

**ASSESSMENT OF SANITATION AND HYGIENE IN PUBLIC PRIMARY  
SCHOOLS IN KAKAMEGA MUNICIPALITY DIVISION**

**BY**

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**DECLARATION**

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## **DEDICATION**

This work is dedicated to my parents Ramadhan and Mariam, my brothers; Mustafa, Maulidi, and Musa. Their advice and assistance nudged me firmly on the path of scholarship. May the almighty Allah bless them.

## ABSTRACT

**Introduction:** In Kenya, adequate sanitation coverage has dropped from 49% to 43% in recent years. The challenge of addressing sanitation has been compounded by rising population. Free Primary Education rolled out in 2003 resulted in increased enrolment of learners in Kenyan schools. Consequently, many schools are very far from achieving acceptable levels of sanitation and hygiene and adequate supply of water. The available facilities are unsuitable. If school sanitation and hygiene facilities are unavailable, unmaintained or misused, schools become hazardous to the entire school community. An assessment of sanitation and hygiene in school is, therefore, important. This study assessed the state of sanitation and hygiene in public primary schools in Kakamega Municipality Division.

**Objectives:** The study was guided by four objectives: to establish the standard of cleanliness of the facilities in public primary schools within Kakamega Municipality; to identify the factors that affect the sanitation and hygiene in public primary schools; to assess the knowledge and practices of the pupils towards sanitation and hygiene in public primary schools; and to identify the common diseases related to poor sanitation and hygiene in public primary schools in Kakamega Municipality.

**Methodology:** All 25 public primary schools located in Kakamega Municipality Division participated. The descriptive cross-sectional study design was used. Stratified random sampling was used to select 400 pupils between class 4 and 7. Twenty-five (25) teachers were purposively sampled. Study tools used were an observational checklist and structured questionnaires. Data analysis was performed using SPSS version 21. Descriptive statistics including mean and cross tabulations were used. Pearson's Chi-Square test was used to determine relationships between the variables. P values of 0.05 or less were considered to be significant. Approval by Internal Research and Ethics Committee of the University and informed consent from all study participants was sought.

**Results:** The state of sanitary facilities in schools was poor, unmaintained and inadequate in almost 50% of schools. This demonstrated that investment in school infrastructure was not accorded due priority. Negative effects on pupil's health were due to inaccessible safe drinking water and inadequate sanitary infrastructure despite pupils demonstrating acceptable levels of knowledge on personal hygiene and sanitation. As a result, pupils suffered from communicable diseases such as diarrhoea, flu, and typhoid which could be prevented by improving sanitation in schools.

**Conclusion:** The study concluded that physical infrastructure in schools within the study area was in a deplorable state and inadequate for the pupil population. Gaps were identified in school management of resources and enforcement of school health laws.

**Recommendations:** All buildings in schools to be designed and constructed based on minimum requirement as stipulated in the Building Code and Public Health Act Cap 242. Public health practitioners should ensure copies of policy and guidelines are available in all school. The Ministry of Education should provide adequate infrastructures such as classrooms and latrines in schools.

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## ACRONYMS AND ABBREVIATIONS

**AMREF**- African Medical Research Foundation

**AEO**-Area Education Officer

**DVPT**- Development

**FPE**- Free Primary Education

**GoK**- Government of Kenya

**JCA**- Joint Call to Action

**JMP**- Joint Monitoring Programme

**KESSP**- Kenya Education Sector Wide Support Programme

**MDG**- Millennium Development Goal

**MMUST**- MasindeMuliro University of Science and Technology

**MoEST**- Ministry of Education, Science and Technology

**MoH**- Ministry of Health

**MoPHS**- Ministry of Public Health and Sanitation

**MoPND**- Ministry of Planning and National Development

**MoWNR**- Ministry of Water and National Resources

**MPH**- Master in Public Health

**NGO**- Non-Governmental Organisation

**NSHG**- National School Health Guidelines

**PHO**- Public Health Officer

**SWAP**- Sector Wide Approach

**SWASH**- School Water and Sanitation Hygiene

**UNICEF**- United Nations Children's Fund

**UN**- United Nations

**WASH**- Water Sanitation and Hygiene

**WHO**- World Health Organisation

## OPERATIONAL DEFINITION OF TERMS

**Deworming programme** –A nationwide programme coordinated by the Ministry of Health whose aim is to deworm school kids.

**Excreta** - Faeces and urine

**Hygiene** – Practice of keeping oneself and the surrounding environment clean.

**Improved sanitation-** An improved sanitation facility is defined as a facility that hygienically separates human excreta from human, animal and insect contact.

**Lifebuoy Hand Washing** – A hand washing programme carried out to encourage hand washing among school children by Unilever and an NGO called Vestergaard

**Pit Latrine** –A system used to dispose of human excreta where there is a pit for collection and decomposition of excreta and from which liquid infiltrates into surrounding soil. One pit may have more than one door on its super-structure.

**Public Health** - The science and art of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, organizations, public and private, communities and individuals

**Sanitation** – The science of preventing and reducing disease through various strategies such as awareness creation, good housing, providing a clean environment in which to live or measures to break the cycle of disease.

**School Children** - Children between the ages of 6-15 years attending primary school

**Superstructure** - Provides shelter and privacy for the user of the toilet. The superstructure can range from a simple shelter of sacks or sticks to a building of bricks.

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## CHAPTER ONE

### INTRODUCTION

#### **1.1 Background Information**

Sanitation and hygiene remain a challenge in many parts of the world. About 50% of the developing world's population (2.5 billion people) lack improved sanitation facilities and over 884 million people still use unsafe drinking water sources (WHO & UNICEF, 2010). This contributes greatly to morbidity and mortality in children. It leads to impoverishment and diminished opportunities for many more children (WHO & UNICEF, 2010). To address this global challenge, the United Nations came up the eight Millennium Development Goals (MDGs) in the year 2000. The MDGs address various sectors with the objective of spurring efforts to meet the needs of the world's poorest nations by 2015. The objective of Millennium Development Goal Number Seven (7) was to halve the proportion of people without sustainable access to drinking water and basic sanitation by 2015 (UN, 2000). This target appears to be out of reach as poor physical planning in urban areas coupled with the proliferation of unplanned settlement is a challenge to the provision of safe drinking water and sanitation.

Some efforts have been made towards improving public health in schools by various stakeholders. Globally, the "Call to Action for WASH in Schools" campaign was formally launched in 2010. This major initiative involved UNICEF and key partners who called on decision-makers to increase investments in the area of safe water supply and sanitation concerns (JCA, 2010). The ultimate goal was to expand water and sanitation (WASH) programmes in school to improve health, foster learning and enable children to participate as agents of change within their homes and communities. The campaign was structured to strategically focus on efforts and resources into key areas (JCA, 2010).

Kenya has made significant milestones in improving sanitation and hygiene in schools. The enactment of the National Environmental Sanitation Policy of 2005 and the launch of School Health Policy and School Health and Guidelines in 2010 illustrate the government's commitment to improving Public health in schools. This was done to enable various stakeholders to implement school health programmes based on well-defined regulations and standardised guidelines. It was also aimed at improving the effectiveness and quality of health intervention programmes in schools as stipulated in the National School Health Strategy Implementation Plan of 2011-2015. This was meant to improve primary health care in Kenya through the full participatory approach by the school children.

Although policy has been in favour of a comprehensive primary health care (PHC) approach, especially school health, there is a disjuncture between policy enactment and its realisation. Health services continue to be highly focused on curative care at higher levels of the Kenya's health system (WHO, 2008). As a result, prevention of diseases has lagged behind. For example, safe drinking water and sanitation provision have dropped from 49% to 43% in Kenya in recent years (MoH, 2005). Consequently, approximately 80% of outpatient hospital attendance in Kenya is attributed to cases of preventable diseases while 50% are water, sanitation and hygiene-related (GoK, 2008). In Kakamega Municipality Division, there is 10% coverage of piped water and over 300 bore holes and yet the common sanitation system is pit latrine being used by about 97% of households (MoPND, 2004). Despite the division having plenty of water resources, use of pit latrines makes access to potable water be at 60% due to pollution of the underground water system (MoPND, 2004).

A report by UNICEF on Kenya Country Profile points out that water and sanitation facilities in schools are increasingly recognized as fundamental for promoting good

hygienic behaviour and children's well-being. However, many schools in Kenya have very poor water and sanitary facilities (UNICEF, 2009). These conditions vary from inappropriate and inadequate sanitary facilities to the outright lack of latrines and safe water for drinking and hygiene. UNICEF (2009) further observes that this situation contributes to absenteeism and the high drop-out rates of pupils especially girls. Lack of sanitation and hygienic facilities in schools has a stronger negative impact on girls than on boys because girls need safe, clean, separate and private sanitation facilities in their schools (UNICEF, 2011). Since girls and boys are affected in different ways by inadequate water, sanitation and hygiene conditions in schools, this may contribute to unequal learning opportunities.

School children make up a large proportion of the total national population in Kenya (MoPHS/MoE, 2009). This makes schools the largest and widest spread of all the social services- approximately ten times the size of the health services (AMREF, 2007). School children also spend a lot of their time in school (Lutomia, 2006). These factors coupled with a lower immunity to most diseases and relative lack of sanitation knowledge exposes the young school-goers to a multitude of health risks (MoPHS/MoE, 2009). These health risks range from those that are mild forms of ailments and discomfort to those that are potentially life-threatening. It has been established that infections and co-infections are prevalent in schools in developing countries as they offer a suitable environment in which diseases can spread from one child to another (WHO, 2009); (JCA, 2010); (UNICEF, 2012).

## **1.2 Problem Statement**

The government of Kenya has continually adopted policies and strategies over the years in order to combat the present challenges in health services (WHO, 2008). However, the challenges of improving sanitation have been due to rising population and increasing

rural-urban migration. For primary schools, heavy investment in the education sector has accelerated reforms such as the launch of Free Primary Education in 2003. This occasioned an increase in the enrolment of learners in public schools leading to an influx of over 1.3 million learners in the education system (UNICEF, 2011).

The rapid increase strained the hygiene and sanitation facilities in primary schools, consequently resulted in low standards of sanitation and hygiene in many primary schools all over the country (MoEST, 2006). As a result, only 29% of all schools at both primary and secondary levels have access to clean and safe drinking water and appropriate sanitation facilities (MoEST, 2006). For example, in most primary schools a pit-latrines serves over 100 pupils. Moreover, the quality is often very low in places where the facilities exist (SWASH, 2009).

In Kakamega Municipality division, incidences of collapsing pit latrines and frequent closure of primary schools by the public health department are frequent experiences, (MoPND, 2004). The Kenya Water Development Report (2006), also pointed out that water conservation measures are generally not practised in schools. Therefore, pupils fetch water from nearby water systems and ferry it to school for drinking and washing. However, this water is of questionable quality which may cause sickness to many children (UN-Water, 2006). To a large extent, the quality of hygiene and sanitation in schools has become compromised.

### **1.3 Justification of the study**

Poor sanitation and hygiene hinder education attainment and drain households' resources due to diseases imposed (WHO, 2008). It causes sickness in thousands of children every day and leads to impoverishment and diminished opportunities for thousands or more (WHO & UNICEF, 2010). To ensure proper literacy levels, a clean



learning environment is needed and would enable a healthy learner population (GoK, 2008). Over time, the population of Kakamega Municipality has expanded without the equivalent improvement or upgrading of the existing sanitation facilities in public schools. Most research on sanitation in schools has also been done on aspects of latrine and water. But sanitation of other facilities like classrooms, urinals, kitchens, and physical environment has not been adequately addressed. Therefore, there was a need for updated in-depth information on sanitation and hygiene in schools in all aspects. This data can be used for development of indicators for monitoring sanitation and hygiene in primary schools. Gaps would be identified in the school health system and would inform policy and decision makers on appropriate mitigations or interventions to improve public health in schools. This will foster a healthy learning environment and improve performance in public primary schools.

### **1.5 Research question**

- i. What are the prevailing conditions of the available hygiene and sanitation facilities within public primary schools in Kakamega Municipality?
- ii. What factors affect sanitation and hygiene in public primary schools in Kakamega Municipality?
- iii. What is the knowledge, attitude and practice sanitation of pupils in public primary schools in Kakamega Municipality?

### **1.6 Objectives**

#### **1.6.1 Broad Objective**

To assess the state of sanitation, hygiene and related diseases in public primary schools in Kakamega Municipality

### **1.6.2 Specific Objectives**

- i. To assess the cleanliness of the facilities in public primary schools within Kakamega Municipality
- ii. To identify the factors that affect sanitation and hygiene in public primary schools in Kakamega Municipality
- iii. To assess the knowledge, and practices of the pupils towards sanitation and hygiene in public primary schools in Kakamega Municipality
- iv. To identify the common diseases related to poor sanitation and hygiene that affected pupils in public primary schools in Kakamega Municipality

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Global Sanitation and Hygiene Status**

Good progress had been made towards halving the number of people without access to improved quality water and sanitation throughout the world. However, it was estimated that globally, 672 million people would not have access to improved drinking water sources by 2015, (WHO & UNICEF, 2010) as envisioned in the MDG number seven: half the proportion of people without sustainable access to safe drinking water and basic sanitation by 2015 (UN, 2000). It was only Eastern, South-Eastern and Western Asia, Northern Africa and Latin America and the Caribbean which countries that were on track to halve the proportion of people without basic sanitation by 2015. All other developing regions of the world had made insufficient progress towards this target. In sub-Saharan Africa, the absolute number of people without access to sanitation had actually increased. The population growth had outstripped the progress to the extent that the actual number of people without access to quality water and sanitation was greater in 2008 than it was in 1990 (UNICEF, 2009). However, the total population access to quality water and sanitation had significantly increased since 1990, rising from 49% to 60% 2008. (WHO & UNICEF, 2010).

#### **2.2 Sanitation and Hygiene in Kenya**

The scenario in sub-Saharan Africa is especially pronounced in Kenya where over 15 million people including more than half the rural population are without access to safe drinking water or sanitation facilities (MoH, 2005). Safe water supply remains a challenge in many parts of the country and a large percentage of the population are without sanitation. Eighty-three per cent (83%) of the country is arid or semi-arid and

therefore has low standards of sanitation and hygiene. However, Kakamega County in western Kenya is well endowed with water sources such as permanent rivers, streams, boreholes, and piped water schemes. This makes the average distance for residents to access potable water to be 500 meters (MoPND, 2004). The development of sanitary disposal of sewage has lagged behind making safe water and sanitation provision inadequate (GoK, 2007). Adequate sanitation coverage in Kenya has dropped from 49% to 43% in recent years (MoH, 2005). The challenges of addressing sanitation and waste management have been compounded by rising population, improved standards of living and high rural-urban migration. Consequently, the main sewer systems also experience constant breakages and leakages leading to increased discharge into small systems (GoK, 2007).

### **2.3 Standard of Sanitation and Hygiene in Public Primary Schools**

Efforts to improve water and sanitation services in Kenya have been in existence since Kenya adopted Primary Health Care (PHC) package in the 1970s as a service delivery strategy. The government has continually adopted policies and strategies over the years in order to combat challenges in health service delivery (WHO, 2008). A key national level strategy for the implementation of MDG is the Kenya Vision 2030. This is the country's economic development blueprint, which seeks to transform Kenya into a newly industrializing, middle-income country providing a high quality of life to all its citizens by the year 2030 (GoK, 2007). Under the social pillar, the country aims to improve the quality of education for all Kenyans. Towards this, the government has invested heavily in the education sector which has witnessed accelerated reforms. Reforms such as the launch of Free Primary Education in 2003 and adoption of Sector Wide Approach (SWAP) to planning and financing of education were implemented. Most notably is the development of Kenya Education Sector-wide Support Programme

(KESSP) investment programme that allowed different stakeholders to support the education sector (MoEST, 2006). Amongst the programmes, school health attracted much investment. The aim was to attain national ownership, alignment of objectives, and harmonization of procedures, and a coherent financing of school health activities (MoEST, 2006). School health in Kenya also enjoys funding from development partners, churches, Non-Governmental Organizations (NGOs), individuals and community initiatives. Therefore, harmonisation of all these sources of funds would exploit the synergies required and add value to the health activities in schools. This is because many Kenyan schools are far from achieving acceptable levels of water, sanitation, and hygiene. This is partly due to lack of capacities and adequate institutional and legal support (UNICEF/WHO, 2009).

Free Primary Education (FPE) introduced in Kenya in 2003, enabled many children to enjoy their right to education. This was to address the MDG Number 2; to attain universal primary education (UN, 2000). With a net enrolment rate of 86%, Kenyan schools are crowded resulting in pressure to limited facilities (MoEST, 2006). This significant increase in primary school enrolment has occasioned additional pressure to existing school infrastructure resulting in poor performance of public schools in national examinations. According to Schneider, (2002), the drive to get children into schools and on track to a better future often outpaces the ability of school officials, communities and governments to equip schools with adequate facilities. The consequence is that public schools experience a drop in performance after this initiative. Previous research has shown positive effects of the small school population in terms of performance and general wellbeing of students (Uwazi trust, 2011).

The Kenya National Water Development Report, 2006, observes that water systems in many schools are not functioning (MoWNR, 2006). The scenario depicted in most schools is that of leaking storage tanks, rusted iron-roof catchments, and faulty hand pumps. Water conservation measures are often not practised and, in some schools, pupils fetch and ferry water to school for drinking and washing from nearby water systems. Such water is of questionable quality and this has direct implications on school attendance, health, and performance of pupils (UN-Water, 2006). A survey by Ministry of Education (MoE) in 2006 indicated that only 29% of all schools in Kenya, at both primary and secondary levels, have access to clean drinking water and appropriate sanitation facilities. In most primary schools, teachers and pupils share a pit-latrine which in some cases serves over 100 people (SWASH, 2009). A study conducted in Nyanza province and Western Kenya by SWASH revealed that approximately 79% of schools in the area have access to an improved water source, mainly rainwater tanks (SWASH, 2009).

#### **2.4 Relevance of Health Programs in Schools**

The decreasing child mortality rate has been due to increase in literacy and spread of immunization programmes. Over population and increasing urbanization now threaten this achievement (AMREF, 2007). This is because communicable diseases increase with poor housing and pollution of the environment by the disposal of human waste and rubbish. Schools, particularly those in rural areas, lack drinking-water and sanitation facilities both in quality and quantity. The resultant unhygienic conditions together with intense levels of person-to-person contact are high-risk environments for pupils and staff. They exacerbate children's susceptibility to diseases. Clean schools not only lower the threat of the spread of illness but also have been linked to improved health which enhances cognitive development, concentration, participation and retention of children

in school (Blanton, 2009). Children also convey a caring message to fellow pupils and at home and have thus been recognised as the main change agents of the society (Bundy, Shaeffer, Jukes, Beegle, Gillespies, & Drake, 2006). To control diarrhoeal diseases, hygiene and sanitation programmes are an active part of child survival programmes in Kenya. Many children are reached through school health programmes with health messages that touch on various aspects of their lives. Such messages are expected to reach community masses from which the students come and in turn reduce the morbidity of easily preventable diseases (AMREF, 2010).

## **2.5 Factors that Affect Sanitation and Hygiene in Public Primary Schools**

### **2.5.1 Ideal Indoor Environment in Schools**

According to Schneider (2002), spatial configurations, noise, heat, cold, light, and air quality has a lot of impacts on students' and teachers' ability to perform. There must be adequate lighting in classrooms focused on the front of the classroom and over the students' desks. Glare from hard surfaces is distracting and should be avoided. The effective lighting of schools has been related to high-performance test scores time and again (Schneider, 2002). Classes should be designed to accommodate students so that the number of students does not exceed 50 (GoK, 2013). A lower density of students per classroom would increase teacher and student interaction and communication. Classrooms must be designed with effective communication and interaction aids so that the pupils are able to easily see and hear the instructor and other fellow pupils (Berry, 2002). Quite often, these requirements of design and construction of classrooms are not adhered to.

There should be minimal noise pollution whereby the noise must be controlled to levels that do exceed 68db. Higher noise levels affect students learning and they begin to have

difficulty understanding what is being said and are distracted by noise in other classrooms. To control temperature, it is also important that classrooms be designed with good ventilation. Effective filters and cleaning be functional so as to keep particulate matter, such as dust, out of the air. Odours can also distract students, but can be removed with good ventilation (Berry, 2002).

### **2.5.2 Water and Sanitation Standards in Schools**

Research has shown that schools with proper water and sanitation facilities report fewer illnesses, reduced drop-outs especially of girls and better school results (UNICEF/WHO, 2009). Poor sanitation and hygiene and inadequate safe water have many serious consequences. Children, particularly girls, are denied their right to education because of lack of private and decent sanitation facilities in their schools which meet their special needs. If sanitation and hygiene facilities are inadequate or are badly maintained and used in schools then a serious health hazard can occur. Facilities should be durable and if possible, easy to maintain. Appropriate technology should be applied considering the local capacities for maintenance and repair of facilities. Responsibilities for maintenance should be clearly defined, and appropriate skills provided (Uwazi trust, 2011).

The presence and the appropriate use of facilities prevent pollution of the school environment and limit health hazards within the community at large. Children have the right to be as healthy and happy as possible. Being clean, healthy and having clean water and proper sanitation facilities contribute to a happy childhood.

### **2.5.3 Statutory Regulations that Guide Public Health in Schools**

Kenya has enacted laws and regulations that govern public health in schools. If regulations are operationalized they play a crucial role in providing and maintaining



optimum health of the pupils. Some of the regulations include National School Health Guideline (NSHG) as well as the National School Health Policy (NSHP). NSHG indicate that children aged 6-15 years constitute 48% of the total national population, (MoPHS/MoE, 2009). This age group is disproportionately affected by the significant degree of ill health, nutritional deficiencies, and morbidity that impede effective learning and realisation of their full potential. To address these challenges, the NSHG stipulates that public health officers should carry out water quality surveillance and monitoring in schools twice per school term. School management should ensure that water is stored safely to avoid any contamination, and appropriate technology is used in the design and construction of water storage facilities. For example, all storage facilities should be fitted with taps to avoid contamination.

The guidelines further stipulate that classrooms should have clean and durable floors. Earthen floors should be swept and watered daily while cemented floors mopped daily as well. According to the Basic Education Act Cap 211, no class in any primary school shall exceed the capacity of 50 pupils (GoK, 2013). This is to avoid congestion in classes. The population of students in class affect pupils' health through air quality and also contributes to accelerated wear of the class. All schools must have adequate sanitary facilities to meet the set standards, regulatory requirements, and quality. It is recommended that a ratio of one door to 25 girls and one door to 30 boys is adequate latrine space in primary schools (MoPHS/MoE, 2009). The aperture size of the latrine should take cognisance of children with special needs, gender, and age (MoPHS/MoE, 2009). Quite often, the construction of facilities is done in disregard of these crucial provisions, hence, inappropriate utilization leading to creating an unhygienic environment.

The NSHG further stipulates that catering staff must be medically examined periodically thus at the beginning of each term and vaccinated appropriately. Proper food storage facilities should be maintained at high standards of hygiene. Food should be adequate in quantity and of appropriate nutritional value. Leftover food should not be recycled (MoPHS/MoE, 2009). It should be noted that food can be contaminated via polluted water, dirty hands, contaminated soil, and flies. It is, therefore, an important source of disease outbreaks in schools.

## **2.6 Importance of Knowledge and Good Practice on Sanitation and Hygiene**

The provision of safe water and sanitation facilities in schools is the first step towards a healthy physical learning environment, benefiting both learning and health (Onsomu, 2004). However, the mere provision of facilities does not necessarily make them sustainable or produce the desired impact. This is because poor hygiene behaviour is the most significant barrier to the control of many infectious diseases (Jerry & Gumbo, 2013). For this reason, pupils reduce their risk of becoming exposed to diseases when they are empowered with appropriate behaviour and provided with suitable facilities (Aseefa&Kumie, 2014). Therefore, provision of water and sanitation facilities linked with good hygiene behaviour has proven to be more effective in reducing diarrhoeal diseases. They also support the improvements of sustained behavioural change. For instance, the use of latrines and the related appropriate hygiene behaviour of pupils have been noted to provide health benefits. Awareness of health aspects of sanitation behaviour is consequently important because it determines the degree of sustainability of an intervention in sanitation (Jerry & Gumbo, 2013). At school setting, teachers act as role models. They provide leadership and knowledge in hygiene related matters within their schools. Appropriate sanitation and hygiene facilities enable pupils to learn good hygiene behaviour such as good hand washing practices.

## **2.7 Prevalent Infections and Diseases of Concern in Schools**

Communicable diseases, infectious diseases, nutrition deficiency disorders and parasitic infections still dominate the morbidity profile of Kenya (UNICEF, 2009). Disease of the respiratory system such as pneumonia, skin diseases, diarrhoeal disease, and intestinal worms contribute to over three-quarters of total outpatient cases reported in Kenya (GoK, 2007). These diseases are the leading causes of death among children who are particularly vulnerable to them (UNICEF/WHO, 2009). A survey among school children in India revealed that about half of the ailments reported were related to unsanitary conditions and lack of personal hygiene (Majra, 2010). Since most of the child's life is spent in school, it is paramount that schools have proper facilities that are adequate and well maintained.

In a typical institutional setting, respiratory infections are a common cause of illness in children. Common cold is the most frequent cause of medical consultation throughout the world and frequently causes absenteeism in school. For instance, influenza has both high attack rate and secondary bacterial infections. Small outbreaks of pneumococcal pneumonia also occur in institutions where pupils are crowded in their classroom and sleeping quarters (AMREF, 2007). Diarrhoeal diseases occur more often during the dry season and could be due to unhygienic practices and warm infestation. It is estimated that between 25% and 35% of school-age children are infected with one or more of the major species of worms (Balnton, Ombeki, Oluoch, Mwaki, Wannemuehler, & Quick, 2009). These diseases are associated more with the inadequate supply of water than its contamination and will usually decrease when the amount of available water is increased (AMREF, 2007). Since Kenya is classified as one of the most water scarce countries in the world, schools face challenges the most as they have huge masses of individuals to provide for (UNICEF, 2009).

Contagious diseases are transmitted through direct contact and occur in clusters of children play groups (AMREF, 2007). Some of the factors that affect the transmission of contagious diseases are encouraged by high population density, overcrowding, and poor personal hygiene. Pediculosis is a disease caused by the infestation of humans and animals by lice. It is a common parasitic condition in school children, especially in crowded and unhygienic conditions. Ring worm (fungal infection) occur mainly in children under ten years (AMREF, 2007). Chicken pox is also a very common viral disease among children that causes frequent outbreaks in schools. Accompanying each illness is the loss of body weight. Hence, communicable diseases together with malnutrition remain a significant public health concern. They are major causes of illness in Kenya and Africa at large (AMREF, 2007). All these conditions are easily prevented by improving hygiene and sanitation in school.

## CHAPTER THREE

### METHODOLOGY

#### 3.1. Study Area

The study was carried out in Kakamega Municipality Division in Kakamega County in October 2013. Kakamega Municipality Division covers an area of approximately 49 square kilometres. It is zoned into the central business district, residential, industrial and agricultural zones. Kakamega town, located in Municipality Division, is the County headquarters. It is an administrative centre with minimal industrial activities. According to the Kenya National Population and Housing Census, Kakamega Municipality Division had a population of 333, 329 (GoK, 2009). The town's annual population growth rate is at 2.12% and the population density of 515 people per Km<sup>2</sup> (GoK, 2009). The age distribution is as follows: 0-14 years (46.6%), 15-64 years (40.7%), 65+years (13.6%) (GoK, 2009). This implies that almost half of the population comprises school going children at primary school level. The establishment of MasindeMuliro University of Science and Technology (MMUST) has had an impact on the population as more students, lecturers and the support staff and their families have settled within the town. The increase in population has not been in tandem with the development of public infrastructure. In addition to high birth rate in the region, the population growth in the past decade can be attributed to the influx of people attracted by the vast opportunities of trade and employment.

The major economic activity in the municipality is trade while small-scale peasant farming is practiced in the outskirts. The area experiences a hot and wet climate with rainfall that ranges from 1259 mm to 2500 mm per annum, the wettest months being March, April, May and June. The temperature range is between 200C and 300C.

Kakamega Municipality receives treated water from Savonna treatment plant which is managed by the Western Water Company Services. The plant was constructed about 30 years ago when the demand for the same was low. The treatment process in the plant is a conventional one. Raw water is received from River Isiukhu.

Liquid waste management is carried out by the Western Water Services Company (WWSC). About a third of Kakamega Municipality is on sewer system composing of stabilization ponds (MoPND, 2004). There are two sewage treatment plants in the Municipality with a third plant under construction. The ponds can handle a maximum of 3000 m<sup>3</sup>. Over the years, the town has expanded and the population increased implying many areas are not served by this essential service. Consequently, there is rampant use of conservancy system especially pit-latrines within the Municipality. This is not an appropriate option due to its potential to contaminate the underground water supply.

### **3.2. Study Population**

The study population comprised 25 public primary schools within Kakamega Municipality. Students and teachers from the schools were also part of the study.

### **3.3. Study Design**

A descriptive cross-sectional study design was used. This design was suitable because it explored the existing status of sanitation and hygiene in the schools.

### **3.4. Sample Size Determination**

The sample size of pupils was calculated from an estimated study population of over 10,000 pupils. The sample size (n) was determined using 95% confidence interval population parameter of 50% and a statistical error of 5%.

The Fishers formula was used as shown below:

Where:

Z= confidence interval

p= proportion of pupils in schools with improved sanitation

1-p= proportion of pupils in schools without improved sanitation

n= desired sample size

e= acceptable sampling error

$$\text{Sample size} = \frac{1.962 * 0.5(1-0.5)}{0.052} = 384.16$$

Table 3.1 indicates the final sample size of 407 which was calculated using this formula:

$$\left[ \frac{\text{Total enrolment per school}}{\text{Total enrolment of all schools}} \right] \times 384.16$$

Table 3.1 Sample Size Distribution in Schools

S/NO.	NAME OF SCHOOL	ENROLMENT	SAMPLE SIZE
1.	Rush primary	293	6
2.	Hirumbi primary	443	9
3.	Rosterman primary school	414	9
4.	Shisasari	670	14
5.	Bukhulunya	804	17
6.	Bondeni	645	14
7.	Shivakala	501	11
8.	Township	1003	22
9.	Ebambwa	566	12
10.	Ichina	749	16
11.	Nyayo tea zones	390	8
12.	Mahiakalo	1522	33
13.	Shitaho	602	13
14.	Mwiyala primary	606	13
15.	Lurambi primary	750	16
16.	Maraba	1065	23
17.	Amalemba	1067	23
18.	Nabongo	1634	36
19.	Kakamega primary	2592	57
20.	Kakamega muslim	405	8
21.	Chief m,utsembi	505	11
22.	Matende	611	13
23.	Approved school	394	8
24.	Daisy school	162	3
25.	Musa primary	550	12
	<b>Total</b>	<b>17309</b>	<b>407</b>

### 3.5. Sampling Techniques

All the 25 schools within Kakamega Municipality were included in the study. Stratified random sampling was used to select the pupils from class four to class seven. Classes from which the pupils were picked represent a stratum where the appropriate number of pupils was selected randomly. They were then interviewed on various practices of hygiene and sanitation. All the interviewed pupils were of the same age group. Purposive sampling was used to select head teachers.



### **3.6. Data Collection and Storage**

Prior to initiating the process of data collection, two training sessions for research assistants were held, one before the pilot study and another before data collection for the main study. Two research assistants were trained to ensure that they were conversant with research knowledge, data collection process and equipment as well as ethical issues to be considered while implementing their duties.

Data was gathered with the aid of checklist (appendix 6.0) and questionnaires. For every school, closed-ended interviewer-administered questionnaires (appendix 7.0) were administered to the pupils. The English language used was simple at the level of the learners. Since students were exposed to the English language from class one, there was no need for translation. Data from teachers was sourced by an open-ended teacher's questionnaire (appendix 8.0) to allow for a broader and in-depth assessment of the management issues as far as school public health is concerned. This was because various schools were managed differently, for instance, depending on the sponsors' requirements such as the religious groups. Additionally, data from schools was gathered by observation using a check-list. Structures whose hygienic standards were studied in the proposed learning institutions include the following; classrooms, administrative buildings, and offices, kitchen and ablution facilities.

All the filled in questionnaires were sorted by the researcher, coded and entered into a computer. Data was stored on a personal computer that was protected by a password. Backup data was written on a compact disk also protected by a password.

### **3.7. Data Processing**

Data collected was standardized using various quality control measures, including checking for consistency and completeness before the data entry process. Data entry personnel were trained and had experience in data entry. Each questionnaire was given a

unique identification number that was filled in, before data entry; these numbers were entered and used as a checkout for any inconsistencies in the data.

### **3.8. Data Analysis**

Data analysis was performed using Statistical Package for Social Sciences (SPSS Version. 21.0 inc., 444 N. Michigan Ave. Chicago Illinois). Descriptive statistics including mean, frequency distributions and cross-tabulations were used. Categorical data was then subjected to inferential statistics where Pearsons' Chi-Square test was used to determine relationships between the variables and the predicted estimates. P values of 0.05 or less were considered to be significant. The findings of the study were then presented using graphs, charts and narrative text. Finally, propositions and conclusions were made based on the apparent patterns or relationships within the data.

### **3.9. Parameters Analyzed**

#### **3.9.1 Cleanliness of School facilities**

Structures whose hygienic standards were studied in the proposed learning institutions include the following; kitchen, toilets, composite pits, playing grounds, water supply, and classrooms. These facilities were investigated for cleanliness standards (the existence of dirt), ventilation levels, lighting, drainage, and quality of workmanship, safety as well as frequencies of cleaning/washing. Bush-trimming in the surroundings, water sources and treatment for safety (whether it is done), the frequency of taps with running water and availability of school emergency services. A checklist was prepared for the assessment of these parameters in each of the selected learning institutions. Based on these parameters, structures were assessed either as being adequate or inadequate, good or bad, present or absent.

### **3.9.2 Knowledge and Practice as well as Common Diseases Affecting Pupils**

For every school, the school pupils were provided with questionnaires for quantifying knowledge on personal hygiene, habits, and values. Data in areas like hand-washing habits, solid waste disposal, soap usage, quality of water used, environmental health awareness, type and frequency of mild and severe infections experienced were collected. Teachers also responded to questions about the common health problems experienced by pupils

### **3.9.3 Factors Affecting Standard of Sanitation and Hygiene**

The data gathered from the teacher's questionnaire as well as the observation checklist was used to assess the following factors: challenges the schools faced regarding sanitation, enrolment of pupils versus facilities currently available.

### **3.10. Pilot Study**

This was done with the objective of subjecting the research instrument to trial so as to gauge its reliability and suitability. To ensure that data collected was valid, data collection tools were pre-tested in public primary schools in Shinyalu Division (this was outside the sampled survey areas with characteristics similar to the study population). The findings and experiences from the pre-test were used to refine the questionnaires and checklist before the final data collection and re-examine the approach of the study.

### **3.11. Ethical Considerations**

- i. Approval from Institutional Research and Ethics Committee (IREC), an ethics and research body in Moi University, was sought (Appendix 3.0). The following ethical issues were put into consideration:
  - a. Participation was entirely voluntary

- b. Persons would withdraw from participation in this study at any time they felt like without being penalized
  - c. No physical risk or physical harm was incurred by obliging to participate in the study.
  - d. The rights and dignity of all participants were protected and respected. All information was treated with utmost confidentiality.
- ii. Official permit to conduct the study was sought from the relevant Area Education Officer's (AEO) office and school administration officials (Appendix 4.0).
  - iii. Informed consent from all study participants was sought. A request form as shown in Appendix 5.0 was read and signed by the head teachers.
  - iv. Since there exists a dynamic pupil-teacher relationship, assent form was read out loud to pupils before the interviews began and were signed by the head teacher.

### **3.12. Inclusion Criteria**

- i. Pupils in class 4 to 7 were interviewed as those in class 1 to 3 were considered too young while those in class eight were preparing for KCPE exams
- ii. Teacher in charge of sanitation in the school was interviewed
- iii. Public primary schools within Kakamega Municipality region

### **3.13. Exclusion Criteria**

- i. Pupils who belonged to other classes other than those of interest
- ii. Private schools

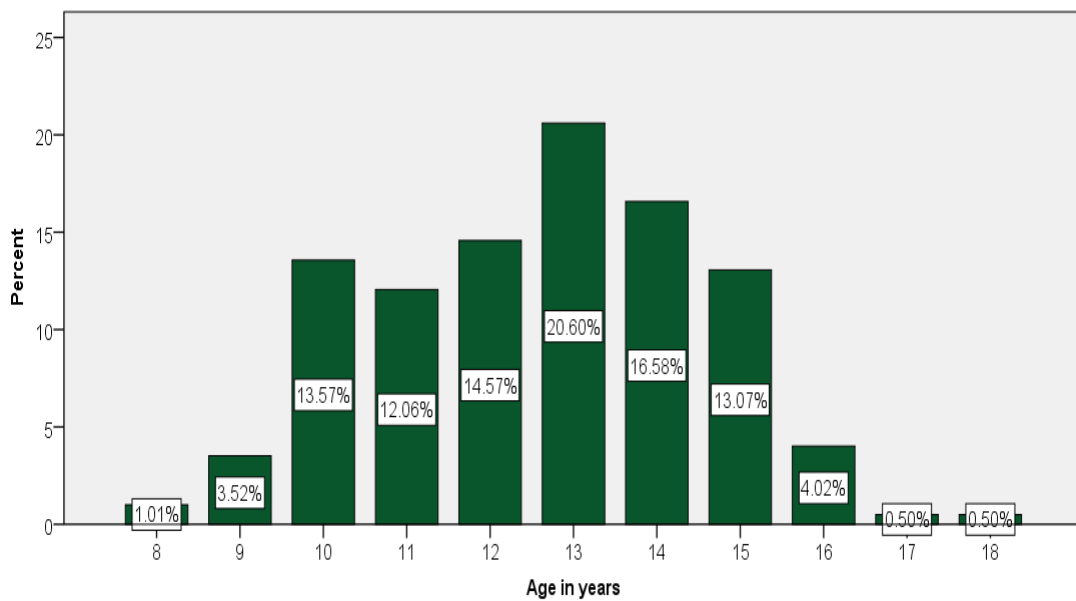
## CHAPTER FOUR

### RESULTS

#### 4.1 Social Demographic Characteristics of the Respondents

##### 4.1.1. Age

The mean age of pupils sampled was 12.8 years. The majority of pupils (83.6%) were between the ages of 10 to 15 years. A Chi Square test of independence conducted on the data showed that there was a significant ( $P < 0.05$ ) variation between responses on age distribution. Figure 4.1 shows distribution of age of the pupils.



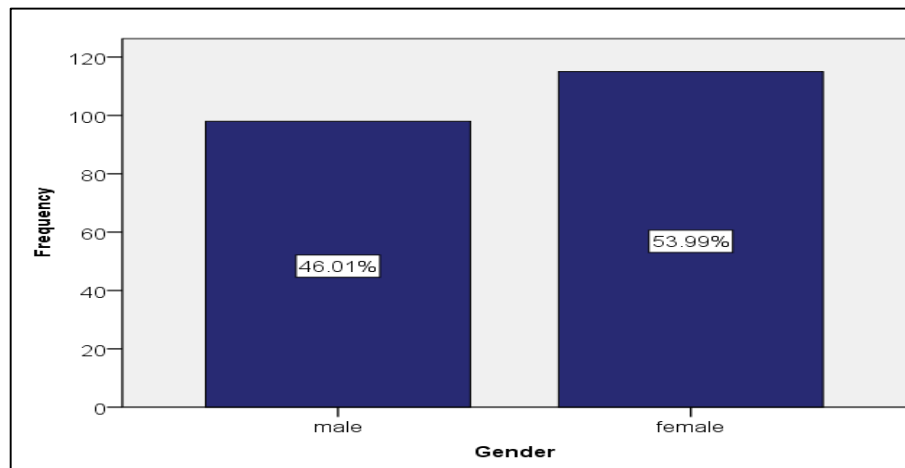
**Figure 4.1:** Age of the Respondents

##### 4.1.2. Class of Attendance

Pupils in class four to seven were included in the study. There was no significant variation in the classes sampled ( $P > 0.05$ ).

### 4.1.3. Gender

Both male and female pupils had an equal chance of participating in the study. There was no significant variation ( $P>0.05$ ) in the distribution of gender of the respondents as shown in Figure 4.2.



**Figure 4.2:** Gender of the Respondents

#### 4.1.4. Enrolment in Schools

As Indicated in Table 4. 1, the average teacher to pupil ratio was 1:30.

**Table 4.1:** Ratio of Teachers to Pupils

School	Ratio
Rosterman Primary School	1:21
Shisasari	1:51
Bukhulunya	1:33
Bondeni	1:29
Shivakala	1:31
Township	1:38
Ebwambwa	1:29
Nyayo Tea Zones	1:26
Mahiakalo	1:41
Shitaho	1:35
Mwiyala Primary	1:24
Lurambi Primary	1:28
Maraba	1:40
Amalemba	1:33
Nabongo	1:34
Kakamega Muslim	1:21
Chief Mutsembi	1:21
Matende	1:19
Overall	1:30

#### 4.1.5. Ratio of Pupils enrolment to Classrooms

Table 4.2 shows the overall ratio of students in each class was 1:48. Thirty six point eight per cent 36.8% of the schools had higher than the recommended ratio of 1:50 pupils per class.

**Table 4.2:** Ratio of Total Enrolment to Total Number of Classrooms

School	Ratio
Hirumbi Primary	1:55
Rosterman Primary School	1:31
Shisasari	1:83
Bukhulunya	1:44
Bondeni	1:37
Shivakala	1:62
Township	1:50
Ebambwa	1:33
Nyayo Tea Zones	1:48
Mahiakalo	1:58
Shitaho	1:40
Mwiyala Primary	1:75
Lurambi Primary	1:50
Maraba	1:42
Nabongo	1:40
Kakamega Primary	1:56
Kakamega Muslim	1:50
Chief Mutsembi	1:29
Matende	1:40
Overall	1:48



## 4.2 Standard of Cleanliness of the Facilities

Classes, latrines, urinals and school kitchen were assessed on the standard of cleanliness and rated adequate or inadequate.

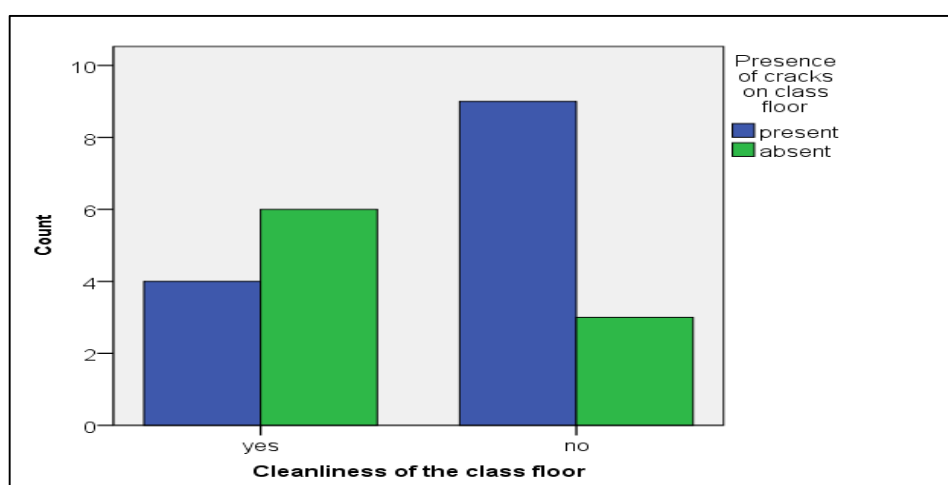
### 4.2.1. Classrooms

The conditions observed in classroom are as shown in Table 4.3.

**Table 4.3:** Conditions Observed in Classrooms

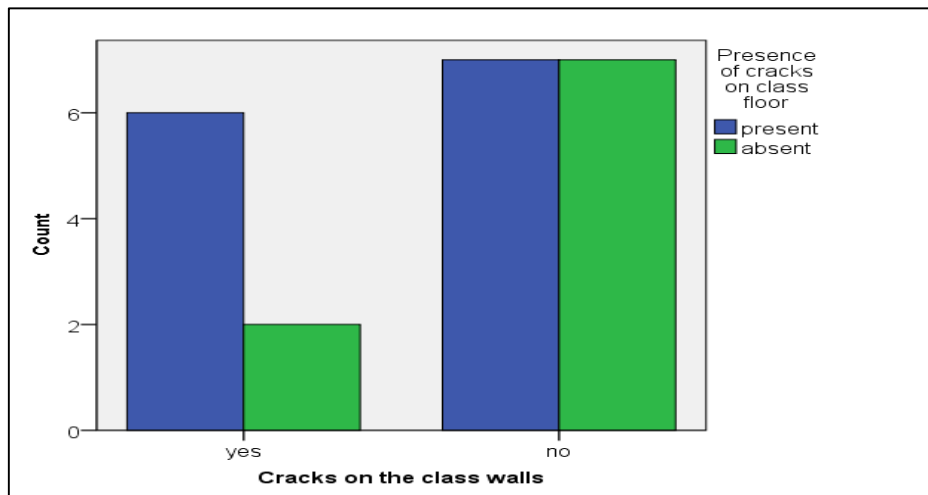
Condition observed	Adequate/ Present	Inadequate/ Absent	P value
Ventilation through windows	90.9%	9.1%	P<0.05
Natural lighting	92%	8%	P<0.05
Artificial lighting (electricity)	54.5%	45.5%	P>0.05
Cleanliness of floor	45.5%	54.5%	P>0.05
Cracks/holes on the floors	59.1%	40.9%	P>0.05
Cleanliness of walls	36.4%	63.6%	P>0.05

There was no significant association ( $P>0.05$ ) in the cleanliness of classroom floors and the presence of cracks on the floor as shown in Figure 4.3.



**Figure 4.3:** Cleanliness of Class Floors Versus Presence of Cracks on Class Floors

A significant number of walls were not clean as indicated in appendix 9, plate 6. Classes that had cracks on the walls did not necessarily have cracks on the floor as shown in Figure 4.4.



**Figure 4.4:** Presence of Cracks on Class Floor and Walls

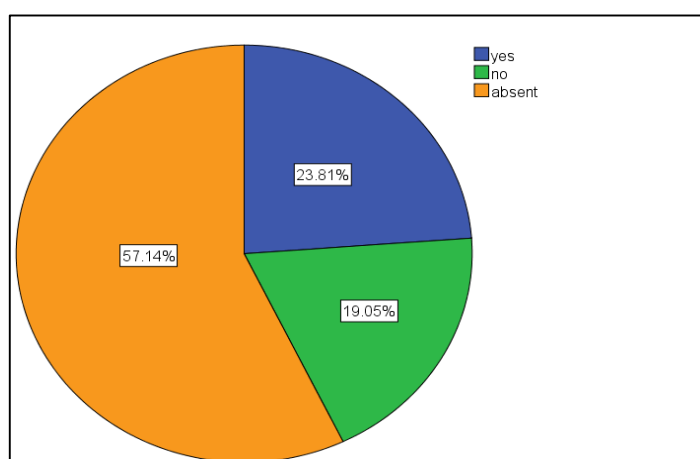
#### 4.2.2. School Kitchen

Conditions observed in school kitchens are as summarized on Table 4.5

**Table 4.4:** Conditions Observed in School Kitchens

Condition observed	Adequate	Inadequate	P value
Natural lighting	57.1%	42.8%	P> 0.05
Ventilation through chimney	19.1%	80.9%	P<0.05
Ventilation through windows	28.6%	71.4%	P<0.05
Drainage system	19%	81%	P<0.05
Food store	10%	90%	P<0.05
Fire extinguisher	0%	100%	P<0.05

A significant number of schools, 57.1% (P<0.05) of schools did not have a food preparation surface shown in Figure 4.5.



**Figure 4.5:** Non-absorbent Food Preparation Surfaces

Water supply and solid waste disposal from all school kitchens were the same as the rest of the school as shown under section 4.3.7.

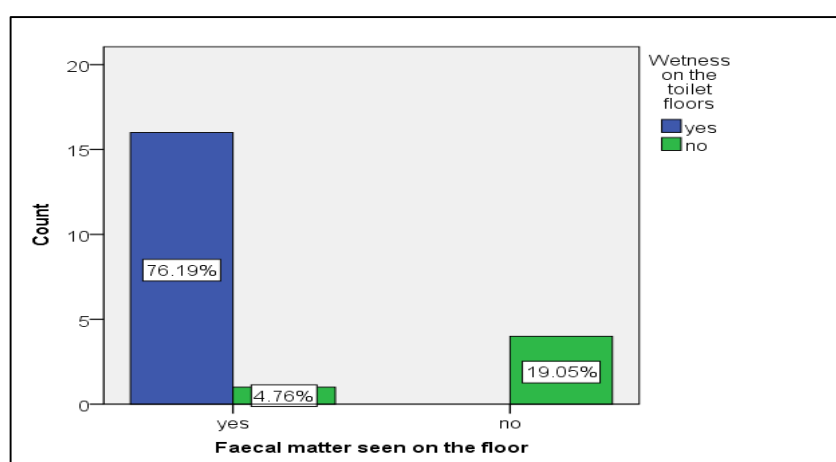
### 4.2.3. Latrines

The structures and conditions of latrines were observed to determine their suitability in their functioning. This was as presented on Table 4.6.

**Table 4.5:** Condition of Latrines in Schools

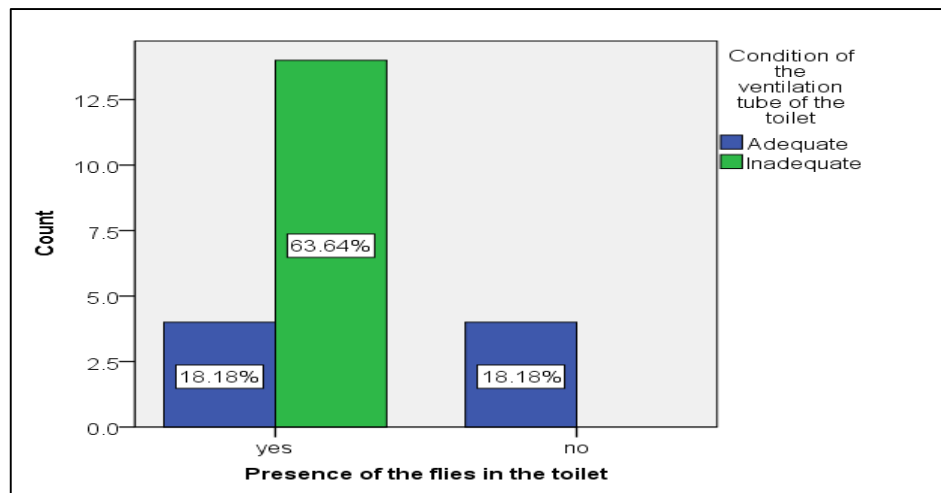
Condition observed	Present	Absent	P value
Ventilation pipe	40.91%	59.09%	P<0.05
Latrine doors	36.36%	63.64%	P<0.05
Presence of flies in latrines	68,18%(absent)	31.82%(present)	P>0.05
Latrine floor (chipped )	54.55%	45.45%	P<0.05

Wetness on the latrine floors and presence of faecal matter was found in significant number of latrines (P<0.05) as shown in appendix 9, plate 10. A significant association (P<0.05) between faecal matter on the floor of latrines and wetness on the floor was observed as indicated in Figure 4.6.



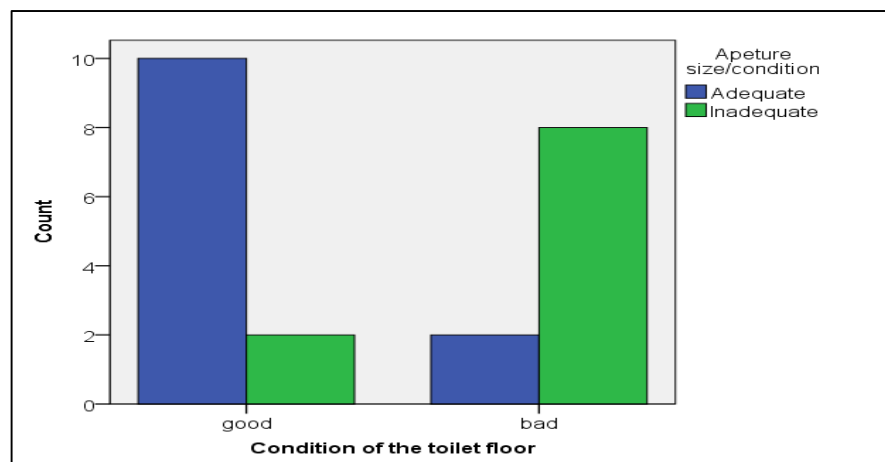
**Figure 4.6:** Wet Latrine Floor versus Faecal Matter on the Floor

A significant association between presence of flies in the latrine and condition of the ventilation tube was observed (P<0.05). Figure 4.7 illustrates that the presence of ventilation tubes helped control flies.



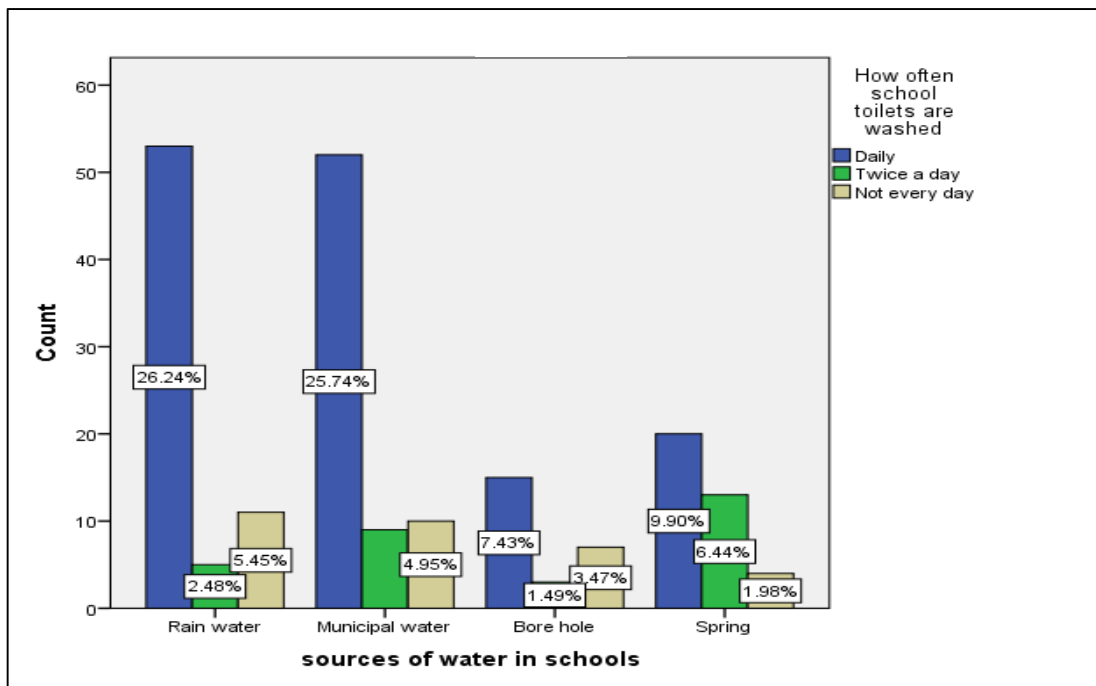
**Figure 4.7:** Ventilation Tube versus Presence of Flies in the Latrines

Latrine floors that were in bad condition (chipped) also had big aperture size as shown in Figure 4.8 and appendix 9, plate 11. A chi-square test indicated a significant association ( $P < 0.05$ ).



**Figure 4.8:** Condition of the Floor versus Aperture Size

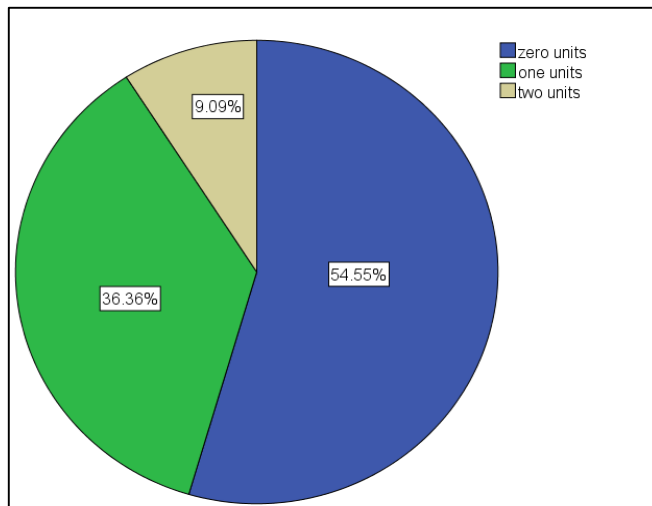
Sources of water in schools were found to be correlated with the frequency of washing of toilets ( $R < 0$ ) as indicated in Figure 4.9.



**Figure 4.9:** Frequency of Washing Verses Source of Water

**4.2.4. Urinal pits**

Most schools did not provide urinal pits for boys, 54.6%. Those that had urinal pits, 36.4% had one unit shown on Figure 4.10 and appendix 9, plate 12.

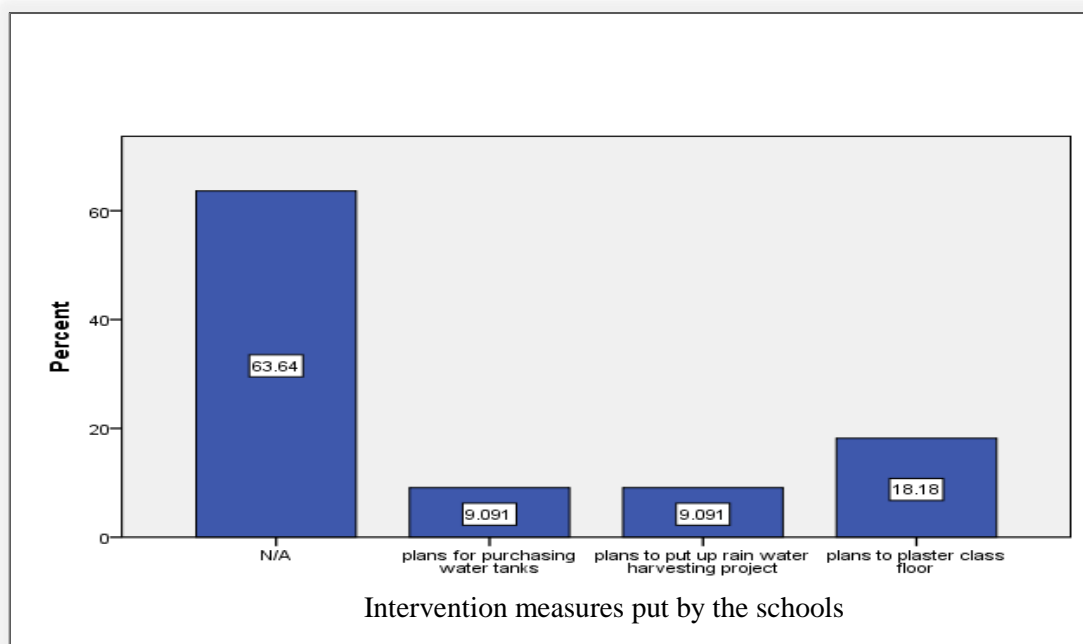


**Figure 4.10:** Number of Urinal Units Provided in Schools

### 4.3 Factors that Affect Sanitation and Hygiene

#### 4.3.1. Health Programs in Schools

Health programmes carried out in 42.1% of schools were *life boy hand washing* and *deworming*. Sixty three per cent (63.4%) of schools that had no health programmes still had no plans at all. Future plans to improve health of the pupils where there were no health interventions are summarised in Figure 4.11.



**Figure 4.11:** Schools without Health Programmes but Planning to Develop Some

#### 4.3.2. Population of Pupils versus Facilities Provided

The total numbers of boys enrolled was compared with the number of doors of pit latrines provided for boys in each school. Table 4.7 shows the overall ratio of 1 door of pit latrine to 39 boys. Note the highlighted values (55%) of schools that are above the ratio of 1:30.

**Table 4.6:**Ratio of Population of Boys to Doors of Pit Latrines Provided

School	Ratio
Hirumbi Primary	1:21
Rosterman Primary School	1:35
Shisasari	1:28
Bukhulunya	1:34
Bondeni	1:39
Shivakala	1:38
Township	1:50
Ebwambwa	1:13
Nyayo Tea Zones	1:15
Mahiakalo	1:123
Shitaho	1:32
Mwiyala Primary	1:52
Lurambi Primary	1:32
Maraba	1:48
Amalemba	1:25
Nabongo	1:40
Kakamega Primary	1:74
Kakamega Muslim	1: 36
Chief Mutsembi	1:35
Matende	1:24
Overall	1:39

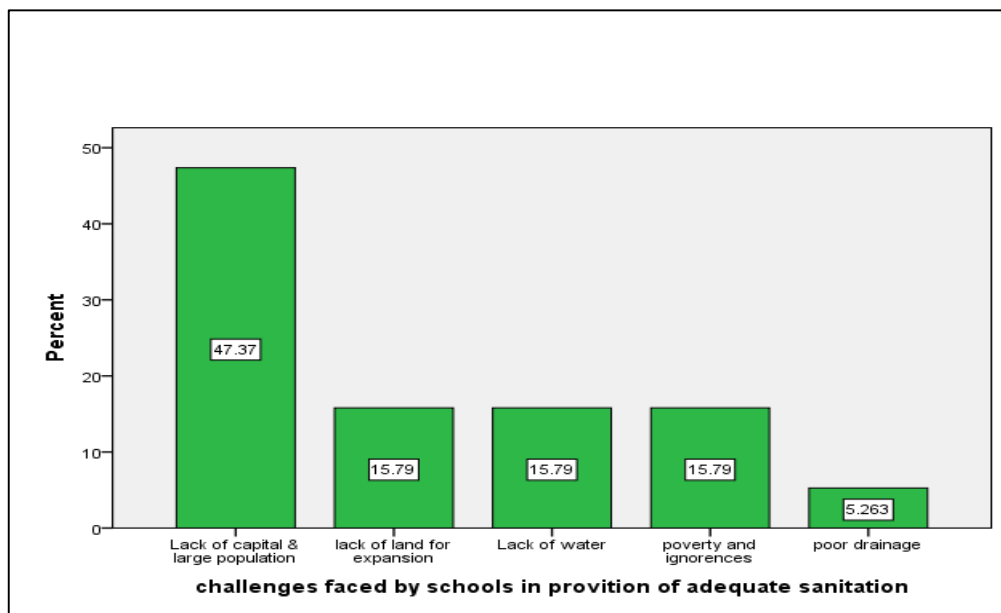
When the total enrolment for girls was compared to the number of doors of latrines, the overall ratio was 1:36. The highest ratio was 1:113 as highlighted in Table 4.8. Those that had higher than the recommended 1:25 ratio were 50% of the schools.



**Table 4.7:** Ratio of Population Girls to Doors for Pit Latrines Provides

School	Means
Hirumbi Primary	1:38
Rosterman Primary School	1:19
Shisasari	1:25
Bukhulunya	1:26
Bondeni	1:41
Shivakala	1:44
Township	1:24
Ebwambwa	1:25
Nyayo Tea Zones	1:15
Mahiakalo	1:64
Shitaho	1:51
Mwiyala Primary	1:33
Lurambi Primary	1:27
Maraba	1:24
Amalemba	1:42
Nabongo	1:24
Kakamega Primary	1:113
Kakamega Muslim	1:42
Chief Mutsembi	1:36
Matende	1:39
Overall	1:36

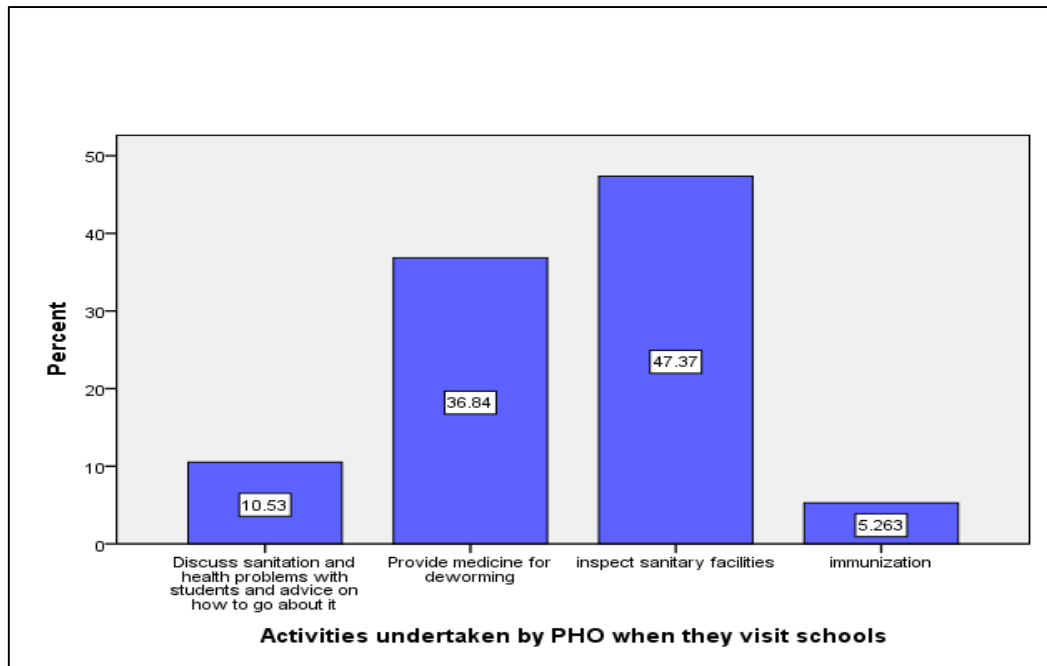
Lack of funds was reported as the major challenge experienced by 47.4% of the schools in provision of sanitary facilities for their big populations in schools. Other challenges are summarised in Figure 4.12.



**Figure 4.12:** Challenges Faced by Schools in Provision of Adequate Sanitation

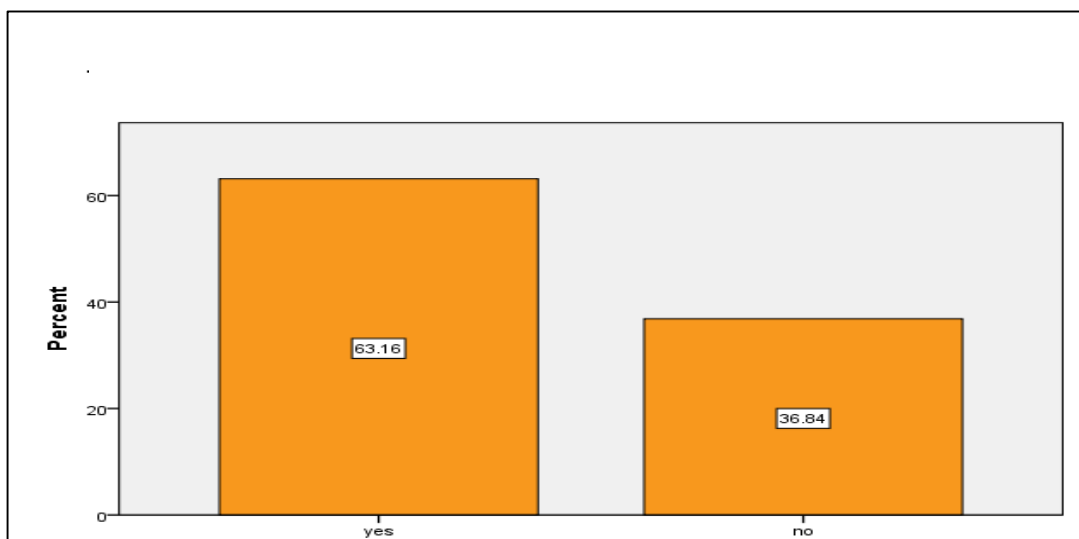
### 4.3.3. Inspection by Public Health Officers

The vast majority 90% of schools reported having been visited by public health officers. Forty four per cent (44.4%) of the schools were visited on termly basis during the school sessions. The activities carried out by the public health officers were sanitary inspection in 47.4% of the schools, distribution of deworming drugs in 36.8% of the schools and immunization in 5.3% of the schools as shown in Figure 4.13.



**Figure 4.13:** Activities Undertaken by Public Health Officers during School Visits

The majority of teachers (63.2%) reported being aware of the National School Health Policy while the remaining proportion (36.8%) indicated being unaware as shown on Figure 4.14. However, a copy of the National School Health Policy was available in 42.1% of the schools.

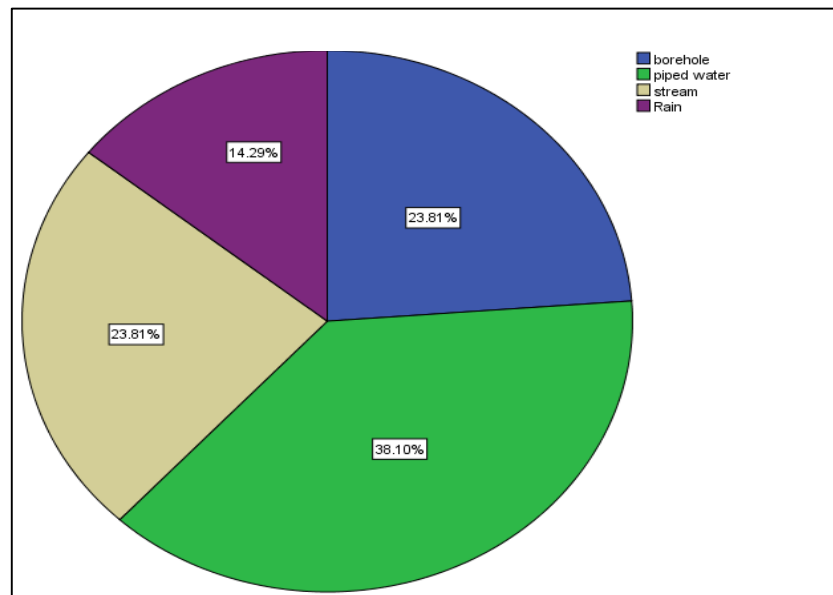


Awareness of Teachers on the National School Health Policy and Guidelines

**Figure 4.14:** Teachers Awareness on National School Health Policy and Guidelines

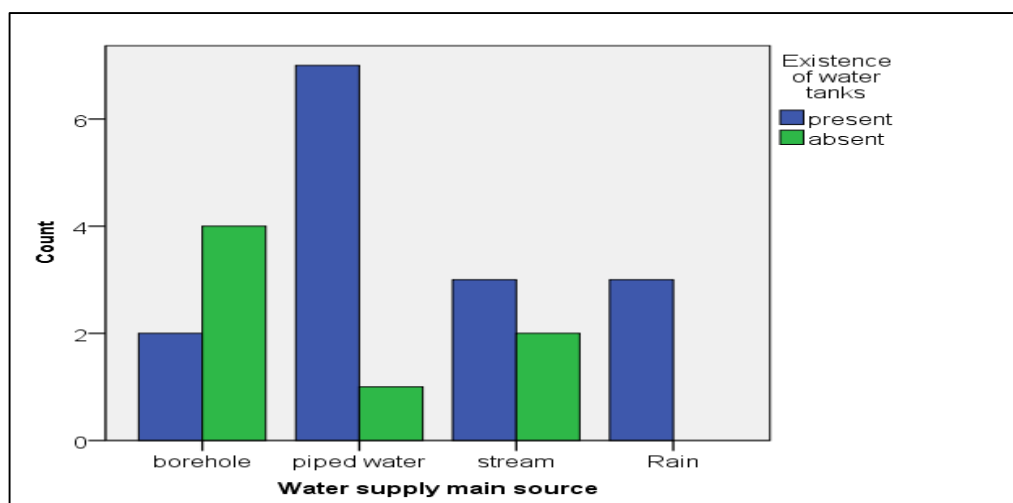
#### 4.3.4. Water Supply and Storage

Thirty eight per cent (38.1%) of schools source their water from piped water system while a significant number - 23.8% - source their water from the nearby streams as shown in Figure 4.15.



**Figure 4.15:** Water Source in Schools

The presence of storage tanks was compared to the main water sources in schools and were not correlated, Pearson's  $R=0.352$ . Most schools that had tanks had piped water as their main source of water. Figure 4.16 shows that the presence of water does not have an implication on the source of water.



**Figure 4.16:** Existence of Water Tanks versus Main Water Supply Source

Twenty seven point four per cent 27.4% of buildings in schools had gutters on all their roofs, 63.6% of them had gutters in some but not all the roofs and 9% did not have gutters at all. The condition of existing gutters was assessed and 36.4% of them were in good condition shown in appendix 9, plate 8.

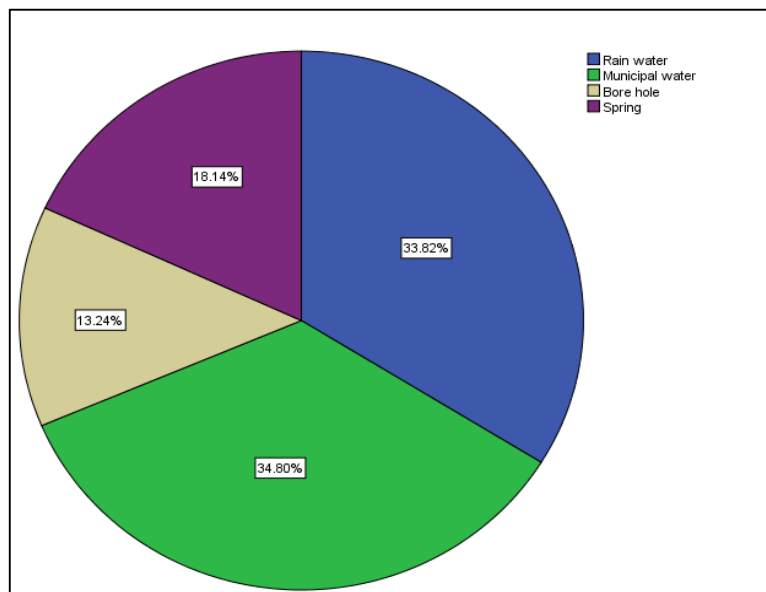
#### 4.3.5. Schools with Provision of Safe Drinking Water

The summary of condition of drinking water containers provided for pupils is shown in Table 4.9.

**Table 4.8:** Condition of Drinking Water Containers

Condition observed	Present	Absent	P value
Availability of drinking water storage container	54.5%	45.5%	P<0.05
Availability of tap	58.3%	41.7%	P<0.05
Availability of a lid	58.3%	41.7%	P<0.05
Availability of water	52%	49%	P<0.05

Thirty four point eight per cent 34.8% of schools sourced their water from municipal water supply as illustrated on Figure 4.17.

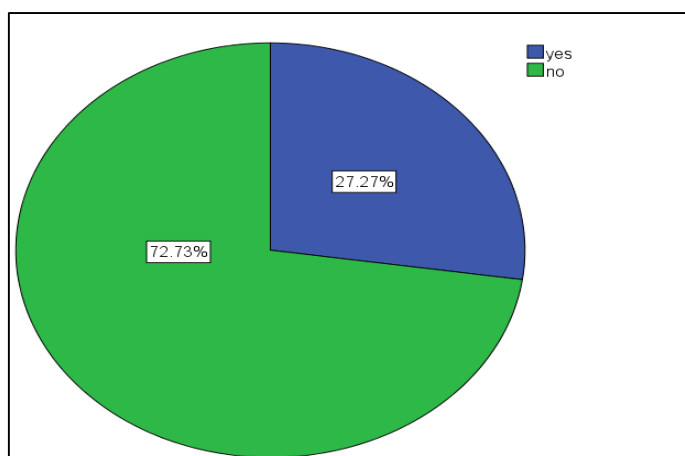


**Figure 4.17:** Sources of Drinking Water in Schools

Sixty seven per cent (60.7%) of the pupils said that they fetch water outside the school. Chi-square test conducted showed a significant of  $P < 0.05$ . Twelve point three per cent 12.3% of water sources were thought to be far.

#### **4.3.6. School with Hand Washing Facility near the Latrines**

Figure 4.18 shows 27.3% of schools provided hand washing facilities near the latrine while 72.7% did not. A significant ( $P < 0.05$ ) number of schools did not provide essential supplies such as water, taps and soap. Water was provided in 9.1% of hand washing facilities and taps in 13.6% of hand washing facilities. No school provided soap or tissue paper.



**Figure 4.18:** Provision of Hand Wash Facilities

#### 4.3.7. Environmental Sanitation

The conditions observed to assess environmental sanitation of schools are presented in Table 4.10, appendix 9 plate 9 and, plate 4.

**Table 4.9:** Environmental Sanitation

Condition observed	Present	Absent	P value
Perimeter fence	86.4%	13.6%	P<0.05
Clean school compound	82%	18%	P<0.05
Compost pit	41%	59%	P<0.05
Surface drainage	86%	14%	P<0.05

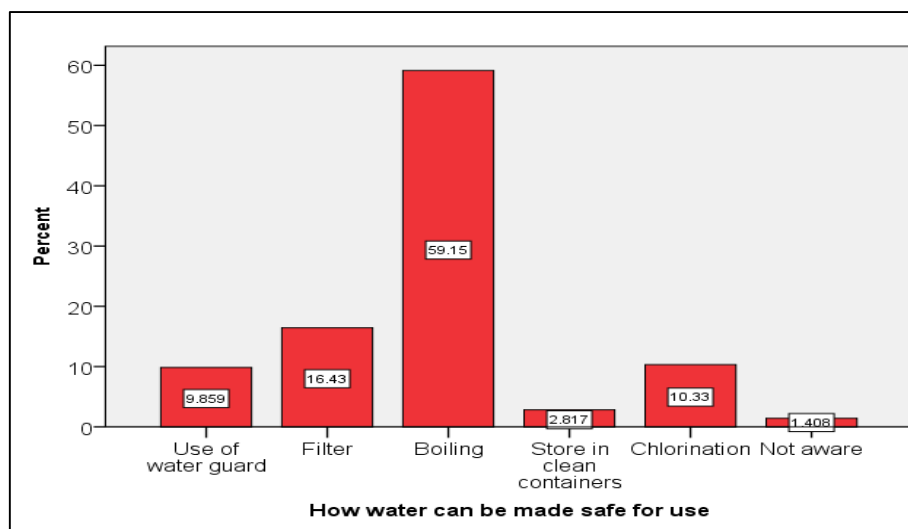
#### 4.3.8. Food Handlers

A total 21 food handlers were found in schools. Ninety point five (90.5 %) of them lacked medical examination certificates, while 66.7% did not have protective clothing. Pearson's correlation indicated that there was a significant association in food handlers with medical certificates and those without protective clothing  $R=0.684$ . Chi square test showed that a significant number of food handlers did not have medical certificates  $P<0.05$ .

## 4.4 The Knowledge and Practices of the Pupils towards Sanitation and Hygiene

### 4.4.1. Level of Knowledge among Pupils

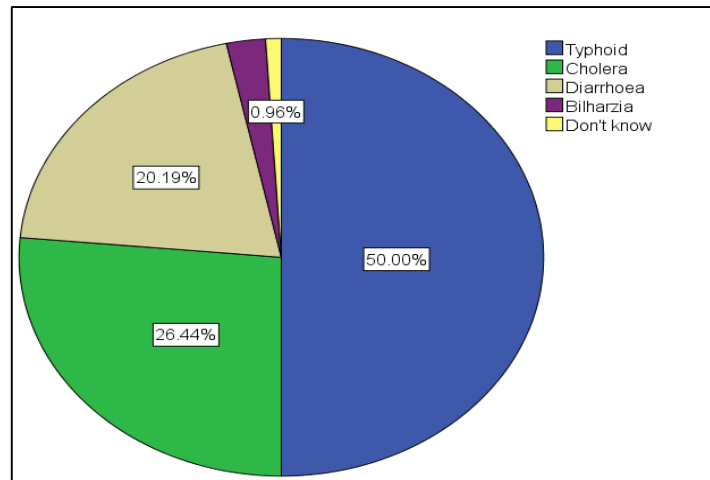
Fifty nine point one per cent (59.1%) pupils stated that boiling was a method of making water safe for drinking. Presented in figure 4.19 are the different responses from pupils on how water could be made safe for drinking.



**Figure 4.19:** Methods of Making Drinking Water Safe

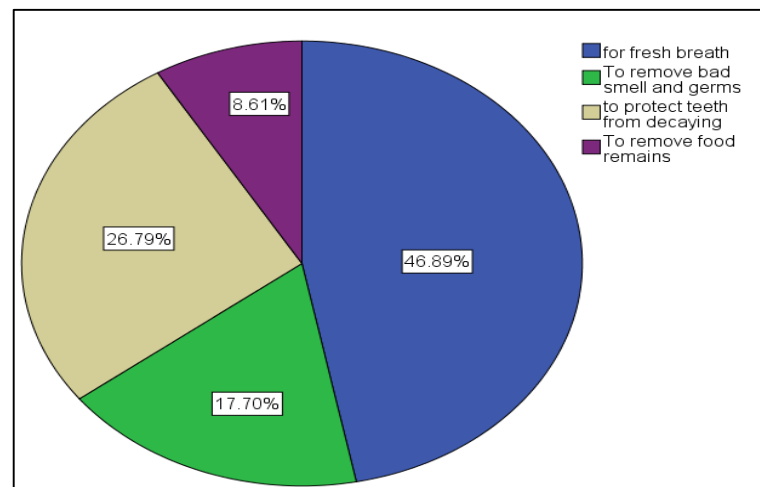
A significant 50% ( $P < 0.05$ ) number of pupils mentioned typhoid as a disease caused by use of dirty water and 0.95% said they did not know of any disease caused by use of dirty water as shown in Figure 4.20.





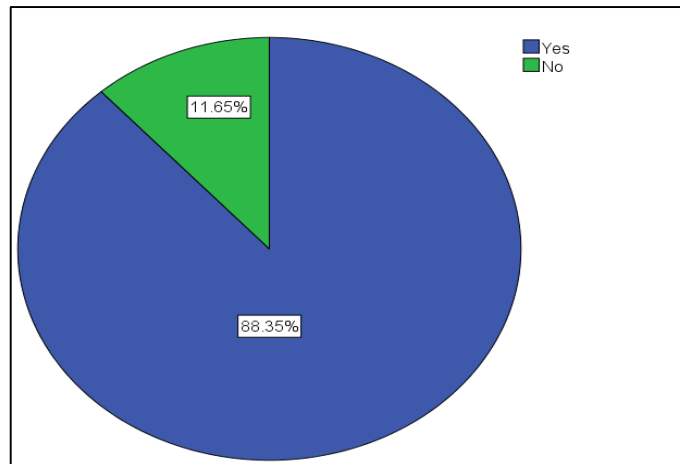
**Figure 4.20:** Knowledge of Waterborne Diseases

Figure 4.21 shows that 46.9% pupils mentioned that the reason of brushing teeth was in order to have fresh breath.



**Figure 4.21:** Reasons for Brushing Teeth

Seventy two point seven per cent 72.7% ( $P=0.000$ ) of pupils in the study said that crowded rooms could expose one to diseases. While 88.4% ( $P=0.000$ ) indicated that stagnant water could expose one to disease as shown in Figure 4.22.

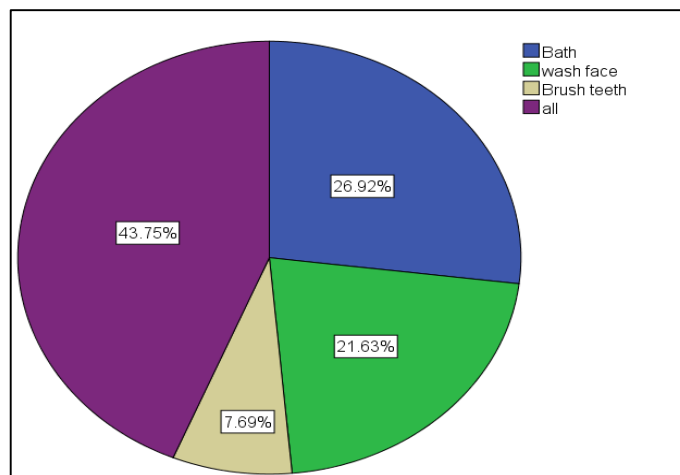


**Figure 4.22:** Knowledge of Stagnant Water Exposing one to Diseases

All pupils knew that dirty hands exposed one to diseases. Another 7.7% ( $P < 0.05$ ) did not know that fly infestation could also expose one to diseases. Seventy eight point nine per cent (78.9%) knew that open defecation could expose one to diseases ( $P < 0.05$ ).

#### 4.4.2. Hygienic Practices of Pupils

The hygienic measures taken before going to school are as shown in Figure 4.23.



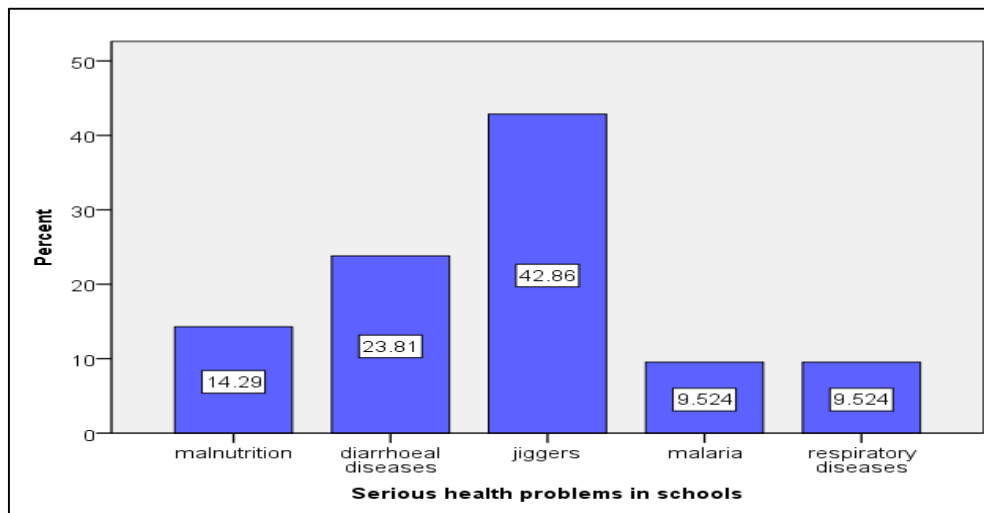
**Figure 4.23:** Hygienic Measures Taken Before Going to School

Fifty one point seven per cent (51.7%)  $P < 0.05$  of pupils would wash hands with soap if provided. A significant number of pupils 74.1%, ( $P < 0.05$ ) always washed their hands

before handling food, A significant number of pupils ( $P < 0.05$ ) always washed their hands after visiting the toilet, 69.4%.

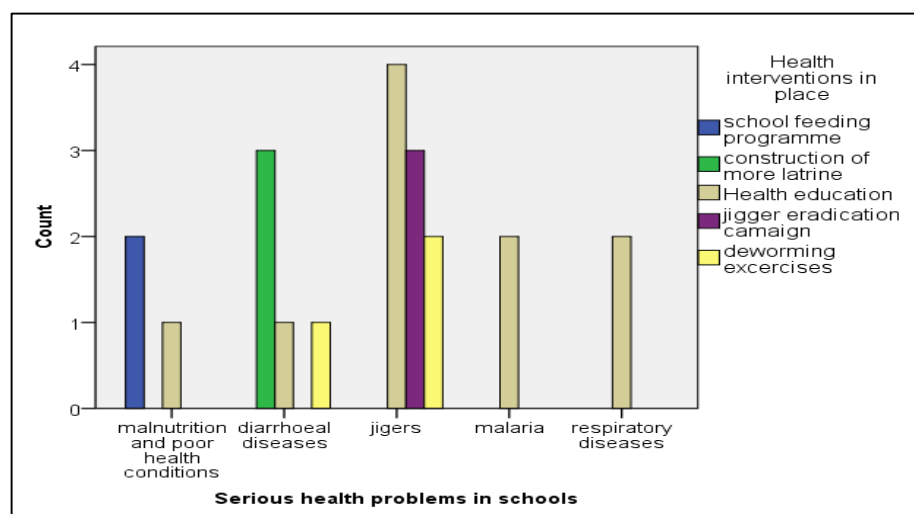
#### 4.5 Common Diseases/conditions Related to Poor Sanitation and Hygiene

Jigger infestation, malnutrition considered as serious health conditions as shown in Figure 4.24.



**Figure 4.24:** Health Problems in Schools

There was a significant association between the most serious health problems in schools and health programmes in schools as shown in Figure 4.25.



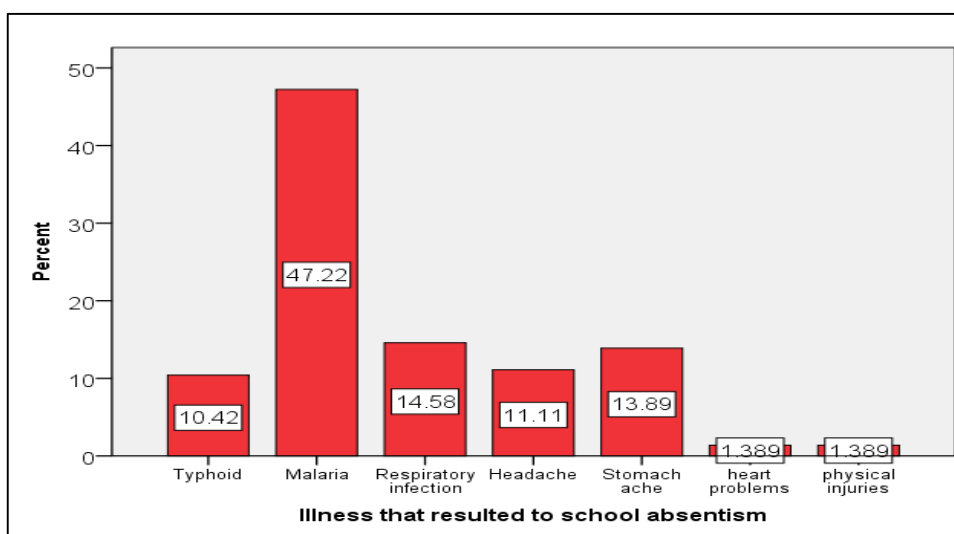
**Figure 4.25:** Health Problems in Schools versus Health Interventions in Place

#### 4.5.1 Diseases/conditions Pupils had Suffered

A significant number of pupils had suffered from cough, and flu ( $P < 0.05$ ). Skin infection contributed to significant illness of pupils, ( $P < 0.05$ ). Injuries were reported by 1.4% of pupils. Most pupils who reported that they always washed their hand still suffered from diarrhoeal diseases.

#### 4.5.2 Illnesses that Resulted to Absenteeism

Malaria resulted in 47.2% of absenteeism. It was the most significant cause of absenteeism ( $P < 0.05$ ). Respiratory infections caused 14.6% of absenteeism due to illness. Stomach ache and typhoid resulted in 13.58% and 10.42% of absenteeism due to illness respectively. These results are as shown in Figure 4.26.



**Figure 4.26:** Illnesses/conditions that Result to Absenteeism in Schools

## CHAPTER FIVE

### DISCUSSION

#### 5.1 Introduction

Appropriate hygiene and sanitation in schools would impact on several of the Millennium Development Goals (MDGs). It would contribute to the achievement of MDG two on universal primary education, MDG number three on gender equality in education and MDG seven on environmental sustainability (UN, 2007). This is because appropriate hygiene and sanitary facilities would attract more pupils to schools especially girls who have unique needs. It would also foster a healthy learning environment and help reduce cases of diarrhoeal diseases. It is for this reason that this research sort to assess the state of sanitation, hygiene and related diseases in public primary schools.

#### 5.2 Characteristics of the Respondents

The mean age of pupils sampled was 12.6 years. Eighty-three per cent (83.6%) were between the ages of 10 to 15 years. There was no significant variation in the distribution of class and gender of the pupils sampled. This demonstrated that the sample was well randomised. The overall teacher to pupil ratio of 1:30 was found to be adequate as per the recommended standards for optimum learning which require a maximum of 1:50 (GoK, 2013). However, other reports have shown that public primary schools in Kenya have inadequate teachers (Muindi, 2009). Since the study location was in an urban area, it was possible that most teachers prefer to work in an urban setup. Schools in the outskirts of the municipality recorded higher teacher to pupil ratios.

Teacher to pupils' ratio is important as teachers are involved in disseminating sanitation and hygiene information to pupils. A small teacher to pupil ratio enables teachers to

address individual or closer to individual concerns so as to increase teacher-student interaction and communication (OESE, 2000). A teacher handling large groups of pupils may not achieve this objective. In most industrialised countries, for example, USA, it is recommended that classes do not exceed a capacity of 20 pupils (Berry, 2002). The overall ratio of pupils to the classrooms was 1:48. It meets the recommended standards of 1:50 (GoK, 2013). However, there were a few schools with a higher ratio of as 1:83, especially in the peri-urban location of the town.

### **5.3 Standard of Cleanliness of the Facilities**

School buildings and grounds must be designed, constructed and maintained to be accessible and free of hazards, in order to promote learning and school engagement (RIDE, 2014). Emphasis must always be laid on specific facilities such as classrooms, kitchens, latrines and physical environment.

#### **5.3.1 Classrooms**

Since pupils spend much of school day indoors, adequate lighting and fresh air should be provided in classrooms. In this study, most classrooms were adequately lit by natural light although a few had artificial lighting (electricity). It shows that lighting did not interfere with pupils' learning process. Classes observed had well-designed windows that provided adequate ventilation. The basic education act recommends that the number of children in a classroom shall not exceed fifty (50) pupils (GoK, 2013). There were some instances of congestion in classes in some schools that had pupils to classroom ratio of more than 1:50. This could impact negatively on the quality of indoor air. The congested environment in classes could lead to pollution of air that could result in an increase in cases of asthma, allergies. It, in turn, affects student performance of mental tasks involving concentration, calculations, and memory (Berry, 2002). A significant

proportion of walls were not clean. Dirty walls are not only unappealing but also a distraction to the learners, therefore, affecting their performance. Furthermore, over half (55%) of the classroom floors observed were dirty. A significant percentage of the floors (59.1%) had cracks and/or potholes. This was attributable to the high population of pupils in classrooms that might have caused a high rate of wear and tear. Also, poor workmanship during construction may have contributed to the occurrence of cracks. However, classrooms with dirty floors did not necessarily have cracks on the floor. There was an association between the cleanliness of classroom floors and water supply. It was observed that schools that had piped water and rain water as main water sources had clean classroom floors while those with boreholes had dirty classroom floors. It meant that water availability was a contributory factor in the cleanliness of classrooms.

Unhygienic conditions in classrooms such as dirty floors and cracks and holes on the floors are health risks to the pupils. Dirty floors are a source of dust particles which increase with overcrowding in the classroom. Such conditions put the pupils in danger of respiratory diseases. For instance, it was noted that respiratory diseases caused a significant amount of illness in pupils. Additional air pollutants may include airborne bacteria and viruses, moulds and fungal growths, and particles from building materials. The holes and cracks may serve as jigger hide out. It may also result in falling of pupils leading to injuries. Injury caused illness in 1.4% of the pupils.

### **5.3.2 School Kitchens**

Food hygiene is a component of sanitation related activities. It includes good housing, occupational health, personal hygiene air pollution, waste water disposal and refuse management. School kitchens should meet the minimum requirements of food preparation starting from production to storage, preparation and consumption. Sanitary

measures should be taken to prevent food becoming contaminated at any stage. It was established that ventilation in kitchens was inadequate. A small proportion (19.1%) of school kitchen had chimneys. Since that all schools used firewood as fuel, this endangered the health of food handlers. It exposed them to high levels of particles and toxic pollutants that could lead to respiratory diseases. It has already been demonstrated that in poorly ventilated dwellings, indoor smoke can be 100 times higher than acceptable levels for small particles diseases such as pneumonia, stroke, ischemic heart disease and lung cancer (WHO, 2014).

Regarding illumination, natural and artificial lighting was adequate in more than 50% of school kitchen. Adequate lighting in the kitchen is important as clear visibility in the working environment prevents injuries and prevents contamination of food with foreign objects. Regarding floors, about two-thirds of kitchen floors were earthen floors while 38.1% were made of concrete. The presence of cracks and/or holes on kitchen floors was significant (45%), while cleanliness of the kitchen floor was inadequate as evidenced by spilled food and water found on kitchen floors. Spilled food, if not disposed of promptly create a slippery floor that could result in workers falling and injuring themselves. Concerning walls and roof, most of the kitchen them were not clean due to soot. Soot falling from the roof contaminates food. About working surfaces, 57.4% of the kitchens did not provide them. Food handlers to work on their hands leading to further health risk from the resultant injuries. Furthermore, food handlers were exposed to fire disasters as no school provided for fire extinguishers in their kitchen. Finally, 80.1% of kitchens had no drainage systems and thus waste water accumulated around the kitchens. This probably created breeding ground for flies and rodents that are vehicles for disease pathogens. Though some schools (40.9%) had



waste disposal pits, they were full and were shared with the rest of the school. All these conditions contributed to poor food hygiene.

### **5.3.3 Latrines**

Human excreta is the biggest source of disease-causing organisms including parasites, bacteria, and viruses (UN, 2007). The disposal of the same is of paramount public health importance. All the schools under study used pit latrines as a method of excreta disposal. Urinal pits were found in 46.4% of the schools. Most of the pit latrines were not functional. About, 59.1% of the latrines had faulty ventilation tubes creating a suitable environment for the presence of flies in 31.8% of latrines. Forty-five per cent (45.5%) of latrines had chipped floors. Chipped floors often resulted in increased apertures size which scared younger users. Latrines in the schools did not provide the needed privacy to the users as indicated in appendix 9, Plate 13. Sixty-three point six per cent (63.6%) of latrines had faulty doors and users were exposed from outside denying them the required privacy. There was a correlation between the condition of doors and contamination of the floor with faecal matter. This indicated that lack of privacy contributed to the poor use of latrines. A study in Nakuru Municipality also found that pit latrines in primary schools were dysfunctional and denied pupils the privacy needed (Gachieya&Mutua, 2009). Thirty per cent (30%) of pupils said that their latrines were clean. Although the latrines were cleaned daily, they were found in a dirty state during the study. Most of them were contaminated by faecal matter. There was also a significant correlation between faecal matter and wetness on the latrine floor. This suggested improper use and not frequency of cleaning resulted in dirty latrines.

It was also demonstrated that the lack of allocation of resources for maintenance of latrines resulted in dilapidated structures that were found in schools. Lack of space to

construct new latrines was a problem in some schools. New superstructures were constructed over old pits resulting in collapsing of the latrine. Since the sanitation facilities in the schools under study were few, pupils used them without ease, a practice that was likely to hinder proper use.

#### **5.3.4 Physical Environment**

Children's behavioural patterns place them at risk of exposure to environmental threats that adults may not face (Barrett, 2012). They interact with the physical environment of their schools; both consciously and unconsciously hence are at risk of different environmental health risks (Jessica, 2006). WHO estimates that between 25% and 33% of the global burden of diseases can be attributed to environmental risk factors. About 40% of the total burden of disease due to environmental risks falls on children under the age of five years (WHO, 2014). Since children spend much of their daily activities within school environment during critical developmental stages, it is crucial that the same environment is kept clean. Most schools, 82% had clean compounds while 41% of the schools had compost pits. These pits were all filled up and resulted in a pile of solid waste in the school compound indicating poor solid waste management in schools. Since children lack the experience to determine risks associated with their behaviours, such the presence waste posed health risks to them. These behaviours include playing with waste, placing their fingers and other objects in the mouth and not washing hands before eating and after visiting the latrine. Preventing childhood exposure to environmental hazards may prevent injuries and many illnesses, such as respiratory infections and diarrhoeal diseases.

The perimeter fence was available in 86.4% of the schools. A fence in a school helps stop animals from defecating in areas where children play as well as keep pupils safe

from outside dangers. It prevents them from wandering away from the safety of school environment (OESE, 2000). Most schools had good surface drainage (86%) and water puddles were not found in most school compounds. This notwithstanding, most schools provided an ambient physical environment for the pupils. It is important to note that schools can also pollute the natural environment in such a way that it causes health hazards for the community at large. It is, therefore, crucial that schools have proper sanitary facilities.

#### **5.4 Factors that Affect Sanitation and Hygiene**

##### **5.4.1 School Enrolment versus Latrines Provided**

Success in eliminating faecal material from the school environment depends on latrines being conveniently located, clean, odour-free, private, adequate and well-maintained (UNICEF/IRC, 2005). It was found that the overall ratio of latrines provided to total boys enrolled was 1:39 and 1:31 for girls. While most of the schools were compliant with the recommended standard of 1:30 for boys and 1:25 for girls (MoPHS/MoE, 2009), high ratios of 1:123 for boys and 1:113 for girls were recorded. Such was evident in schools where no health programmes were being implemented and particularly no sanitation programme in place. This meant that the problem of inadequate latrines could persist for a longer time. The pressure on the few available sanitation facilities was evidenced by the cleanliness of latrines and their wear and tear. A similar study in Nakuru, Kenya, revealed that the major problem in school sanitation was the high pupil/toilet ratio (Gachieya&Mutua, 2009). Mbula (2014) also found that the availability of adequate sanitation facilities had implications on good hygiene practices in schools indicated by proper use of toilets.

#### **5.4.2 Hand Washing Facilities**

Studies have suggested that hand washing can prevent 47% of diarrhoeal infections and 30% of acute respiratory infections (Jessica, 2006). It has also been established that lack of resources, such as soap and water, contribute to the low practice of hand washing in school children (Aseefa&Kumie, 2014). Some pupils may also forget to wash hands when the location of hand washing facilities away from latrines (Aseefa&Kumie, 2014). It was established that hand washing facilities were found near the latrine in 27.3% of the schools. However, no school provided the pupils with soap for hand washing, 13.6% of hand washing facilities had taps while only 9.1% of them had water. Consequently, hand washing after visiting the toilet was not practiced. Therefore, there was increased the risk of diarrhoeal diseases transmitted to pupils while at school due to poor hygiene. This was evidenced by 10.4% of pupils reported to have been sick with typhoid. A similar study in Nakuru Municipality also found that hand washing facilities in primary schools were inadequate (Gachieya&Mutua, 2009). WHO estimates that each year, nearly two million children under the age of five dies of diarrhoeal diseases caused by unsafe water supplies, sanitation, and hygiene (WHO, 2014).

#### **5.4.3 Drinking Water Facilities**

Drinking water should be safe and clean. According to the NSHG, schools should provide separate drinking water facilities to ensure drinking water is safe (MoPHS/MoE, 2009). About 45.5% of the schools in this study did not provide separate drinking water points for their pupils. A significant number of drinking water storage containers did not have a functioning tap (41.7%), lids (41.7%) and water (49%). After installation, most were left unused and/or unmaintained. The Kenya water report also observes this scenario in schools (UN-Water, 2006). In about 38.1% schools that sourced water from piped water system within the division, pupils probably had access

to treated safe water. However, 23.81% of pupils always sourced water from nearby streams. Sixty point seven per cent (60.7%) of the pupils said that they sometimes fetched water from outside the school from nearby streams. This implied that some schools with municipal water supply still sourced water from outside the school. Hence, pupils in such schools were still exposed to unsafe water as the safety of such sources could not be assured. Consequently, typhoid disease was prevalent among pupils.

#### **5.4.4 Water Conservation**

Water conservation is one of the methods of ensuring adequate water supply in schools. Nonetheless, planners prefer the exploitation of groundwater for the installation of hand pumps or piped water-supply schemes (UNICEF/IRC, 2005). This approach of water supply is often expensive for some communities. Since it was established that schools lacked funds to improve sanitation, harvesting rainwater would provide cheap drinking water to school children (Casey, 2012). There is a huge potential in water conservation in schools due to the large roof area provided by buildings. Rainwater harvesting could meet their water demands and reduce the costs of water in schools. A study by Casey 2012 in western Uganda, found that the potential of rainwater harvested in schools was of an adequate amount and could lower the cost of water supply (Casey, 2012). The findings of this study showed that 52.4% of schools had water tanks, 14.3% of them harvested rainwater as shown in appendix 9, plate 1 while 38.1% of schools stored piped water. This implied that although water storage tanks were available in schools, they were often not used for water conservation.

The Kenya water development report (2006) is consistent with these findings that water conservation measures are generally not practised in schools and that pupils fetch and ferry water to school for drinking and washing from nearby water systems (UN-Water,

2006). To reduce the resultant strain on pupils, rainwater could provide a cheaper source of water during the dry season. Since Kakamega Municipality receives an average of 2500ml of rain per annum, rainwater harvesting would go a long way in reducing the cost of water for schools (MoPND, 2004). The Kenya water supply report, (2006) also indicates that water systems in many schools are not functional. Broken down water pumps and leaking storage tanks is a common problem experienced in most schools (UN-Water, 2006). In spite of these shortcomings, all boreholes in schools under study were protected and hand pumps installed. It was encouraging to note that all tanks were in a functional state.

#### **5.4.5 Food Handlers**

Foodborne illnesses due to unsafe food remain a widespread public health problem in all parts of the world. Schools are an important source of foodborne disease outbreaks (Aseefa&Kumie, 2014). Incidences of foodborne outbreaks have been reported in schools in Kenya. For example, a case was reported in Machakos County where two pupils died and ten were hospitalised from one school (The Kenyan Daily Post, 2013). This could have been a case of food contamination by the food handlers. It is for this reason that food handlers should be free from communicable diseases. The Food, Drugs, and Chemical Substances Act Cap 254 laws of Kenya require that all food handlers should undergo a medical examination, vaccinated appropriately and wear protective clothing before handling food for public consumption.

Ninety per cent (90.5 %) of food handlers in schools studied did not have medical certificates whereas 66.7% of them lacked protective clothing. This implied that there was a risk of contamination of food during handling and preparation by uncertified personnel. It meant that there was a likelihood of an occurrence of food borne illnesses,

especially typhoid. Typhoid was found to cause significant illnesses among the pupils sampled. It also has been estimated that about 97% of food poisoning comes from improper food handling and 80% of the poisoning originates from food prepared in businesses or institutions (Diet.com, 2014). These findings identify gaps in the compliance with the National School Health Guidelines which stipulates that catering staff must be medically examined and vaccinated at the beginning of each term. There seemed to be a laxity in the enforcement of guidelines and regulations on the food handling and preparation. Supervision of the schools by the public health officers was not satisfactory.

#### **5.4.6 School Health Programs**

Sanitation is a public good, and sanitation improvement has much greater benefits when it is achieved by a whole community (Muindi, 2009). Kenya recognises the potential of improving the health status of children by using primary school pupils as a vehicle for health education (MoPHS/MoE, 2009). Schools set the pace on sanitation and hygiene which the community can emulate resulting in an improved health status of an entire community. Some of the health programmes carried out in some schools were 'life buoy hand washing' and 'deworming programme' both at 42.1%. Since there were no records of any school initiating its own programme, it was assumed that sanitation activities were donor funded. Sixty-three point six per cent (63.6%) of the schools did not have plans to initiate a health programme although the sanitary facilities in their school were in a poor state. These findings are consistent with the report of UNICEF/WHO (2009) which observes that schools usually do not plan for the health of their pupils and this was due to lack of capacities and adequate institutional and legal support (UNICEF/WHO, 2009). It was found that lack of funds was a major challenge faced by about 47.4% of the schools as regards to the provision of sanitary facilities. KESSP

2006 report indicates that most of the public schools are funded by the community. Subsequently, it means that the poorer communities will be unable to fund the school sanitation (MoEST, 2006).

#### **5.4.7 Public Health Supervision**

It is the duty and mandate of the health officials to ensure that design and construction of school facilities are appropriate and acceptable. This should be done through frequent inspection of the schools. Whereas most schools were visited by public health officers, 10% of them were not visited. The schools that were visited on termly basis were 44.4% of the total. This was consistent with the National School Health Guidelines (NSHG) which requires that public health officers visit schools on a termly basis. The main activity for the school visits was sanitary inspection and 47.4% of the schools were visited and inspected accordingly. It is important that the sanitary inspection recommendations be enforced as outlined in the NSHG. During the study period, most facilities were found in the deplorable state. It was therefore assumed that the recommendations by public health officers were not implemented or no follow-ups were made. However, it was observed that national school health campaigns such as deworming programme (36.8%) and immunization (5.2%) contributed to a large proportion of the visitation of officers to schools. Most teachers (63.2%) were aware of the National School Health Policy. However, a copy was available in 42.1% of the schools. These implied that teachers were unaware of the public health regulations for schools.

#### **5.5 The Knowledge, and Practices of the Pupils towards Sanitation and Hygiene**

Knowing about the causes of disease helps in reducing disease burden. It helps ensure the optimal use of safe water supply and sanitation facilities and practising good



hygiene is what makes a significant impact (JCA, 2010). In this study, most pupils were aware of the importance of good personal hygiene and environmental hygiene practices as well as related diseases. Here, 46.9% of pupils knowledgeable about the importance of good oral hygiene. Fifty per cent (50%) of pupils mentioned typhoid as a disease transmitted by use of dirty water. These findings indicate that the pupils were knowledgeable on sanitation issues in schools. Teachers also reported that health education on sanitation and hygiene was the main measure taken to improve sanitation in schools. Most pupils mentioned that boiling water is a method of making water safe for drinking. It was established that knowledge of pupils on sanitation was adequate.

However, education alone does not necessarily result in improved health (UNICEF/WHO, 2009). Application of knowledge and the availability of resources are essential to ensure proper practice. The study revealed that 51.7% would wash hands with soap if provided. Since no school had provided soap for washing hands, it goes to show pupils would wash hands with soap. Similarly, 74.2% of the pupils wash hands before handling food and 69.4% always washed their hands after visiting the latrine. Although children did not generally practice hand-washing due to lack of facilities, they knew about health problems associated with not washing their hands as stated earlier. The findings agree with a study conducted in Uganda indicating that lack of hygiene enabling facilities at schools and homes did not allow children to practice the hygiene knowledge they had.

### **5.6 Common Diseases Related to Poor Sanitation and Hygiene**

Many organisms spread through contaminated food and water particularly those that are dependent on the faecal-oral route (AMREFF, 2007). Diarrhoeal diseases, the second most common global illness affecting young children and a major cause of death in

lower income countries (UN, 2007), are closely linked with poor sanitation, poor hygiene, and lack of access to safe and sufficient supplies of water and food. Diarrhoeal diseases and typhoid were also found to cause significant illnesses among pupils in this study at 13.7% and 10.4% respectively. These diseases are linked to poor hygiene both in and out of the school (UNICEF/IRC, 1998). It was established that pupils were exposed to unsanitary conditions that resulted in poor hygiene. The unsanitary conditions in most schools, therefore, contributed to the prevalence of diarrhoeal diseases.

Respiratory infections are the most common among all diseases in children, and pneumonia is the primary cause of childhood mortality worldwide (UN, 2007). Under favourable conditions, schools are known to offer a point of transmission and outbreaks (Sphere Project, 2014). Respiratory infections caused 14.6% illnesses among the pupils in the study. Indoor and outdoor air pollution may be blamed for as much as 60% of the global burden of disease brought about by respiratory infections (UNICEF/IRC, 2005). Although most classrooms provided adequate ventilation, congestion in classrooms was observed in some schools. These compromised the quality of air in such classes and contributed in the prevalence of respiratory illnesses in pupils.

Other diseases that contributed to the ill health of the pupils included, skin infection. Jiggers were reported by teachers to be a major sanitation problem in 42.9% of the schools. Falls and injuries within the school grounds occur as a result of poorly maintained physical facilities or poor construction management. It was established that injuries caused 1.4% of absenteeism among pupils. These diseases are also associated with poor hygiene and sanitation.

Malaria, the most deadly of mosquito-transmitted diseases, kills over one million people each year. The majority of these deaths occur in African children. In endemic areas, 60% of all school children may suffer from malaria (UN, 2007). Malaria was found to be the most common cause of illness in 47.2% of pupils. This was because Kakamega is an area of intense endemic malaria transmission (Lutomia, 2006).

## CHAPTER SIX

### CONCLUSION AND RECOMMENDATION

#### 6.1 Conclusion

The study made the following conclusions;

- i. The standard of cleanliness of classrooms, kitchens, physical environment and sanitary facilities in schools was low. Most facilities were in need of repair and dirty. Fifty-nine per cent (59%) of the class floors were chipped. About 60% of latrines were faulty resulting in poor usage by pupils. All schools kitchens did not meet the minimum standards of design, construction, and safety.
- ii. Factors that affect sanitation and hygiene in schools were as follows: inadequate sanitary facilities (59.9%), inadequate funds (47.4%), and poor compliance with school health guidelines.
- iii. Pupils were knowledgeable as regards to sanitation and hygiene. Inadequate provision of the facilities in their schools adversely affected the hygienic practices.
- iv. The common diseases that are associated with poor hygiene and sanitation were: diarrhoea diseases, 13.9%, respiratory infections, 14.6% and typhoid 10.4%. Malaria caused highest of absenteeism in schools (47.2%).

## 6.2 Recommendations

- i. The department of Public Works and of Health should ensure that all buildings in schools are designed and constructed based on minimum requirement as stipulated in the Building Code and Public Health Act Cap 242. The use of buildings that do not meet minimum standards should be stopped.
- ii. Public health practitioners should ensure copies of policy and guidelines are available in all schools. In addition, they should be more vigilant in ensuring compliance with guidelines and statutory stipulations. This would enable school management systems to prioritise school health initiatives that would address challenges such as funding.
- iii. Ministry of Education to provide adequate infrastructures such as classrooms and latrines in schools so as to provide an optimum learning environment. This would also ensure pupils put their knowledge on sanitation and hygiene to appropriate use.
- iv. The Public health office within Kakamega Municipality should ensure all schools are visited on a termly basis for sanitary inspection purposes. This would in turn help in the prevention of preventable sanitation and hygiene related diseases
- v. Further, study to be done on factors affecting the implementation of school health policy and guidelines

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## APPENDICES

## 3.0 IREC Approval

 <b>MOI TEACHING AND REFERRAL HOSPITAL</b> P.O. BOX 3 ELDORET Tel: 33471/2/3	<b>INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)</b> MOI UNIVERSITY SCHOOL OF MEDICINE P.O. BOX 4606 ELDORET Tel: 33471/2/3 13 <sup>th</sup> June, 2013
---	--

Reference: IREC/2013/10  
**Approval Number: 0001006**

Faiza Mwatumu Barasa,  
 Moi University,  
 School of Public Health,  
 P.O. Box 4606-30100,  
ELDORET-KENYA.



Dear Ms. Barasa,

**RE: FORMAL APPROVAL**

The Institutional Research and Ethics Committee have reviewed your research proposal titled:-

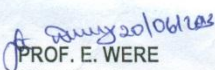
***“Assessment of the State of Public Health and Hygiene in Public Primary Schools in Kakamega Municipality.”***

Your proposal has been granted a Formal Approval Number: **FAN: IREC 1006** on 13<sup>th</sup> June, 2013. You are therefore permitted to begin your investigations.

Note that this approval is for 1 year; it will thus expire on 12<sup>th</sup> June, 2014. If it is necessary to continue with this research beyond the expiry date, a request for continuation should be made in writing to IREC Secretariat two months prior to the expiry date.

You are required to submit progress report(s) regularly as dictated by your proposal. Furthermore, you must notify the Committee of any proposal change (s) or amendment (s), serious or unexpected outcomes related to the conduct of the study, or study termination for any reason. The Committee expects to receive a final report at the end of the study.

Sincerely,

  
**PROF. E. WERE**  
 CHAIRMAN  
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE

cc:	Director	-	MTRH
	Principal	-	CHS
	Dean	-	SOM
	Dean	-	SPH
	Dean	-	SON
	Dean	-	SOD

## 5.0 Consent form

*(To be read and interpreted to the volunteer and questions answered in the language in which the volunteer is fluent)*

**STUDY TITLE:** Assessment of Status of Sanitation and Hygiene in Primary Schools in Kakamega Municipality

**INVESTIGATOR:** Barasa M. Faiza, Masters student at Moi University – School of Public Health, P.O. Box 4606 – 30100, Eldoret, Mobile phone number: 0728 637 125. Email: [faizabarasa@gmail.com](mailto:faizabarasa@gmail.com).

### Introduction to the Respondent

I am a postgraduate student undertaking a Masters degree in Public Health at the Moi University, School of Public Health. This study forms part of the basic requirement for my degree course. I would like to kindly request you to spare around 20 minutes of your time to respond to the following questions.

### Purpose and Background of the study

This study aims to assess the state of sanitation and hygiene in primary schools in Kakamega Municipality. Poor sanitation and hygiene result in poor performance and ultimately a drawback to the entire community's future.

### Participation information

I would like your student to participate in a research study. It is very important that you understand the following general principles, which apply to participants in a study.

1. Participation is entirely voluntary
2. Persons may withdraw from participation in this study at any time they feel like without being penalized
3. After reading the following explanations feel free to ask any questions that will allow you to understand clearly the nature of the study

### Benefits

There will be no direct benefits from participating in the study. However, findings made will benefit pupils and school management as better strategies will be put in place to promote high standards of sanitation and hygiene.

### Risk

No physical risk or physical harm will be incurred by obliging to participate in the study. However, questions that may seem to intrude into personal privacy and may be embarrassing will be explained comprehensively prior to the interview process.

**Confidentiality**

The rights and dignity of all participants will be protected and respected. All information will be treated with utmost confidentiality. The respondent should not write his/her name on any part of the questionnaire to ensure anonymity.

**Questions**

In case of any further questions, comments or complaints relating to the research, the investigator can be contacted on mobile number 0728 637 125 or through the Email address faizabarasa@gmail.com.

**Immediate Inquiries:** Do you have any inquiries about the study? If yes, the interviewer responds to the question(s).

If no or after questions are answered: are you willing to be interviewed? If:

- a) No (Thank the person for considering your request).
- b) Yes (Interview the participant or make an appointment to interview him/her later).

**CONSENT**

I, the undersigned hereby agree to participate in this study. I was taken through this consent form and understood its content.

**Signature** .....

**Date** .....

## Assent for Pupils

### (To be read aloud to the pupil)

My name is **Faiza Mwatumu Barasa**. I work with parents and children but I am also a student. Right now, I am trying to learn more about Sanitation and Hygiene in Public primary schools.

If you agree, you will be asked a few questions on this.

You may be helping me understand the state of sanitation and hygiene in schools, your knowledge on hygiene and how you practice hygiene. Therefore enable the school to provide you with a clean and health learning environment

If you agree to help me, you should know that your teacher and classmates won't know what you have said. You should also know that if you decide to help us or if you decide to say "no," your choice will not affect your grades, or whether people like you.

There is no right or wrong answers.

Please talk this over with your parents before you decide if you want to be in my study or not.

I will also ask your parents to give their permission for you to be in this study, but even if your parents say "yes," you can still say "no" and decide not to be in the study.

If you don't want to be in my study, you don't have to be in it. Remember, being in the study is up to you and no one will be upset if you don't want to be in the study or if you decide to stop after we begin, that's okay, too. Also, remember that no one else, not even your parents, will know what you've said.

You can ask any questions that you have about the study. If you have a question later that you didn't think of now, you can call me or ask your teachers to call me at: 0728 637 125.

Would you like to answer my questions?

YES.....

NO.....

Head teacher's signature

## 6.0 Observation Check list

### A. Information about the school

Name of school.....

Boarding

Day

Private

Public

Special

Total number of teachers: Male  Female

### Total student enrolment

Total Enrolment per class										
	ECD	Std. 1	Std. 2	Std. 3	Std. 4	Std. 5	Std. 6	Std. 7	Std. 8	TOTAL
Boys										
Girls										
No. of streams per class										
Total Enrolment:					Enrolment Ratio (girls/boys):					

Absenteeism in the previous two weeks										
	ECD	Std. 1	Std. 2	Std. 3	Std. 4	Std. 5	Std. 6	Std. 7	Std. 8	TOTAL
Boys										
Girls										
Percentage of students absent in previous two weeks: ...%										

### A. BUILDINGS

General status of buildings with respect to hygiene and sanitation

.....  
 .....

PREMISES	ITEMS	CHARACTERISTICS	CONDITION	
CLASS ROOM	DESK	Material		
			Adequate	Inadequate
		Strength		
		Cleanliness		
	VENTILATION	Permanent		
		Windows		
	LIGHTING	Natural lighting		
		Artificial lighting		
	FLOOR	Material		
			Yes	No
		Smooth finish		
		Rough finish		
		Presence of cracks/holes		
		Cleanliness		
	WALLS	Material		
			Yes	No
		Smooth finish		
		Rough finish		
		Painting		
		Presence of cracks		
	Cleanliness			
ROOF /CEILING	Material			



			Yes	No
		Leakages		
		Cleanliness		
DINING	SEATS	Material		
			Adequate	Inadequate
		Strength		
		Cleanliness		
	VENTILATION	Permanent		
		Windows		
	LIGHTING	Natural lighting		
		Artificial lighting		
	FLOOR	Material		
			Yes	No
		Smooth finish		
		Rough finish		
		Presence of cracks/hole		
		Cleanliness		
	WALLS	Material		
			Yes	No
		Smooth finish		
		Rough finish		
		Presence of cracks		
		Painting		
		Cleanliness		
	ROOF /CEILING	Material		
		Leakages		
		Cleanliness		
	HAND WASHING FACILITIES	Present	Yes	No
		Material		
		Presence of a tap		
		Presence of soap		
KITCHEN	VENTILATION		Adequate	Inadequate
		Chimney		
		Windows		
	LIGHTING		Adequate	Inadequate
		Natural lighting		
		Artificial lighting		
	FLOOR	Material		
			Yes	No
		Finish		
		Presence of cracks/holes		
		Cleanliness		
	WALLS	Material		
		Finish		
		Presence of cracks		
		Painting		
		Cleanliness		
	ROOF /CEILING	Material		
		Leakages		
		Cleanliness		
	FUEL TYPES			
	FOOD PREPARATION SURFACES		Yes	No
		Non-absorbent material		
		Absorbent material		
		Cleanliness		
	WATER SUPPLY	Main source		

	UTENSIL DRYING	Sun drying		
		Dried indoors		
	DRAINAGE	Type	Clogged	Flowing
		Closed		
		Open		
	FOOD STORAGE AREA	Odour		
		Dampness		
	FIRE EXTINGUISHER			

### B. FOOD HANDLERS

		Number
1.	Total number of food handlers	
2.	Total number with medical certificate	
3.	Total number with protective clothing	

### 4. ENVIRONMENTAL SANITATION OF THE SCHOOL

		Yes	No
1.	Entire perimeter of the school is fenced		
2.	Clean compound with well-kept grass, trees, flowers (no litter):		
3.	Existence of an excavated compost pit		
4.	Good surface drainage/ absence of pools of water		
5.	Safe playing ground well levelled/graded		
6.	An Odourless environment		

### 7. WATER SUPPLY

#### 1. Water Collection and Storage

i. Water Tank: Present  Absent

Tank Size: .....Number of tanks.....

Condition of Tank: .....

Gutters: Yes  No

Building blocks having Gutters: All  Number of missing

Condition of Gutters: Good condition  Malfunctioned

Poor state of repair

ii. Tap water: Present  Absent

iii. Bore hole: Present  Absent

How is water drawn from the borehole: Pump  Bucket

Borehole protection Yes  No

iv. Other: .....

#### 2. Students' drinking water storage

	Container	Number
1.	Number of storage containers for storing drinking water	
2.	Total Containers with water:	
3.	Total Containers with lid:	
4.	Total Containers with functioning tap:	

## 8. CONSERVANCY SYSTEMS

### Types of the existing systems

		Number of units		Number of doors	
		Girls	Boys	Girls	Boys
1.	Pit latrine:				
2.	Water closet				
3.	Urinals				
4.	Soakage pits				
5.	Septic tanks				
6.	Other				
7.	Existence of sharing				

### Condition of the toilets/urinals

	adequate/good	inadequate/bad
Aperture design		
Ventilation tube		
Doors condition		
Presence of flies		
Wetness on the floor(drains)		
Faecal matter on the floor		
Floor		
Roofing		
Walls		

### Hygiene

	Yes	No
Is running water available in closets		
Provision of soap		
Provision of toilet paper		
Provision of wash hand basin/facility		
Taps of wash hand basin/facility running		

**7.0 Questionnaire for the pupil's**

NAME OF SCHOOL.....

CODE.....

**Section A**

Personal details

Male  Female

What is your age?

Class:

Four  Five  Six  Seven  Eight

**Section B**

This section seeks to elicit information about knowledge on hygiene of pupils

1. How can we make water safe for our use

.....  
 .....

2. Why is it important to wash hands after using toilet

.....  
 .....

3. Why is it important to wash your face in the morning

.....  
 .....

4. Why is it important to brush teeth

.....  
 .....

5. What diseases will one get for using dirty water

.....  
 .....

6. What environment or habits could expose you to disease? ( tick all that are stated)

Environment/habits	Yes	No
Crowded classrooms	<input type="checkbox"/>	<input type="checkbox"/>
Stagnant water	<input type="checkbox"/>	<input type="checkbox"/>
Dirty hands	<input type="checkbox"/>	<input type="checkbox"/>
Fly infestation	<input type="checkbox"/>	<input type="checkbox"/>
Open defecation	<input type="checkbox"/>	<input type="checkbox"/>
Walking bare foot	<input type="checkbox"/>	<input type="checkbox"/>

7. Do you know of worms that infect human beings?

Yes  No

**Section B**

This section seeks to elicit information on health impact of poor sanitation on pupils

*Tick only ones or fill in spaces provided*

8. Have you been absent from school due to illness this year?

Yes  No

9. If "yes", state the illness

.....

.....

10. Have you suffered from any of the following this year? (tick all that are stated)

Illness	Yes	No	Don't know
Diarrhoeal diseases			
Cough			
Worm infection			
Skin diseases			
Malaria			
Flu			
Eye infection			

### Section C

This section seeks to elicit information on hygienic practices of pupils

11. What do you use to wash your hands while at school? (tick in the appropriate column )

	Soap	Water only	Other
Before eating			
After eating			
After using the toilet			

12. Does the school provide soap for washing hands?

Yes  No

13. How often do you wash hands when handling food?

Sometimes  Always  Never

14. Do you wash hands after visiting the toilet?

Sometimes  Always  Never

15. What are the sources of drinking water in school? (you can tick more than one)

Rain water Tank  Municipal water Tap  Bore hole  Spring

Other.....

16. Do you fetch drinking water outside school

Yes  No

17. If yes where?

Carry from home

Get water from outside the school compound

Other.....

18. How far is this place  
 Very far  Not so far   
 Near
19. Is the water treated?  
 Yes  No  Don't know
20. Who distributes drinking water in school? (*ask only if there is a water source in school*)  
 Teachers  A staff  Pupil
21. How clean are your toilets?  
 Very clean  Clean  Fairly clean  Dirty   
 Very dirty
22. How clean are your urinals?  
 Very clean  Clean  Fairly clean  Dirty   
 Very dirty
23. How often are the school toilets washed?  
 Every day  Twice a day  Not every day
24. How often do you take a bath?  
 Every day  Not every day
25. What hygienic measure do you take before coming to school  
 Bath  Wash face   
 Brush my teeth  None   
 Other.....

## 8.0 Teacher's Questionnaire

NAME OF SCHOOL.....

1. What in your opinion are the most serious health problems in your school?
  - i.....
  - ii.....
  - iii.....
  - iv.....
2. What health interventions have been put in place so far to avert the problems?
  - i.....
  - ii.....
  - iii.....
  - iv.....
3. If no interventions, is there a plan to develop an intervention programme?  
.....  
.....
4. What health programmes are currently carried out in your school?
  - i.....
  - ii.....
  - iii.....
  - iv.....
5. Are there teachers in your school that have been trained by health personnel to disseminate health information to pupils?  
.....
6. What are the challenges faced by your school in provision of adequate sanitation?  
.....
7. What has the school put in place to mitigate such challenges?  
.....
8. Are you aware of the national school health policy and guidelines?  
.....
9. Is there a copy in the school?  
.....
10. Does the school have a facility to attend to sick children under emergency such as first aid kit, and a sick room?  
.....
11. Do you keep health records for students in school?  
.....
12. Do health personnel such as the public health officers visit the school?  
.....
13. When did health personnel such as the public health officers visit the school?  
.....
14. If "yes", how often do they visit?  
.....
15. What activities do they do?  
.....
16. Does the school treat drinking water?  
 Yes  No
17. What method(s) is/are used to treat drinking water?  
.....
18. What is the primary water source for the school?  
.....
19. What are other water sources?  
.....

## 9.0 Plates



Plate 1: Water conservation tank in Ebwambwa primary school



Plate 2: A condemned classroom block that is still in use at Shitaho primary school





Plate 3: A stalled renovation project in Matende primary school



Plate 4: A filled up compost pit at Mahiakalo primary school resulting in garbage strewing the school compound



Plate 5: A dilapidated classroom floor in Muyala primary school



Plate 6: A research assistant interview a pupil in a dilapidated classroom in Matende primary school



Plate 7: Dilapidated desks in a class in Kakamega Township primary school



Plate 8: Neglected rain water collection gutters at Ebwambwa primary school



Plate 9: Expansive compound at Ichina primary school without a fence and designated gate



Plate 10: A filled up pit latrine with maggots still in use at Mahiakalo primary school



Plate 11: A chipped latrine floor that results in increased aperture size



Plate 12: A dilapidated pit latrine in Nyayo Tea Zone primary school



Plate 13: An unconventional boys' urinal pit at Ichina primary school



Plate 14: Newly constructed sanitary block at Nyayo Tea Zone primary school (was not in use at the time of study)

## 10.0 Publication

This has been shared through a peer reviewed open access journal as under the following title:

1. Faiza Mwatumu Barasa, Wanjala Christine, Shaviya Nathan, Barasa Mustafa, Sowayi Alubokho George, Vincent Aden Odini, Johnston Wakhisi and Josphat Otwelo Abwajo(2015) State of sanitation and hygiene of public primary schools in Kakamega municipality, Western Kenya.*International Research Journal of Public and Environmental Health Vol.2 (12),pp. 215-224*, Available online at <http://www.journalissues.org/IRJPEH/>