EFFECT OF SANITATION AND HYGIENE PRACTICES ON STUDENTS' ACADEMIC PERFORMANCE IN PUBLIC SECONDARY SCHOOLS IN MUHORONI SUB-COUNTY, KENYA

BY

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DECLARATION

Declaration by the Candidate

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DEDICATION

This work is dedicated to my dearest and lovely husband Mr Philemon Keter, my lovely Daughter Brunhilda Jepchirchir and adorable sons; Dennis Kiplagat and Thaddeus Kibiwott.

ABSTRACT

Access to improved sanitation is an important component of human health and wellbeing. Minimum requirements for safe WASH in schools are not provided in most rural schools in Kenya. The current study investigated the effect of sanitation and hygiene practices on students' academic performance in public secondary schools in Muhoroni Sub-County. The specific objectives were to find out the influence of availability and access to safe drinking water, availability of sanitation facilities, provision and access to hand washing facilities and provision of hygiene education on secondary school students' academic performance. The study was anchored on Health Belief Model. Descriptive research design and mixed methodology was used. The target population was 2354 form three students and 23 teachers. Krejcie and Morgan sample size determination formula was used to obtain a sample size of 331 respondents. Questionnaires, interviews, observation and document analysis were used to collect data. Piloting was carried out in Kisumu Central sub-County. Validity was determined by consulting research supervisors while reliability was determined through the use of Cronbach Alpha. The quantitative data were analyzed by SPSS (version 25) and the findings presented using frequencies, percentages and the mean. In addition, Pearson Product Moment Correlation analysis was used to determine the relationship between independent and dependent variables. Qualitative data were thematically classified and arranged before they were reported in narrations and quotations. The study found that 65.4% of the learners reported that they were using safe drinking water in their schools. In addition, 63.3% of the study participants reported that their schools had reliable, sufficient and clean water supply. It also emerged that 51.2% of the learners acknowledged that their schools had insufficient number of toilets. Additionally, 67.8% of the learners acknowledged that their schools did not have sanitation facilities which are accessible to all students, including those with disabilities. The study found that 67.1% of the learners believed that their schools had inadequate hand washing facilities while71.6% learners acknowledged that hygiene and sanitation practices could be enhanced through hygiene education. The study also found that there was a significant correlation between availability and access to safe drinking water and academic performance ($r = .678$; $p = .000$), availability of sanitation facilities and academic performance ($r = .764$; $p = .001$), provision and access to handwashing facilities and students' academic performance ($r = .506$; $p = .000$) and provision of hygiene education and students' academic achievement performance ($r = .822$; $p = .000$).The study concluded that availability of safe drinking water at schools reduces the likelihood of water-related illnesses, such as diarrhea or other waterborne diseases. In addition, availability to sanitation facilities influences students' academic performance among secondary school students. The provision and access to hand washing facilities have a profound impact on students' academic performance. The study recommended that schools and education policymakers need to prioritize the provision of safe drinking water, availability of hand washing facilities and promote proper hand hygiene practices to support students' academic performance. This study would give the current WASH scenario of schools in the study area that can help ministry of education to improve the school's WASH situation.

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LIST OF ABBREVIATIONS AND ACRONYMS

HBM	Health Belief Model
LMICs	Low- and Middle-Income Countries
MM	Mixed Methodology
MMR	Mixed Methods Research
NACOSTI	National Council for Science, Technology and Innovations ()
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social Science
UNICEF	united Nations Children's Fund
WASH	Water Sanitation and Hygiene

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter covers the background to the study, statement of the problem, purpose of the study, objectives of the study, research questions, justification and significance of the study, scope of the study, assumptions, theoretical framework, conceptual framework, limitations of the study and operationalization definition of terms.

1.1 Background of the Study

Communicable diseases are common among school-aged children around the world, and exposure to a wide range of microorganisms that cause preventable diseases in the school population is unavoidable. The underlying issues are mostly poor personal hygiene and inadequate sanitation practices, which result in school absenteeism, which has an impact on children's academic performance owing to illness (Pradhan, Mughis, Ali, Naseem & Karmaliani, 2020). Inadequate health care facilities in low and middle income countries (LMICs) exacerbate the problem, resulting in schoolchildren's health being jeopardized (Marmot, 2015).

Basic sanitation entails having access to facilities for the safe disposal of human waste (feces and urine), as well as the ability to maintain sanitary conditions through garbage collection, industrial/hazardous waste management, and wastewater treatment and disposal (UNICEF and the World Health Organization, 2012). According to WHO and UNICEF (2012), the world will not meet the United Nations' Sustainable Development Goals (SDGs) sanitation target unless development is accelerated immediately to halve

the proportion of people without sustainable access to basic sanitation. Thus, sanitation is considered to be essential in all places of work and circumstances, particularly in schools.

Personal hygiene is a collection of behaviors that aid in maintaining good health and preventing illness transmission. This entails bathing one's body, hands, and nails on a regular basis, as well as washing one's clothes, hair, and brushing one's teeth (Abdelrahman, 2022). Due to their inherently weak immune systems and lack of awareness of fundamental hygiene procedures, learners spend the majority of their time in schools closer to one another, leading in rapid spread of illnesses (Adnane, 2014). As a result, hygiene is critical in the prevention of communicable diseases (Motakpalli *et al.*, 2013). These illnesses are the leading cause of absenteeism resulting in lost work time for parents and high medical costs due to doctor visits and antibiotic prescriptions. If drinking water was available, sanitation was improved, and the frequency of diarrhoeal diseases was reduced, more than 1.9 billion school days could be gained (Tamiru *et al.*, 2017). The supply of drinking water and sanitary facilities in schools helps to enhance personal hygiene, which benefits students' health (McMichael, 2019).

Since the prevention and management of communicable illnesses remains a global concern (WHO/UNICEF, 2014), there has been a global call to action to address diseases caused by a lack of water, sanitation, and hygiene. This is remarkable given the literature's findings on the efficiency of cleanliness in the prevention of contagious diseases such as diarrhoea, trachoma, schistosomiasis, infectious hepatitis, dental plaque and caries, periodontal disease, and other faecal-oral disorders. Handwashing with soap and water after defecation and before consuming food has been regarded as good

handwashing. Brushing teeth at least twice a day is also considered good oral hygiene (Dobe, Mandal & Jha, 2013).

Access to improved sanitation is an important component of human health and wellbeing (Busienei, Ogendi, & Mokua, 2019; WHO/UNICEF, 2015). Globally, by 2015, approximately 2.4 billion people lacked access to basic sanitation with 892 million people still defecating in the open (WHO, 2019). The lack of access to basic sanitation, the use of unsafe drinking water, and poor hygiene are said to be responsible for about 88% of all deaths from diarrheal diseases in developing countries (Wolf *et al.*, 2018). Most students in public secondary schools in Kenya have access to basic sanitation however, they sanitation facilities are inadequate.

Students in low-income settings are at substantial risk of water, sanitation, and hygiene (WASH) related infections such as pathogens causing diarrheal diseases, soil transmitted helminths (STH), and trachoma. According to Chard, Garn, Chang, Clasen and Freeman (2019) crowded, unsanitary conditions may facilitate the spread of pathogens and increase students' risk for diseases. Conversely, access to adequate WASH facilities at school may have the potential to reduce the risk of diseases and absenteeism among students (Trinies, Garn, Chang & Freeman, 2016). According to United Nations International Children's Emergency Fund [UNICEF], (2016) schools with adequate water, sanitation, and hygiene (WASH) facilities have reliable, sufficient and clean water supply; sufficient number of private toilets that are safe, clean, and gender segregated; adequate hand washing facilities with water and soap; and hygiene education in the school curriculum have higher students' attendance rates.

These WASH facilities should cater for the whole school community which includes; small children, pubescent girls, and children with disabilities. Improved school WASH conditions for example, adequate water quality and quantity, provision of soap, improved latrine access and cleanliness may reduce student's absence by providing a learning environment that is clean, private and safe. Such school environments appeals to learners, specifically older girls of menstruating age to attend school since they are guaranteed of personal hygiene at all time (Ghosh, Kabir, Khan, Shill & Alam, 2020).

In Africa, a study by Garn, Trinies, Toubkiss and Freeman, (2017) on the role of adherence on the impact of a school-based water, sanitation, and hygiene intervention in Mali, found that increased access and adherence to multiple WASH components was important for improving health but that there was no effect of the intervention on pupil absence. The study findings suggested that a comprehensive WASH intervention and a focus on increasing adherence may help maximize the health effects of school WASH programs, but that WASH alone might not be sufficient to decrease pupils' absenteeism.

Additionally, a study conducted by Wanjiku, Gachahi and Mwaruvie, (2017) on availability of sanitation facilities in schools concluded that lack of sanitation amenities such as piped water and good toilets led to occurrence of diseases such as typhoid, cholera and other highly contagious diseases which affect learners' access to education through high absenteeism rates. The study further poised that sicknesses contributed to lower academic achievement among students due to absenteeism and low cognitive development due to illnesses. Lack of proper Sanitation amenities was also associated with incidences of diseases among students and this resulted to increased rate of

absenteeism in schools. Similarly, a study conducted by O'reilly *et al.,* (2008) on the impact of a school-based safe water and hygiene programme on knowledge and practices of students and their parents in Nyanza province, western Kenya concluded that school-based safe water and hygiene programme described in the study showed promise for reducing absenteeism by improving the quality of the school environment, and changing behaviour in the home through knowledge transfer from students to parents.

Even if poor hygiene practices can be avoided in low- and middle-income countries (LMICs), active public health programs must concentrate on identifying individuals who are most vulnerable (Peltzer & Pengpid, 2014). As a result, studies into the socio-demographic factors that influence hygienic behaviors, particularly among adolescents, are necessary. Previous research on the factors of teenage hygiene behavior has largely been done in countries like India, Saudi Arabia, and Lebanon, with an emphasis on oral hygiene (Anand & Prakash, 2018; Ranasinghe, Ramesh & Jacobsen, 2016). In general, these studies have related poor oral hygiene among adolescents to male sex, low socioeconomic position, rural location, smoking, alcohol and cannabis use, insufficient exercise, and infrequent fruit and vegetable intake. A few researches on hand hygiene and sleep hygiene have also been carried out (Cruz & Bashtawi, 2016). The current study concentrated on effect of hygiene practices on academic performance in secondary schools.

Illness-related absences from school have been shown to lead to adverse educational and economic outcomes; for instance, a sick learner may fall behind in his or her coursework and suffer academically (Ranabhat, Nepal & Regmi, 2019). A study in Nepal by Sharma

and Adhikari, (2022) found that students' school absenteeism was higher in schools that did not have improved WASH services compared to those that had. In addition, despite the proven effectiveness of improved sanitation and hygiene practices in educational settings (Willmott, *et al.,* 2016), there is evidence that maintaining good hygiene practices in low-income countries has a relatively low implementation rate (Smith, *et al.,* 2020). In Kenya, all schools were required by the government to put in place hand washing stations with adequate water and soap during the Covid 19 period. However, very few schools in the study area fully implemented the policy due to lack of adequate clean water and in some instances lack of budgetary allocations. This leads to emergence of communicable diseases in these schools affecting student school attendance which have an effect on learner performance. The current study was undertaken among school going learners in Muhoroni Sub-county, Kenya to find out the effect of sanitation and hygiene practices on students academic performance.

1.2 Statement of the Problem

Schools need to have adequate clean drinking water, adequate and well maintained number of toilets for their students and staff members, water and adequate hand washing stations among other sanitation facilities. Minimum requirements for safe WASH in schools, such as drinking water from an improved source, useable improved facilities and handwashing facilities with available water and soap (WHO, 2019) are not provided in most rural schools in Kenya particularly in Muhoroni Sub-County, Kisumu County. According to a 2017 school-based study (Morgan *et al.,*2017), 25% of the 198 surveyed schools relied on unimproved drinking-water sources, 38% of the schools had unsafe sources, contaminated with E. coli, and 44% of the schools collected drinking-water off-

premise. About 25% of the rural schools had unimproved sanitation facilities and insufficient provisions for menstrual hygiene, and overcrowding of sanitation facilities was common in 24% of schools. Handwashing facilities were largely lacking (40%), as were soap (87%) and hand drying materials (81%) (Morgan *et al.,* 2017).

Muhoroni sub-County is disaster prone to floods and drought. Floods cause damage to health infrastructure and people's health, causing interruptions in access to safe water (Mournie, 2011). These factors indicate that population in Muhoroni Sub County is at high risk of contracting communicable diseases including diarrhea, typhoid and cholera among others affecting students' school attendance (Odongo, Wakhungu & Stanley, 2017).

A number of studies have been conducted on the puzzle of dismal performance by learners during Kenya certificate of Secondary education, but most researchers have not looked into the effect of sanitation and hygiene practices despite the fact that parents have been complaining about poor sanitation in secondary schools in Kisumu County, Muhoroni sub-county (Waga, 2013).

According to Kisumu County Director of Education (2020), public secondary schools lack sanitation facilities as compared to private secondary schools in the study area. During the covid-19 period, all schools were required to implement the WASH programme; however, statistics shows that the wash programmes are dysfunctional since learners no longer use them. In addition, the inadequacies in hygiene and sanitation services in most public secondary schools in Muhoroni sub-County have an influence on disease occurrence amongst learners affecting the number of days they attend school.

This in turn has an effect on the overall performance of learners in these schools. Additionally, Muhoroni sub-county is prone to pollution of water sources and the environment due to industrial activities and agricultural runoff which has contributed to the spread of water borne diseases. Additionally, weather conditions, such as heavy rainfall and flooding, further exacerbate sanitation challenges and increase the risk of waterborne diseases in the area.Therefore, the current study investigated the effect of sanitation and hygiene practices on students' academic performance in public secondary schools in Muhoroni Sub-County, Kenya.

1.3 Purpose of the Study

The aim of this study was to investigate the effect of sanitation and hygiene practices on students' academic performance in public secondary schools in Muhoroni Sub-County, Kenya.

1.4 Objectives of the Study

This study was guided by the following specific objectives;

i. To find out how availability and access to safe drinking water influence students' academic performance in secondary school in Muhoroni sub-county
ii. To assess how availability to sanitation facilities influence students' academic performance among secondary school students in Muhoroni sub-county
iii. To explore how provision and access to hand washing facilities influence secondary school students' academic performance in secondary schools in Muhoroni sub-county

iv. To examine how provision of hygiene education influences secondary school students' academic performance in public secondary schools in Muhoroni sub-county

1.5 Research Hypotheses

The following research hypotheses were tested at 95% confidence level;

$H0_1$: There is no significant relationship between availability and access to safe drinking water and students' academic performance in Muhoroni Sub-County

$H0_2$: There is no significant relationship between availability of sanitation facilities and students' academic performance in Muhoroni Sub-County

$H0_3$: There is no significant relationship between provision and access to hand washing facilities and students' academic performance in Muhoroni Sub-County

$H0_4$: There is no significant relationship between provision of hygiene education and students' academic performance in Muhoroni Sub-County

1.6 Justification of the Study

Investigating the impact of sanitation and hygiene practices on students' academic performance is essential for improving educational outcomes, public health, and equity in access to education. It has wide-ranging implications for individuals, communities, and societies, making it a valuable area of research and policy development. Poor sanitation and hygiene can lead to the spread of diseases and illnesses. By investigating their impact on students' academic performance, the study identified potential interventions to improve not only educational outcomes but also the health and well-being of students. Access to proper sanitation and hygiene facilities is not uniform across all schools in Muhoroni Sub-county. Thus this study highlighted disparities in access and thus research

findings can help advocate for more equitable educational opportunities for all students, regardless of their socioeconomic status. In addition, Understanding the correlation between sanitation and hygiene practices and academic performance can lead to evidence-based strategies that schools and policymakers can implement to enhance students' learning outcomes. Clean and healthy environments can contribute to improved focus, attendance, and overall educational performance.

1.7 Significance of the Study

This study would help school staff, learners, school management committee, Government and non-government organizations working in schools to create and provide accessible infrastructure in school WASH. Students who are healthy, well-nourished, and have access to WASH facilities are better equipped to focus on their studies, attend school regularly, and perform well academically. Students often share what they learn about WASH practices with their families, contributing to improved community health which is beneficial to both the parents and the governmentl. In addition, this study gave the current WASH scenario of schools in the study area that can help concerned authorities abide by WASH guidelines to improve the school's WASH situation. Moreover, the study findings would be used as the baseline for those who want to conduct detail study on various aspect of WASH in schools in Kenya.

1.8 Assumptions of the Study

The study was based on the following assumptions:

i. The respondents gave honest opinions concerning hygiene and sanitation practices in their schools

ii. Most secondary schools in the study area had put in place intervention strategies to minimize cases of diseases as a result of poor hygiene and sanitation practices.

iii. The combination of both qualitative and quantitative aspects of data collection and analysis in this study provided a better understanding of effect of hygiene and sanitation practices on students' health.

1.9 Scope of the Study

This study was conducted among form three students and teachers in-charge of boarding section from public boarding secondary schools in Muhoroni Sub-County. The study mainly focused on sub-county and county schools within Muhoroni Sub-County. The content scope included effect of sanitation and hygiene practices on students' academic performance in public secondary schools in Muhoroni Sub-County and specifically covered influence of how availability and access to safe drinking water, availability to sanitation facilities, provision and access to hand washing facilities and provision of hygiene education influences secondary school students' academic performance. The study used mixed methods where both qualitative and quantitative data were collected and analyzed.

1.10 Limitations of the Study

The study was limited by the fact that there are many other factors that influence students' academic performance in secondary schools and therefore using only one factor of sanitation and hygiene practices could attract criticism. However, in the current study, the students' academic performance was based on students' personal experience. The localization of the study to Muhoroni sub-County could limit its generalizability to other

schools in other counties in Kenya but should be useful for exemplification and the beginning of a debate. However, the study used triangulation in both data collection and analysis thus allowing for generalization of the study findings.

The study population comprised of form three students and teachers in charge of boarding section in selected county schools. Sampling from all categories of schools is likely to enrich the study but this can come with problematic extraneous factors that could affect the credibility of the findings. However, the research can benefit from a larger sample but this is not possible within the available time and resources.

1.11 Theoretical Framework

This study was anchored on Health Belief Model (HBM). The health belief model was earliest models of WASH developed in the 1950s by a group of social psychologists at the U.S. Public Health Service, primarily by Hochbaum, Rosenstock, and Kegels to explain behavior associated to tuberculosis screening (Glanz *et al.*, 2008). Rainey and Harding conducted a study using a modified version of the Health Belief Model. This model showed the correlation between individual opinions and behavioral results that is linked by modifying factors, such as recognized threat, personal socio-demographics, and cues to action. The study concludes that public health education is a must to reduce water-borne diseases, water resource protection, and a motivational component for sustainable use of water treatment (Rainey & Hardinng, 2006).

Sustainable Development Goal 4 (SDG4) requires “inclusive and equitable quality education” that will “provide safe, non-violent, inclusive and effective learning environments for all”. Potable water, sanitation, and hygiene promotion are often

overlooked, and these components are crucial for ensuring that students can attend school regularly, remain healthy and fulfill their human right to education (WaterAid, 2019).

A student spends most of the time in school and WASH in schools has a significant impact on learning and health. Thus, sanitation practices will have an influence on a learners' time in school which affects academic performance of the individual learners. Sanitation in schools is important in terms of health and quality education which includes access to potable water, sanitation, and hygiene (WASH) services while at school. Sanitation in schools is also a milestone towards the Sustainable Development Goals (targets 4.a, 6.1, 6.2) emphasizing the need for WASH outside of the home (UNICEF, 2020). According to the HBM, individuals' beliefs about their susceptibility to a health condition can influence their behavior. In the context of academic performance, if students perceive a link between their health and academic success, a higher perceived susceptibility to poor grades or academic setbacks may motivate them to take actions to protect their health and prioritize behaviors that enhance their academic performance.

School water sanitation and hygiene practices, such as access to clean drinking water, proper sanitation facilities, and hygiene education, contribute to students' overall health and well-being. Safe drinking water and proper sanitation can help prevent waterborne diseases and reduce absenteeism due to illness. Further, adequate water sanitation measures in schools can reduce the prevalence of waterborne diseases, such as diarrhea and cholera. When students are healthy and not affected by frequent illnesses, they are more likely to attend school regularly and perform better academically. Schools with proper water sanitation and hygiene facilities are more likely to see improved attendance

rates among students. When schools provide a safe and healthy environment, students are more likely to attend regularly, leading to better academic outcomes. Schools with good water sanitation and hygiene practices may experience reduced dropout rates. Improved health and attendance can lead to higher student retention rates and decreased chances of students leaving school prematurely. Further, hygiene education programs in schools can promote positive behavior change among students, such as adopting regular hand washing practices and proper sanitation habits. These behavioral changes contribute to better health outcomes and academic performance.

1.12 Conceptual Framework

Figure I present the conceptual framework that was used in the study

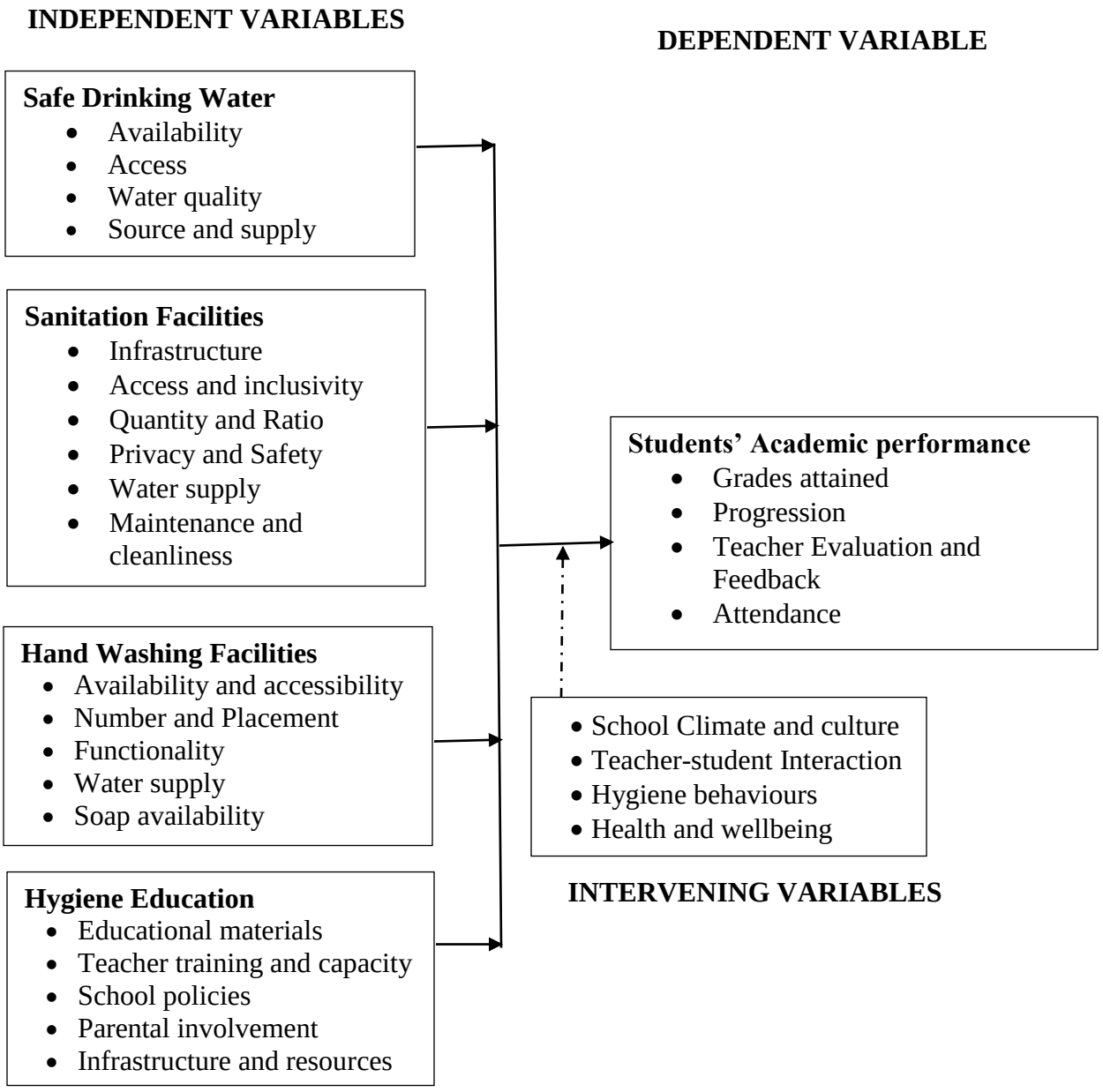

Figure 1: Conceptual Framework on Effect of School Water Sanitation and Hygiene Practices on Students' Performance
(Source: Author, 2023)

Figure 1 shows that the independent variables for the study were safe drinking water in schools (availability, access, water quality, source and supply), sanitation facilities

(infrastructure, access and inclusivity, quantity and ratio, privacy and safety, water supply, maintenance and cleanliness), Hand Washing Facilities (availability and accessibility, number and placement, functionality, water supply and soap availability) and hygiene education in schools (Educational materials, teacher training and capacity, school policies, parental involvement and infrastructure and resources) while the dependent variable was students' academic performance which involved grades attained, progression to higher levels, teacher evaluation and feedback and students school attendance, the intervening variables were school climate and culture , teacher-student interaction, hygiene behaviours health and wellbeing of students. To minimize the effects of intervening variables on the study outcomes, these variables were included as covariates or control variables in the analysis, thus their effects were statistically accounted for, allowing for a clearer understanding of the relationship between the main variables.

1.13 Operational Definition of Key Terms

Academic Performance: This is the student's assessment based on the scores achieved in the different subjects by a learner in secondary school. In this study, school attendance was considered to be affected by sanitation and hygiene practices in schools where schools with adequate hygiene infrastructure performed better than those with inadequate hygiene infrastructure.

Hygiene practices: These are conditions or practices that are undertaken by schools which are conducive for maintaining health and preventing diseases among students, particularly through cleanliness. In this study, it means the ability of schools to provide adequate sanitation facilities which in turn allows students to use them efficiently thus reducing the spread of hygiene related diseases.

Sanitation: This is the provision of clean drinking water to students, teachers and non-teaching staff in public secondary schools. It also involves safe sewerage disposal in schools.

Students' Health: The state where students are free from illness particularly those related to sanitation and hygiene.

1.14 Chapter Summary

This chapter presents background to the study and statement of the problem. It also highlights the purpose of the study, objectives and research questions and significance of the study, scope, assumption and limitation of the study, also the theoretical as well as conceptual framework and the operational definition of key terms.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature effects of school water sanitation and hygiene practices on students' performance. Specifically, it addresses sanitation practices and learners' health in schools, Knowledge and Practices of WASH in Schools, attitude towards wash practices, intervention strategies put in place to enhance wash programme, sanitation practices and students' academic performance and gaps in literature

2.2 Sanitation Practices and Learners' Health in Schools

Improving the access to safe drinking water and adequate sanitation, as well as promoting good hygiene, are key components in the prevention of diseases such as diarrhea in schools. According to Patel (2015), about 60–90% of children worldwide suffer from dental caries leading to pain and discomfort. The negative impact and burden of oral diseases restrict activities in schools and home, leading to the loss of many potential working hours and more than 51 million school hours worldwide (Macnab, 2015). Oral hygiene is the practice of maintaining the mouth clean and healthy so that oral diseases affecting the oral cavity and its surrounding structures are prevented. Maintaining good oral hygiene is considered to be a lifelong habit, and these oral habits are said to begin in an early stage of life (Subait, Alousaimi, Geeverghese, Ali & Metwally, 2016).

The lack of basic school-WASH services has been revealed to be widespread in Nigeria, contributing significantly to youth and adolescent sanitation and hygiene practices (Egbinola & Amanambu, 2015; Wada *et al.*, 2020; Wada & Oloruntoba, 2021).

Furthermore, the situation is exacerbated by the Nigerian WASH sector's widespread social inequalities. According to the World Bank, around 90% of rural Nigerians defecate in the open, and 51% of rural communities lack access to improved water (World Bank Group, 2017). The disparities between rural and urban areas are primarily due to differences in wealth quantiles. Wealthier households and stronger economic power are more common in urban areas.

Access to safe water, adequate sanitation services, and improved hygiene practices could prevent a significant number of infections (Sanneh & Sanneh, 2018). A lack of awareness of the health benefits of personal hygiene is a common cause of poor health among schoolchildren (Khatoon, Sachan, Khan & Srivastava, 2017). Handwashing has become a major priority in the promotion of hygiene practices in recent years, not least since unwashed hands are the source of many upper respiratory and diarrhoeal diseases, particularly colds and gastroenteritis. However, personal hygiene extends beyond the hands. For example, oro-dental hygiene, which involves brushing and flossing your teeth on a regular basis, can help you avoid foul breath, gum disease, and tooth decay (Rajbhandari, Dhaubanjar & Dahal, 2018). Body odor and skin problems can be caused by poor body hygiene, including wearing unclean clothing.

While examining the population hand hygiene practices is of interest in its own right, it is particularly important to explore these practices in young people, as they are the “silent carriers” who unknowingly play a major role in community transmission of infections (Chisholm *et al.*, 2018). It is well established that adolescence, a sensitive phase of life, exerts significant influence in shaping long term health behaviors (Patton *et al.*, 2018).

The impact of inadequate and unclean water, lack of sanitation, and poor hygiene behavior on disease burden is a complex issue. Human behavior about the practice of appropriate hygiene considerably increases the prevalence and severity of hygiene-related outbreaks in endemic areas (Njoh, 2010). In impoverished countries, poor hygiene habits are a serious issue (Dube & January, 2012). In underdeveloped nations, hygiene and sanitation-related diseases constitute a tremendous burden, causing many people to become ill and even die. Schools have been frequently linked in the spread of gastrointestinal disease. Improvements in hygiene behavior are the most critical barrier to many infectious diseases, because people can lower their risk of disease exposure by following safe practices and using appropriate facilities (Tambekar, & Tiwari, 2018).

Hands are a key mechanism of infectious illness transmission among school-aged children. Hand hygiene dramatically reduces illness-related absences in elementary school learners by 26 percent, helping to protect children from the two most prevalent worldwide paediatric deaths (diarrhoea and lower respiratory infection) (Aiello, Coulborn, Perez & Larson, 2008). Hand washing is especially important after using the restroom, after cleaning a child, and before handling food (Assefa & Kumie, 2014). The installation of water and sanitation facilities alone is insufficient to reduce morbidity and death rates (Tambekar, &Shirsat, 2012). Water and sanitation infrastructure related to cleanliness behavior have been shown to be more successful in lowering diarrhoeal illnesses and promoting long-term behavioral change (Dube & January, 2012).

The paucity of basic school-WASH services in Nigeria has been revealed to be prevalent, and to contribute significantly to poor sanitation and hygiene practices of youths and

adolescents (Egbinola & Amanambu, 2015; Wada *et al.*, 2020; Wada & Oloruntoba, 2021). Moreover, the situation is worsened due to the widespread social inequalities that exist in the Nigerian WASH sector. In 2017, the World Bank estimated that around 90% of rural Nigerians defecate in the open, and indicated that 51% of rural communities did not have access to improved water (World Bank Group, 2017). The rural/urban disparities are mostly a result of the differences in wealth quantiles. Urban areas tend to have a higher number of wealthier households and stronger economic power. Hence, the political will for providing basic WASH and social infrastructure in rural areas tends to be relatively lower (Ojima *et al.,* 2020; Sinharoy *et al.,* 2019).

Another study that monitored the progress made in WASH in sub-Saharan Africa revealed that rural poor households were 29 times less likely to access improved water and 25 times less likely to access improved sanitation facilities when compared to the urban poor (Armah *et al.,*2018). Moreover, wealthier households in these rural areas have better WASH services when compared to other households (Chasekwa*et al.,* 2018). In addition, unhealthy sanitation and hygiene practices among Nigerian youths and adolescents have also been associated with inadequate knowledge and negative attitude towards proper hygiene and sanitation (Azuogu *et al.,* 2016; UNICEF, 2015). This makes it paramount to look beyond just assessing for the availability of adequate WASH facilities when conducting school-WASH surveys. The students' associated knowledge and attitudes are also important variables to examine

Personal hygiene strives to enhance personal cleanliness within the context of people's living conditions (Paul, Panigrahi, Soodi Reddy, & Sahu, 2017). Bathing, clothes, handwashing after using the restroom, nail, foot, and tooth care; spitting, coughing,

sneezing, personal appearance, and instilling good habits in young people are all examples of personal hygiene (Gawai, Taware, Chatterjee & Thakur, 2016). Personal hygiene education should begin at an early age and continue throughout school (Kasaei*et al.*, 2018). It was also realized that better personal hygiene can help reduce the spread of numerous diseases (Soleymani, *et al.,* 2017). Every year, over two million people die from diarrheal diseases, according to the World Health Organization (WHO) (Sekhon, & Minhas, 2014). Children under the age of five years account for the bulk of deaths. Hygiene techniques help to prevent or reduce disease and its transmission. Germs can cause microbial proliferation, which can lead to a variety of infectious disorders in children (Ghanim *et al.*, 2016). The relevance of school health has been acknowledged around the world since the turn of the twentieth century. In communities with weak socioeconomic conditions and deteriorating living conditions, school health may be worse (Sarkar, 2013).

Personal hygiene is currently considered a primary health preventative strategy, as it has been shown to reduce childhood morbidity and death (Aburaghif, 2015). School is a location where important components of hygiene, the environment, and sanitation, as well as social conventions, are taught (Paul *et al.*, 2017). UNICEF has provided a wealth of information on school sanitation and hygiene in order to help students become change agents in their communities. It was accomplished by an assessment of the hardware factors, such as physical infrastructure, school sanitation facilities, and the availability of safe water (Ghanim *et al.*, 2016).

Negative health practices such as toilet avoidance and poor hydration adversely impact on pupils' attention and cognitive performance in class and on their health and well-being

(Merhej, 2019). Besides the environmental provisions for WASH services, WASH education is of importance as well: the risk of parasitic infections, for example, is lower in children with knowledge on hygiene and sanitation practices. Moreover, WASH interventions with an integrated education component are more efficient, and ensure commitment and adherence to healthy practices such as hand washing (Joshi &Amadi, 2013).

2.3 Knowledge and Practices of WASH in Schools

Shrestha *et al.,* (2018) evaluated that urban schools have proper handwashing facilities, but the soap was missing in both rural and urban. From the study on knowledge and practices of water, sanitation, and hygiene among secondary school students from community school students of grades 9-10 India found that urban and rural students (35% and 16% respectively) knew transmission route seemed inadequate. The practice of handwashing was found high (94.4%) among all students. Potable water and handwashing facilities with water were found lacking in rural schools.

Manandhar and Chandyo (2018) found that all the participants had knowledge of handwashing at critical times. All most all students reported that they practice handwashing before meal and after use of latrine facilities. However, handwashing with soap and water reported only 8.5% at school and 47% at home. Most students at home washed their hands only with water due to unavailability of soap.

2.4 Attitude towards WASH Practices

Some of the indicators assumed to be on the causal pathway to behavior are attitudes, knowledge, and beliefs. Personal hygiene knowledge, practice, and attitudes have

detrimental effects for a child's long-term general development (Scott *et al.,* 2007). According to a study conducted in Ethiopia, 60% of youngsters examined were unaware that diseases might be transmitted by human excrement (Kumie, & Ali, 2005). The degree of sustainability of a sanitation intervention is determined by the degree of awareness of health elements of sanitation behavior. Hand washing attitudes and habits are heavily influenced by one's perception.

2.5 Intervention Strategies put in Place to Enhance WASH Programme

School children's hygiene literacy and practices have received considerable attention to control the spread of infections among this group (Haque, *et al.,* 2016). Infections due to poor knowledge and unhygienic habits of young children lead to compromised academic performance (Sakar, 2013). Knowledge, Attitude, and Practice (KAP) survey of primary school students in Ethiopia indicated that almost half of the students had adequate knowledge of hygiene. However, the practice of handwashing with soap was not appreciable (36%) (Haque *et al.,* 2016). A survey in Palestine showed that 68% of the students reported washing hands with soap after using toilets, playing, and eating (Freeman *et al.,* 2014). A study in India demonstrated that majority of the students' correct knowledge about handwashing before meals, brushing teeth, rinsing mouth after eating, and combing hairs; did not translate into correct practice in all the cases, indicating the significance of behavior change reinforcement strategies (Sakar, 2013).

Adequate WASH provision for healthy practices at school have beneficial medium- and long-term consequences: WASH interventions in schools, such as the provision of soap, water treatment or improvements to sanitation can reduce absenteeism due to diseases,

improving pupils' mental and physical health, nutritional status, and learning outcomes (Schlegelmilch, Lakhani, Saunders & Jhangri, 2016). Improved WASH services, including means for menstrual hygiene management, also improve enrolment and gender parity increasing girls' class attendance and well-being (Garn*et al.*, 2013; Sumpter &Torondel, 2013).

2.6 Sanitation and hygiene Practices and Students' Academic Performance

Sanitation and hygiene practices are essential for maintaining good health and preventing the spread of infectious diseases. In addition to their health benefits, these practices have been found to have a positive influence on students' academic performance. Sanitation refers to the provision of facilities and services for the safe disposal of human waste, the treatment of wastewater, and the provision of safe drinking water. Hygiene, on the other hand, refers to the promotion of practices that prevent the spread of disease and infection, such as hand washing, proper food handling, and personal hygiene. Both sanitation and hygiene practices are essential for maintaining good health and preventing the spread of infectious diseases.

Several studies have found a positive relationship between sanitation and hygiene practices and students' academic performance. For example, a study conducted by Adinma and Adinma (2014) in Nigeria found that students who had access to improved sanitation facilities, such as clean toilets and hand washing stations, had higher academic performance than those who did not. The study also found that students who practiced good hygiene habits, such as regular hand washing, had better academic performance than those who did not.

Similarly, a study conducted by Freeman *et al.,* (2017) in Kenya found that providing improved sanitation facilities in schools led to improved attendance and academic performance among students. The study found that students who had access to clean toilets were more likely to attend school regularly and had higher academic performance than those who did not. Another study conducted by Snel *et al.,* (2014) in Indonesia found that hand washing promotion programs in schools led to a significant reduction in absenteeism among students. The study found that students who were taught proper hand washing techniques were less likely to miss school due to illness, leading to improved academic performance.

In addition to their health benefits, sanitation and hygiene practices may also have indirect effects on students' academic performance. For example, a study conducted by Spears et al. (2013) in India found that improved sanitation facilities in schools led to a reduction in open defecation, which in turn led to a reduction in the incidence of water-borne diseases. The study found that students who were less likely to suffer from water-borne diseases were more likely to attend school regularly and had better academic performance than those who were not.

It is worth noting that the relationship between sanitation and hygiene practices and academic performance may be affected by other factors, such as socioeconomic status, gender, and cultural factors. For example, a study conducted by Caruso et al. (2015) in Bangladesh found that while improved sanitation facilities had a positive effect on the academic performance of girls, the effect was not significant for boys. The study also found that cultural factors, such as the perception that menstruation is dirty or shameful, may affect girls' attendance and academic performance

World Bank (2005) reports that in most developing countries, the sanitary conditions are often appalling, characterized by the absence of proper functioning water supply, sanitation and hand washing facilities. A report by United Nations International Children's Education Fund (UNICEF) (2006) showed that around 5.4 million youths worldwide do not have access to safe drinking water and use mainly unprotected surface water from rivers, ponds or dams. Findings further revealed that over two million youth did not have access to any kind of toilet facility. This lack of safe water, poor hygiene practices and lack of sanitation services were reported to be major causes of morbidity among children. Inadequate access to safe water and sanitation services coupled with poor hygiene practices kills and sickens thousands of people every day and leads to impoverishment and diminished opportunities for thousands more. When it comes to schools, the World Bank (2005) warns that schools that lack access to basic water supply and sanitation services will have an increased incidence of major illness among students. Poor health is an important underlying factor for low school enrollment, absenteeism, poor classroom performance and early school dropout.

Redhouse (2004) carried out a study in Tanzanian schools to determine the rate of access to safe drinking water. In this study, a sample of public schools was carried out and was intended to determine how many school children had access to safe drinking water at a distance of 15 minutes away from the school. This study concluded that less than 12% of the public primary schools had access to safe drinking water. The study noted that lack of safe piped water contributed to prevalence of diseases associated with unsafe water such as typhoid and cholera. Thus, the study noted that such sicknesses contributed to lower

academic achievement among children due to absenteeism and slow cognitive development due to illness.

According to previous research, students' performance can be affected due to social, psychological, economic, environmental, and personal factors (Alsharari&Alshurideh, 2021; Alshurideh, 2015; Mushtaq, 2012). It has been reported that a learner's performance in school is influenced by various factors including a student's learning ability, race, gender (Sumyea; Jiuyong; Lin; Esmaeil; Shane; Murray, 2019; Kurdi, Alshurideh, Salloum, Obeidat, & Al-dweeri, 2020). Additionally, motivation simulates energy and a sense of desire in students to stay committed to a subject, goal, field or job (Al-Maroof*et al.,* 2021; Alshurideh, 2014; Gbollie & Keamu, 2017). However, the current study investigated the effect of sanitation and hygiene practices on students' academic performance in public secondary schools in Muhoroni Sub-County, Kenya

2.7 Summary and Gaps in Literature

A few studies have been documented on educational and health achievements associated with provision of WASH intervention in schools. For instance, a study conducted by Vally*et al.,*(2019) on the impact of school-based water, sanitation and hygiene intervention on knowledge, practices, and diarrhoea rates in Philippines found that presence WASH program in schools appeared to increase knowledge and hygiene behaviors of students, reduce absenteeism, and increase hand washing among household members. On the other hand, a study conducted in Pakistan by Ahmed, Wong, Chua, Hydrie and Channa (2021) on the impact of WASH-related interventions and policy on student school performance found that the school performance was significantly associated with presence of WASH interventions and WASH Policy. Thus, the current

study was undertaken in Kenyan context where most of the public secondary schools particularly in Muhoroni Sub-County lack WASH facilities and therefore the aim of this study was to investigate the effects of school water sanitation and hygiene practices on students' performance in public secondary schoolsin Muhoroni Sub-County, Kenya.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter gives the research strategy that was used so as to achieve the aims of the study. The chapter describes the research design and approach, study area, target population, sample size determination and sampling strategies, instruments that were used in the study, validity and dependability of research instruments, procedures that were used in data collection, analysis of collected information and the ethical considerations of the study.

3.2 Research Design

Research design is the overall framework for connecting conceptual research concerns to relevant and feasible empirical research. It is an investigation that provides explicit guidance for methods in research (Asenahabi, 2019). This study used descriptive research design and thus data were collected from the population at a single point in time as pointed out by Wang and Cheng (2020). This approach is considered ideal for this study since it requires direct responses from study participants while studying current phenomena without changing the variables. Participants can also describe and share their ideas on the topics under consideration in greater detail thanks to the design

In addition the study used mixed methodology (MM) where both quantitative and qualitative approaches of data collection and analysis were used. Mixed methods as a methodology, includes philosophical assumptions that provide directions for the

collection and analysis of data from multiple sources in a single study (Dawadi, Shrestha &Giri, 2021).

A mixed-methods approach to difficult research challenges has a lot of advantages because it mixes post-positivism and interpretivism philosophical frameworks (Fetters, 2016), interweaving qualitative and quantitative data in such a way that research issues are effectively explained. It also provides a logical foundation, methodological flexibility, and a thorough knowledge of minor cases (Maxwell, 2016). In other words, using mixed-methods research allows researchers to answer study questions with adequate depth and breadth (Plano Clark, &Ivankova, 2016), as well as generalize findings and implications of the studied topics to the entire population (Linnander*et al.*,2019). The quantitative technique, for example, enables a researcher to collect data from a large number of participants, boosting the likelihood of generalizing the findings to a larger population. The qualitative technique, on the other hand, allows for a more in-depth understanding of the subject under investigation while also honoring the participants' opinions. To put it another way, quantitative data adds breadth to a study, but qualitative data adds depth. Furthermore, qualitative data can be triangulated with quantitative results, and vice versa. The use of numerous methodologies or data sources to generate a full picture of a research problem or to test validity through the convergence of information from various sources is referred to as triangulation as a qualitative research strategy (Fàbregues*et al.*,2020).

Mixing two methods might be superior to a single method as it is likely to provide rich insights into the research phenomena that cannot be fully understood by using only

qualitative or quantitative methods. A mixed-methods design can integrate and synergize multiple data sources which can assist to study complex problems (Poth &Munce, 2020). The application of MMR, as mentioned in the previous section, means purposeful data consolidation which allows researchers to seek a wide view of their study by enabling them to view a phenomenon from different perspectives and research lenses (Shorten & Smith, 2017).

3.3 Study Area

This research was carried out in Muhoroni Sub County, of Kisumu County, Kenya. The Sub-county is situated in Nyanza, Kenya and its geographical coordinates are 0° 90' 0" South, 35° 12' 0" East. Appendix IV provides the Map of the study area. It has 34 secondary schools spread across the five wards; Chemelil/Tama, Muhoroni/Koru, Masogo/Nyang'oma, Miwani and Ombeyi wards.

Muhoroni sub-County is disaster prone to floods and drought. Floods cause damage to health infrastructure and people's health, causing interruptions in access to safe water (Mournie, 2011). These factors indicate that population in muhoroni sub county is at high risk of contracting communicable diseases including diarrhea, typhoid and cholera among others. This is likely to affect school attendance by students (Odongo *et al.,* 2017. The inadequacies in hygiene and sanitation services in most public secondary schools in Muhoroni sub-County have an influence on disease occurrence amongst learners affecting the number of days they attend school. This in turn has an effect on the overall performance of learners in these schools. Muhoroni sub-county is prone to pollution of water sources and the environment due to industrial activities and agricultural runoff which has contributed to the spread of water borne diseases. Additionally, weather

conditions, such as heavy rainfall and flooding, further exacerbate sanitation challenges and increase the risk of waterborne diseases in the area.

3.4 Target Population

Target population according to Ackerman, Lesko, Siddique, Susukida and Stuart (2021) is the whole set of applicable units of analysis or data. The target population of this study comprised of all students from public boarding secondary schools in Muhoroni Sub-County. According to Sub-County Director of Education (2022), there are 23 public boarding secondary schools with a student population 6346 students and 23 boarding masters/mistresses. However, the current study only targeted Form three students from the 23 public secondary schools thus giving a target population of 2354 students and 23 teachers who were in-charge of boarding thus giving a total of 2377 respondents as shown in Table 3.1.

Table 3.1: Target Population

Category	**Target Population**
Students	2354
Boarding Masters/Mistress	23
Total	**2377**

Source; Sub-County Director of Education, 2022

3.5 Sampling Procedures and Sample size

This section presents the sample size determination and the sampling procedures that was followed in order to get a representative sample.

3.5.1 Sampling Procedures

The study used simple random sampling to select the schools and students of public boarding secondary schools. According to Rahi, Alnaser, and Abd Ghani, (2019) simple random sampling guarantees that every item in the population has an equal likelihood of being nominated for the study at any given phase of sampling procedures thus circumventing biasness in the selection process. All the secondary schools were classified into three; pure boys' pure girls and mixed schools. In the study area there were five mixed secondary schools, 8 pure girl schools and 10 pure boys' schools. Table 3.2 provides the sampling frame for the study

Table 3.2: Sampling Frame for the Study

School Type	Number of schools	sample size
Mixed schools	5	72
Pure girl schools	8	115
Pure Boy schools	10	144
Total	23	331

Purposive sampling was used to select all the 23 teachers in-charge of boarding section in the selected schools. Purposive sampling, according to Saunders and Bezzina (2015), allows the researcher to use subjects that have the necessary information for the study.

3.5.2 Sample Size

The sample size for this study was based on Krejcie and Morgan (1970) sample size determination formula. The formula is given as:

$$\mathrm{n} = \frac{X^2 * N * P(1-P)}{\left(ME^2 * (N-1)\right) + (X^2 * P * (1-P))}$$

Where;

n=Sample size

X^2=Chi Square for the specified confidence level at 1 degree of freedom= (3.841) from tables

N=Population size

P=Population proportion (.50 in the table)

ME=Desired margin of error (expressed as a proportion=0.05)

=3.841x2354x0.5 (1-0.5)/ 0.05x0.05 (2354-1) +3.841x0.5 (1-0.5)

= 2247.94525/6.81025

= 331

Using the formula, a total of 331 respondents was obtained and used in the study.

3.6 Research Instruments

According to Kalkbrenner (2021), social sciences use questionnaires, interviews and Focus Group Discussions (FGD) to collect data. The current study used both quantitative and qualitative forms of collecting data and thus questionnaires, interview schedules, observation and document analysis were used for data collection making this research a mixed methods approach.

3.6.1 Questionnaires

The current study used closed ended questionnaires to collect quantitative data (Appendix II). Questionnaires were administered to 331 students. Survey questionnaires usually do not have interview partiality as the responses are in participants' personal understanding

(Creswell & Hirose, 2019). In addition, the research participants also have adequate time to provide well informed choices. Similarly, questionnaires are assumed to save time and at the same time, information can be collected from a very large population over a short period of time (Schrepp, & Thomaschewski, 2019). The questionnaire was developed based on the objectives of this research and the study variables as used in the literature reviewed. The questionnaire contained five sections with section A covering the demographic characteristics of the respondents, section B covered the Influence of availability and access to safe drinking water on students' academic performance, section C covered the availability to sanitation facilities and its influence on students' academic performance and section D covered how provision and access to hand washing facilities influence secondary school students' academic performance while the last section covered how the provision of hygiene education influences secondary school students' academic performance

3.6.2 Interview schedules

According to Heritage (2016) many individuals are ready to verbally give certain information than in writing and they would therefore give information more willingly and completely than on a research questionnaire. A researcher is in a position to inspire subjects and inquire from them more deeply into a research problem. In this study, structured interviews were administered to seven (7) teachers in charge of boarding sections from the public secondary schools selected as shown in Appendix III.

According to Nathan, Newman and Lancaster (2019), interview as a strategy of investigation characteristically includes a face-face meeting in which an investigator enquires from a personal a series of queries. It is a communication between the

investigator who in this case is the interviewer and the interviewee where a great deal of qualitative information comes from chatting with individuals whether through official interviews or casual communications.

3.4.3 Observation

In this study, sanitation facilities including infrastructure such as toilets, hand washing stations were observed by the researcher. The main aim of the observation was to ascertain the adequacy of these facilities and also to check on their maintenance.

3.6.4 Document analysis

In this study records of students' performances were obtained from the 23 schools which were selected to participate in the study.

3.7 Piloting of the Research Instruments

Pre-testing of research instruments was conducted before the main study in order to eliminate some ambiguous items, establish if there were challenges in administering the questionnaire, test run data collection information, establish the practicability of the study, anticipate and adjust any logical and procedural setbacks concerning the research and allow a preliminary information investigation to establish whether there would be challenges in the main data analysis and to guarantee that the collected data answer the researcher's questions (Gall, Gall & Borg, 2010). The pre-testing of research instruments was conducted using a total of 33 learners from secondary schools in the nearby Kisumu Central Sub-county. This shares similar characteristics as the study area. O'Leary, (2014) recommend that 10% of cases for pre-testing of instruments in order to facilitate any meaningful analysis of data.

3.8 Validity and Reliability of the Research Instruments

This section covers the achievement of both validity and reliability of the research instruments that was used to collect data.

3.8.1 Validity

Validity is the extent to which an instrument measures what it purports to measure (Mokhtarinia, Hosseini, Maleki-Ghahfarokhi, Gabel &Zohrabi, 2018). Theoretical and empirical evidences are used to assess validity. Theoretical assessment is the process through which a concept's idea is transformed or expressed into an operational measure. This is done by a panel of experts, who are university lecturers, who score the acceptability of each item and assess its fitness in the specification of the construct. Validity is determined empirically when it is based on quantitative investigation using statistical procedures.

The content validity of a set of scale items is determined by how closely they relate to the appropriate content domain of the construct being measured (Mohajan, 2017). Content validity is a qualitative sort of validity, according to Vakili and Jahangiri (2018), in which the domain of the notion is stated and the analyst assesses whether the measures appropriately represent the domain. In this study, the researcher designed questionnaires and interview schedules that adequately addressed the construct or area under investigation. In addition, research experts from the University of Eldoret who had content in the area under investigation were consulted and their comments used to improve the questions in the questionnaire and interview schedules.

3.8.2 Reliability

The degree to which the outcomes of a measurement and process can be duplicated is referred to as reliability (McDonald, Schoenebeck & Forte, 2019). In determining the reliability of the research instruments, the researcher pilot tested the instruments in the nearby Kisumu Central Sub-county which shares similar characteristics as the study area. Thereafter Cronbach Alpha Coefficient was calculated and found to be 0.75. Cronbach Alpha is normally used as a degree of internal consistency. Since alpha represents the fraction of two means, it should oscillate between 0 and 1. However, in practice, alpha can be assigned any number that is not greater than one. Higher alpha levels, on the other hand, are thought to be more desirable. Before use a research tool, researchers require a reliability coefficient of 0.70 or higher (Griethuijsen *et al.*,2014). According to Cortina in Amirrudin, Nasution, and Supahar (2021), Cronbach alpha generally rises when the intercorrelation among test matters rises, and is thus characterized as an internal consistency estimate of test score reliability. Cronbach alpha is thought to indirectly reflect the amount to which a group of items measures a single unidimensional hidden construct since inter-correlations between test matters are utilized when all items measure a comparable construct. A reliability coefficient of 0.75 was considered adequate to allow the researcher proceed with the study as per the recommendations of Taber (2018). Table 3.3 presents the reliability of all constructs

Table 3.3: Cronbach Alpha on Items in the Questionnaire

Variable		Number of Items	Cronbach Alpha
Independent Variables	Availability and access to safe drinking water	4	.701

	Availability of sanitation facilities	5	.787
	Provision and access to hand washing facilities	5	.706
	Provision of hygiene education	4	.743
Dependent variable	Students' academic Performance	4	.750

For interviews, the researcher ensured that data collected information did not have any minor errors and at the same time all the research themes are captured during the instrument preparation, the process of interviews and during the analysis stage.

3.9 Data Collection Procedures

After successful completion of proposal defense, the researcher obtained an authorization letter from the University of Eldoret which allowed the researcher to apply for a research permit from the National Council for Science, Technology and Innovations (NACOSTI) before embarking on data collection. After getting the research permit, the researcher further needed to seek for permission to conduct the study from the County Director and County Commissioner, Kisumu County. Following the acquisition of permission, each of the sampled secondary schools in the Sub-County were visited for familiarization and to obtain consent from the school administration regarding the scheduled date of data collection within their schools. Form three Students were identified, sampled and issued with research questionnaires and given time to respond to all of the items in the questionnaire, after which all of the questionnaires were collected and analyzed immediately. In addition, 30-minute interviews were administered to teachers who were in-charge of the boarding sections in their selected schools.

3.10 Data Analysis Techniques

The researcher used a variety of statistical techniques to put the acquired data into a logical and understandable format. This is required to bring out the properties of the data in order to assist description, interpretation and generalization (Agresti, 2018). The quantitative data from the questionnaire were first subjected to preliminary processing through validation, coding and tabulation in readiness for analysis with the help of the Statistical Package for Social Science (SPSS) computer package (Version 26). Frequencies, percentages and mean were used to analyze quantitative data. In addition, Pearson Correlation analysis was used to determine the relationship between independent and dependent variables. Qualitative data from interview schedules were thematically classified and arranged before they were reported in narrations and quotations as per the research objectives. The analyzed data were presented in tables and graphs. In addition, the quantitative analysis was supplemented by qualitative descriptions to explore and expand on the quantitative finding in order to provide in–depth explanations of the findings and validation.

3.11 Ethical Issues

The study observed all the rules and regulations in carrying out research in Kenya. Before undertaking fieldwork, a research permit was sought from relevant authorities including the National Council of Science, Technology and Innovations (NACOSTI) and the, Director of Education, County Commissioner and Principals of the Selected secondary schools. Privacy, confidentiality and openness in data collection was ensured throughout the study. The major ethical issues of concern were informed consent from the participants' privacy and confidentiality on information supplied, anonymity to safeguard

the identity of the respondents and the researcher's sensitivity to human dignity (Suri, 2020). The researcher further sought consent from the class teachers to allow the students to participate in the study since they (students) were still considered as minors.

In terms of trustworthiness, respondents were asked to be open and honest when answering the questions. The identities of the respondent were not revealed in this research, and the data obtained were purely used for the academic purposes of this study.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTEPRETATION AND DISCUSSION

4.1 Introduction

This section gives the outcomes of the analyzed information on the effect of sanitation and hygiene practices on students' academic performance in public secondary schools in Muhoroni Sub-County, Kenya. The section opens with the responses rate and socio-demographic data of the respondents who participated in the research followed by the factors that affect sanitation and hygiene, the knowledge and practices of the learners towards sanitation and hygiene, intervention strategies put in place to enhance sanitation and hygiene and the influence of sanitation and hygiene practices on students' academic performance.

4.2 Response Rate

In this study, a total of 289 out of 331 questionnaires were dully filled and returned by the students while 7 teachers in-charge of boarding sections were interviewed. Therefore, the response rate used for questionnaires used in data analysis in this study was 87.31% which was considered adequate to provide reliable information on effect of sanitation and hygiene practices on students' academic performance in public secondary schools in Muhoroni Sub-County. The high response rate in this study supports the argument by Peytchev, (2013) that the best way to obtain unbiased estimates is to achieve a high response rate. However, in a study by Fosnacht, Sarraf, Howe & Peck, (2017) found out that even relatively low response rates provided reliable institution-level estimates, albeit with greater sampling error and less ability to detect statistically significant differences with comparison institutions. Further, Massey and Tourangeau (2013) suggest that a high

rate of nonresponse increases the potential for biased estimates but does not necessarily bias an estimate.

4.3 Reliability Test

Reliability tests were carried out to establish reliability of the research instrument used. According to Ursachi, Horodnic and Zait, (2015) a cut-off alpha coefficient of 0.7 is sufficient to prove that the item on scale were consistent and dependable. The reliability index was assessed. It emerged that all the constructs utilized were found to be reliable with Cronbach alpha value above 0.7 as suggested by Alkhadim, (2022).

4.4 Socio-Demographic Characteristics of the Respondents

In this study, the demographic information that was sought from the learners included gender, age bracket, education level of their mothers, and religion. Socio-demography of statuses reflects the demographic and social roles and achievements of an individual(s) in a population and as such when designing a survey, the research needs to assess who to survey and how to breakdown overall survey response data into meaningful groups of respondents and these assessments (Abdullahi, 2019). In addition, socio-demographic information gives information about research participants and is required to determine whether the persons in a particular study are a representative sample of the target population for generalization purposes (Hughes, Camden &Yangchen, 2016).

4.4.1 Gender of the Respondents

In this study, students were asked to indicate their gender in the questionnaire provided. Their responses were tabulated and the results are presented in Figure 4.1.

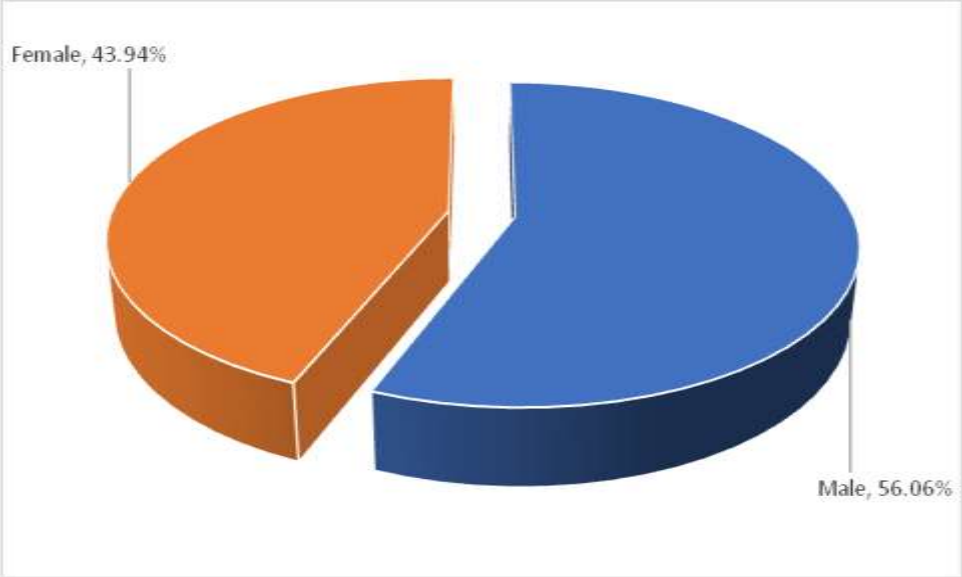

Figure 4.1: Gender of Learners

Figure 4.1 shows that 162(56.06%) of the learners were male while 127(43.94%) of the learners were female. The study thus found out that a majority (56.06%) of the students in secondary schools in Muhoroni sub-county were male in comparison to their female counterparts. There is still a lot of attention paid to how the needs of men and women are different in terms of who has access to and control over infrastructure and services for water supply, sanitation, and hygiene (Mbatha, 2011). Poor access to and availability of water and sanitation impair women's practical needs in many regions of the world, especially in developing nations, placing them in disadvantageous circumstances in comparison to males (Gelaye *et al.*, 2014; Jewitt & Ryley, 2014). Experiences from Zambia have shown that poor WASH affects girls and females disproportionately (Kasongamulilo, 2013; USAID, 2014).

4.4.2 Age Bracket

The study participants were further asked to indicate their age bracket. The results of the analyzed information are provided in Figure 4.2.

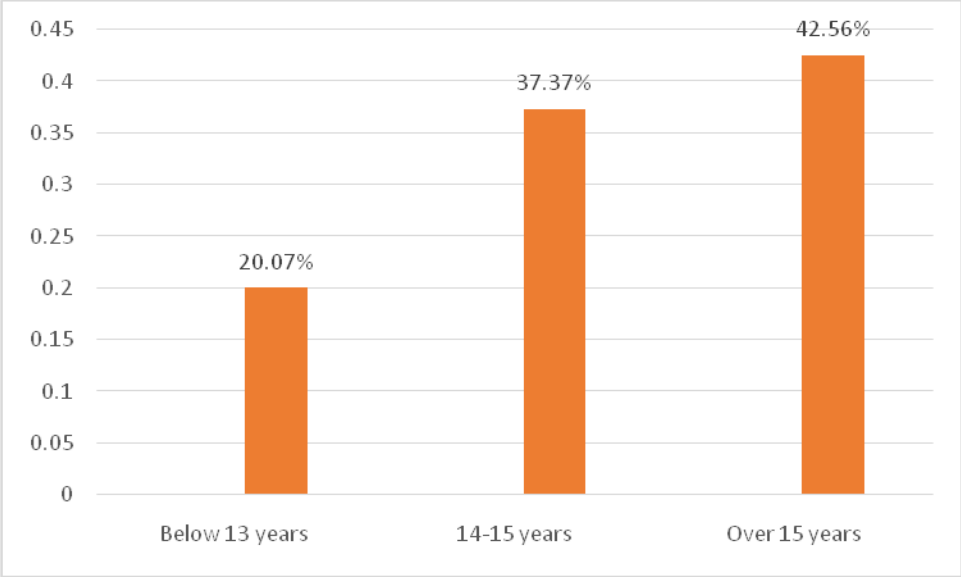

Figure 4.2: Age bracket of the Learners

Figure 4.2 shows that 123(42.56%) learners were over 15 years, 108(37.37%) learners were 14-15 years while 58(20.07%) learners were aged below 13 years. From the responses it emerged that most (42.56%) of the learners in secondary schools in Muhoroni Sub-County were aged over 15 years. According to Jewitt and Ryley, 2014)noted that lack of access to sanitation creates an unfavourable learning environment for teenage girls due to increased risks of menstrual leaks, discomfort and stigmatization. For example, access to WASH in schools by students, whether female or male, goes beyond availability, quantities, location, distance and functionality, as widely debated (Alexander *et al.*, 2014; Garn *et al.*, 2014; Jewitt & Ryley, 2014; Deroo *et al.*, 2015).

Access is also about understanding demand needs and responses by different grades and age groups in schools.

4.4.3 Mothers' highest level of Education

In addition, the respondents were asked to indicate their mothers' highest level of education. Their responses were tabulated and the results are presented in Figure 4.3.

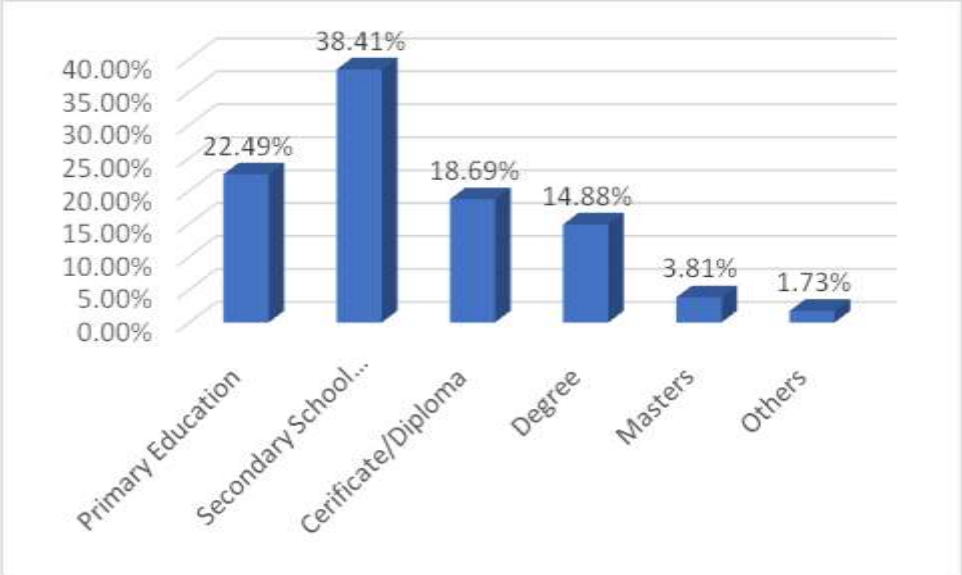

Figure 4.3: Respondents' Mothers' Education Level

Figure 4.3 shows that 111(38.4%) respondents reported that their mother's level of education was secondary school, 65(22.49%) were primary education levers, 54(18.69%) respondents reported their mothers had certificate/diploma education levels, 43(14.88%) had degrees and 11(3.8%) mothers had masters degrees while 5(1.7%) respondents had PhDs. From the response, it appeared that majority of the respondents acknowledged that their mothers had secondary school level of education. According to Mangal *et al.*, (2019), the level of personal hygiene of a person is the cumulative effect of his or her

own efforts to be neat and clean both externally and internally. The knowledge for this is attained through sources like parents. In this study, therefore, mothers with adequate level of education and particularly on hygiene practices influences their son or daughters.

4.5 Availability and Access to Safe Drinking Water on Students' Academic Performance

The first objective of this study was to find out how availability and access to safe drinking water influence students' academic performance in secondary school in Muhoroni sub-county. To achieve this objective, the study participants were requested to indicate their level of agreement/disagreement on statements which covered how the availability and access to safe drinking water influence students' academic performance in secondary school in Muhoroni sub-county. The participants rated their response on a five-point Likert scale questions as; on a scale of 1-5, as Strongly Disagree (SD=1) Disagree(D=2) Neutral (N=3) Agree (A=4) and Strongly Agree (SA=5). Their responses were tabulated and the results are presented in Table 4.1.

Table 4.1: Responses on Availability and Access to Safe Drinking on Students' Academic Performance

Statement	SD		D		UD		A		SA	
	F	%	F	%	F	%	F	%	F	%
Safe drinking water is accessible to all students and staff throughout the school premises	36	12.5	60	20.8	4	1.4	134	46.4	55	19.0
Water provided in school meets quality standards as	26	9.0	72	24.9	14	4.8	106	36.7	71	24.6

recommended by public health										
Our school has reliable, sufficient and clean water supply	36	12.5	69	23.9	1	.3	137	47.4	46	15.9
There is a water treatment facility for water that we use in our school	131	45.3	60	20.8	3	1.0	77	26.6	18	6.2

Table 4.1 shows that 134(46.4%) respondents agreed with the statement that safe drinking water was accessible to all students and staff throughout the school premises, 60(20.8%) respondents disagreed with the assertion, 55(19.0%) respondents strongly agreed with the statement and 36(12.5%) respondents strongly disagreed with the statement while only 4(1.4%) learners were neutral on the statement. The study found that a majority (65.4%) of the respondents reported that they were using safe drinking water in their schools. This implies that most schools in the region have access to safe drinking water. However, according to UNICEF, most of the world's schools lack clean bathrooms, drinking water, and hygiene education for students, particularly schools in rural areas, which either lack drinking water and sanitation facilities, or have infrastructure that is both insufficient in quality and quantity creating high-risk situations where diseases can readily spread (Otto, Opatoki & Luyi, 2022). A study by Abanyie, Ampadu, Frimpong and Amuah, (2023) in Ghana found that due to availability of safe drinking water in schools, there was improvement in school attendance and performance of school children. This was attributed to the relatively short distances covered to access drinkable water. This reveals that the provision of improved water supply systems in

school plays a significant role in students' academic performance due to reduction in occurrence of WASH related diseases.

Further, 106(36.7%) respondents agreed with the statement that water provided in their schools meets quality standards as recommended by public health, 72(24.9%) respondents disagreed with the statement,71(24.6%) learners strongly agreed with the statement and 26(9.0%) respondents were strongly in disagreement with the statement while 14(4.8%) respondents were undecided on the statement. The responses showed that a majority (61.3%) of the learners in secondary schools in Muhoroni sub-county acknowledged that water provided in their schools meets quality standards as recommended by public health. According to Hussain, Khadim, Aslam and Ghufran (2023) being exposed to contaminated water leads to increased levels of water-related ailments, which has a detrimental impact on schools since it causes chronic absenteeism that hinders learning.

Further, 137(47.4%) respondents agreed with the statement that their schools had reliable, sufficient and clean water supply, 69(23.9%) respondents disagreed with the statement, 46(15.9%) respondents strongly agreed and 26(12.5%) learners strongly disagreed with the statement while 0nly 1(0.3%) respondent was undecided on the statement. From the responses, it emerged that a majority (63.3%) of the study participants reported that their schools had reliable, sufficient and clean water supply. This implies that most of secondary schools in the study area have reliable, sufficient and clean water supply. Water and sanitation are critical components of a supportive atmosphere and high-quality education. In many impoverished countries, sanitary conditions in schools are appalling (Ana, 2008), and are either insufficient or unavailable, resulting in filthy latrines due to a

shortage of water or a far distance from it. These conditions increase the risk of disease, which, according to Egbinola and Amanambu, (2015) have a negative impact on cognition, growth, concentration, physical activities, and academic performance.

In addition, 131(45.3%) respondents strongly disagreed with the statement that there was water treatment facilities in their schools, 77(26.6%) respondents agreed with the statement, 60(20.8%) respondents disagreed and 18(6.2%) respondents strongly agreed while 3(1.0%) respondents were neutral on the statement. From the responses, it emerged that 66.8% of the students believed that there were no water treatment facilities in their schools. This implies that most of the schools in the area depended on untreated water for learners which could have effects on student health. This could result in occurrence of diseases leading to student absenteeism and poor academic achievement.

4.5.1 Qualitative Data on Availability and Access to Safe Drinking on Students' Academic Performance

In order to obtain qualitative information, teachers in-charge of boarding sections were interviewed and it emerged that most of the secondary schools in the study area lacked water treatment facilities in their schools with most schools depending on boreholes or rain water harvesting for their daily use. One of the teachers noted that;

> *It is challenging for our school to provide drinking water to our students and staff since we don't have a well-protected water source. Most of the time we harvest rain water and I believe this is the safest water source for our learners.*

From the sentiments above it can be shown that most of the schools need to have water treatment facilities in their schools to ensure safety of drinking water to both students and staff.

4.5.2 Correlation between Availability and Access to Safe Drinking and Students' Academic Performance

The first hypothesis of this study stated that;

$H0_1$: There is no significant relationship between availability and access to safe drinking and students' academic performance in Muhoroni Sub-County

The hypothesis was tested using Pearson correlation at 95% confidence level. The results are presented in Table 4.2.

Table 4.2: Correlation Coefficient between Availability and access to Safe Drinking Water and Students' Academic Performance

		Academic Performance
Availability and access to safe drinking Water	Pearson Correlation	.678**
	Sig. (2-tailed)	.000
	N	289

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.2 shows that there was a significant correlation between availability and access to safe drinking water and students' academic achievement in secondary schools in Muhoroni Sub-County (r = .678; p = .000). This means that at 95% confidence level the r value for availability and access to safe drinking water was .678 showing a moderate correlation with students' academic performance. Thus, the null hypothesis which stated that there is no significant relationship between availability and access to safe drinking water and students' academic achievement was rejected and the alternate accepted. This shows that availability and access to safe drinking water positively influences students' academic performance. According to Zulkarnain *et al.*, (2019), availability of safe drinking water contributes to an overall positive school environment. Students are more

likely to feel comfortable and supported in a school that prioritizes their health and well-being. This can have a positive influence on their motivation, behavior, and overall academic performance.

4.6 Availability to Sanitation Facilities on Students' Academic Performance

The second objective of this study was to assess how availability to sanitation facilities influence students' academic performance among secondary school students in Muhoroni sub-county. To achieve this objective, To achieve this objective, the study participants were requested to indicate their level of agreement/disagreement on statements which covered how availability to sanitation facilities influence students' academic performance among secondary school students in Muhoroni sub-county. The participants rated their response on a five-point Likert scale questions as; on a scale of 1-5, as Strongly Disagree (SD=1) Disagree(D=2) Neutral (N=3) Agree (A=4) and Strongly Agree (SA=5). Their responses were tabulated and the results are presented in Table 4.3.

Table 4.3: Responses on Availability to Sanitation Facilities on Students' Academic Performance

Statement	SD		D		UD		A		SA	
	F	%	F	%	F	%	F	%	F	%
Our school has sufficient number of toilets that are safe, clean, and gender segregated	56	19.4	92	31.8	16	5.5	57	19.7	68	23.5
Sanitation facilities in our school are accessible to all students, including those with disabilities	117	40.5	79	27.3	11	3.8	43	14.9	39	13.5
Sanitation facilities in our school provide a sense of privacy and safety for users	89	30.8	84	29.1	24	8.3	66	22.8	26	9.0
Our school has available water for flushing toilets, maintaining hygiene and handwashing after toileting	108	37.4	149	51.6	4	1.4	19	6.6	9	3.1
Our school has waste bins and wastes are regularly collected and disposed contributing to a healthy school environment	32	11.1	50	17.3	12	4.2	136	47.1	59	20.4
Regular cleaning and maintenance of sanitation facilities is undertaken on regular basis in our school to prevent the spread of diseases and maintain a hygienic environment	25	8.7	51	17.6	17	5.9	123	42.6	73	25.3

Table 4.3 shows that 92(31.8%) respondents disagreed with the statement that their schools had sufficient number of toilets that are safe, clean, and gender segregated, 68(23.5%) respondents strongly agreed with the statement, 57(19.7%) respondents agreed with the sentiments and 56(19.4%) learners strongly disagreed with the statement while 16(5.5%) respondents were undecided on the statement. From the responses, it appeared

that a majority (51.2%) of learners acknowledged that their schools had insufficient number of toilets. According to Ray and Datta (2017), separate female toilets in schools is linked with improved female enrolment and higher participation at school also Ramani, Frühauf, and Dutta (2017) found that access to and usage of a school toilet in a village school in India was a crucial determinant of less diarrhoea amongst adolescents. According to Kim and Rhee's (2019) empirical analysis of the impact of school toilet availability on Kenya's primary school enrollment rate, it is essential to have school toilets in order to overcome the gender education gap in developing nations. They also point out that providing restrooms in schools increases girls' attendance rates more than boys', with adolescent females experiencing the effects more so than the other group.

In addition, 117(40.5%) respondents strongly disagreed with statement that sanitation facilities in their schools were accessible to all students, including those with disabilities, 79(27.3%) respondents disagreed with the statement, 43(14.9%) respondents agreed with the assertion and 39(135%) learners were strongly in disagreement with the statement while 11(3.8%) learners were neutral. The study found out that majority (67.8%) acknowledged that their schools did not have sanitation facilities which are accessible to all students, including those with disabilities. This therefore shows that most schools in Muhoroni Sub-county lack adequate sanitation facilities and most of them have not designed sanitation facilities for the learners with disabilities. This implies that schools need to have sanitation facilities designed specifically for the disable learners. This finding is similar to that of Poague, Blanford, Martínez and Anthonj (2023) who found that most schools in brazil lacked adequate sanitary facilities designed for learners with disabilities.

Further, 89(30.8%) learners strongly disagreed with the statement that sanitation facilities in their schools provided a sense of privacy and safety for users, 84(29.1%) respondents disagreed with the statement, 66(22.8%) respondents agreed with the statement and 26(9.0%) respondents strongly agreed while 24(8.3%) learners were neutral on the statement. From the responses, it emerged that 59.9% of the learners in the study area believed that sanitation facilities in their schools did not provide a sense of privacy and safety to users. This could affect students' use of sanitary facilities in schools. In a study by Caruso *et al.*,(2014) it emerged that students weighed multiple factors to decide whether to use the school toilet. The factors included safety and privacy. This implied protecting learner's privacy and safety might be attractive factors for students to use school toilets. Proper sanitation facilities in schools reduce the risk of harassment, provide a comfortable environment, and contribute to a positive learning experience.

In addition, 149(51.6%) learners disagreed with the statement that their schools had adequate water for flushing toilets, maintaining hygiene and handwashing after toileting, 108(37.4%) learners strongly disagreed with the statement, 19(6.6%) respondents agreed with the assertion and 9(3.1%) learners were strongly in disagreement with the statement while only 4(1.4%) learners were neutral on the statement. From the response, it emerged that 89.0% learners reported that their schools lacked adequate water for flushing toilets, maintaining hygiene and handwashing after toileting. This implies that majority of the schools in the study area lack adequate water for cleaning toilets and hand washing. Access to safe and clean water is a fundamental requirement for maintaining good hygiene and sanitation practices. In many parts of the world, including schools, the lack of access to clean water is a major barrier to achieving good hygiene and sanitation

practices. Provision of water within the school compound, particularly around the toilets, is essential for promoting good hygiene and sanitation practices among students (Luby *et al.*, 2005). The provision of water within the school compound, particularly around the toilets, is essential for promoting good hygiene and sanitation practices among students. This is because access to water is essential for proper handwashing, which is one of the most effective ways of preventing the spread of diseases. Proper handwashing involves using soap and water to clean hands thoroughly, particularly after using the toilet, before eating, and after handling animals or animal products. The provision of water within the school compound, particularly around the toilets, has been shown to be effective in promoting good hygiene and sanitation practices among students. In a study conducted in rural Bangladesh, the provision of handwashing facilities in schools led to a significant reduction in the incidence of diarrhea among students (Sommer & Sahin, 2013). In addition, a study conducted in rural Kenya found that the provision of water within the school compound, particularly around the toilets, led to a significant improvement in students' hygiene and sanitation practices (Luby *et al.*, 2005).

Furthermore, 136(47.1%) respondents agreed with the statement that their schools have waste bins and wastes were regularly collected and disposed contributing to a healthy school environment, 59(20.4%) respondents strongly agreed with the statement, 50(17.3%) learners disagreed with the statement and 32(11.1%) respondents strongly disagreed with the statement while 12(4.2%) learners were neutral on the statement. The responses showed that 67.5% of the learners acknowledged that their schools had waste bins and wastes were regularly collected and disposed contributing to a healthy school environment. According to World Health Organization (2009), Schools should have a

waste collection, storage, and disposal policy and thus containers for garbage collection are required at designated locations. Additionally, Montgomery *et al.,* (2012) pointed out that as girls turn 14 and reach puberty, there is a substantial correlation between proper cleanliness in schools and students' ability to learn and maintain good health, particularly among female students.

Similarly, 123(42.6%) learners agreed with the statement that regular cleaning and maintenance of sanitation facilities was undertaken on regular basis in their schools to prevent the spread of diseases and maintain a hygienic environment, 73(25.3%) learners strongly agreed with the statement, 51(17.6%) learners disagreed and 25(8.7%) learners were strongly in disagreement with the statement while 17(5.9%) respondents were neutral on the statement. From the responses, it emerged that 67.9% of the learners in public secondary schools in Muhoroni Sub-County acknowledged that there was regular cleaning and maintenance of sanitary facilities in their schools thus preventing the spread of diseases. One of the key benefits of having cleaners in schools is the reduction of disease transmission. Studies have shown that schools can be a breeding ground for infectious diseases such as influenza, norovirus, and other respiratory illnesses (Bender, 2014). Maintaining clean and hygienic surfaces can help reduce the transmission of these diseases among students and staff. Cleaners in schools can also help promote proper hand hygiene practices among students. Hand hygiene is one of the most effective ways to prevent the spread of infectious diseases. Studies have shown that hand hygiene interventions in schools can significantly reduce absenteeism due to illness (Luby *et al.*, 2005). Cleaners can help reinforce hand hygiene practices by providing clean and well-stocked handwashing facilities and reminding students to wash their hands regularly.

Furthermore, the availability of cleaners in schools can improve the overall cleanliness of the school environment, which can have a positive impact on student behavior and academic performance. A study conducted in the UK sanitation and hygiene practices, found that students in schools with clean and well-maintained facilities were more likely to have higher academic achievement and lower rates of absenteeism (Barrett, Davies, Zhang & Barrett, 2015).

4.6.2 Qualitative Data on Availability to Sanitation Facilities on Students' Academic Performance

In order to obtain qualitative information, teachers in-charge of boarding sections were interviewed and it emerged that most schools lacked of adequate toilets and hand washing stations. The inadequacies of toilets and handwashing stations were attributed to lack of adequate finances to construct toilets and adequate hand washing stations. One of the teachers noted that;

> *It is challenging for our small schools to provide adequate toilets for boys and girls. In some instances, you will find learners lining up in toilets. The toilets which are in existence end up getting filled within short periods of time due to large number of learners in schools. This puts pressure on the limited finances in the school since the management are sometimes forced to construct new toilets.*

According to UNICEF (2016), the lack of adequate sanitation facilities, such as toilets, handwashing stations, and waste disposal systems, is a significant factor that affects sanitation and hygiene practices in secondary schools. In many schools, the existing facilities are either inadequate or poorly maintained, leading to poor hygiene practices among students.

It also emerged that attitudes and behaviors also play a significant role in determining sanitation and hygiene practices in secondary schools. Students and in some instances staff members may lack knowledge and awareness of the importance of sanitation and hygiene practices, leading to poor practices such as not washing hands after using the toilet or during food handling which could lead to spread of diseases as pointed out by UNICEF, (2016).

4.6.2 Correlation between Availability of Sanitation Facilities and Students' Academic Performance

The second hypothesis of this study stated that;

$H0_2$: There is no significant relationship between availability of sanitation facilities and students' academic performance in Muhoroni Sub-County

The hypothesis was tested using Pearson correlation at 95% confidence level. The results are presented in Table 4.4.

Table 4.4: Correlation Coefficient between Availability of Sanitation Facilities and Students' Academic Performance

		Academic Performance
Availability of Sanitation Facilities	Pearson Correlation	.764**
	Sig. (2-tailed)	.001
	N	289

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.4 shows that there was a significant correlation between availability of sanitation facilities and students' academic achievement in secondary schools in Muhoroni Sub-County ($r = .764$; $p = .001$). This means that at 95% confidence level the r value for

availability of sanitation facilities was .764 showing a strong positive correlation with students' academic performance. Thus, the null hypothesis which stated that there is no significant relationship between availability of sanitation facilities and students' academic achievement was rejected and the alternate accepted. This shows that availability of adequate sanitation facilities in schools positively influences students' academic performance. According to Sommer (2010), adequate sanitation facilities can have a particularly positive impact on girls' education. When girls have access to safe and private sanitation facilities, they are more likely to attend school during their menstrual periods, reducing absenteeism and contributing to improved academic performance. Additionally, Alexander *et al.,* (2016) noted that proper sanitation facilities reduce the time students spend waiting in line for toilets or dealing with inadequate facilities. This allows students to spend more time in the classroom, engaging in learning activities and focusing on their studies.

4.7 Provision and Access to Hand Washing Facilities on Students' Academic Performance

The third objective of this study was to explore how provision and access to hand washing facilities influence secondary school students' academic performance in secondary schools in Muhoroni sub-county. The respondents were asked to rate their level of agreement on a five-point Likert scale items in the questionnaire on the influence of provision and access to hand washing facilities on students' academic performance in secondary schools. The results of the analysed information are provided in Table 4.5.

Table 4.5: Responses on Provision and Access to Hand Washing Facilities on Students' Academic Performance

Statement	SD		D		UD		A		SA	
	F	%	F	%	F	%	F	%	F	%
Our school has adequate hand washing facilities with water and soap	129	44.6	65	22.5	15	5.2	28	9.7	52	18.0
Handwashing facilities in our school are in good working conditions	46	15.9	37	12.8	13	4.5	116	40.1	77	26.6
Our school has adequate water source and consistent supply of soap or hand sanitizers to promote effective hand hygiene practices	101	34.9	109	37.7	14	4.8	45	15.6	20	6.9
There is regular cleaning and maintenance of handwashing facilities in our school to ensure cleanliness and functionality	78	27.0	127	43.9	4	1.4	41	14.2	39	13.5

Table 4.5 shows that 129(44.6%) respondents strongly disagreed with the statement that their schools had adequate hand washing facilities with water and soap, 65(22.5%) respondents disagreed with the statement, 52(18.0%) learners strongly agreed with the statement and 28(9.7%) respondents agreed with the statement while 15(5.2%) respondents were neutral on the statement. From the responses, a majority (67.1%) of the learners believed that their schools had inadequate hand washing facilities with water and soap. This implies that most of the learners were not in a position to wash their hands after toileting. Most poor and middle-income countries are still concerned about the health effects of infectious diseases affecting children of school age as a result of

inadequate personal hygiene habits and insufficient sanitary facilities in public primary schools (Ali *et al.,* 2021). A worldwide study shows that the rate of absenteeism is reduced by developing the hand washing practice among learners (Monse*et al.,*2013). This therefore shows that schools need to provide students with adequate hand washing facilities to reduce incidences of disease occurrence.

Similarly, 116(40.1%) learners agreed with the statement that handwashing facilities in their schools were in good working conditions, 77(26.6%) respondents strongly agreed with the statement, 46(15.9%) respondents strongly disagreed with the statement and 37(12.8%) respondents agreed with the statement while 13(45%) respondents were neutral. From the responses, it emerged that 66.7% of the learners reported that handwashing facilities in their schools were in good working conditions. Handwashing facilities in schools are crucial for promoting proper hygiene practices and preventing the spread of diseases among students. According Chittleborough*et al.,* (2012) and Wichaidit*et al.*,(2019) increasing the number of handwashing facilities and their functional quality improves handwashing practice after a WASH intervention in schools thus promoting hygiene practices among students.

Further, 109(37.7%) learners disagreed with the statement that their schools had adequate water source and consistent supply of soap or hand sanitizers to promote effective hand hygiene practices, 101(34.9%) respondents strongly disagreed with the statement, 45(15.6%) learners strongly agreed with the statement and 20(6.9%) respondents strongly disagreed with the statement wile 14(4.8%) learners were neutral. The stud therefore found out that a majority (72.6%) of the learners acknowledged that their schools either lacked adequate water source or had inconsistent supply of soap or hand sanitizers to

promote effective hand hygiene practices. This therefore points out that despite the presence of handwashing stations in schools, most of these stations lacked either water or had inconsistent supply of soap or hand sanitizers. This affects the hand washing practices by students especially after toileting and thus could lead to occurrence of infectious diseases which could affect learners' school attendance and performance. Provision of water within the school compound, particularly around the toilets, is essential for promoting good hygiene and sanitation practices among students (Luby *et al.*, 2005). This is because access to water is essential for proper handwashing, which is one of the most effective ways of preventing the spread of diseases. Proper handwashing involves using soap and water to clean hands thoroughly, particularly after using the toilet, before eating, and after handling animals or animal products. The provision of water within the school compound, particularly around the toilets, has been shown to be effective in promoting good hygiene and sanitation practices among students. In a study conducted in rural Bangladesh, the provision of handwashing facilities in schools led to a significant reduction in the incidence of diarrhea among students (Sommer &Sahin, 2013). In addition, a study conducted in rural Kenya found that the provision of water within the school compound, particularly around the toilets, led to a significant improvement in students' hygiene and sanitation practices (Luby *et al.,* 2005). According to Saboori *et al.*,(2011), Schools in Kenya often lack funds for purchasing soap, and bar soap tends to be stolen or lost, thus many students did not have soap to wash their hands.

In addition,127(43.9%) respondents disagreed with the statement that there was regular cleaning and maintenance of handwashing facilities in their schools to ensure cleanliness and functionality, 78(27.0%) learners strongly disagreed with the statement, 41(14.2%)

learners agreed with the statement and 39(13.5%) learners strongly agreed while only 4(1.4%) learners were neutral. From the responses, it can be deduced that majority (70.9%) learners reported that there was irregular cleaning and maintenance of handwashing facilities in their schools thus handwashing facilities were not clean and mostly unfunctional. Non-functional handwashing facilities in schools can contribute to poor hand hygiene practices among students. Insufficient access to functional handwashing stations, clean water, soap, or hand sanitizers may lead to inadequate hand hygiene, increasing the risk of infectious diseases such as respiratory infections, gastrointestinal illnesses, and skin infections (Ataiyero, Dyson & Graham, 2023).

4.7.1 Correlation between Provision and Access to Hand Washing Facilities and Students' Academic Performance

The third hypothesis of this study stated that;

$H0_3$: There is no significant relationship between provision and access to hand washing facilities and students' academic performance in Muhoroni Sub-County

The hypothesis was tested using Pearson correlation and the results are presented in Table 4.6.

Table 4.6: Correlation Coefficient between Provision and Access to Hand Washing Facilities and Students' Academic Performance

		Academic Performance
Provision and Access to Handwashing Facilities	Pearson Correlation	.506**
	Sig. (2-tailed)	.000
	N	289

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.6 shows that there was a significant correlation between provision and access to handwashing facilities and students' academic achievement in secondary schools in Muhoroni Sub-County (r = .506; p = .000). This means that at 95% confidence level the r value for provision and access to hand washing facilities was .506 showing a moderate but positive correlation with students' academic performance. Thus, the null hypothesis which stated that there is no significant relationship between provision and access to hand washing facilities and students' academic achievement was rejected and the alternate accepted. This implies that provision and access to hand washing facilities influences student's health and learning outcomes. The presence of handwashing facilities provides an opportunity for schools to educate students about the importance of hand hygiene and its role in preventing disease (Pickering, 2012). This education can lead to the adoption of lifelong hygienic practices, positively impacting both health and learning. Additionally, Hamner *et al.,* (2017) noted that clean hands and proper hygiene are linked to better cognitive performance and attention. The researchers pointed out that when students practice good hand hygiene, they are less likely to be distracted by illness or discomfort, leading to increased focus and improved learning outcomes.

4.8 Provision of Hygiene Education and its Influence on Students' Academic Performance

The fourth objective of this study was to examine how provision of hygiene education influences secondary school students' academic performance in public secondary schools in Muhoroni sub-county. The respondents were asked to rate their level of agreement on a five-point Likert scale items in the questionnaire on the influence of provision hygiene

education on students' academic performance in secondary schools. The results of the analyzed information are provided in Table 4.7.

Table 4.7: Responses on Provision of Hygiene Education and its Influence on Students' Academic Performance

Statement	SD		D		UD		A		SA	
	F	%	F	%	F	%	F	%	F	%
Hygiene education programs to teach the importance of handwashing, proper handwashing techniques, and the occasions when handwashing is regularly conducted in our school	18	6.2	40	13.8	24	8.3	83	28.7	124	42.9
Students are encouraged in our school to have positive handwashing behaviors through reinforcement strategies	33	11.4	55	19.0	1	.3	144	49.8	56	19.4
There is display of educational materials near handwashing facilities in our school	26	9.0	44	15.2	7	2.4	125	43.3	87	30.1
Our school collaborates with parents and the wider community in the reinforcement of hygiene education	30	10.4	63	21.8	9	3.1	107	37.0	80	27.7

Table 4.7 shows that 124(42.9%) respondents strongly agreed with the statement that hygiene education programs to teach the importance of handwashing, proper handwashing techniques, and the occasions when handwashing were regularly conducted

in their schools, 83(28.7%) respondents agreed with the statement, 40(13.8%) respondents disagreed with the statement and 24(8.3%) learners were neutral on the statement while 18(6.2%) learners strongly disagreed with the statement. The study found out that a majority (71.6%) of the study participants acknowledged that hygiene and sanitation practices can be enhanced through teaching of related lessons in schools. Teaching hygiene and sanitation practices in schools has been shown to be effective in promoting good hygiene and sanitation practices among students. In a study conducted in India, students who received hygiene education as part of their curriculum had better knowledge and practices related to hygiene and sanitation than students who did not receive this education (Brian *et al.,* 2013). A study conducted by Dreibelbis *et al.,* (2013) found that teaching handwashing in schools led to increased handwashing behavior among students, which in turn reduced rates of diarrhea and other infectious diseases. A study conducted by Biran *et al.,* (2012) found that teaching hygiene in schools led to increased hygiene behavior not only among students but also among their families and communities.

Further, 144(49.8%) respondents agreed with the statement that students are encouraged in their schools to have positive handwashing behaviors through reinforcement strategies, 56(19.4%) respondents strongly agreed with the statement, 55(19.0%) learners disagreed and 33(11.45) learners were strongly in disagreement with the statement while only 1(.3%) learner was undecided on the statement. From the responses, it emerged that 69.2% of the learners in secondary schools in the study area acknowledged that students in their schools were encouraged to have positive handwashing behaviors through reinforcement strategies. By promoting positive handwashing behaviors, schools can

contribute to reduced absenteeism rates (Liddelow, Ferrier & Mullan, 2023). Proper hand hygiene practices can help prevent the spread of diseases, leading to fewer cases of illness among students (Dangis *et al.,* 2023). This, in turn, can result in improved attendance and academic performance.

Further, 125(43.3%) learners agreed that there was display of educational materials near handwashing facilities in their schools, 87(30.1%) respondents strongly agreed, 44(15.2%) learners disagreed with the statement and 26(9.0%) respondents strongly disagreed while only 7(2.4%) learners were neutral on the statement. From the responses, it can be shown that a majority (73.4%) of the learners in public secondary schools in Muhoroni Sub-County reported that there was display of educational materials near handwashing facilities in their schools. Displaying educational materials near handwashing facilities can increase students' awareness of the importance of handwashing. Visual cues such as posters, signs, or infographics can remind and reinforce proper handwashing techniques, the critical times for handwashing, and the benefits of good hand hygiene. This can also influence students' hand washing behavior (Lau, *et al.,* 2012). According to Watson, *et al.,* (2023) clear instructions, demonstrations, and information about the consequences of poor hand hygiene can motivate students to adopt and maintain proper handwashing practices. Additionally, Sharma *et al.,* (2023) pointed out that visual aids near handwashing facilities can help students understand and practice correct handwashing techniques. Educational materials that provide step-by-step instructions, illustrations, or videos can assist students in effectively washing their hands, including proper lathering, rinsing, and drying methods.

Furthermore, 107(37.0%) learners agreed with the statement that their school collaborates with parents and the wider community in the reinforcement of hygiene education, 80(27.7%) respondents strongly agreed with the statement, 63(21.8%) respondents disagreed with the statement and 30 (10.4%) respondents were strongly in disagreement with the statement while 9(3.1%) learners were undecided on the statement. The study found out that 64.7% of the learners acknowledged that their schools collaborated with parents and the wider community in the reinforcement of hygiene education.

In addition, learners were asked to indicate how they practiced hand hygiene in their schools. The responses of the learners were tabulated and the results of the analysed data are provided in Figure 4.4.

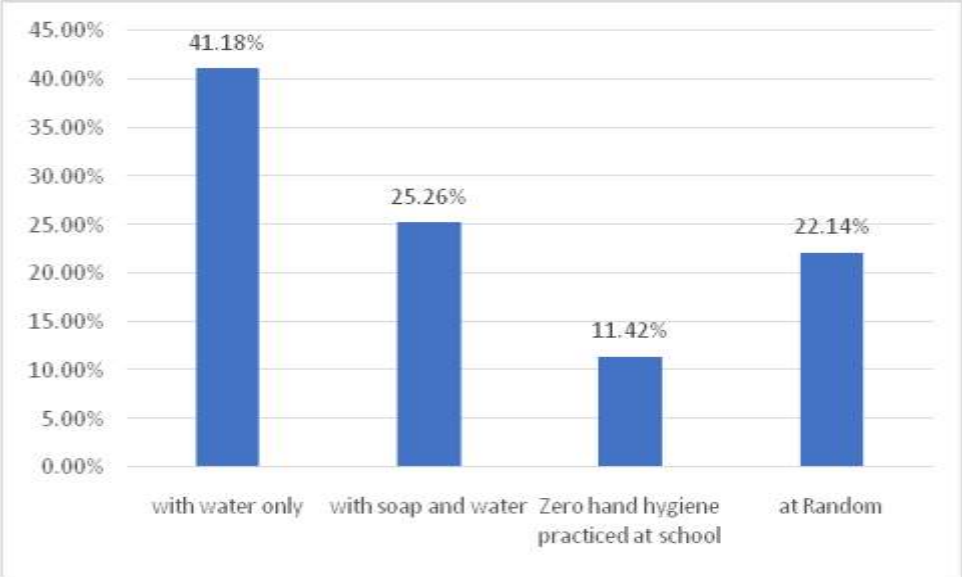

Figure 4.4: Hand Hygiene practices in school

Figure 4.4 shows that 119(41.18%) learners acknowledged that they practiced hand hygiene using water only, 73(25.26%) learners used soap and water and 64(22.24%) learners practiced hand hygiene and random while 33(11.42%) respondents practiced

zero hygiene in school. From the responses, it appeared that most (41.18%) of the learners in public secondary schools in Muhoroni Sub-County. This implies that most of the learners in schools are not following the proper laid down protocols for hand hygiene. There is a significant body of literature on the importance of hand hygiene practices in schools and the strategies to promote them. For instance, a study by Cairncross *et al.,* (2007) demonstrated that handwashing with soap can reduce the incidence of diarrhea by up to 42% in schools. The study also found that hand hygiene education and training can improve handwashing behavior among students. Another study by Aiello *et al.,* (2008) showed that the use of alcohol-based hand sanitizers in schools can reduce absenteeism rates by up to 19.8%. Moreover, several guidelines and recommendations have been developed to promote hand hygiene practices in schools. For instance, the World Health Organization (WHO) has developed guidelines on hand hygiene in healthcare, including recommendations for schools. The guidelines emphasize the importance of hand hygiene education, the provision of handwashing facilities, and the use of alcohol-based hand sanitizers as an alternative to handwashing when necessary (WHO, 2019). The Centers for Disease Control and Prevention (CDC) also provides guidance on hand hygiene practices in schools. The CDC recommends that schools provide adequate handwashing facilities, including soap, water, and paper towels, and that students and staff members wash their hands regularly. The CDC also recommends the use of alcohol-based hand sanitizers as an alternative to handwashing when necessary, but emphasizes that handwashing with soap and water is the most effective way to prevent the spread of germs (CDC, 2021).

Further, learners were asked to indicate the moments they mostly wash their hands while at school. Their responses were tabulated and the results are presented in Figure 4.5.

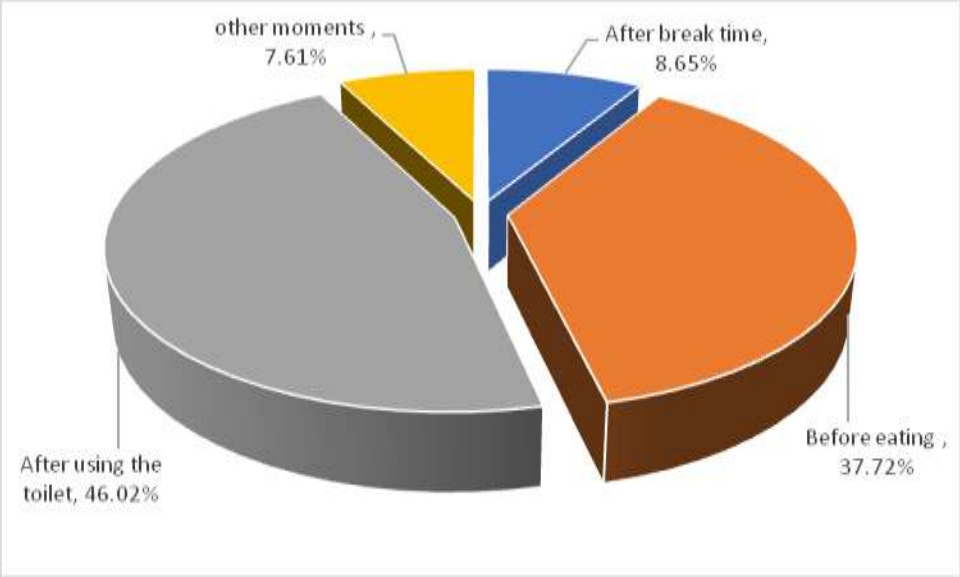

Figure 4.5: Moments learners wash their hands

Figure 4.5 shows 133(46.02%) learners acknowledged that they washed their hands after using toilets, 109(37.72%) reported that they washed their hands before eating and 25(8.65%) learners reported that they washed their hands after every break time while 22(7.61%) respondents washed their hand during other moments. From the responses, it emerged that most (46.02%) of the learners in public secondary schools in Muhoroni sub-county washed their hands after using toilets. Hand hygiene is an essential component of disease prevention in schools. Proper hand washing can reduce the spread of infectious diseases, including respiratory and gastrointestinal illnesses. The recommended period for hand washing in schools is an important consideration in promoting effective hand hygiene practices. In addition to the recommended period for hand washing, the frequency of hand washing is also important in preventing the spread of infectious

diseases in schools. Hands should be washed after using the restroom, before eating or handling food, after coughing or sneezing, and after touching shared surfaces, such as doorknobs or desks. Hand washing should also be performed when hands are visibly dirty or contaminated with bodily fluids (WHO, 2017).

Additionally, the respondents were asked to indicate the major reasons that make them skip handwashing at school. Their responses were tabulated and the results of the analysed information are provided in Table 4.8.

Table 4.8: Reasons for skipping Hand washing at School

Reason	Frequency	Percentages
Forgetfulness	70	24.22
No attributed importance	75	25.95
Lack of water	83	28.72
Lack of handwashing station at school	61	21.12
Total	**289**	**100.00**

Table 4.8 shows that 83(28.72%) learners reported that lack of water hindered their handwashing while in school, 75(25.95%) respondents reported that there was no specific attributed importance of and washing and 70(24.22%) respondents acknowledged that the usually forgot to wash their hands during the recommended times for hand washing while 61(21.12%) attributed this to lack of handwashing stations at their schools. One of the most significant hindrances to handwashing by learners in schools is the lack of adequate facilities and supplies. Schools may have limited or inadequate handwashing stations, soap, or water, which may discourage learners from washing their hands. A study conducted in Nepal found that only 32% of schools had a dedicated handwashing facility

(Shrestha *et al.*, 2020). Learners in schools may also face challenges in finding time to wash their hands. In many schools, students have a limited amount of time between classes or activities, which may make it challenging to take the time to wash their hands. Additionally, learners may not want to take time away from socializing or playing to wash their hands. In a study conducted in India, only 26% of students reported washing their hands before eating meals due to a lack of time (Borchgrevink, Cha, Kim & Herwaldt, 2013). Additionally, learners may not be aware of the health benefits of handwashing, and therefore may not see the importance of the behavior. Another reason that students skip handwashing at school is the inconvenient location or availability of handwashing facilities. Students may not want to use restrooms that are dirty or poorly maintained, or may find that the facilities are located too far from their classroom or other activities. According to a study published in the Journal of School Nursing, students were less likely to wash their hands if the facilities were perceived as inconvenient or unpleasant (Bowen *et al.*,2017).

4.8.1 Qualitative data on Provision of Hygiene Education and its Influence on Students' Academic Performance

Interviews conducted with teachers pointed out that teaching hygiene and sanitation practices in schools can also help address the issue of gender inequality. Women and girls are often disproportionately affected by poor sanitation and hygiene practices, particularly in relation to menstrual hygiene management. By teaching these practices in schools, we can help reduce the stigma and shame associated with menstruation and increase awareness of the importance of proper menstrual hygiene management. This can help girls stay in school and participate fully in their education, which can in turn lead to

better health and economic outcomes later in life. A study conducted by Sommer *et al.*, (2013) found that providing menstrual hygiene education in schools led to improved menstrual knowledge, increased use of sanitary materials, and reduced absenteeism among girls. Additionally, teaching hygiene and sanitation practices in schools can help prepare students for future careers in public health or related fields. With the growing need for professionals in these areas, teaching related lessons in schools can help inspire and prepare the next generation of public health leaders. Additionally, it can help raise awareness of the importance of hygiene and sanitation practices more broadly, leading to greater investment and resources for public health initiatives. A study conducted by Roesel *et al.*,(2017) found that teaching hygiene in schools led to increased interest among students in pursuing careers in public health and related fields.

4.8.2 Correlation between Provision of Hygiene Education and Students' Academic Performance

The fourth hypothesis of this study stated that;

$H0_4$: There is no significant relationship between provision of hygiene education and students' academic performance in Muhoroni Sub-County

The hypothesis was tested using Pearson correlation and the results are presented in Table 4.0.

Table 4.9: Correlation Coefficient between Provision of Hygiene Education and Students' Academic Performance

		Academic Performance
Provision Hygiene Education	Pearson Correlation	.822**
	Sig. (2-tailed)	.000
	N	289

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.9 shows that there was a significant correlation between provision of hygiene education and students' academic achievement in secondary schools in Muhoroni Sub-County (r = .822; p = .000). This means that at 95% confidence level the r value for provision hygiene education was .822 showing a strong positive correlation with students' academic performance. Thus, the null hypothesis which stated that there is no significant relationship between provision of hygiene education and students' academic achievement was rejected and the alternate accepted. This implies that provision of hygiene education enhances student's health and learning outcomes. According to Kanyangara and Hartinger (2017), hygiene education empowers students to make informed decisions about their health. When students understand the consequences of poor hygiene practices, they are better equipped to make choices that positively impact their health, leading to improved overall well-being and academic performance. Additionally, Sharma *et al.,* (2019) noted that hygiene education equips students with knowledge about proper hygiene practices, such as handwashing, dental hygiene, and personal cleanliness. When students understand the importance of these practices and how they contribute to their health, they are more likely to adopt them, leading to better health and well-being.

4.9 Elements Associated with Sanitation and Hygiene Practices and Academic Performance

The aim of this study was to establish the influence of sanitation and hygiene practices on students' academic performance in public secondary schools in Muhoroni Sub-County. To achieve this, schools were classified into two; those with adequate and well maintained sanitation facilities and those without adequate sanitation facilities. A total of 23 schools were selected to participate in the study. Mean scores obtained by students in the last Kenya certificate of secondary education was obtained from each of the 23 schools. The students' performance was classified as; A= Excellent, B = Good, C=Satisfactory, D= Needs Improvement and F= Fail. From the results obtained, it emerged that eight (8) schools had a mean score of A, B and C and these were deemed to be good academic performance. A total of 15 schools had their performance as D and F and these were considered to be low/poor performance. A comparison was made to determine the effect of adequacy of sanitation facilities on academic performance and it emerged that the eight (8) schools which performed well academically had adequate sanitation facilities while all the 15 remaining schools had inadequate sanitation facilities. This concurs with the findings of Spears *et al.*,(2013) who found that in India lack of adequate sanitation facilities in schools contributed to the high incidence of water-related diseases among students. The study found that students who suffered from diarrhea and other water-related diseases were more likely to miss school, resulting in lower academic achievement. A study conducted by Caruso *et al.* (2015) in Bangladesh found that the lack of adequate sanitation facilities in schools contributed to menstrual-related problems among girls, such as discomfort and embarrassment. The study found that girls who

suffered from menstrual-related problems were more likely to miss school and had lower academic achievement than those who did not.

According to a study conducted in Bangladesh by Sarker *et al.,* (2018), inadequate maintenance of toilets resulted in increased student absenteeism due to health issues related to poor sanitation. The study found that the majority of students reported that their school toilets were dirty and poorly maintained, which contributed to a reluctance to use them. This resulted in increased absenteeism among students, particularly girls who may be reluctant to use unsanitary toilets. Moreover, girls are disproportionately affected by inadequate and dirty toilets. A study conducted in Ethiopia by Tilahun *et al.,* (2018) found that girls were more likely to miss school due to inadequate and unhygienic toilet facilities than boys. The study found that girls were more likely to experience menstrual hygiene management issues and were more likely to miss school during their menstrual cycle due to inadequate sanitation facilities. This highlights the need for schools to provide adequate and hygienic toilets that cater to the specific needs of female students. According to Kondo *et al.,* (2018), a clean and well-maintained environment can have a positive impact on students' mental well-being. A hygienic and organized setting can contribute to reduced stress levels and better overall mental health, leading to improved focus and concentration in the classroom.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter has a summary of the research findings, conclusions, recommendations and suggestions for further research based on the analysis of information that was collected.

5.2 Summary of the Findings

The aim of this study was to investigate the effect of sanitation and hygiene practices on students' academic performance in public secondary schools in Muhoroni Sub-County, Kenya. This was based on the fact that public secondary schools lack sanitation facilities as compared to private secondary schools in the study area. Specifically, the conclusions and recommendations of this study are based on the findings as in chapter four. The study's objectives were to identify the factors that affect sanitation and hygiene, assess the knowledge and practices of the learners towards sanitation and hygiene, identify intervention strategies put in place to enhance sanitation and hygiene among students and establish the influence of sanitation and hygiene practices on students' academic performance in public secondary schools in Muhoroni Sub-County. Data was collected and analyzed through mixed methods approach where questionnaires were used to collect quantitative data while interviews were used to collect qualitative data. The analyzed data revealed the following;

5.2.1 Socio-Demographic Information of Learners

The study thus found out that a majority (56.06%) of the students in secondary schools in Muhoroni sub-county were male in comparison to their female counterparts. It also

emerged that most (42.56%) of the learners in secondary schools were aged over 15 years while majority of the respondents acknowledged that their mothers had secondary school level of education.

5.2.2 Influence of Availability and Access to Safe Drinking Water on Students' Academic Performance

The first objective of this study was to find out how availability and access to safe drinking water influence students' academic performance in secondary school in Muhoroni sub-county. The study found that a majority (65.4%) respondents reported that they were using safe drinking water in their schools. This implies that most schools in the region have access to safe drinking water. However, according to UNICEF, most of the world's schools lack clean bathrooms, drinking water, and hygiene education for students, particularly schools in rural areas, which either lack drinking water and sanitation facilities, or have infrastructure that is both insufficient in quality and quantity (UNICEF, 2004), creating high-risk situations where diseases can readily spread (Otto, *et al.*, 2022). A study by Abanyie, *et al.*, (2023) in Ghana found that due to availability of safe drinking water in schools, there was improvement in school attendance and performance of school children. This was attributed to the relatively short distances covered to access drinkable water. This reveals that the provision of improved water supply systems in school plays a significant role in students' academic performance due to reduction in occurrence of WASH related diseases.

Further, a majority (61.3%) of the learners in secondary schools in Muhoroni sub-county acknowledged that water provided in their schools meets quality standards as recommended by public health. According to Hussain, *et al.,* (2023) being exposed to

contaminated water leads to increased levels of water-related ailments, which has a detrimental impact on schools since it causes chronic absenteeism that hinders learning.

In addition, 63.3% of the study participants reported that their schools had reliable, sufficient and clean water supply. This implies that most of secondary schools in the study area have reliable, sufficient and clean water supply. Water and sanitation are critical components of a supportive atmosphere and high-quality education. In many impoverished countries, sanitary conditions in schools are appalling (Ana, 2008), and are either insufficient or unavailable, resulting in filthy latrines due to a shortage of water or a far distance from it. These conditions increase the risk of disease, which, according to Egbinola and Amanambu, (2015) have a negative impact on cognition, growth, concentration, physical activities, and academic performance.

Additionally, 66.8% of the students believed that there were no water treatment facilities in their schools. This implies that most of the schools in the area depended on untreated water for learners which could have effects on student health. This could result in occurrence of diseases leading to student absenteeism and poor academic achievement.

Teachers in-charge of boarding sections were interviewed and it emerged that most of the secondary schools in the study area lacked water treatment facilities in their schools with most schools depending on boreholes or rain water harvesting for their daily use. This shows that most of the schools need to have water treatment facilities in their schools to ensure safety of drinking water to both students and staff.

5.2.3 Influence of Availability to Sanitation Facilities on Students' Academic Performance

The second objective of this study was to assess how availability to sanitation facilities influence students' academic performance among secondary school students in Muhoroni sub-county. The study found out that 51.2% of the learners acknowledged that their schools had insufficient number of toilets. According to Ray and Datta (2017), separate female toilets in schools is linked with improved female enrolment and higher participation at school also Ramani, *et al.,* (2017) found that access to and usage of a school toilet in a village school in India was a crucial determinant of less diarrhoea amongst adolescents. According to Kim and Rhee's (2019) empirical analysis of the impact of school toilet availability on Kenya's primary school enrollment rate, it is essential to have school toilets in order to overcome the gender education gap in developing nations. They also point out that providing restrooms in schools increases girls' attendance rates more than boys', with adolescent females experiencing the effects more so than the other group.

In addition, 67.8% of the learners acknowledged that their schools did not have sanitation facilities which are accessible to all students, including those with disabilities. This therefore shows that most schools in Muhoroni Sub-county lack adequate sanitation facilities and most of them have not designed sanitation facilities for the learners with disabilities. This implies that schools need to have sanitation facilities designed specifically for the disable learners. This finding is similar to that of Poague, *et al.,* (2023) who found that most schools in Brazil lacked adequate sanitary facilities designed for learners with disabilities.

Further, 59.9% of the learners in the study area believed that sanitation facilities in their schools did not provide a sense of privacy and safety to users. This could affect students' use of sanitary facilities in schools. In a study by Caruso *et al.*,(2014) it emerged that students weighed multiple factors to decide whether to use the school toilet. The factors included safety and privacy. This implied protecting learner's privacy and safety might be attractive factors for students to use school toilets. Proper sanitation facilities in schools reduce the risk of harassment, provide a comfortable environment, and contribute to a positive learning experience.

In addition, 89.0% learners reported that their schools lacked adequate water for flushing toilets, maintaining hygiene and handwashing after toileting. This implies that majority of the schools in the study area lack adequate water for cleaning toilets and hand washing. Access to safe and clean water is a fundamental requirement for maintaining good hygiene and sanitation practices. In many parts of the world, including schools, the lack of access to clean water is a major barrier to achieving good hygiene and sanitation practices. Provision of water within the school compound, particularly around the toilets, is essential for promoting good hygiene and sanitation practices among students (Luby *et al.*, 2005). The provision of water within the school compound, particularly around the toilets, is essential for promoting good hygiene and sanitation practices among students. This is because access to water is essential for proper handwashing, which is one of the most effective ways of preventing the spread of diseases. Proper handwashing involves using soap and water to clean hands thoroughly, particularly after using the toilet, before eating, and after handling animals or animal products. The provision of water within the school compound, particularly around the toilets, has been shown to be effective in

promoting good hygiene and sanitation practices among students. In a study conducted in rural Bangladesh, the provision of handwashing facilities in schools led to a significant reduction in the incidence of diarrhea among students (Sommer &Sahin, 2013). In addition, a study conducted in rural Kenya found that the provision of water within the school compound, particularly around the toilets, led to a significant improvement in students' hygiene and sanitation practices (Luby *et al.*, 2005).

Furthermore, 67.5% of the learners acknowledged that their schools had waste bins and wastes were regularly collected and disposed contributing to a healthy school environment. According to World Health Organization (2009), Schools should have a waste collection, storage, and disposal policy and thus containers for garbage collection are required at designated locations. Additionally, Montgomery *et al.*, (2012) pointed out that as girls turn 14 and reach puberty, there is a substantial correlation between proper cleanliness in schools and students' ability to learn and maintain good health, particularly among female students.

Similarly, 67.9% of the learners in public secondary schools in Muhoroni Sub-County acknowledged that there was regular cleaning and maintenance of sanitary facilities in their schools thus preventing the spread of diseases. One of the key benefits of having cleaners in schools is the reduction of disease transmission. Studies have shown that schools can be a breeding ground for infectious diseases such as influenza, norovirus, and other respiratory illnesses (Bender, 2014). Maintaining clean and hygienic surfaces can help reduce the transmission of these diseases among students and staff. Cleaners in schools can also help promote proper hand hygiene practices among students. Hand hygiene is one of the most effective ways to prevent the spread of infectious diseases.

Studies have shown that hand hygiene interventions in schools can significantly reduce absenteeism due to illness (Luby *et al.,* 2005). Cleaners can help reinforce hand hygiene practices by providing clean and well-stocked handwashing facilities and reminding students to wash their hands regularly. Furthermore, the availability of cleaners in schools can improve the overall cleanliness of the school environment, which can have a positive impact on student behavior and academic performance. A study conducted in the UK found that students in schools with clean and well-maintained facilities were more likely to have higher academic achievement and lower rates of absenteeism (Barrett, *et al.,* 2015).

Teachers in-charge of boarding sections were interviewed and it emerged that most schools lacked of adequate toilets and hand washing stations. The inadequacies of toilets and handwashing stations were attributed to lack of adequate finances to construct toilets and adequate hand washing stations. It also emerged that attitudes and behaviors also play a significant role in determining sanitation and hygiene practices in secondary schools. Students and in some instances staff members may lack knowledge and awareness of the importance of sanitation and hygiene practices, leading to poor practices such as not washing hands after using the toilet or during food handling which could lead to spread of diseases as pointed out by UNICEF, (2016).

5.2.4 Provision and Access to Hand Washing Facilities on Students' Academic Performance

The third objective of this study was to explore how provision and access to hand washing facilities influence secondary school students' academic performance in secondary schools in Muhoroni Sub-County. The study found out that 67.1% of the

learners believed that their schools had inadequate hand washing facilities with water and soap. This implies that most of the learners were not in a position to wash their hands after toileting. Most poor and middle-income countries are still concerned about the health effects of infectious diseases affecting children of school age as a result of inadequate personal hygiene habits and insufficient sanitary facilities in public primary schools (Ali *et al.,* 2021). A worldwide study shows that the rate of absenteeism is reduced by developing the hand washing practice among learners (Monse *et al.,* 2013). This therefore shows that schools need to provide students with adequate hand washing facilities to reduce incidences of disease occurrence.

Similarly, 66.7% of the learners reported that handwashing facilities in their schools were in good working conditions. Handwashing facilities in schools are crucial for promoting proper hygiene practices and preventing the spread of diseases among students. According Chittleborough *et al.,* (2012) and Wichaidit *et al.,* (2019) increasing the number of handwashing facilities and their functional quality improves handwashing practice after a WASH intervention in schools thus promoting hygiene practices among students.

Further, 72.6% of the learners acknowledged that their schools either lacked adequate water source or had inconsistent supply of soap or hand sanitizers to promote effective hand hygiene practices. This therefore points out that despite the presence of handwashing stations in schools, most of these stations lacked either water or had inconsistent supply of soap or hand sanitizers. This affects the hand washing practices by students especially after toileting and thus could lead to occurrence of infectious diseases which could affect learners' school attendance and performance. Provision of water

within the school compound, particularly around the toilets, is essential for promoting good hygiene and sanitation practices among students (Luby *et al.,* 2005). This is because access to water is essential for proper handwashing, which is one of the most effective ways of preventing the spread of diseases. Proper handwashing involves using soap and water to clean hands thoroughly, particularly after using the toilet, before eating, and after handling animals or animal products. The provision of water within the school compound, particularly around the toilets, has been shown to be effective in promoting good hygiene and sanitation practices among students. In a study conducted in rural Bangladesh, the provision of handwashing facilities in schools led to a significant reduction in the incidence of diarrhea among students (Sommer & Sahin, 2013).

In addition, 70.9% of the learners reported that there was irregular cleaning and maintenance of handwashing facilities in their schools thus handwashing facilities were not clean and mostly unfunctional. Non-functional handwashing facilities in schools can contribute to poor hand hygiene practices among students. Insufficient access to functional handwashing stations, clean water, soap, or hand sanitizers may lead to inadequate hand hygiene, increasing the risk of infectious diseases such as respiratory infections, gastrointestinal illnesses, and skin infections (Ataiyero, *et al.,* 2023).

5.2.5 Provision of Hygiene Education and its Influence on Students' Academic Performance

The fourth objective of this study was to examine how provision of hygiene education influences secondary school students' academic performance in public secondary schools in Muhoroni sub-county. The study found out that 71.6% of the study participants acknowledged that hygiene and sanitation practices can be enhanced through teaching of

related lessons in schools. Teaching hygiene and sanitation practices in schools has been shown to be effective in promoting good hygiene and sanitation practices among students. In a study conducted in India, students who received hygiene education as part of their curriculum had better knowledge and practices related to hygiene and sanitation than students who did not receive this education (Brian *et al.,* 2013). A study conducted by Dreibelbis *et al.,* (2013) found that teaching handwashing in schools led to increased handwashing behavior among students, which in turn reduced rates of diarrhea and other infectious diseases. A study conducted by Biran *et al.,* (2012) found that teaching hygiene in schools led to increased hygiene behavior not only among students but also among their families and communities.

Further, 69.2% of the learners in secondary schools in the study area acknowledged that students in their schools were encouraged to have positive handwashing behaviors through reinforcement strategies. By promoting positive handwashing behaviors, schools can contribute to reduced absenteeism rates (Liddelow *et al.,* 2023). Proper hand hygiene practices can help prevent the spread of diseases, leading to fewer cases of illness among students (Dangis *et al.,* 2023). This, in turn, can result in improved attendance and academic performance.

Similarly, 73.4% of the learners in public secondary schools in Muhoroni Sub-County reported that there was display of educational materials near handwashing facilities in their schools. Displaying educational materials near handwashing facilities can increase students' awareness of the importance of handwashing. Visual cues such as posters, signs, or infographics can remind and reinforce proper handwashing techniques, the critical times for handwashing, and the benefits of good hand hygiene. This can also influence

students' hand washing behavior (Lau, *et al.*, 2012). According to Watson, *et al.*, (2023) clear instructions, demonstrations, and information about the consequences of poor hand hygiene can motivate students to adopt and maintain proper handwashing practices. Additionally, Sharma *et al.*, (2023) pointed out that visual aids near handwashing facilities can help students understand and practice correct handwashing techniques. Educational materials that provide step-by-step instructions, illustrations, or videos can assist students in effectively washing their hands, including proper lathering, rinsing, and drying methods. Furthermore, 64.7% of the learners acknowledged that their schools collaborated with parents and the wider community in the reinforcement of hygiene education

In addition, learners were asked to indicate how they practiced hand hygiene in their schools. The study found out that most of the learners in schools are not following the proper laid down protocols for hand hygiene. There is a significant body of literature on the importance of hand hygiene practices in schools and the strategies to promote them. For instance, a study by Cairncross *et al.* (2007) demonstrated that handwashing with soap can reduce the incidence of diarrhea by up to 42% in schools. The study also found that hand hygiene education and training can improve handwashing behavior among students. Another study by Aiello *et al.* (2008) showed that the use of alcohol-based hand sanitizers in schools can reduce absenteeism rates by up to 19.8%. Moreover, several guidelines and recommendations have been developed to promote hand hygiene practices in schools. For instance, the World Health Organization (WHO) has developed guidelines on hand hygiene in healthcare, including recommendations for schools. The guidelines emphasize the importance of hand hygiene education, the provision of handwashing

facilities, and the use of alcohol-based hand sanitizers as an alternative to handwashing when necessary (WHO, 2019). The Centers for Disease Control and Prevention (CDC) also provides guidance on hand hygiene practices in schools. The CDC recommends that schools provide adequate handwashing facilities, including soap, water, and paper towels, and that students and staff members wash their hands regularly. The CDC also recommends the use of alcohol-based hand sanitizers as an alternative to handwashing when necessary, but emphasizes that handwashing with soap and water is the most effective way to prevent the spread of germs (CDC, 2021).

Further, learners were asked to indicated the moments they mostly washed their hands while at school and it emerged that most (46.02%) of the learners in public secondary schools in Muhoroni sub-county washed their hands after using toilets. Hand hygiene is an essential component of disease prevention in schools. Proper hand washing can reduce the spread of infectious diseases, including respiratory and gastrointestinal illnesses. The recommended period for hand washing in schools is an important consideration in promoting effective hand hygiene practices. In addition to the recommended period for hand washing, the frequency of hand washing is also important in preventing the spread of infectious diseases in schools. Hands should be washed after using the restroom, before eating or handling food, after coughing or sneezing, and after touching shared surfaces, such as doorknobs or desks. Hand washing should also be performed when hands are visibly dirty or contaminated with bodily fluids (WHO, 2017).

Additionally, the respondents were asked to indicate the major reasons that make them skip handwashing at school. It emerged that one of the most significant hindrances to handwashing by learners in schools is the lack of adequate facilities and supplies. Schools

may have limited or inadequate handwashing stations, soap, or water, which may discourage learners from washing their hands. A study conducted in Nepal found that only 32% of schools had a dedicated handwashing facility (Shrestha *et al.,* 2020). Learners in schools may also face challenges in finding time to wash their hands. In many schools, students have a limited amount of time between classes or activities, which may make it challenging to take the time to wash their hands. Additionally, learners may not want to take time away from socializing or playing to wash their hands. In a study conducted in India, only 26% of students reported washing their hands before eating meals due to a lack of time (Borchgrevink, *et al.,* 2013). Additionally, learners may not be aware of the health benefits of handwashing, and therefore may not see the importance of the behavior. Another reason that students skip handwashing at school is the inconvenient location or availability of handwashing facilities. Students may not want to use restrooms that are dirty or poorly maintained, or may find that the facilities are located too far from their classroom or other activities. According to a study published in the Journal of School Nursing, students were less likely to wash their hands if the facilities were perceived as inconvenient or unpleasant (Bowen *et al.,* 2017).

5.3 Conclusions of the Study

The study concluded that availability of safe drinking water at schools reduces the likelihood of water-related illnesses, such as diarrhea or other waterborne diseases. By reducing the prevalence of these illnesses, students are less likely to miss school days due to illness, resulting in improved attendance rates. Regular attendance allows students to keep up with the curriculum and enhances their academic performance.

The study also concluded that availability to sanitation facilities influence students' academic performance among secondary school students. Access to and usage of school sanitation facilities is a crucial determinant of occurrence of diseases such as diarrhoea among learners leading to learner absenteeism and low academic performance. Inadequate sanitation facilities often result in students avoiding school or missing classes due to discomfort or embarrassment. When students do not have access to proper toilets, they may choose to stay home or limit their fluid intake to avoid using unsanitary facilities. By providing clean and functional sanitation facilities, schools can reduce absenteeism rates and ensure that students are present in the classroom, leading to improved academic performance.

It was further concluded that most schools in Muhoroni sub-county had inadequate hand washing facilities to accommodate all learners. Provision and access to hand washing facilities have a profound impact on students' academic performance. It improves health and hygiene, reduces absenteeism, prevents disease transmission, enhances cognitive function and focus, fosters behavior and personal responsibility, and promotes inclusion and equity.

Based on the fourth objective of the study, it was concluded that the provision of hygiene education has a profound influence on students' academic performance. It improves health and hygiene knowledge, promotes behavior change and practice, prevents diseases and absenteeism, creates a healthy learning environment, develops lifelong skills, and fosters equity and inclusion.

5.4 Recommendations of the Study

The following are the recommendations of this study based on the study findings

i. Schools and education policymakers need to prioritize the provision of safe drinking water to all learners and staff to optimize students' academic performance and overall well-being.

ii. Schools and other institutions of learning and policymakers should prioritize the provision of clean, functional, and gender-segregated sanitation facilities to create an environment conducive to learning and maximize students' academic potential.

iii. The study recommended that schools and policymakers should prioritize the availability of hand washing facilities and promote proper hand hygiene practices to support students' overall well-being and maximize their academic potential.

iv. Schools need to prioritize hygiene education as an essential component of the curriculum to empower students with the knowledge and skills needed to maintain good hygiene, supporting their overall well-being and academic success.

5.5 Suggestions for Further Research

The following suggestions are made for further research

i. There is need for a study on attitude of students towards school water sanitation and hygiene practices since attitude determines students’ behavioural changes affecting their well-being and academic performance.

ii. Conduct longitudinal studies that track students' academic performance over an extended period to examine the long-term effects of improved school water sanitation and hygiene practices need to be undertaken. This would provide

valuable insights into how sustained improvements in these practices impact students' academic outcomes.

iii. Comparative studies across different schools or regions with varying levels of water sanitation and hygiene practices need to undertaken. This would compare the academic performance of students in schools with robust water sanitation and hygiene interventions to those without such interventions. This would help establish a stronger causal link between these practices and academic performance.

iv. There is need for a study on the potential mediating factors between water sanitation and hygiene practices and students' performance.

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APPENDICES

Appendix I: Informed consent

Dear Participant,

RE: PARTICIPATION IN THIS STUDY

I am a post graduate student pursuing Mater of Philosophy Degree at the University of Eldoret University. I am currently conducting research on **"Effects of school water sanitation and hygiene practices on students' performance in public secondary schools; A case of Muhoroni Sub-County, Kenya".** I kindly request you to participate in this study. Your response to the items on questionnaire will be treated with utmost confidentiality and will not be used for any other purposes except this study. You may also request the researcher to inform you about the findings of this study.

Thank you very much for accepting to participate in this study. Please sign in the space provided on this letter if you accept to be a respondent in this study.

Yoursfaithfully,

Sang EdnahJepkoech

Appendix II: Research questionnaire for students

Section A: Socio-Demographic Characteristics

1. What is your gender?

i. Male ☐

ii. Female ☐

2. Please indicate your age bracket

i. Below 13 years ☐

ii. 14-15 years ☐

iii. Over 15 years ☐

3. Mothers' highest level of Education

i. Secondary education

ii. Certificate/Diploma ☐

iii. University ☐

iv. Masters ☐

v. Others ……

4. Religion

i. Christianity ☐

ii. Islam ☐

iii. Atheist ☐

iv. Others ……

Section B: Influence of availability and access to safe drinking water on students' academic performance

Statement	**SD**	**D**	**UD**	**A**	**SA**
Water provided in school meets quality standards as recommended by public health					
Water provision in our school is reliable and consistentallowing learners to concentrate on their learning activities					
There is a water treatment facility for water that we use in					

our school					
Safe drinking water is accessible to all students and staff throughout the school premises					

Section C: Influence of availability to sanitation facilities on students' academic performance

Statement	**SD**	**D**	**UD**	**A**	**SA**
Our school has sufficient number of toilets for all students and teaching staff					
Sanitation facilities in our school are accessible to all students, including those with disabilities					
Sanitation facilities in our school provide a sense of privacy and safety for users					
Our school has available water for flushing toilets, maintaining hygiene and handwashing after toileting					
Our school has waste bins and wastes are regularly collected and disposed contributing to a healthy school environment					
Regular cleaning and maintenance of sanitation facilities is undertaken on regular basis in our school to prevent the spread of diseases and maintain a hygienic environment					

Section D: Influence of provision and access to hand washing facilities on students' academic performance

statement	SD	D	UD	A	SA
Our school has sufficient handwashing facilities available throughout the school premises					
Our school has adequate number of handwashing stations to accommodate the student population and prevent overcrowding					
Handwashing facilities in our school are in good working conditions					
Our school has adequate water source and consistent supply of soap or hand sanitizers to promote effective hand hygiene practices					
Our School has a consistent supply of soap or hand sanitizers to					

promote effective hand hygiene					
There is regular cleaning and maintenance of handwashing facilities in our school to ensure cleanliness and functionality					

Section E: Influence of provision of hygiene education on students' academic performance

statement	SD	D	UD	A	SA
Hygiene education programs to teach the importance of handwashing, proper handwashing techniques, and the occasions when handwashing is regularly conducted in our school					
Students are encouraged in our school to have positive handwashing behaviors through reinforcement strategies					
There is display of educational materials near handwashing facilities in our school					
Our school collaborations with parents and the wider community in the reinforcement of hygiene education					

a. How do you practice hand hygiene in your school?

i. With only water ☐
ii. With soap and water ☐
iii. Zero hand hygiene practiced at school ☐
iv. At random ☐

b. At what moments do you wash your hands? (*Multiple responses*)

i. After break time ☐
ii. Before eating ☐
iii. After using the toilet ☐
iv. Other moments ☐

c. What are the major reasons that make you skip handwashing? (*Multiple responses*)

i. Forgetfulness ☐
ii. No attributed importance ☐
iii. Lack of water ☐
iv. Lack of handwashing station at school ☐

THANK YOU FOR PARTICIPATING

Appendix III: Interview guide

1. What factors affect the sanitation and hygiene in your school?

……

……

……

2. Do learners in your school have knowledge on sanitation and hygiene practices? If yes elaborate

……

……

……

3. What practices do your learners undertake towards sanitation and hygiene?

……

……

……

4. What intervention strategies have your school put in place to enhance sanitation and hygiene among students?

……

……

……

5. What influence does sanitation and hygiene practices have on students' academic performance?

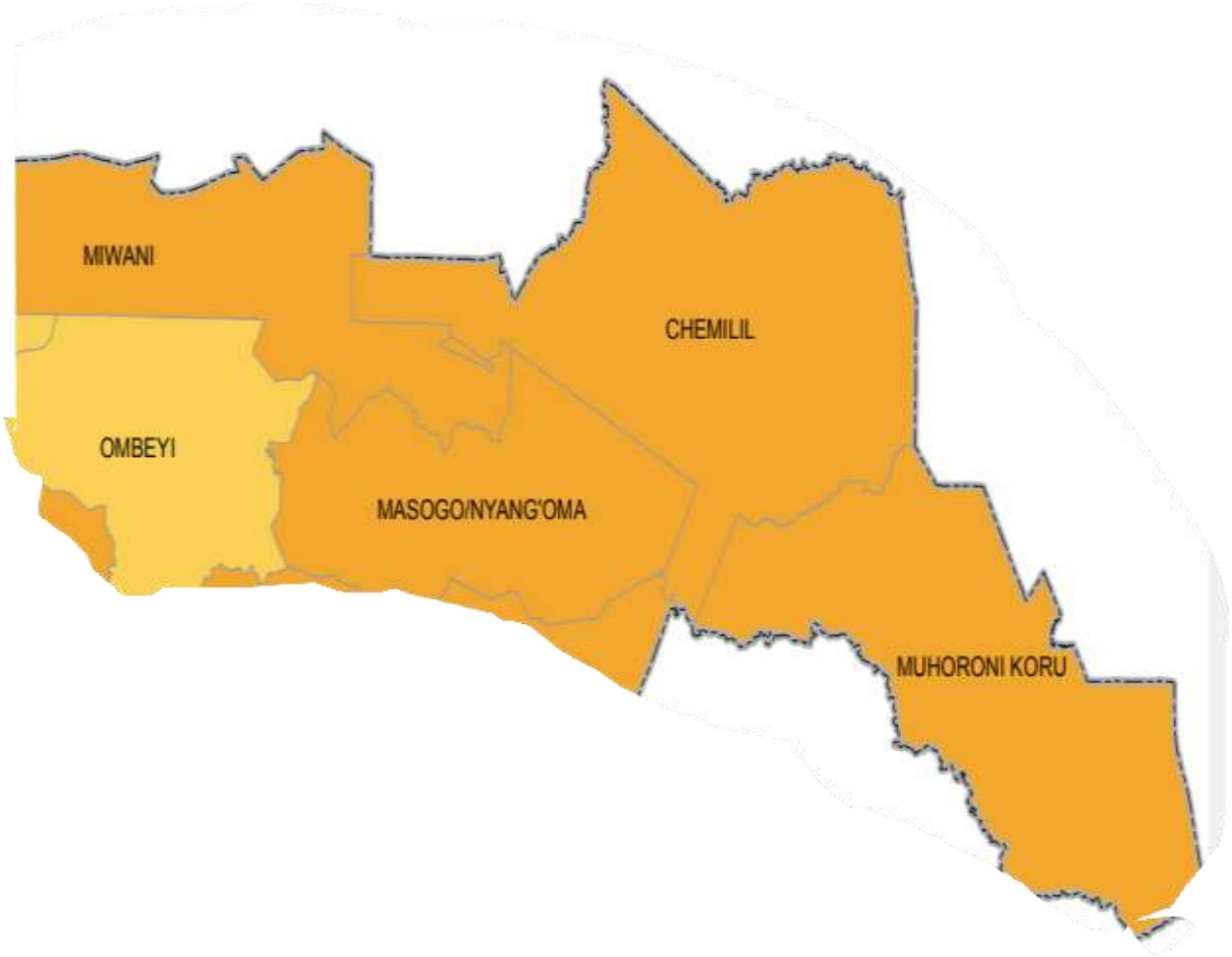
……

……

……

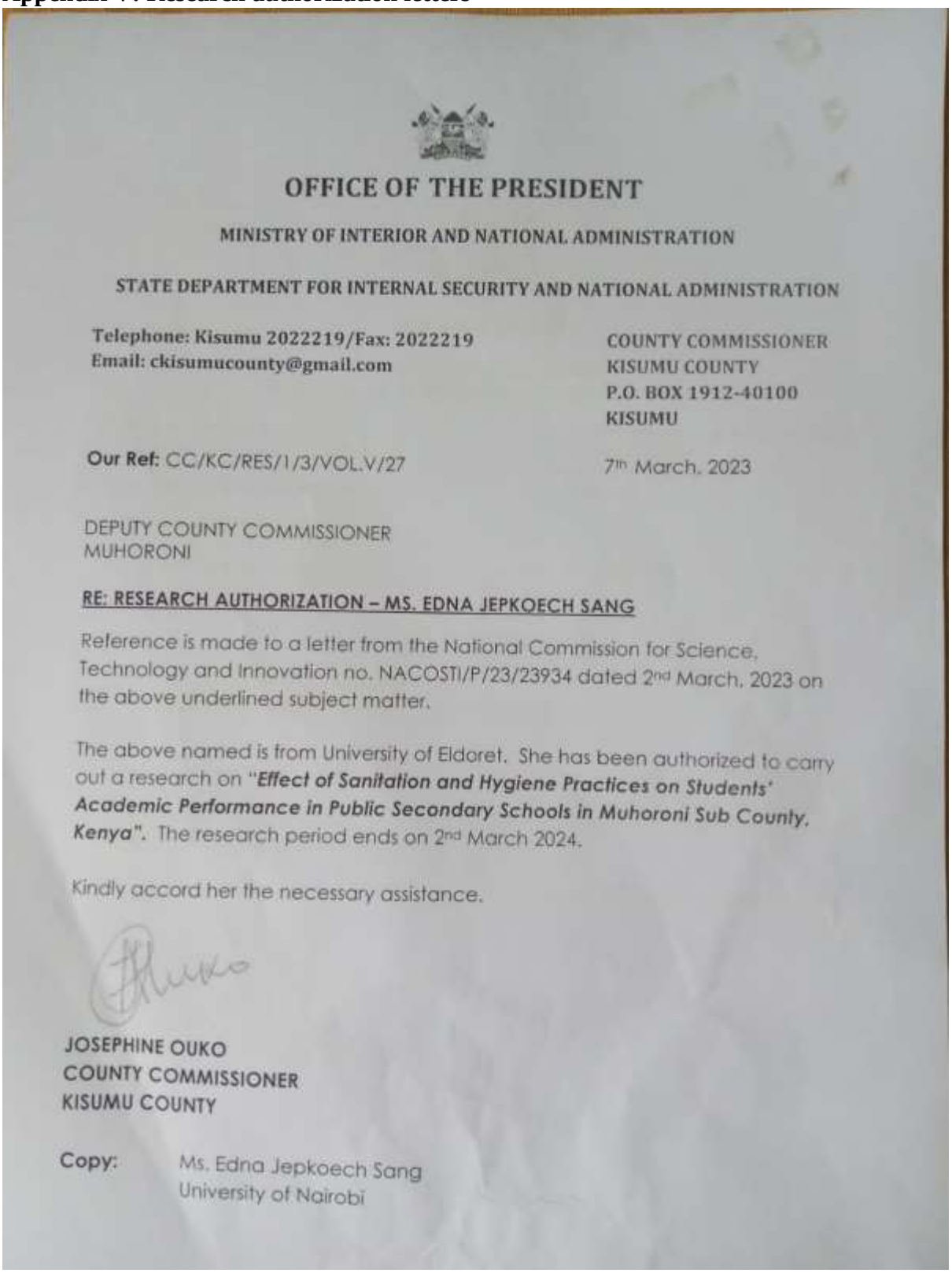
THANK YOU FOR PARTICIPATING

Appendix IV: Map of the study area



Source: Kisumu County integrated development plan, 2023

Appendix V: Research authorization letters



OFFICE OF THE PRESIDENT

MINISTRY OF INTERIOR AND NATIONAL ADMINISTRATION

STATE DEPARTMENT FOR INTERNAL SECURITY AND NATIONAL ADMINISTRATION

Telephone: Kisumu 2022219/Fax: 2022219
Email: ckisumucounty@gmail.com

COUNTY COMMISSIONER
KISUMU COUNTY
P.O. BOX 1912-40100
KISUMU

Our Ref: CC/KC/RES/1/3/VOL.V/27

7th March, 2023

DEPUTY COUNTY COMMISSIONER
MUHORONI

RE: RESEARCH AUTHORIZATION – MS. EDNA JEPKOECH SANG

Reference is made to a letter from the National Commission for Science, Technology and Innovation no. NACOSTI/P/23/23934 dated 2nd March, 2023 on the above underlined subject matter.

The above named is from University of Eldoret. She has been authorized to carry out a research on "***Effect of Sanitation and Hygiene Practices on Students' Academic Performance in Public Secondary Schools in Muhoroni Sub County, Kenya***". The research period ends on 2nd March 2024.

Kindly accord her the necessary assistance.

JOSEPHINE OUKO
COUNTY COMMISSIONER
KISUMU COUNTY

Copy: Ms. Edna Jepkoech Sang
University of Nairobi

REPUBLIC OF KENYA

MINISTRY OF EDUCATION
State Department of Early Learning and Basic Education

Telegrams:"schooling",Kisumu
Telephone: Kisumu 057 - 2024599
Email:
countyeducation.kisumu@gmail.com

COUNTY DIRECTOR OF EDUCATION
KISUMU COUNTY
P.O. BOX 575 – 40100
KISUMU

When replying please quote

REF: CDE/KSM/GA/3/24/VOL.V/59

7th March, 2023

TO WHOM IT MAY CONCERN

RE: RESEARCH AUTHORIZATION
Ms. EDNA JEPKOECH SANG – NACOSTI/P/23/23934

This is to confirm that Ms. Edna Jepkoech Sang from University of Eldoret has been granted authority by NACOSTI to conduct research on the topic ***"Effect of Sanitation and Hygiene Practices on Students' Academic Performance in Public Secondary Schools in Muhoroni Sub-County, Kenya"*** for the period ending **2nd March, 2024.**

Any assistance accorded to her to accomplish the assignment will be highly appreciated.

EVANS MOSE
For: COUNTY DIRECTOR OF EDUCATION
KISUMU COUNTY

Appendix VI: Research permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 948225

Date of Issue: 02/March/2023

RESEARCH LICENSE

This is to Certify that Ms.. Edna Jepkoech Sang of University of Eldoret, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kisumu on the topic: EFFECT OF SANITATION AND HYGIENE PRACTICES ON STUDENTS' ACADEMIC PERFORMANCE IN PUBLIC SECONDARY SCHOOLS IN MUHORONI SUB-COUNTY, KENYA for the period ending : 02/March/2024.

License No: NACOSTI/P/23/23934

948225

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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See overleaf for conditions

APPENDIX VII: SIMILARITY REPORT

University of Eldoret

Certificate of Plagiarism Check for Thesis

Author Name	Sang Ednah Jepkoech SEDU/CTE/M/007/21
Course of Study	Type here...
Name of Guide	Type here...
Department	Type here...
Acceptable Maximum Limit	Type here...
Submitted By	titustoo@uoeld.ac.ke
Paper Title	EFFECT OF SANITATION AND HYGIENE PRACTICES ON STUDENTS' ACADEMIC PERFORMANCE IN PUBLIC SECONDARY SCHOOLS IN MUHORONI SUB-COUNTY, KENYA
Similarity	14%
Paper ID	1043417
Submission Date	2023-10-24 13:42:31

Signature of Student

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University Librarian

Director of Post Graduate Studies

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