primary School which is one of the most populated and longest-serving public primary schools in Kiambu County. Content validity was checked to enhance some logic in the data collection. A questionnaire, an interview guide, and an observation checklist were employed during the data collection process to capture both quantitative and qualitative data. The primary data was screened, coded, and analyzed using advanced Microsoft Excel tools and the Statistical Package for Social Sciences (SPSS).

Results

The study covered a total of 32 public primary schools in Kiambu County, Kenya. From the results, 43.8% (14) of the schools had between 8 and 14 classrooms, 40.6% (13) had between 15 and 21 classrooms, 9.4% (3) had between 22 and 28 classrooms and 6.3% (2) had between 29 and 35 classrooms. In addition, the results showed that 34.4% (11) of the public primary schools in Kiambu County had between 601 and 900 children, 31.3% (10) had between 301 and 600 children, 18.8% (6) had less than 300 children, 9.4% (3) had above 1500 children, 3.1% (1) had between 901 and 1200 children and 3.1% (1) had between 1201 and 1500 children. Further, 43.8% (14) of the public primary schools in Kiambu County had between 16 and 23 teachers, 40.6% (13) had between 8 and 15 teachers, 9.4% (3) had between 32 and 39 teachers and 6.3% (2) had between 24 and 32 teachers. This study found that 75.0% (24) of the head teachers were female and 25.0% (8) were male. In addition, 81.3% (26) of the head teachers were 45 years and above in age, 15.6% (5) were aged between 35 and 45 years, and 3.1% (1) were aged between 25 and 35 years. Further, 34.4% (11) of the header teachers had been serving in their schools for more than 5 years, 25.0% (8) indicated for less than 1 year, 21.9% (7) indicated for a period between 1 and 2 years and 18.8% (6) indicated for a period of between 3 and 5 years. Moreover, 68.8 (22) of the head teachers had bachelor's degrees, 21.9% (7) had master's degrees and 9.4% (3) had diplomas. From the results of this study 51.3% (200) of the pupil's population were female and 48.7% (190) were male. In addition, 46.9% (183) of the pupils indicated that they were aged between 10 and 12 years, 42.8%

(167) indicated between 12 and 14 years, and 10.0% (39) indicated between 14 and 16 years. Also, 39.0% (8) of the pupils were in grade/ class 8, 30.8% were in grade/ class 6, and 30.3% (5) were in grade/ class.

64.5% (20) of the head teachers indicated that they had piped water from a Water Company, 48.4% (15) were using shallow wells, 9.7% (3) used a public water network, 3.2% (1) had a borehole and the same percent were using water from springs as their main source of water. In addition, 86.4% (337) of the pupils indicated that the source of drinking water while in school is tap water, 33.3% (130) indicated that they carried water to school, 39% (152) indicated the main source of water was rainwater collection, 6.9% (27) indicated water bowsers/ tanker trucks, 1.3% (5) indicated surface water - rivers, dam, pond, the same percent indicated others and 0.5% (2) indicated from hand-dug. From the results, 77.4% (24) of the head teachers indicated that their schools treated water before drinking, 12.9% (4) did not treat the water, and 9.7% (3) indicated that they sometimes treated water before drinking. The head teachers who indicated that their schools treated water before drinking were further asked to indicate how the water was treated. From the results, as shown in Figure 4.2 51.7% (15) indicated that water was treated using a water guard, 24.1% (7) indicated that it was treated using chlorine, 13.8% (4) indicated that it was treated at source and 10.4% (3) indicated that it was treated using water filters.

The head teachers were asked to indicate whether they paid for water supplied to the schools. A majority of the teachers involved in this study (74.2%, 23) indicated that they paid for water supplied in their schools while 25.8% (8) indicated that they did not pay for water supplied in the schools. The schools that indicated no payment of water were schools affiliated with a church or institution and water was provided for free. 93.5% (29) of the head teachers indicated that they had improvements in the water supply since the onset of COVID-19. This was supported by 83.6% (326) of the pupils who indicated that they had noticed improvements in the school's water availability for the last two years, 9.0% (35) of the pupils indicated that they had not noticed any change and 7.4% (29). 87.5% (28) indicated that there was sufficient and safe drinking water in their schools in the last two years, and the same percentage indicated that there was proper monitoring of water quality in the school, 84.4% (27) indicated that there was enough water in the school for hand washing, 84.4% (27) indicated that they had increased installation of water provision facilities, 78.1% (25) indicated that they had increased water supply in their schools in the last two years, 75% (24) indicated that their schools had sufficient water storage and 56.3% (18) indicated that they had increased the budget for water supply. From the findings indicated in, 99.5% (388) of the pupil's population indicated that they confirm availability of water storage tanks in their school. Only 0.5% (2) of the respondents indicated that they did not have any water storage in their school.

From the observations, all the public primary schools in Kiambu County had water storage containers. A larger number of schools (78.1%, 25) used plastic tanks to store water, 15.6% (5)

used concrete tanks, 3.1% (1) used reservoirs/dams, and the same per cent used metallic tanks. It was observed that 56.3% (18) of the schools had a water storage capacity of between 30,001 and 60,000 litres, 34.4% (11) had below 30,000 litres, 6.3% (2) had between 60,001 and 90,000 litres and 3.1% (1) had above 90,000 litres. It was observed that most schools had inadequate water storage tanks while few had adequate storage tanks which was disproportional to the school population and most tanks were either supplied by NGO, NG_CDF, church, or private entities. From the findings, 87% (26) of the schools had water taps for hand washing, but 13% (6) of the schools had no observable water taps for hand washing. Most schools 74.2% (23), between 1 and 10 water taps were functional and non-leaking, in 9.7% (3) of the schools between 21 and 30 water taps were functional and non-leaking, in 6.5% (2) of the schools between 11 and 20 water taps were functional and non-leaking and the same per cent had over 50 water taps that were functional and non-leaking, and in 3.2% (1) of the schools had between 41 and 50 water taps that were functional and non-leaking. Only 3.1% (1) of the schools had a functional but leaking water tap while 93.6% (29) were found with non-functional water taps. The head teachers were asked to indicate key challenges experienced concerning water supply in their schools. Almost a half population of the head teachers (48.4%, 15) indicated that the high cost of maintenance and repairs was the main challenge experienced in the water supply in their schools.

The head teachers were asked to indicate key challenges experienced concerning water supply in their schools. Almost a half population of the head teachers (48.4%, 15) indicated that the high cost of maintenance and repairs was the main challenge experienced in the water supply in their schools. The study found that most of Kiambu County's public primary schools were using piped water (64.5%), followed by shallow wells, rainwater harvesting, r, water bowsers/tanker trucks as well as boreholes and springs. The adequacy of the water varied from one school to another with some schools having adequate water and others having inadequate water. The study revealed that there was sufficient and safe drinking water in the schools in the period between 2020-2022 (93.3%). In addition, there was proper monitoring of water quality among public primary schools in Kiambu County (93.3%). The study revealed that there was enough water in the school for hand washing (90%). The study found that most of the schools had increased installation of water facilities (87.1%). It was established that schools had sufficient water storage (80%) and most of them had increased the budget for water supply (60%). The study found that all the public primary schools in Kiambu County had water storage containers/tanks but unevenly distributed - some adequate and others inadequate in some schools. Most of the water storage tanks were made of plastic (81.3%) and others were concrete (19.2%). One school had a reservoir/dam and one had an elevated steel tank (100M3). The water storage capacity in most of the public primary schools in Kiambu County was between 30,001 and 60,000 litres (56.3%).

The study established that the majority of the public primary schools in Kiambu County had observable water taps for hand washing (86.7%). The study found that 74.2% of the schools had between 1 and 10 water taps that were functional and non-leaking. However, 93.6% of the schools

also had between 1 and 5 taps that were non-functional. The highest ranked challenge experienced concerning water supply in the schools was the high cost of maintenance and repairs (48.4%) followed by water rationing and lack of reliable water supply (32.3%), lack of enough water storage and high-water demand/requirement (25.8%) as well as damages and water leakage. The study found that public primary schools in Kiambu County had more toilets/latrines for the girls than those for the boys. Specifically, 56.3% of the schools had between 1 and 10 functional boys' toilets/ latrines and 46.9% had between 11 and 20 functional girls' toilets/ latrines. The study established that most of the public primary schools had clean latrines (42.3%). However, about one-quarter of the schools (26.9%) had dirty/poor hygiene latrines. In addition, latrines in the public primary schools were kept clean by washing with water. However, one school was using sprinkling ash to clean the latrines. The study found that in most of the schools (93.5%) the latrines were cleaned daily.

The study revealed that while in the majority of the schools (52.3%), caretakers were used in washing the toilets/latrines, the rest of the schools' used pupils in cleaning the toilets/latrines. The study found that the majority of the public primary schools (86.2%) normally had sufficient water for use in the latrines and handwashing. The study established that in all the schools (100%) had latrines/toilets with concrete/ cemented floors. The majority of the toilets/latrines were pit latrines (96.9%), but some had both pit latrines and flush toilets. The study found that hygiene lessons were offered weekly (58.1%) and in some schools every month. The study established that the pupils had demonstrated their hygiene knowledge in school in a good way (64.5%). In addition, public primary schools in Kiambu County had trained WASH/Environment teachers (51.6%). Further, in most of the schools, the children knew whether they were likely to suffer from various diseases if they did not wash their hands regularly. These diseases included suffering from stomach problems, diarrhoea, cholera, intestinal worms, and typhoid. The study established that most of the schools (51.6%) rarely experienced cases of absenteeism and the rest never experienced cases of absenteeism due to the outbreak of waterborne related diseases.

Conclusion

The study concludes that there has been an improvement in the water supply in schools since the onset of COVID-19 but a majority of schools (80.7%) still have limited WASH services. Most of the schools had adequate water for drinking and maintaining good sanitation and hygiene. However, availability of water varied from one school to another with some schools indicating that they had adequate water while others indicated that they had inadequate water. A majority of the schools used piped water followed by shallow wells, rainwater harvesting water bowsers/tanker trucks. In addition, most of the schools ensured the treatment of drinking water using water guards, chlorine, and water filters. The study found that all the public primary schools in the study area had water storage containers/tanks, which were mainly made of plastic with capacities ranging between 30,001 and 60,000 litres.

The study concludes that there was an improvement in sanitation conditions in public primary schools in Kiambu County post-COVID-19 pandemic although a majority (51.6%) were still ranked with limited sanitation services. The study established that most of the public primary schools had clean latrines with the main method of cleaning the latrines/toilets being washing with water. Most of the schools ensured that the latrines/toilets were cleaned daily by caretakers. However, the study found that human excreta could be observed on the floor of the latrines/toilets in most of the schools. The study found that the majority of the public primary schools had sufficient water for use in the latrines and handwashing.

The study established that all the schools had latrines/toilets with concrete/ cemented floors but varying floor finishes. The majority of the toilets/latrines were pit latrines, but some schools had a mixture of both pit latrines and flush toilets. About one-half of the schools that had flush toilets had enough water for use. The study also found that most of the latrines/toilets had functional doors that could be locked from the inside. The study established that in most of the public primary schools in Kiambu County, classrooms were cleaned daily. The study found that in all the schools, the children were practicing handwashing. The materials used for handwashing in the school included water and bar soap or liquid soap, which were located near the toilet.

The study concludes that there was an increase in the level of knowledge, awareness, attitude, and hygiene practices among the pupils and educators in Kiambu County's public primary schools post the COVID-19 epidemic. In most of the schools, the pupils demonstrated good hygiene knowledge. In addition, hygiene lessons were offered weekly with the main topics being general food hygiene, how to use the toilet, and general and personal hygiene/ cleanliness. The study also found that slightly over one-half of public primary schools in Kiambu County had trained WASH/Environment teachers. In the majority of schools, the children knew possible diseases and illnesses that could occur if they did not wash their hands regularly.

Recommendations

The study found that the water supply was still inadequate in some of the schools in Kikuyu Sub-County. As such, the study recommends that the government of Kenya through the Ministry of Education should ensure adequate financing of water supply systems in public primary schools in Kiambu County. This can be done by increasing water storage tanks, extending of water network within the schools, constructing additional water points, constructing additional hand washing stations next to toilets and classrooms, drilling boreholes where feasible, rehabilitation and replacement of non-functional and leaking water taps, provision of gutter for rainwater harvesting, provide budget allocation for operation and maintenance of water systems. The study recommends more resources either from the government, private or NGOs should prioritize sanitation which seems lagging and poses public health risks, especially to pupils. Most schools do not meet the MoE standard of 1:25 toilet stances for boys and 1:30 toilet stances for girls, and (48.2%) do not meet the required standard ratio. The majority of the latrines were also found to meet basic

standards of privacy, protection, and safety. The school management with support from BOM should ensure that the public primary schools in Kiambu County have toilets/latrines with functional doors that can be locked from the inside to guarantee the safety and privacy of learners. The study also recommends that the management of the public primary schools in Kiambu County should ensure proper cleaning of the latrines/toilets to ensure that there is no visible human excreta on the floor. In addition, pupils should be trained on how to use latrines/toilets without leaving human excreta on the floor.

The study recommends more training for WASH/Environment teachers as only half of them had been trained on issues related to sanitation and hygiene. In addition, the study recommends that there should more training of the pupils on the importance of good sanitation and hygiene as measures of preventing waterborne related diseases.
The study recommends more inclusive sanitary facilities – persons with disabilities (PwD), the minority of the schools (22%) had disability-friendly sanitary facilities.

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