

**AN ASSESSMENT OF SANITATION IN PRIMARY SCHOOLS IN EMBAKASI
DISTRICT, NAIROBI**

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NOVEMBER, 2014

DECLARATION OF ORIGINALITY

Declaration by the Student

I Stella Nyawira Mwangi do hereby declare that this dissertation is my original work and has not been submitted to any other college, institution or university for academic credit.

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Signature

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DEDICATION

This project is especially dedicated to my husband and daughter and entire family members for their love, encouragement and support throughout my studies.

ACKNOWLEDGEMENT

I most sincerely thank the almighty God for giving me good health to carry out this research. I salute my supervisors Prof. M. A. Mwanthi and Mrs. M. Kinoti who devotedly guided and encouraged me through the proposal. I am convinced that without their support, this study would not have been a success.

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ABSTRACT

There is a need to meet the millennium development goals, especially to achieve universal primary education. However, there are challenges due to continual increase in enrollment of primary school pupils. Despite the increase in enrollment, quality education must be provided, and some factors that influence the quality of education are water, sanitation and hygiene. Lack of water sanitation and hygiene are the leading causes of diarrheal illnesses and helminthes infections. These diseases affect the participation, attendance and performance of children and impede their overall growth and development. The Government of Kenya has laid down regulations for the number of pupils per latrine and has also published a safety standards manual for schools in Kenya that expound on how sanitation facilities should be in schools.

The aim of this research was to find out if these regulations are being implemented in constituency which has the highest enrolment and number of schools in Nairobi. Using stratified sampling method a sample of 147 schools was selected for the study with a sample randomly selected from each stratum. Data were collected by way of questionnaires and then compared with the expected standards.

Analysis was done, among the following variables tested in the study were: level of cleanliness, protective materials provided for the personnel who clean toilets, availability of water in schools for hand washing among others. From the results, the sanitation standards as defined in the schools manual have not been wholly complied with in any school. For instance in nearly 14% of the schools girls and boys share toilets.

There is a lot of work needed to improve the levels of sanitation in all primary schools in the district. It was concluded from this study that majority of the schools had scarce existence of sanitary facilities. In addition, the majority of the schools had moderate level of sanitation as there was scarcity of water and soap in some schools at the hand washing facilities. It was also possible to conclude that not all schools provided the cleaners with protective equipment or clothing and this is an indication that there are more people at risk of water borne diseases.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
CDF	Constituency Development Fund
CHDC	Child Health and Development Centre
GoK	Government of Kenya
HIV	Human Immunodeficiency Virus
IQ	Intelligence Quotient
IRC	International Rescue Committee
KEMRI	Kenya Medical Research Institute
MoE	Ministry of Education
MoPH	Ministry of Public Health and Sanitation
NEWAS	Network for Water and Sanitation
PCEA	Presbyterian Church of East Africa
SPSS	Statistical Package for the Social Sciences
SWASH	Sustaining and Scaling School Water, Sanitation and Hygiene
SWASH+	Sustaining and Scaling School Water, Sanitation and Hygiene Plus Community Impact
TB	Tuberculosis
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children Education Fund
VIPL	Ventilation Improved Pit Latrine
WHO	World Health Organization
WSP	Water and Sanitation Programme

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Sanitation encompasses the isolation of human excreta from the environment, maintenance of food and personal hygiene, safe disposal of solid and liquid wastes, safe drinking water chain and vector control (Ministry of Health, 1997). The National Sanitation Guidelines (2000) define sanitation as a process where people demand, develop, and sustain a hygienic and health environment for themselves erecting barriers to prevent the transmission of disease. The process thus involves building, use and maintenance of latrines and other sanitation facilities; such as construction of urinals, hand washing facilities, anal cleansing materials and safe water supply. It also involves learning, behaviour change, organization, and collective action with other community members. Water and sanitation are basic human rights.

Kenya has a population of 39 million and faces enormous challenges in providing water and sanitation services to a rapidly growing population (Water supply and Sanitation in Kenya, 2009). In 2008, 59% of Kenyans (83% in urban areas and 52% in rural areas) had access to improved drinking water sources, 31% (27% urban and 32% rural) had access to improved sanitation (Water Supply and Sanitation in Kenya, 2009). In urban areas 51% use shared latrines, 18% practice open defecation in rural areas (Water supply and Sanitation in Kenya, 2009). In 60 countries in the developing world more than half of primary schools have no adequate water facilities and nearly 2/3 lack adequate sanitation (United Nations Children's Fund 2010).

Up to 88% of cases of diarrhea worldwide are attributable to unsafe water, inadequate sanitation or insufficient hygiene (UNICEF 2010). Improvements in water, sanitation and hygiene can prevent 2.2 million deaths in children (UNICEF 2010). A study revealed that 40% of diarrhea cases in school children result from transmission in schools rather than homes (Koopman, 1978). Damage to children's mental, physical health and development is as a result of diarrheal diseases (UNICEF 2010). Worm infections are also as a result of poor sanitation and hygiene. It is estimated that 400 million school age children in the developing world are infected (UNICEF 2010). Chronic hookworm infestations are associated with reduced physical growth and impaired intellectual development (UNICEF 2010).

Infections cause poor performance in cognitive function tests which delay reaction times and also affect short term memory. Worm infestations leads to an average loss of 3.75 IQ (Intelligence Quotient) points per child totaling to 633million IQ points for children in the developing world (WHO 2010). Children persistently infected with hookworm are less likely to be literate (13%) and earn less as adults (43%), than those who grow up free of worms (WHO 2010).

A study by Protos (2005), for example, showed that children with worm infections have higher absenteeism than non-infected children. Basically, this means that children with worm infections spend less time and are disadvantaged in the learning process. Effective school sanitation and hygiene education should help reduce these infections. Good sanitation at primary school level means that every pupil should have ready access to a

convenient and well maintained facility for the safe disposal of human waste, suitable anal cleansing materials. In addition, and most importantly, the means to effectively wash hands with soap after defecation must be provided (Waterkay, 2000). Beyond being just an issue of convenience, children have a right to basic facilities such as school toilets, safe drinking water, clean surroundings and basic information on hygiene. In addition if sanitary conditions are created children will be more enthusiastic to come to school, they will enjoy their school experiences and will learn better; and can bring concepts and practices on sanitation and hygiene back to their families (Protos, 2005). Schools can play an important role in bringing about behavioural changes and promoting better health as children are potential agents of change in their homes through their knowledge and use of sanitation and hygiene practices learned at school.

More children are going to school worldwide. It is estimated that 83% of primary school aged children now attend school and 84% of these complete primary school (United Nations Educational, Scientific and Cultural Organization, 2005). This development shows that the initiative aiming for education for all has been successfully achieved. Free primary education was introduced in Kenya in January 2003, this led to an increase in enrollment by 106% of pupils in schools (United Nations Educational, Scientific and Cultural Organization, 2005). In light of the above, this study undertook an investigation into the adequacy of sanitation facilities in selected primary schools in Embakasi District a case study for this inquiry.

Types of Sanitation

Sanitation is in two categories: Off site- associated with the developed world where there are sewerage systems. These require reliable water supply and waste water treatment. The excreta is moved from the area of deposition through sewerage systems to treatment collection areas. Examples include village specific sewerage system (small scale), water latrines and sewerage systems.

On site- these are more widely employed and cheaper. There is some level of treatment or containment of excreta at the toilet location and avoid the need for further treatment. These include pit latrines, ventilation improved pit latrine, pour flush latrine, composting latrine, composting dry latrine with urine separation, septic tanks and aqua privies (WSP, 2009).

A latrine is the simplest and safest way to improve sanitation. It is described as a safe and private place to be used for defecation. It is the commonest type of on-site sanitation. An improved latrine prevents contamination of water bodies, breaks contact between faeces and humans, prevents unpleasant odor, and prevents exposure to insects and animals, if it is well constructed and safe and easy to clean. A latrine improves dignity and privacy, ensures a cleaner environment and overall breaks the transmission of sanitation related diseases.

A latrine has three main parts:

The superstructure; which is above ground provides privacy and protection from the sun wind and rain. It can be made from readily available materials such as bamboo, wood, leaves, and bricks.

The slab; this covers the pit and provides a foot rest. It can be made of any material that is strong enough to support the user, is long lasting and easily cleaned.

The underground hole; this is the pit; it can be of any shape, round being the strongest. The depth depends on the soil conditions and ground water levels (WSP, 2009).

Types of Latrines

A *simple latrine* is a hand dug pit that is unlined and covered with a series of wooden logs strapped together allowing the user to defecate into the pit. The advantages are that it is low construction cost, simple technology, allow a wide range of cleansing materials and do not require water. The disadvantages are that there is groundwater contamination if the pit is not lined, not easy to construct in rocky or unstable ground, house fly and smell nuisance. Other types include raised pit latrine which is built when ground water is high or in rocky ground.

Ventilation Improved Pit latrine: this type eliminates two unpleasant aspects of a latrine; flies and smell. The latrine remains dark inside, and there is a vent pipe where flies are trapped and bad smells are released into the air. The advantages are that it is low construction cost, simple technology, allow use of various anal cleansing materials,

do not require water to operate and controls smell and flies. The disadvantages are that there is groundwater contamination if the pit is not lined, difficult to construct in rocky ground, does not control mosquitoes, vent pipe can make construction complicated and must keep latrine dark inside.

Pour flush latrine: this type has a plastic basin with a u-bend pipe for the hole. The u-bend pipe prevents bad odor and flies from affecting the user. The system requires a few liters of water. The advantages are that it reduces flies, mosquitoes, and odor, easy to keep clean, and is easily constructed simpler than a VIP latrine. The disadvantages are that it requires water supply to operate, water seal prevents the use of solid anal cleansing materials; the plastic basin requires increased skill to produce and is more expensive to construct.

Ecological sanitation latrines: also known as composting latrines. These are toilets which treat the waste to some extent prior to using the product to increase fertility of land. These can be divided into dehydrating and composting types with urine diversion. The advantages are that urine and feces are used as a source of cheap fertilizer and soil conditioner and reduces pollution problems associated with forms of waste disposal. The disadvantages are that the users need to be trained to ensure systems operate correctly, do not accept a wide range of anal cleansing materials and are more expensive than simpler types of latrines.

Aqua privy: it functions in a manner similar to aseptic tank whilst avoiding the need for consistent water supply to operate a flush toilet. The advantages are that it doesn't

require water supply the user defecates directly into the tank and is a cheaper form of septic tank. The disadvantages are that if the water seal is not maintained the system can fail to reduce smells, requires availability of plenty of water and requires constant emptying.

Septic tanks: this is a water tight tank that typically receives waste from a flush toilet. The system provides some level of treatment through the separation of solids. The advantages are that it reduces flies and odor problems and convenience of a water closet which can be located indoors. The disadvantages are that it is expensive, water in quantity and reliability is required and require regular emptying (Boot, 2008).

Latrines in schools

School latrines should follow some principles such as:

Simple design, construction, operation and maintenance such that semi-skilled persons can construct and are easy to clean. They should be low cost and use readily available materials.

They must be hygienic (free from bad smells and litter), inaccessible to insects flies and animals and should not contaminate ground water. In addition they should ensure safe disposal of excreta should be culturally acceptable to the users and should provide minimum safety and privacy. They should have a nearby hand washing facility with soap, or ash (UNICEF, 2009).

Toilets should have appropriate dimensions and features for children. Some of the following factors should be considered: Height of seats, height of urinals, height of hand washing facility, distance between the footrests of squatting platform, height of door knobs and locks, height of steps and handrails of stairs, diameter of squatting hole should be small (Zoomerplaag, 2005).

For disabled children in addition the following factors should be considered: proper lighting for those with poor vision, children with wheelchairs and crutches need wider doors, no entrance steps, foldable seats; children with missing arms or paralyzed arms need lids/taps/knobs that can be opened with one hand, are not heavy or can be operated with the feet (Zoomerplaag, 2005).

Expected Standards

The Ministry of Education together with Church World Service and School Safe Zones entered into a partnership programme that promotes the safety of learners in schools. They came up with a manual on Safety Standards in Schools that covers physical aspects of schools ranging from the school grounds, buildings and sanitation. There are sections that also promote general hygiene and health. The manual emphasizes that ignoring of these aspects may inflict considerable damage to the physical, social and mental health of school-going children. This research focused only on the guidelines set for sanitation.

Table 1.1: Selected Guidelines Used as per the Safety Standards Manual for Schools in Kenya

Number of pit latrines/toilets	For the first 30 learners 4 closets (holes) or the next 270 learners 1 extra closet for every 30 learners, For additional learners over 270 1 closet for every 50 learners For staff at least 1 toilet for every 12
Construction of latrines	Should be at least 10m from tuition or boarding facilities Should be at least 15m or 50ft from a water supply point or borehole Should have provision for special needs learners and the very young
Additional provisions Specifications for females	All toilets must be clean, well ventilated and properly maintained Personal protective measures for those who clean toilets. In mixed schools girls sanitation must be separate and offer complete privacy. There should be separate provision for female staff Girls washing places should be behind a screen or wall. Schools should ensure safe and effective disposal of sanitary facilities.

Source: Ministry of Education, 2008.

1.2 Statement of Research Problem

With the introduction of free primary education in Kenya in 2003, there was 106% increase in enrollment of pupils, which was a positive gain for the country (United Nations Educational, Scientific and Cultural Organization, 2005). However, the facilities in schools were not adjusted to accommodate the rise in enrollment. An assessment report showed that sanitary facilities were lacking in schools and wherever they existed, they were inadequate and in poor condition (UNESCO, 2005).

Poor sanitation facilities encourage children to defecate in the bush (Illechukwu, 2003), which predisposes them to helminthes infections. Children do not prefer to use latrines due to poor and unsafe designs or very dirty latrines hence they use the field, also

improper use of latrines was mainly due to insufficient latrines with 200 pupils per latrine (Wandera *et al* 2009). Children with worm infestation record poor performance in school than children without infection (Celkzoz *et al* 2005). Worm infestation is also associated with stunting in growth and anaemia (Yu Shaud *et al* 2010). Children have 30% chance of missing school due to diarrhea and helminthes infections (SWASH, 2009). Good sanitation is thus an important aspect of providing education. The study was carried out in Embakasi District as it has the highest enrollment in Nairobi Province. The highest enrollment is likely to exceed the ideal facilities.

1.3 Justification of the Study

Diarrhea and helminthes infections get less attention than malaria, tuberculosis and human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) yet they contribute to 4.2% of deaths globally (Cairncross, 2010). In low income countries diarrhea accounts for 8.2% of deaths second to respiratory tract infections. HIV/AIDS takes up 7.8% while malaria 5.2% of deaths in the same areas (WHO, 2008.) However campaigns for diarrheal diseases, such as hand washing and proper sanitation have gained momentum only in recent times.

In Kenya, it was estimated that 2.7million dollars was lost each year due to productivity losses whilst sick, or accessing health care due to absenteeism from work or school due to diarrheal diseases. The amount spent on treating these illnesses was estimated to be 51 million dollars (World Bank, 2011). It is estimated that a total of 272 million school days are lost due to children getting infected with diarrheal illnesses (UNICEF, 2010).

Lack of sanitation facilities cause's girls to miss school for up to four days in a month. (UNICEF, 2010) A survey conducted in South Africa revealed that 30% of girls had been raped while attending school and most of which occurred at the school toilet especially in toilets that were far from the protective environment of the school (UNICEF 2010). This study was carried out in Embakasi District which has the highest enrollment in Nairobi Province and the highest number of schools.

Table 1.2: Enrollment of Pupils in Nairobi County per According to Type of School (n=401,441)

Constituency	Informal School	Public School	Private School	Total Enrollment
Dagoretti	14,409	22,046	4,157	40,612
	55,077	48,618	5,307	109,002
Kamukunji	1,280	18,125	2,174	21,579
Kasarani	38,889	30,560	3,759	73,759
Langata	23,852	15,560	4,310	43,722
Makadara	4,190	20,879	2,295	27,364
Starehe	21,456	24,577	2,311	48,344
Westlands	8,718	22,942	5,950	37,610
Total	16,7871	203,307	30,263	401,441

Source: City Council of Nairobi, City Education Department Statistics, 2012.

1.4 Objectives of the Study

1.4.1 Broad Objective

The main objective of the study was to assess the level of sanitation in primary schools in Embakasi District in Nairobi.

1.4.2 Specific Objectives

The specific objectives were to:

- i. Identify and describe the types of sanitary facilities in primary schools in Embakasi Sub-county;
- ii. Determine the ratio of pupils to available sanitary facilities;
- iii. Describe the level of cleanliness of sanitary facilities in schools;
- iv. Assess the availability of water and soap for hand washing.

1.5 Research Hypothesis: Null Hypothesis

1. H_0 : Sanitation facilities are adequate in primary schools in Embakasi District.

H_1 : Sanitation facilities are inadequate in primary schools in Embakasi District.

2. H_0 : Sanitary facilities are clean.

H_1 : Sanitary facilities are not clean.

3. H_0 : Soap and water are available for hand washing.

H_1 : Soap and water are not available for hand washing.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literal materials that have been written on the subject area with a view to examining what has been researched or written before delineating what the current study is going to accomplish.

2.2 Availability of Sanitation

It is stated that 2.6 billion people lack access to basic sanitation (WHO, 2008). According to World Health Organization (WHO, 2002) assessment, it concluded that if the 1990/2002 trends hold, the world will miss the sanitation target by half a billion (The target was to reduce the proportion of the population without sustainable access to safe drinking water and basic sanitation). Nearly 2 billion people should gain access to basic sanitation by 2015 (WHO 2008). Despite continued effort to promote sanitation, 40% of the world's population is still without basic sanitation (WHO, 2008). This number does not tell the whole story. Sanitation coverage is often much lower in rural areas than in urban areas for example in Africa 84% of urban, 45% of rural residents have access to basic sanitation. The number is similar in Asia where 78% of urban and 31% of rural residents has access to basic sanitation (WHO, 2008).

Africa is one of the worst performing continents in sanitation and is sure to miss the target by wide margins unless urgent radical action is taken to turn things around rapidly (UNICEF, 2010). It further states that, sanitation coverage in sub-Saharan Africa is only 35%. In Africa, lack of clean water and basic sanitation is the main reason for diseases

transmitted by faeces to escalate (WHO, 2008) Faecal matter deposited near homes and on open ground normally contaminates drinking water. This accounts for the ten percent disease burden in developing countries (World Bank Report, 1993).

In Kenya the Ministry of Health (1997), stated that inadequate facilities combined with unhygienic practices and the general lack of clean water supply as well as safe disposal of domestic waste water and solid waste present sanitation problems. In Kenya the huge backlog in sanitation coverage indicated by the current national coverage of about 57% in both rural and urban areas is a challenge (State of Environment Report for Kenya 2000/2001). It further states that many urban settings in Kenya do not have access to adequate sewerage facilities. It adds that piped water and sewerage services are available to only ten of the eleven towns covered by National Water and Sewerage Corporation and that even in these towns; it's only a small proportion of the population (approximately 10%) that has access to this service.

The State of Environment Report for Kenya (1998) reports that there is low level of domestic water supply in the country with only 40% and 75% coverage for rural and urban areas respectively. And according to WHO (2008), in the last decade access to water supply rose from 61% to 71% in Kenya, but during the same period, the proportion of people with access to sanitary means of excreta disposal declined from 36% to 34% as funding for sanitation decreased and population increased. But even with the increase in water supply, the quality of water has been degraded.

2.3 Sanitation and Disease

Sanitation facilities interrupt the transmission of faecal pathogens to oral transmission causing disease at the most important source by preventing human faecal contamination of water and soil. Poor waste disposal practices are responsible for significant proportion of world's infectious disease burden. Poor sanitation, unsafe drinking water and unavailability of water for hygiene purposes account for 88% of cases due to diarrheal diseases (UNICEF, 2010). These diseases account for 4.2% of all deaths and 5.7% of all disability or ill health in the world (Caincross *et al* 2010).

Richford (1995), argues that in Kenya today, diarrhoea diseases rank second among the five killer diseases being transmitted mainly through swallowing faecal germs. This has been mainly because of the poor disposal of faecal and unprotected water source. He further revealed that the provision of safe water resource and sanitation was very important, but constructing latrines and digging wells would have little effect on health unless people used these facilities.

One gram of faeces can contain ten million viruses, one million bacteria, one thousand parasite cysts and a hundred worm eggs, that is what makes the safe disposal of faeces the most important of all public health priorities (Mara *et al*, 2010). Still today, the majority of illnesses in the world are caused by the fact that faecal matter enters the human body because of lack of safe sanitation and lack of hygiene. In order to prevent this huge burden of illness, safe water and sanitation are only half of the answer. The other half is getting people to use them wisely and well. Millions of people have still not

been adequately informed about the link between faeces and diseases (Water, Sanitation and Hygiene, 2009).

Sanitation reduces or prevents human faecal pollution of the environment thereby reducing or eliminating transmission of diseases from the source. Effective sanitation isolates excreta and inactivates the pathogens within faeces. Poor sanitation, hygiene and inadequate water supply are also related to the spread of other diseases, including tropical diseases such as schistosomiasis (sometimes called Bilharzias) which rank second in terms of socio-economic and public health importance in tropical and subtropical areas (Esrey 1994). The diseases are endemic in 74 developing countries Kenya inclusive, infecting more than 200 million people of these; 20 million suffer severe consequences from the disease.

Across the world, billions of people still lack basic sanitation unless it is controlled and safely disposed off. Human excreta pose a major threat to health, particularly infectious disease. But basic sanitation such as latrines can protect health, waste can also be a useful resource, for example human excreta and waste water are used and recycled in many countries for example in agricultural and aquaculture and this can be done safely.

Access to toilets can reduce child diarrheal deaths by over 30%, hand washing by more than 40% (Zoomerplaag, 2005). Figures 2 and 3 show how poor sanitation causes contamination with faecal matter and what can be done to prevent contamination.

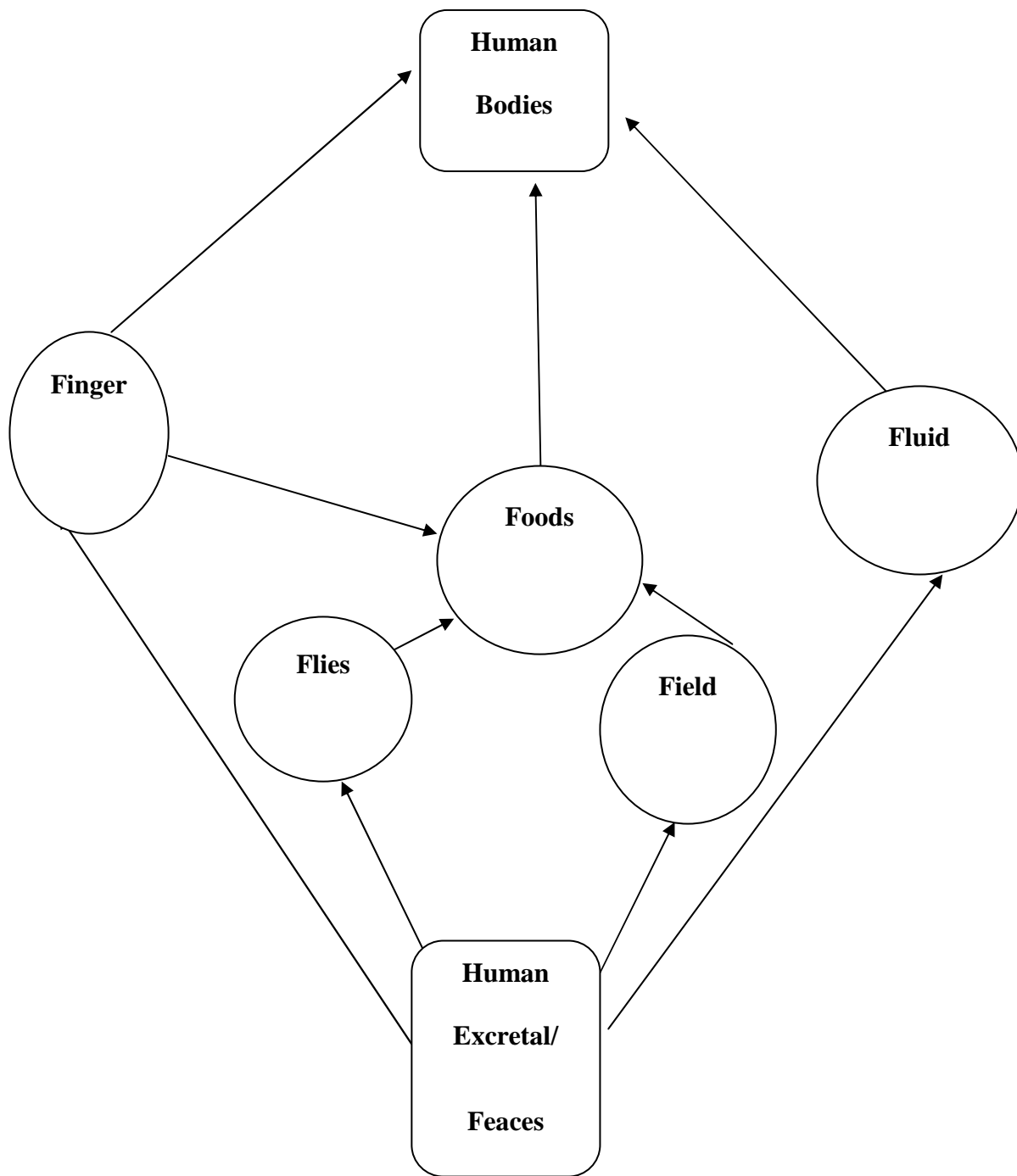


Figure 1: Routes of contamination due to poor sanitation

Source: Haughtanen, 2006

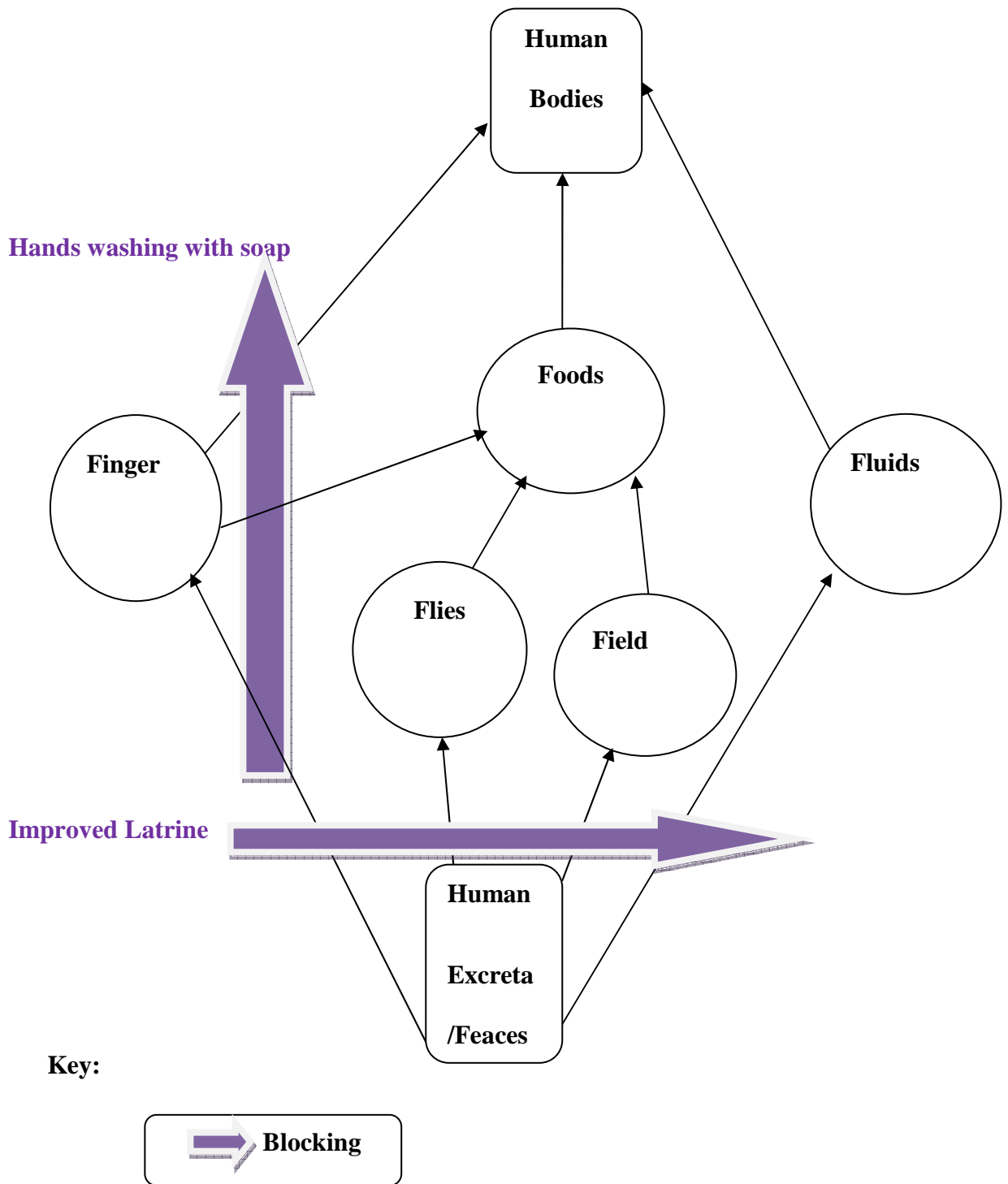


Figure 2: Good Sanitation as a Barrier of Potential Contaminants

Source: Haughtanen, 2006

2.4 Effects of Disease

Diarrhea can be described as abnormally high fluid content in stool of more than 10mls/kg/day in infants and young children and more than 200gm/day in teenage and adult (Diarrhea, 2011). In children acute diarrhea is usually caused by infection. Diarrhea can be acute lasting less than 14 days or chronic lasting more than 14 days. Diarrhea causes poor absorption of nutrients in the intestines and additional loss of important electrolytes and water from the gut. This brings about dehydration, electrolyte imbalance and malnutrition which may cause death. Recurrent diarrhea deprives a child off nutrients important for growth and development (Diarrhea, 2011).

Over 400 million school children are infected with worms in the developing world (UNICEF, 2010). Worms cause anemia, malnourishment and impairment of mental and physical development. In the short term children with worms may be too sick or tired to attend school. In the long term worms are associated with impaired cognitive development and decreased educational achievement (WHO, 2010). Worms affect nutrition and growth by feeding on the hosts contents in the gut including secretions, feeding on the hosts tissues including blood and serum that leads to loss of blood and protein, causing maldigestion or malabsorption of nutrients, by inflammatory responses that lead to the production of substances that may affect appetite and food intake or substances that modify the metabolism and storage of key nutrients such as iron, and through contingent responses to infection such as fever leading to an increase in metabolic rate. All of which result in the diversion of nutrients from use for growth and development, if the worms had not been present (Hall, 2008).

Poorly maintained sanitation facilities encourage children to defecate in the bush. The use of the bush and unhygienic pit latrines predisposes children to helminthes infection (Illechukwu *et al*, 2003, Elpo *et al*, 2007). Children with worm infestation record poorer performance in school than children without infection (Celkzoz *et al*, 2005). High worm infestation causes stunting and is associated with anemia which further increases the risk of stunting by 40.7% (Yu Shaud *et al*, 2010). In Kenya , along the coast helminthes infections range from 29.5% at the coast to 17.3% in Tana river while anemia ranges from 17.4% to 22.7% respectively (MoE, 2008).

2.5 Utilization of Sanitation Facilities

Improving water and sanitation facilities does not necessary lead to a decrease in water and sanitation related diseases. To bring about real improvement in health, the installation of facilities has to go hand in hand with their proper use and maintenance, hygiene promotion aims to ensure the proper use and maintenance of facilities by motivating people to change their behavior (IRC, 2004).

Proper latrine use is a behavior much beyond structures. Using a latrine, hand washing after latrine use, maintaining a latrine in an adequately sanitary state, is in many cases, more of factors of attitude and habit than existence of structures. In Hoima district 24% of studied subjects normally used the bush (Burfaederi *et al*, 1993) while in Tororo 36% did so (Karamagi and Aboda, 1993). In Kwale and South Nyanza districts of Kenya only 30 – 35% of people had access to adequate excreta disposal facilities.

The provision of safe water and sanitation facilities in schools is a first step towards a healthy physical learning environment benefiting both learning and health. However, the mere provision of facilities does not make them sustainable or produce the desired impact (WELL, 2003). It is the use of technical facilities and the related appropriate hygiene behaviors of people that provide health benefits. In schools, hygiene education aims to promote those practices that will help prevent water and sanitation-related diseases as well as promoting healthy behavior in the future generation of adults (Burgers, 2000; WELL, 2003).

Feachem (1982) asserts that much as the majority of the population living around lake shores and river banks do realize the importance of water in life, minority do actually ensure its quality before use. This has greatly led to poor sanitation in many regions especially landing sites. Govdie and Brum (1986) noted that wastes dumped in open areas or indiscriminately in surrounding environs are major source of surface and ground water contamination due to washing down of contaminants and deposition into water sources such as wells, streams and rivers.

2.6 Sanitation in Primary Schools

A study conducted by Child Health and Development Centre, Makerere University (CHDC, 2006), found that almost all schools surveyed did not meet the minimum sanitation and hygiene school standards. One in five people defecate in the open and this applies in the case of children (Cairncross et al 2010). A study by Illechukwu *et al* (2003) showed that 44.7% of school children defecate in the bush.

Children fear using latrines due to poor and unsafe designs of latrines or very dirty latrines, hence they use the field (Wandera *et al*, 2009). In the same study 93% of toilets were dirty. Most toilets are dirty, the floors are soiled with feces and wet with urine, and they also have a strong stench. Some even had feces on the walls (Elpo *et al* ,2007, SWASH Plus 2008). Improper use of latrines was mainly due to insufficient latrines with 200 pupils /latrine (Wandera *et al*, 2009).

In Western Kenya 97% of schools exceeded the government recommended latrine to girl pupil ratio of 1:25 with a ratio of 57.1 girls per latrine. On the other hand 96% exceeded the government recommendation of 1:30 boy pupils with an average of 81.2 boys per latrine. In Nairobi the ratio stood at 50.9 for boys and 37.7 for girls (SWASH, 2009). A rapid assessment of schools in Nairobi, Machakos, Kajiado and Kiambu in 2004 showed a latrine to pupil ratio of 1:64 (SWASH, 2009). This is the value that will be used to estimate our sample size. In another study in Kisumu and Nyando the ratio was 86.3:1 for girls and 99.7:1 for boys. 52% of latrines had odor problems, 68% were generally unclean with visible feces, 45% had fly control problems, and 21% provided water for hand washing (SWASH Plus, 2008).

A survey done in the coast among 65 schools showed that 6 had no sanitary facility for boys, 1 had no sanitary facility at all, 67% cleaned the sanitary facility daily while one cleaned the facility in four weeks: 75% lacked hand washing facilities near the toilets, 2 schools had soap and 8 schools had no water source (KEMRI, 2008).

The provision of safe drinking water, hand washing facilities and hygiene education reduces pupil absenteeism by 35%, by reducing the incidence of diarrheal diseases (Orielly, 2006). There is also improved class attendance for both boys and girls (UNICEF, 2008). Sanitation and hygiene in schools also has effects on the community with reduction in disease prevalence in the community as well (UNICEF, 2008 and SWASH, 2009). A study in Brazil (Barreto, 2004) showed that the implementation of a city wide sanitation programme caused a reduction in the prevalence of diarrhea by 22%.

2.6.1 Poor Sanitation and Gender

Poor privacy in toilets in schools make it uncomfortable for girls especially those who are menstruating to use the toilet thus they opt to either miss school or reduce the frequency of changing menstrual towels, hence increasing the risk of infection. (Seymour, 2009). A survey done in 16 schools in Kenya showed that in 2 schools girls went home to change sanitary towels (Njuguna, 2008). The attendance of girl pupils markedly improves during menstrual flow when there are good sanitation facilities (UNICEF 2008, SWASH 2009).

Sexual harassment also occurs at toilets, especially in those that are far away from the protective environment of the school (UNICEF, 2010). A study in Europe revealed that bullying occurred in school toilets 40% in Newcastle England and 47% in Sweden (Vernon, 2002). The study also showed that 52% of female pupils reported there was inadequate privacy. In addition it was found that avoidance of school toilets has

potentially negative consequences such as incontinence, constipation and urinary tract infections. Children's experiences of school toilets present a risk to their physical and psychological health (Vernon, 2002). A similar study done in Kenya showed that there was fear of bullying when or near toilets: In Mombasa 22% among girls and 27% among boys, in Nairobi 66% among girls and 70% among boys (Njuguna, 2008).

2.6.2 Hand Washing

Washing hands with soap can reduce instances of diarrhea by 35-50% and reduce acute respiratory infections such as pneumonia by 30% (UNICEF,GoK,WSP 2009). Lack of water, soap and hand washing facilities means that children do not wash their hands after defecation, increasing the risk of reinfection to themselves and transmission to other children (Elpo, 2007). Children in such schools have a 30% chance of missing school due to diarrheal and helminthes infections (SWASH, 2009). Studies showed that schools do not provide soap, only 5 out of 100 had soap available (Njuguna, 2008). In public schools overcrowding at hand washing areas due to inadequate facilities, discourages children from washing their hands. Hand washing facilities were found to be muddy with poor drainage, some were found to be far from the toilets and even in the opposite direction. Dirty soap bars, inconsistent water supply and facilities that do not accommodate young children, further discourages children from washing their hands. It has been stated by UNICEF (2009), that each latrine should be provided with a hand washing facility with 3 taps for each block of six latrines, and that hand washing facilities should be near latrines. Njuguna (2008) found that on average there were 3

working taps for a mean of 203 children per tap. In 26 schools more than 500 children had to share one tap.

According to Abwoka (1998), over 70% of children in primary schools in Embakasi District knew washing hands before meals and after latrine use and brushing teeth were important for disease prevention and also that indiscriminate disposal of excreta caused diseases. They also knew that cholera could result from drinking contaminated water and that water can be made safe to drink by boiling it. As few children knew the qualities of a good latrine.

With regard to sanitation practices in schools, a study done by UNICEF/NEWAS (2005) revealed that the practice of hand washing after using a latrine was not being done by the pupils in the camp schools in northern Kenya. The study however noted that this could be because latrines in most camp schools do not have hand washing facilities, except for those camps that have benefited from "*mobilets*" (crest tank latrine superstructures) that are supplied with hand washing facilities.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides a discussion of the outline of the research methodology that was used in this study. It focused on the research design, population of study, sample and sampling techniques, data collection methods and comes to a conclusion with the data analysis and data presentation methods that were used in this study.

3.2 Study Design

The research was done using a descriptive study. It utilized quantitative methods of inquiry. The study used cross-sectional design given that the issues involved concerned both the risk factors and outcome which was to be ascertained at the same time.

3.3 Study Area and Study Population

The study area was Embakasi District. Embakasi was considered part of Nairobi's Eastlands area lying to the south east of Nairobi county. Embakasi comprises of the following -Dandora, Embakasi, Kariobangi south, Kayole, Mukuru kwa Njenga, Njiru, Ruai, and Umoja (Embakasi, 2011).

According to the 2009 population census, Embakasi had a population of 925,775 people, with a population density of 4,546 and covers 203.6km sq. The main water source was piped water into dwelling places. Other sources of water include boreholes, harvested rain water, streams and water vendors. The main mode of human waste disposal was

through pit latrines followed by the main sewer and septic tanks (Kenya Population and Housing Census, 2009).

Embakasi has a relatively high population compared to other constituencies in Nairobi, a significant part of which is poor. The constituency has 41% of its population living below the poverty line. It is ranked 39th under the poverty ranking and its income inequality is at 37% (CDF Case File Embakasi District, 2008).

In security, crime is high in low income neighborhoods'. There is one police station in Embakasi with several police posts. There are several hospitals within the area such as Mama Lucy Kibaki Hospital, Gertrudes Hospital Donholm, Mater Hospital Embakasi Clinic, Embakasi Barracks Medical Clinic, Dandora and Umoja health centres. There are other small privately operated clinics (Hass Consult, 2011).

There were 152 private schools, 59 informal schools and 38 public schools, in total 249 schools; this is the highest number of primary and nursery schools in Nairobi. It also has the highest enrollment of pupils; the total number of children in school from age 0-14 is 294,260. The literacy levels for Nairobi are 61.3% at primary level and 32.3% at secondary level. The list of schools in Embakasi is as shown in Appendix 1 (Embakasi Municipal Education Department, 2011).

Table 3.1: Target Population for Study Area (n=249)

Type of Schools	Population Size
Public	38
Informal	59
Private	152
Total	249

Source: Embakasi Municipal Education Department (2012)

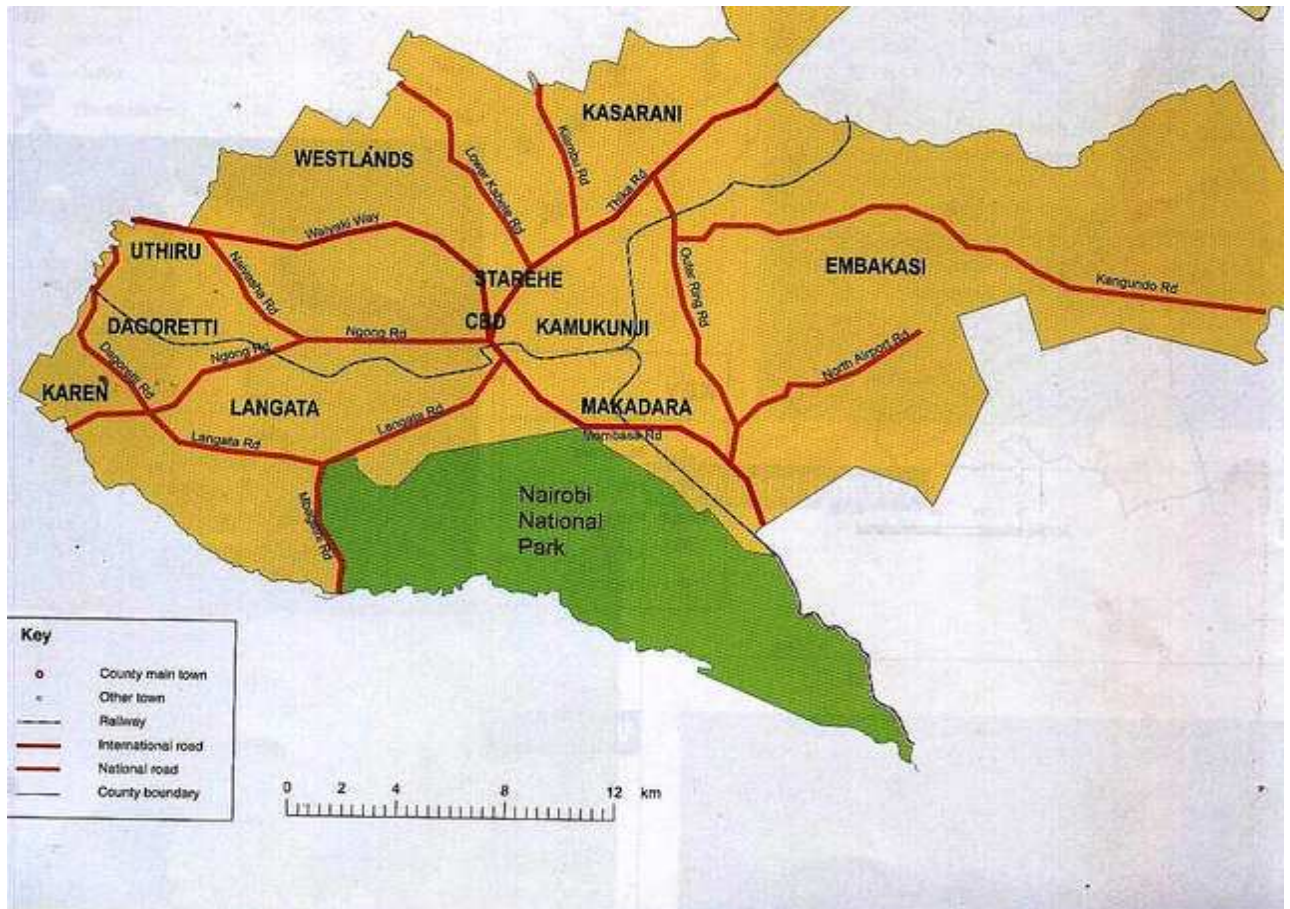


Figure 3.1: Embakasi District in Nairobi County
Source: Inima, 2010.

3.5 Selection of Study Participants

This selection of study participants was based on unit. In this case the unit was a primary school.

3.5.1 Inclusion Criteria

The recruitment of participating schools in the study was voluntary, based on the willingness to participate. The head teacher or teacher in charge of sanitation was the main informants.

3.5.2 Exclusion Criteria

Non teachers, such as administrative staff were excluded. Institutions and teachers who decline to participate were also excluded from the study.

3.6 Sample Design

Sampling is a deliberate choice of a number of people who are to provide the data from which you will draw conclusions about some larger group, whom these people represent (Jankowicz 2002). Stratified random sampling was used to divide the population into subgroups in terms of private, public and informal. The choice of this technique was governed by the benefits that accrued to the researcher in terms of increasing the sample's statistical efficiency, provision of adequate data for analyzing the various sub-populations and that it enabled different research methods and procedures to be used in different strata. Then samples were selected randomly from the three types of schools. The sample size was determined using the following method (Daniel 2005).

sample size:

$$n = \frac{\hat{n} z^2_{(1-\alpha/2)} p(1-p)}{d^2(\hat{n}-1) + z^2 p(p-1)}$$

Where z is the critical value at 95 % which is 1.96

n is the Population size = 249

P is the population ratio(obtained from surveys carried out earlier) = 0.64

$d = 0.05$

sample size $n = 146,4291$

To cater for non respondents **10%** was added bringing the figure to **161**

Table 3.2: Sampling Frame Based on the Groups of Schools in the Population

($n=161$)

Type of Schools	Population Size	Ratio n/N	Sample size	10%Adjustment	Total sample size
Public	38	0.15	22	2	24
Informal	59	0.24	35	4	39
Private	152	0.61	89	9	98
Total	249	1.00	146	14	161

Source: Embakasi Municipal Education Department, 2011.

3.7 Study Variables

3.7.1 Dependent Variable

The level of sanitation

3.7.2 Independent Variables

The type of sanitation facility

The number of latrines per pupils

The adequacy of privacy in the latrines

The presence of soap and water at the hand washing facility

3.8 Data Collection Methods

Primary data collection method was applied in this study. Data was collected by use of quantitative questionnaires. A structured questionnaire was administered; the questions were in closed and open-ended format and were based on the research objectives. The questions were administered in English. A questionnaire was the preferred mode of data collection as it allowed for the collection of a lot of data over a short period of time and with minimal interruption to the respondents schedules. The questionnaire consisted of two parts A and B. Part A captured the biographical data and Part two was mainly an observational questionnaire, which addressed the major issues such as the number and types of sanitation facilities, cleanliness, ventilation, provision of anal cleansing materials, presence of hand washing facilities and availability of water. The questionnaires were distributed by the researcher through hand-delivery, due to the fact that the respondents were in easily accessed locations within the region.

3.9 Pilot Test

According to Harper (2002) for questionnaire to provide useful results, the questions must be both valid and reliable. Reliability measures the relevance of the questions included in the questionnaires and validity refers to whether the instrument is actually able to test what it is supposed to test.

Pre-testing enables the researcher to receive important feedback on how questions were to be recorded or restructured. The questionnaire needs to be pre-tested under field

conditions before it is ready for the field (Lewin, 2005). It is very important for the researcher to pretest research instruments to enhance clarity of the instruments to be used. The purpose of enhancing clarity is to ensure collection of accurate information and to correct any deficiencies revealed during pre-testing exercise (Mugenda, 2003). The researcher pretested the questionnaire in primary schools in Dagoretti District, which was not part of the actual study since subjects in the actual sample should not be used for pre-testing. Finally, the responses to be received from the questionnaires were attuned accordingly and any area needing adjustments was revised.

Part 1 of the questionnaire was given to the head teacher or teacher in charge of sanitation in the school to fill in and then returned to the research assistant. It involved filling in biographic data of the school, and then questions which were filled by ticking in the appropriate box. In areas where the answer was not provided then there was an area provided for 'others', where the informant would describe the situation on the ground. Part 2 of the questionnaire was filled by the research assistant who recorded what was observed by ticking a box. In areas where an answer was not provided then there was a space for the research assistant to describe his/her observations.

3.10 Research Assistant

A research assistant was recruited into the study, who had done several other studies for research institutions. Fluency in both English and Kiswahili languages was considered during recruitment to ensure that translation of the questions and responses did not

distort their meanings. She underwent a training process to familiarize herself with the on-site observation method and administration of questionnaires.

3.11 Data Processing and Analysis

This study used the quantitative method of data analysis. Data were coded and thereafter analyzed using Statistical Package for Social Sciences (SPSS version 20) programme and presented using tables to give a clear picture of the research findings at a glance. Microsoft Excel was also used. This was done by tallying up responses, computing percentages of variations in response as well as describing and interpreting the data in line with the study objectives. According to Denscombe (1998) descriptive statistics involves a process of transforming a mass of raw data into tables, charts, with frequency distribution and percentages which are a vital part of making sense of the data.

3.12 Ethical Considerations

Written consent to conduct the study was obtained from the Kenyatta National Hospital and University of Nairobi Ethics and Research Committee and the City Education Department.

The research did not disrupt learning in the schools; no pupil was required to participate.

Only schools in Embakasi who gave an informed consent to participate in the study were included.

Participants were assured of confidentiality and that refusal to participate in the study would not in any way affect them. They were also assured that they were free to withdraw from the study without explanation or consequence.

All interviews were carried out at schools as observational findings were filled in the questionnaire. The participating schools were given a study number which was for identification purpose, to avoid use of names. There was a study book which linked the study number and the school, but this was kept under lock and key and was only be accessible to the study staff at the discretion of the principle investigator.

The results of this research were presented to the Department of City Education and the National Council for Science and Technology, as part of their regulations; however no names of schools or participants were listed in the results.

Authorization was obtained from the National Council for Science and Technology, the District Commissioner and the District Education Officer at the time before change of titles.

3.13 Limitations of the Study

1. There was no proper recording of all the schools in Embakasi. At the education office that administrates matters concerning primary schools the list of schools was obtained from a wall hangingl, despite obtaining consent from the City Education Department. In addition, not all the schools were listed. At the City Education Department again not all the schools were listed.

2. Informal schools were difficult to differentiate from poor private schools, as some of the informants did not know the difference due to the fact the curriculum is the same as for normal schools. Informal schools are meant to cater for those children who work during the day, such as herds boys and child parents, thus come to school in the evening. Learning in informal schools is also meant to be at an accelerated pace, so that the pupils can complete school, but this was not the case.

CHAPTER FOUR: RESULTS

4.1 Demographic Characteristics

An overall response rate of 100 % (154/154) was achieved in the study. This means that the results are adequately representative of the target population from which it was drawn as it was above the required 70% response rate (Patel *et al*, 2003). The study sought to assess the level of sanitation in primary schools in Embakasi District in Nairobi. A total number of 154 schools participated in the research of which 63.6% were private schools, 10.4% were public schools and 26% were informal schools. Table 4.1 shows that about forty five percent (44.8%) of the respondents were head teachers, followed by 16.9% who were general teachers and 15.6% deputy head teachers. Ninety eight percent of the respondents indicated that their schools had pre-primary section, 72.7% of the respondents indicated that their schools did not have physically disabled children.

In addition, the study findings indicated that there were 7.03 : 6.68 girls students to male students. Fifty one point two percent were female students and 48.7% were boys. However, there were more male students in private schools (42.1%) as compared to public (36.7%) and 21.2% from the informal centers. The distribution of female students across the type of school was not as different from the boys as private schools had a higher population (41.9%), public schools (36.8%) and 21.3% represented female students in informal schools. The total number of teachers was 2208 of which 71.2% were female teachers and 28.8% were male teachers. The teachers were further distributed across the type of schools they were teaching. About 62.5% of male teachers

were from private schools, while 26.2% were from informal centers and 11.3% were from public school. In the female category, 52.2% of the teachers were in private schools, 29.3% were in public schools and 18.5% were in informal centers.

Table 4.1: Distribution of Respondents According to Position, Type of School, Pre-Primary Section, Physically Disabled, Number of Students and Number of Teachers (n=154)

Position of Respondent			Type of School		
Category	No.	(%)	Category	No.	%
Administrator	18	11.7	Public	16	10.4
Ass. Director	2	1.3	Private	98	63.6
Board Member	1	0.6	Informal	40	26.0
Deputy Head Teach	24	15.6	Total	154	100
Director	10	6.5			
Head Teacher	69	44.8			
Manager	3	1			
Teacher	26	16.9			
Other	1	0.6			
Total	154	100			
Pre-Primary Section			Physically Disabled Children		
Category	No.	%	Category	No.	%
Yes	151	98.1	Yes	42	7.3
No	3	1.9	No	112	72.7
Total	154	100	Total	154	100
Number of Male Students			Number of Female Students		
Category	No.	%	Category	No.	%
Public School	9996	36.7	Public School	10546	36.8
Private	11503	42.1	Private	12024	41.9
Informal	5773	21.2	Informal	6116	21.3
Total	27272	100	Total	28686	100
Number of Male Teachers			Number of Female Teachers		
Category	No.	%	Category	No.	%
Public School	72	11.3	Public School	460	29.3
Private	398	62.5	Private	820	52.2
Informal	166	26.2	Informal	292	18.5
Total	636	100	Total	1572	100
Number of All Students			Number of All Teachers		
Category	No.	%	Category	No.	%
Male	27272	48.7	Male	636	28.8
Female	28686	51.2	Female	1572	71.2
Total	55958	100	Total	2208	100

4.2 Description of the Types of Sanitary Facilities

The first objective of the study was to identify and describe the types of sanitary facilities in primary schools in Embakasi District. Majority (86.4%) of the respondents indicated that the schools had separate toilets for male and female students. Forty six point one of the respondents indicated that teachers were sharing the toilets (Table 4.2).

Table 4.2: Existence of Sanitary Facilities in Primary Schools according to Accessibility, Accommodation of handicapped, hand washing facilities, Accommodation of young Students and Facility Privacy (n=154)

Separate Toilets for male and female students			Accommodation of Handicapped		
Category	No.	%	Category	No.	%
Yes	133	86.4	yes	28	18.2
No	21	13.6	No	123	79.9
Total	154	100	Missing	3	1.9
			Total	154	100
Accessible sanitary facilities			Facility Privacy		
Category	No.	%	Category	No.	%
Yes	150	97.4	Yes	148	96.1
No	4	2.6	No	5	3.2
Total	154	100	Missing	1	0.6
			Total	154	100
Facilities Accommodate the Young			Girls washing places behind wall		
Category	No.	%	Category	No.	%
Yes	149	96.8	Yes	135	87.7
No	4	2.6	No	17	11.0
Missing	1	0.6	Missing	2	1.3
Total	154	100	Total	154	100
Hand washing Facilities					
Category	No.	%			
Yes	132	85.7			
No	20	13.0			
Missing	2	1.3			
Total	154	100			

Table 4.3 illustrates that 50.6% of the respondents indicated that there were separate toilets for male and female teachers.

Table 4.3: Existence of Separate Toilets for Male and Female Teachers in Primary Schools (n=154)

Separate toilets for male and female teachers		
Category	Number	Percentage
Yes	78	50.6
No	71	46.1
Missing	5	3.2
Total	154	100

4.2.1 Influence of Demographics on the Existence of Sanitary Facilities

Pearson’s chi- square’s p values were used to show if there was any association between demographic and existence of sanitary facilities.

To test hypothesis one “the type of school does not influence existence of sanitation facilities” a cross tabulation was done. A cross tabulation of type of school and existence of sanitary facilities indicated that there was significant relationship between type of school and existence of sanitary facilities. This is supported by a chi square statistic of 13.604 (p=0.009). This further implies that intervention measures to increase existence of sanitary facilities should target all types of school since they all had low existence of sanitary facilities.

Table 4.4: Cross Tabulation of Type of School and Existence of Sanitary Facilities (n=81)

		Existence of sanitary facilities			Chi Square
		Low	Medium	High	
Type of School	Public	12	4	0	
	Private	56	20	22	
	Informal	13	11	16	
	Total	81	35	38	13.604 (p=0.009)

A cross tabulation of pre-primary section and existence of sanitary facilities indicate that there was no significant relationship between pre-primary section and existence of sanitary facilities (Table 4.5). This is supported by a chi square statistic of 0.903 ($p=0.637$). This further implies that intervention measures to increase existence of sanitary facilities should not target specific school (schools with pre-primary section and schools without pre-primary section).

Table 4.5: Cross- Tab of Pre- Primary Section and Existence of Sanitary Facilities (n=81)

		Existence of sanitary facilities			Chi Square
		Low	Medium	High	
Does the School have a pre- primary section	Yes	79	35	37	
	No	2	0	1	
	Total	81	35	38	0.903 (p=0.637)

A cross tabulation of physically disabled and existence of sanitary facilities indicate that there was no significant relationship between physically disabled and existence of sanitary facilities (Table 4.6). This is supported by a chi square statistic of 0.998 ($p=0.607$). This further implies that intervention measures to increase existence of sanitary facilities should not target specific schools (schools with physically disabled students and schools without physically disabled students).

Table 4.6: Cross- Tab of Physically Disabled and Existence of Sanitary Facilities (n=81)

		Existence of sanitary facilities			
		Low	Medium	High	Chi Square
Are there Physically Disabled Children	Yes	24	10	8	
	No	57	25	30	
Total		81	35	38	0.998 (p=0.607)

4.2.2 Relationship between Demographics and Existence of Sanitary Facilities

Correlations between number of male students, number of female teachers, number of female teachers and existence of sanitary facilities indicate that the association is negative and significant. This was revealed by $R = -0.21$ and $p \text{ value} = 0.009$, $R = -0.168$ $p \text{ value} = 0.000$ and $R = -0.311$ $p \text{ value} = 0.000$. This implies that there was competition of scarce sanitary facilities among the users. However, number of male teachers and existence of sanitary facilities had a negative and insignificant relationship.

Table 4.7: Correlation of Demographics and Existence of Sanitary Facilities

Variable		Existence of sanitary facilities	No of Male Students	No of Female Students	No of Female Teachers	No of Male Teachers
Existence of sanitary facilities	Pearson Correlation	1				
	Sig. (2-tailed)					
No of Male Students	Pearson Correlation	-0.211	1			
	Sig. (2-tailed)	0.009				
No of Female Students	Pearson Correlation	-0.168	0.977	1		
	Sig. (2-tailed)	0.037	0.000			
No of Female Teachers	Pearson Correlation	-0.311	0.877	0.866	1	
	Sig. (2-tailed)	0.000	0.000	0.000		
No of Male Teachers	Pearson Correlation	-0.102	0.506	0.475	0.451	1
	Sig. (2-tailed)	0.209	0.000	0.000	0.000	

4.2.3 Type of Sanitary Facilities used in Schools

The respondents were asked to indicate the type of sanitary facilities used in schools by both students and teachers. Table 4.8 illustrates that 49% of the pupils toilets were pour flush latrine, followed by 23% which represented ordinary latrine and 15% were flush toilet with off-site sanitation. As for the teachers, 56% of the sanitary facilities were pour flush latrine, while 18% of the sanitary facilities were ordinary latrine and another 18% of the sanitary facilities for the teachers were flush toilet with off-site sanitation. The study findings revealed that the most used facilities required a lot of water in order to maintain cleanliness and thus schools needed to have reliable water supply.

Table 4.8: Types of Sanitary Facilities

Type of Toilet	Pupils	Teachers	Chi square
Latrine	23%	18%	14.604(p= 0.008)
Pour Flush latrine	49%	56%	24.254(p=0.005)
VIP Latrine	4%	5%	16.325(p=0.001)
Composting Latrine	1%	0%	9.797(p=0.012)
Composting Latrine with Urine Separately	1%	1%	12.302(p=0.003)
Flush Toilet with Off-site Sanitation	15%	18%	10.245(p=0.004)
Pit Latrine	3%	0%	8.789(p=0.005)
Pit Latrine + Pour Flush Latrine	3%	0%	13.546(0.002)

4.2.4 Comparison of Type of Toilet for Students and Category of school

Table 4.9 shows that the most commonly used type of toilet in public schools was flush toilets with off-site sanitation (56%), followed by pour flush latrines (25%) and then ordinary latrines (13%). In private schools 60% of the sanitary facilities were flush latrines, 20% were ordinary latrines and 13% were flush toilets. As for the informal schools majority (35%) of the sanitary facilities was ordinary latrines while 30% were pour flush latrines and 10% were pit latrines plus pour flush latrine

The study sought to determine if there was a relationship between type of school and the type of sanitary facility used in the school. The two variables are categorical and therefore the appropriate test to conduct the test was a Chi-Square test. A cross tabulation of type of sanitary facility and type of school indicated that there was significant relationship between type of sanitary facility and type of school ($p = 0.001$). The results implied that the intervention measures to improve type of sanitary facility should target all types of school since there were scarce sanitary facilities.

Table 4.9: Comparison between Type of Toilet and Category of School

Type of Toilet for Pupils	Public (16)	Private (98)	Informal (40)	Total (154)	Chi Square
Latrine (ordinary)	13%	20%	35%	23%	12.45; p=0.008
Pour Flush latrine	25%	60%	30%	49%	9.087; p=0.001
VIP Latrine		2%	10%	4%	7.855; p=0.013
Composting Latrine		2%		1%	10.35; p=0.025
Composting Latrine with Urine Separately	6%	1%		1%	12.354; p=0.007
Flush Toilet with Off-site Sanitation	56%	13%	3%	15%	9.458; p=0.030
Pit Latrine		1%	10%	3%	10.254; p=0.041
Pit Latrine + Pour Flush Latrine			13%	3%	11.235; p=0.005
Total	100%	100%	100%	100%	
Chi-Square Test	0.001				

4.2.5 Types of Sanitary Facilities for Teachers

The study sought to find out the distribution of various types of sanitary facilities for the teachers in all the three categories of the schools. Table 4.10 illustrates that 57% of the sanitary facilities in public schools for teachers use were pour flush toilet with off-site sanitation and 36% of the facilities were pour flush toilet. The study findings further revealed that 62% of the sanitary facilities in private schools for teachers use were pour flush toilet and in informal schools the most used type of sanitary facility for teachers was also pour flush latrines. Chi-Square test was performed to determine if there was a significant relationship between the two categorical variables (type of sanitary facility for teachers and the type of the school). The p value for the Chi Square test result was 0.004 which is significant at 95% level of confidence. We can therefore conclude that there was a significant relationship between the type of school and the type of sanitary

facility available for teachers in the schools. Private schools having 62% of the sanitary facilities being pour flush, in private 57% of the facilities were those with off-site sanitation while in informal 48% were pour flush latrines for the teachers.

Table 4.10: Types of Sanitary Facilities for Teachers

Type of Toilet for Teachers	Type of School			Total
	Public	Private	Informal	
Latrine		17%	33%	18%
Pour Flush latrine	36%	62%	48%	56%
VIP Latrine	7%	4%	7%	5%
Composting Latrine with Urine Separately		1%		1%
Flush Toilet with Off-site Sanitation	57%	16%	7%	18%
Pit Latrine + Pour Flush Latrine			4%	1%
Total	100%	100%	100%	100%
Chi – Square Test	24.562; p=0.004			

4.2.6 Number of Toilets

In order to determine the ratio of pupils to toilets, the study only considered the schools where there were separate toilets between boys and girls. All types of schools had higher number of toilets for girls than for boys. This is in line with the fact that girls are more than boys in the schools in Embakasi. Private schools had more toilets and this is also due to the fact that there are more schools and pupils in the private sector. The findings are presented in Table 4.11.

Table 4.11: Total Number of Toilets (n=589)

Type of School	No of Toilets for Boys (%)	No of Toilets for Girls (%)	Total
Public	189 (42.2)	259(57.8)	448
Private	313(45.3)	378(54.7)	691
Informal	87(47.1)	98(52.9)	185
Total	589(44.5)	735(55.5)	1,324

4.3 Determine the Ratio of Pupils to Available Sanitary Facilities

Table 4.12 illustrates that the ratio of boys per toilet which indicates that one toilet was to be used by 53 boys in public school (53:1) while in private schools 36 boys were to use one toilet (36:1) and in informal schools 62 boys were to use one toilet (62:1).

Table 4.12: Ratio of Boys per Toilet (n=26,625)

Type of School	No of Male Students	No of Toilets for Boys	Boys per Toilet
Public	9996	189	53
Private	11238	313	36
Informal	5391	87	62
Total	26625	589	45

The International standards for sanitation require that the ratio of girls to one toilet should be 25:1 (Adams *et al*, 2009). Table 4.13 indicates that the public schools have a ratio of 41:1; the private schools ratio is at 31:1, informal schools had the highest ratio of 58:1. Overall, the schools in the district have a ratio of 38:1 girls per toilet.

Table 4.13: Ratio of Girls per Toilet (n=28,016)

Type of School	No of Female Students	No of Toilets for Girls	Girls per Toilet
Public	10,546	259	41
Private	11,754	378	31
Informal	5,716	98	58
Total	28016	735	38

The study further sought to find out the ratio of teachers per toilet. For proper analysis, the schools where teacher shared toilets between females and males were excluded from this analysis. The Safety Standard Manual specifies that there should be at least one toilet for every 12 teachers (Ministry of Education, 2008). Based on the selected sample, the overall number of teachers using one toilet is 7. However, public schools had 14 female teachers using one toilet, while in private schools the ratio was 6:1 and in informal the ratio was 8:1.

Table 4.14: Ratio of Female Teachers per Toilet (n=1,046)

Type of School	No of Female Teachers	No of Toilets for Female Teachers	Female teachers per Toilet
Public	345	24	14
Private	603	108	6
Informal	98	12	8
Total	1,046	144	7

Based on the selected sample, the overall number of male teachers using one toilet was 4. Table 4.15 indicates that all the schools (private, public and informal) had achieved the recommended ratios for male teachers this could be due to low numbers of male teachers in all the schools.

Table 4.15: Ratio of Male Teachers per Toilet (n=440)

Type of School	No of Male	No of Toilets for	Male Teachers
	Teachers	Male Teachers	per Toilet
Public	63	18	4
Private	321	93	4
Informal	56	12	5
Total	440	123	4

About 49% of the schools did not have urinals at all for boys (Table 4.16). Public schools were better placed with only two of them not having urinals. In private schools, 51 out of 98 did not have urinals. Urinals decrease the requirements of toilets. The national standards (Ministry of Education, 2008) require that one third of the fittings for boys should be closets and the rest urinals. Thus there should be 1 urinal and 2 latrines per 75 boys.

Table 4.16: Type of School and the proportion of Boy's Urinals (n=154)

Type of School	Number of Urinals for Pupils							Total
	0	1	2	3	4	6	8	
Informal	22	15	2		1			40
Private	51	38	4	2	1	1	1	98
Public	2	12	1	1				16
Total	75	65	7	3	2	1	1	154
% of Total	49%	42%	5%	2%	1%	1%	1%	

4.4 Level of Cleanliness of Sanitary Facilities in Schools (Observational)

The third objective of the study was to describe the level of cleanliness of sanitary facilities in schools. Table 4.17 shows that majority of the of the schools were observed to have a high level of cleanliness in the sanitary facilities. This is supported by the results in Table 4.17 which reveals that 86.4% of the researchers observed that sanitary

facilities were cleaned by the workers, 32.5% of the researchers observed that the cleaners were provided with gloves for cleaning and 81.2% also observed that protective clothing is provided.

The researchers observed whether the schools had clean sanitary facilities, 74.7% observed that the sanitary facilities were clean, 87% observed that the sanitary facilities were well maintained, 91.6% observed that the sanitary facilities were well ventilated and 50% observed that the schools had facilities for disposal of sanitary towels. Fifty eight point four percent of the schools were observed to provide toilet papers for anal cleaning materials. The study also sought to find out the distance of facilities from classrooms and water points, 41.6% of the researchers observed that the facilities were 10 metres from the classrooms and 60.4% observed that the sanitary facilities were 15 metres from the water points.

Table 4.17: Table Distribution Responses on Cleanliness of Facilities, Protective Clothing, Cleaning Materials and Facilities Distance (N=154)

Who Cleans Sanitary facilities			Type of Protective Clothing Provided		
Category	No.	%	Category	No.	%
Student	9	5.8	Gloves	50	32.5
Workers	133	86.4	Uniform	4	2.6
Other	1	0.6	Gloves & Gumboots	25	16.2
Workers& teachers	1	0.6	Gloves, overall & Gumboots	22	14.3
Teachers	8	5.2	Gloves & Overall	16	10.4
Student & Teachers	1	0.6	Overall & Gumboots	4	2.6
Missing	1	0.6	Gumboots	2	1.3
Total	154	100	Missing	31	20.1
Protective Clothing Provided			Clean sanitary facilities		
Category	No.	%	Category	No.	%
Yes	125	81.2	Yes	115	74.7
No	29	18.8	No	38	24.7
Total	154	100	Missing	1	0.6
Maintained Sanitary Facilities			Ventilated Sanitary facilities		
Category	No.	%	Category	No.	%
Yes	134	87.0	Yes	141	91.6
No	20	13.0	No	13	8.4
Total	154	100	Total	154	100
Facilities for Disposal of Sanitary Wear			Anal cleaning Materials		
Response	No.	%	Response	No.	%
Yes	77	50	Yes	90	58.4
No	75	48.7	No	62	40.3
Missing	2	1.3	Missing	2	1.3
Total	154	100	Total	154	100
Facilities Distance (10 metres) from classroom			Facilities distance (15 metres)from Water Point		
Category	No.	%	Category	No.	%
Yes	64	41.6	yes	93	60.4
No	90	58.4	No	61	39.6
Total	154	100	Total	154	100

4.4.1 Influence of Demographics on the Level of Sanitation/Cleanliness of Facilities

In order to test hypothesis 2 which state that the type of school does not influence the cleanliness of sanitary facilities, a cross tabulation of type of school and level of sanitation indicated that there was no significant relationship between type of school and level of sanitation. This was supported by a chi square statistic of 9.171 ($p=0.057$). This

further implied that intervention measures to improve level of sanitation should target all schools since they had low levels of sanitation.

Table 4.18: Cross Tabulation of Type of School against Level of Sanitary Facilities (n=80)

		Sanitation Level			
		Low	Medium	High	Chi Square
Type of School	Public	12	0	4	
	Private	54	1	43	
	Informal	14	0	26	
Total		80	1	73	9.171(p=0.057)

Table 4.19 shows the chi square results of pre-primary section and level of sanitation which indicates that there was no significant relationship between pre-primary section and level of sanitation. This is supported by a chi square statistic of 0.275 (p=0.871). This further implies that intervention measures to improve level of sanitation should not target specific school (schools with pre-primary section and schools without pre-primary section).

Table 4.19: Cross- Tab of Pre- Primary Section and Level of Sanitation (n=80)

		Sanitation Level			
		Low	Medium	High	Chi Square
Does the School have a pre-primary section	Yes	78	1	72	
	No	2	0	1	
Total		80	1	73	0.275 (p=0.871)

A cross tabulation of physically disabled and level of sanitation indicate that there was no significant relationship between physically disabled and sanitation level. This is supported by a chi square statistic of 0.499 (p=0.779). This further implies that intervention measures to improve the level of sanitation should not target specific schools (schools with physically disabled students and schools without physically disabled students). Results are presented in Table 4.20 below.

Table 4.20: Analysis of Physically Disabled Against Level of Sanitation (N=80)

		Sanitation Level			
		Low	Medium	High	Chi Square
Are there Physically Disabled Children	Yes	21	0	21	
	No	59	1	52	
Total		80	1	73	0.499 (p=0.779)

4.4.2 Relationship between Demographics and level of Sanitation

Correlations between number of male students, number of female teachers, number of male teachers and level of sanitation indicate that the association is negative and significant. This was revealed by R= -0.168 and p value= 0.038, R= -0.206 p value=

0.010 and $R = -0.218$ p value = 0.007. This can be explained by the competition of scarce sanitary facilities among the schools i.e. the higher the number of students the lower the level of sanitation. However, number of female students and sanitation level had a negative and insignificant relationship.

Table 4.21: Correlation of Demographics and Level of Sanitation

Variable		Sanitation Level	No of Male Students	No of Female Students	No of Female Teachers	No of Male Teachers
Sanitation Level	Pearson Correlation	1				
	Sig. (2-tailed)					
No of Male Students	Pearson Correlation	-0.168	1			
	Sig. (2-tailed)	0.038				
No of Female Students	Pearson Correlation	-0.156	0.977	1		
	Sig. (2-tailed)	0.054	0.000			
No of Female Teachers	Pearson Correlation	-0.206	0.877	0.866	1	
	Sig. (2-tailed)	0.010	0.000	0.000		
No of Male Teachers	Pearson Correlation	-0.218	0.506	0.475	0.451	1
	Sig. (2-tailed)	0.007	0.000	0.000	0.000	

4.5 Availability of Water and Soap for Hand Washing

Table 4.22 illustrates that there was water availability in the hand washing facilities in the schools and this water was mostly available from piped sources for example from

the city council. The respondents (50.6%) indicated that they were aware of safety standards manual for schools in Kenya, published by the Ministry of Education and this was further supported by 79.2% of the respondents who indicated that they were aware of other publications of hygiene and sanitation campaigns in the area such as Unilever-Lifebuoy or WASH.

Results from the observation guide supported the findings whereby 79.2% of the respondents indicated that there was availability of water at hand washing facility and 58.4% indicated there was availability of soap at the hand washing facilities in the schools.

Table 4.22: Table Showing Distribution Responses on Availability of Water and Soap at Hand Washing Facility, Water Source, Awareness of Safety Standards (n=154)

Water Availability at Hand washing facilities			Water Source		
Category	No.	%	Category	No.	%
Yes	120	77.9	Piped	107	69.5
No	34	22.1	Borehole	24	15.6
Total	154	100	Buying	22	14.3
			Missing	1	0.6
			Total	154	100
Awareness of Safety Standards			Publication on Hygiene & Sanitation		
Category	No.	%	Category	No.	%
Yes	78	50.6	Yes	6	79.2
No	76	49.4	No	46	20.1
Total	154	100	Missing	102	0.6
			Total	154	100
Soap Availability at Hand washing facilities					
Category	No.	%			
Yes	90	58.4			
No	62	40.3			
Missing	2	1.3			
Total	154	100			

4.5.1 Influence of Demographics on Water and Soap Availability (n=154)

A cross tabulation of type of school and water availability in hand washing facilities indicated that there was significant relationship between type of school and water availability. This was supported by a chi square statistic of 24.958 ($p=0.000$). Private schools were found to have water available at the hand washing facilities than other types of schools. This further implied that intervention measures to increase water availability should target all schools since they had scarce water.

Table 4.23: A Cross Tab of Type of School against Water Availability (n=122)

		Is there water at the hand washing facility		
		Yes	No	Chi Square
Type of School	Public	10	6	
	Private	90	8	
	Informal	22	17	
	Total	122	31	24.958 ($p=0.000$)

Table 4.24 illustrates the chi square results of type of school and soap availability in hand washing facilities indicated that there was significant relationship between type of school and soap availability. This was supported by chi square statistic of 8.241 ($p=0.016$). This indicates that private schools were more likely to have soap at the hand washing facilities. This further implied that intervention measures to increase soap availability should target all schools since they had scarce soap.

Table 4.24: A Cross Tab of Type of School against Soap Availability (n=90)

		Is there soap at the hand washing facilities		
		Yes	No	Chi Square
Type of School	Public	8	7	
	Private	66	32	
	Informal	16	23	
	Total	90	62	8.241(p=0.016)

The respondents were asked to indicate if they were aware of any hygiene and sanitation campaigns in the area such as Unilever-Lifebuoy or WASH, 75.3% indicated they were aware of the campaigns of which 46.8% indicated they knew about Dettol wash campaigns, 3.9% were aware about Dettol and Lifebuoy campaign and Dettol and safeguard campaigns. About sixty percent (59.7%) of the respondents indicated that the campaigns have assisted the school in great ways of increasing the level of sanitary cleanliness in the schools.

Table 4.25: Distribution Responses on Awareness of Campaigns And Campaigns Assistance

Awareness of Other Campaigns			Campaigns Assistance		
Category	No.	%	Category	No.	%
Yes	116	75.3	Yes	92	59.7
No	36	23.4	No	46	29.9
Missing	2	1.3	Missing	16	10.4
Total	154	100	Total	154	100
Which Campaigns					
Category	No.	%			
Dettol	72	46.8			
Dettol & Freshlife	1	0.6			
Dettol & Lifebuoy	6	3.9			
Dettol & Safeguard	6	3.9			
Dettol, safeguard & Lifebuoy	4	2.6			
Others	6	3.9			
Lifebuoy	6	3.9			
Protex	1	0.6			
Safeguard	8	5.2			
missing	44	28.6			
Total	154	100			

The respondents were asked to indicate how the campaigns have assisted the schools in any way. Table 4.26 illustrates that 26% of the respondents indicated that the campaigns have helped in educating students on hand washing, 16.2% indicated that the schools benefited from education on hand washing and donated soap and 5.8% indicated that they benefited from donated soap.

Table 4.26: Benefits of the Campaigns in the School (n=154)

Benefit	No.	%
Donated Learning Materials	1	0.6
Donated Sanitary Items	2	1.3
Donated Soap	7	4.5
Education on Hand Washing and Donated Soap	25	16.2
Education of Hygiene	9	5.8
Education on Hand Washing	40	26
Improved Health Standards	5	3.2
Hand washing Education, Improved Health, Donated Soap	1	0.6
Hand washing Education, Improved Health	2	1.3
Missing	62	40.3
Total	154	100

CHAPTER FIVE: DISCUSSION

5.1 Introduction

This chapter discusses the summary of major findings of the study, relevant discussions, conclusions and the necessary recommendations. The study sought to assess the level of sanitation in primary schools in Embakasi District.

The summary is done in line with the objectives of the study based on the output of the descriptive and inferential statistical analyses guided to test the research hypothesis of the study. Various methods were used to arrive at the findings. These methods included demographic analysis, descriptive statistics, correlation analysis and t test analysis

5.2 Discussion

5.2.1 Type of Sanitary Facilities

The first objective of the study was to identify and describe the type of sanitary facilities used in schools by both students and teachers. Results illustrated that most of the pupils and teachers toilets were pour flush latrine. The study findings revealed that the most used facilities required a lot of water in order to maintain cleanliness and thus schools needed to have reliable water supply. The findings are consistent with those of WSP (2009) which stated that sanitation is in two categories: Off site- associated with the developed world where there are sewerage systems. These require reliable water supply and waste water treatment. The excreta is moved from the area of deposition through sewerage systems to treatment collection areas. Examples include village specific sewerage system (small scale), water latrines and sewerage systems. On site- these are

more widely employed and cheaper. There is some level of treatment or containment of excreta at the toilet location and avoid the need for further treatment. These include pit latrines, VIP latrine, pour flush latrine, composting latrine, composting dry latrine with urine separation, septic tanks and aqua privies (WSP 2009). This supports the findings because most of the schools went for cheaper latrines and which could consume or use little water.

The study sought to find out the distribution of various types of sanitary facilities for the teachers in all the three categories of the schools. The study findings indicated that the sanitary facilities in public schools for teachers were pour flush toilet with off-site sanitation and in private schools the teachers use pour flush toilet and in informal schools the most used type of sanitary facility for teachers was also pour flush latrines. In other studies the main type of sanitary facility was a latrine (Wandera et al 2009, WHO 2010). It can therefore be concluded that there is a significant relationship between the type of school and the type of sanitary facility available for teachers in the schools. There is some level of treatment or containment of excreta at the toilet location and avoid the need for further treatment. These include pit latrines, VIP latrine, pour flush latrine, composting latrine, composting dry latrine with urine separation, septic tanks and aqua privies (WSP 2009).

5.2.2 Ratio of Pupils to Available Sanitary Facilities

In order to determine the ratio of pupils to toilets, the study only considered the schools where there were separate toilets between boys and girls. All types of schools had higher

number of toilets for girls than for boys. This is in line with the fact that girls are more than boys in the schools in Embakasi. Private schools had more toilets and this is also due to the fact that there are more schools and pupils in the private sector.

Results illustrates that the ratio of boys per toilet which indicates that one toilet was to be used by 53 boys in public school (53:1) while in private schools 36 boys were to use one toilet (36:1) and in informal schools 62 boys were to use one toilet (62:1). This indicates that there were many sanitary facilities in the private schools as compared to public and informal schools. According to the International standards for sanitation, the number of boys to be served by one toilet is 30 (Ministry of Education, 2008). However none of the schools had achieved the international standards for the sanitation hence the schools needed to put in place measures to build more sanitary facilities. The International standards for sanitation require that the ratio of girls to one toilet should be 25:1 (MoE, 2008). The study findings indicated that the public schools had a ratio of 41:1; the private schools ratio was 31:1, informal schools had the highest ratio of 58:1. Overall, the schools in the district have a ratio of 38:1 girls per toilet. This implies that all the schools had scarce facilities to cater for the female students.

The study further sought to find out the ratio of teachers per toilet. For proper analysis, the schools where teacher shared toilets between females and males were excluded from this analysis. The Safety Standard Manual specifies that there should be at least one toilet for every 12 teachers. From the sample selected, the overall number of teachers using one toilet is 7. However, public schools have 14 female teachers using one toilet,

while in private schools the ratio was 6:1 and in informal the ratio was 8:1. The study findings implied that only public schools have not adhered to the safety standards measures put in place by the ministry of health. The Safety Standard Manual specifies that there should be at least one toilet for every 12 teachers. From the sample selected, the overall number of male teachers using one toilet is 4. The study findings indicated that all the schools (private, public and informal) had achieved the recommended ratios for male teachers this could be due to low numbers of male teachers in all the schools.

The study findings agree with those in Child Health and Development Centre, Makerere University (CHDC, 2006) who found that almost all schools surveyed did not meet the minimum sanitation and hygiene school standards. One in five people defecate in the open and this applies in the case of children. (Cairncross *et al.*, 2010). Another study by Iilechikwu *et al.* (2003) showed that 44.7% of school children defecate in the bush. The study further agrees with Wandera *et al.* (2009); Elpo *et al.* (2007); and SWASH Plus (2008) who asserted that children fear using latrines due to poor and unsafe designs of latrines or very dirty latrines, hence they use the field.

5.2.3 Level of Cleanliness of Sanitary Facilities

The third objective of the study was to describe the level of cleanliness of sanitary facilities in schools. The study findings shows that majority of the respondents indicated that there was low level of cleanliness of sanitary facilities in schools. The study findings agree with those in a report released by the Ministry of Health (1997), which stated that inadequate facilities combined with unhygienic practices and the general lack of clean water supply as well as safe disposal of domestic waste water and solid waste present sanitation problems. In Kenya the huge backlog in sanitation coverage indicated by the current national coverage of about 57% in both rural and urban areas is a challenge (State of Environment Report for Kenya 2000/2001). It further states that many urban settings in Kenya do not have access to adequate sewerage facilities. It adds that piped water and sewerage services are available to only ten of the eleven towns covered by National Water and Sewerage Corporation and that even in these towns; it's only a small proportion of the population (approximately 10%) that has access to this service.

5.2.4 Availability of Water and Soap for Hand Washing

Results revealed that there was water availability in the hand washing facilities in the schools and this water was mostly available from piped sources for example from the city council. The respondents indicated that there were aware of safety standards manual for schools in Kenya, published by the Ministry of Education and this was further supported by 79.2% of the respondents who indicated that they were aware of other

publications of hygiene and sanitation campaigns in the area such as Unilever-Lifebuoy or WASH. The respondents were asked to indicate if they were aware of any hygiene and sanitation campaigns in the area such as Unilever-Lifebuoy or WASH, dettol wash campaigns, dettol and lifebouy campaign and dettol and safeguard campaigns. A majority of the respondents indicated that the campaigns have assisted the school in great ways of increasing the level of sanitary cleanliness in the schools. Results from the observation guide supported the findings whereby the respondents indicated that there was availability of water at hand washing facility and availability of soap at the hand washing facilities in the schools.

The study findings agree with State of Environment Report for Kenya (1998) which reported that there was low level of domestic water supply in the country with only 40% and 75% coverage for rural and urban areas respectively. And according to WHO (2008), in the last decade access to water supply rose from 61% to 71% in Kenya, but during the same period, the proportion of people with access to sanitary means of excreta disposal declined from 36% to 34% as funding for sanitation decreased and population increased. But even with the increase in water supply, the quality of water has been degraded.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusions

The study findings indicated that there was statistically significant relationship between type of school and existence of sanitary facilities. This implied that intervention measures to increase existence of sanitary facilities should target all types of school since they all had low or less existence of sanitary facilities. This led to the conclusion that there was low existence of sanitary facilities in the schools. It can be concluded that most of the pupils and teachers toilets were pour flush latrine and mostly used facilities required a lot of water in order to maintain cleanliness and thus schools needed to have reliable water supply.

It can be concluded from this study that majority of the schools had scarce existence of sanitary facilities this is revealed by the ratio of pupils to available sanitary facilities. However this existence has not led to any changes in the improvement of sanitation level because all schools were not sufficiently equipped with the sanitary facilities, water, soap and protective clothing for the workers taking care of the sanitary facilities.

Type of school was not statistically significant in explaining the level of sanitation. This led to a conclusion that there was low level of cleanliness in all the categories of schools. It was also possible to conclude that not all schools provided the cleaners with protective equipment or clothing and this is an indication that there are more people at risk of water borne diseases.

It was possible to conclude that there was scarcity of water and soap for hand washing in the schools. The main water source in schools was less than 15m away from sanitary facilities, this led to a conclusion that contamination of water sources can occur easily and cause the spread of disease. This was common in schools that occupied small pieces of land and in schools with poor structural plans that have poorly maintained buildings, inadequate toilets and few hand washing areas.

6.2 Recommendations

6.2.1 School Level

Some schools were noted to have sought sponsorship from organizations, parents or the government to purchase large water storage tanks and drill boreholes. Schools that lack water should also follow this example to ensure that there is a continuous supply of water.

The schools without hand washing facilities should develop simple modified facilities that were noted in some schools such as water Jeri cans fitted with a tap, which could be fitted outside the toilets and in the classrooms, to ensure children can wash their hands at any time or place.

Schools should encourage children to carry soap from home, as noted in some of the schools, which is deposited with the teacher, and provided every time the child visits the toilet. This will also enable teachers to ensure that children are washing their hands.

Schools should develop cleaning schedules for the toilet facilities, such that after every break or a certain time period the sanitary facilities are cleaned. This will ensure that sanitary facilities are clean at all times.

School Heads should motivate workers such as; the teachers to ensure that the children are taught on hygiene and especially the four critical times to wash their hands. The cleaners should be provided with proper protective gear and remuneration. In some schools workers have more than one role and this affected their ability to keep the sanitary facilities clean. Parents can be requested to hire an additional worker whose primary role would be to ensure cleanliness in the sanitary facilities.

6.2.2 County Government Level

The county government needs to enforce that construction of all schools should follow specified plans for schools. This will ensure that all schools have adequate toilets and sanitary facilities.

More public schools may need to be constructed to decongest the existing ones as this was the major contributing factor to poor hygiene and maintenance of the sanitary facilities due to high numbers of pupils enrolled in public schools.

Since all these schools are in estates where citizens live, the county government should ensure that schools have an adequate source of clean water just as they ensure the taps don't run dry in commercial houses. The county government can also assist in the drilling of boreholes and providing water tanks for storage to schools.

Proper record keeping and data storage for all the schools, with a central office. During the study, one had to travel to several offices for information which was not computerized. This brought about delays and inaccuracy in information. This was also raised by the staff who reported that they are unable to keep track of all the new schools being developed. The staff also pointed out that some schools did not register with the county offices and operated autonomously.

6.2.3 Ministry of Education/ Ministry of Health

The ministry should set out clear guidelines on the functions and roles of the different types of schools i.e. informal, public, private. In addition, the different structural requirements for the different types of establishments to ensure that during registration of schools and building of the same, the parties adhere to the requirements and meet up the conditions.

The ministry of education should ensure provision and distribution of the Safety Standards Manual to all schools and educating of all the teachers on the same through seminars or continuous education sessions. This is to ensure and emphasize on healthy living and studying in friendly environment for all pupils.

The ministry of healthy should embrace the campaigns initiated by different organizations and companies to educate all citizens on healthy living standards and the dangers of staying in unhygienic conditions. The ministry should ensure that all schools are provided with soap at all times to ensure children wash their hands properly.

Establish a role for Public Health Officers in schools, who will not only ensure that water and sanitation facilities meet the requirements as per the Safety Standards Manual but can also teach the teachers and children not only on proper sanitation and hygiene but also other diseases of concern such as HIV/AIDS, Dengue Fever, Cholera, Measles, Polio, Tuberculosis: the list is endless.

Encourage private companies to continue with campaigns on sanitation and hygiene not only in Nairobi, but throughout the country.

More research needs to be carried out in the attitudes and practices of school children in Embakasi considering the inadequate sanitary facilities.

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APPENDIX 1

Questionnaires

PART 1 Interview Questionnaire.

1. Study number of the school _____
2. Position of interviewee at the school _____
3. Type of school-
 1. public
 2. Private
 3. Informal
4. Number of male pupils _____
5. Number of female pupils _____
6. Number of female teachers _____
7. Number of male teachers _____
8. Are there physically disabled children in the school?
 1. Yes
If yes how many _____
 2. No
9. Who cleans the sanitary facilities?
 1. Pupils
 2. Workers
 - 3 Others (specify) _____
10. Are the cleaners of the sanitary facilities provided with protective equipment or clothing?
 1. Yes
If yes what type _____
 2. No
11. How often are the sanitary facilities cleaned?
 1. Daily
 2. Weekly
 3. Others (specify) _____

12. Is water always available at the school toilets or hand washing facilities?

1. Yes

2. No

13. What is the source of water? 1. Piped

2. Borehole

3. Rain

4. Others (specify) _____

14. Are you aware of the Safety Standards Manual for Schools in Kenya, published by the Ministry of Education?

1. Yes

2. No

Or Any other publication concerning Sanitation and Hygiene_____

15. Are you aware of any hygiene and sanitation campaigns in the area such as Unilever-Lifebuoy or WASH?

1. Yes

If yes which ones_____

3. No

16. Have the campaigns assisted your school in any way?

1. Yes

How? _____

3. No

Why?

PART 2 Observational Questionnaires.

1. Identification of type and number of sanitary facilities are there for boys and girls

Type of toilet	Boys	Girls	Boys:latrine ratio	Girls:latrine ratio
Latrine				
VIP Latrine				
Pour Flush Latrine				
Composting Latrine				
Composting Latrine with Urine separation				
Flush toilet with off-site Sanitation				
Urinals				
Others				

2. Identification of type and number of sanitary facilities are there for male and female teachers.

Type of toilet	Male	Female	Male:latrine ratio	Female:latrine ratio
Latrine				
VIP Latrine				
Pour Flush Latrine				
Composting Latrine				
Composting Latrine with Urine separation				
Flush toilet with off-site Sanitation				
Urinals				
Others				

3. Are the male toilets separate from the female toilets for pupils?

1. Yes

2. No

4. Are the male toilets separate from the female toilets for teachers?

1. Yes

2. No

5. Are the sanitary facilities accessible, that is are they open for pupils to use at any time?

1. Yes

2. No

6. Are the sanitary facilities clean? (no fecal matter on the floor or seat, floor is dry)

1. Yes

2. No

If No state condition _____

7. Are the sanitary facilities well ventilated?

1. Yes

2. No

8. Are the sanitary facilities well maintained? (intact walls , doors and roof)

1. Yes

2. No

3. Describe condition____

9. Are anal cleansing materials provided?

1. Yes

2. No

3. If yes what kind _____

10. Are there facilities for effective disposal of sanitary wear?

1. Yes

2. No

11. Do the facilities accommodate the handicapped? (wider doors, handle bars, foldable sits)
1. Yes
 2. No
12. Do the facilities accommodate the very young? (low height of seats, urinals and hand washing facilities)
1. Yes
 2. No
13. Is there privacy at the sanitary facility?(presence of doors, presence of locks, walls with no holes)
1. Yes
 2. No
 3. Describe _____
14. Are there hand washing facilities? (sink, basin, jerry can with a hole)
1. Yes
 2. No
15. How many hand washing facilities are there? _____
16. Is there soap at the hand washing facility?
1. Yes
 2. No
17. Is there water at the hand washing facility?
1. Yes
 2. No
18. Are the girls washing places behind a screen or a wall?
1. Yes
 2. No

19. Are the sanitary facilities especially pit latrines at least 15meters away from a water supply point?

1. Yes

2. No

3. If no, how many meters_____

20. Are the sanitary facilities 10 meters away from the classrooms _____

1. Yes

2. No

If No, how many _____meters

APPENDIX 2

CONSENT FORM

Research Statement

I am, Dr. Stella N. Mwangi of the School of Public Health, University of Nairobi, conducting a study to determine the level of sanitation in primary schools in Embakasi District according to the standards prescribed in the Safety Standards Manual for Schools in Kenya, as per the Ministry of Education.

I am requesting that the school you represent, be involved in the research study. The purpose of this consent form is to give you the information you need to help you decide whether to be in the study or not. Please read the form carefully or we can go over the form together. You may ask any question about the research, possible risks and benefits, your rights as a volunteer and anything else. When we finish you can decide if you want to be in the study or not. This process is called 'informed consent' I will give you a copy of the consent form for your own records.

Objectives of the study and Benefits

The purpose of this study is to determine whether sanitation facilities in the schools are sufficient, clean and suitable for children. This is in keeping with the standards provided in the Safety Standards Manual for Schools in Kenya. I intend to interview and observe the school sanitary facilities during one visit, but you are welcome to contact us if you have any additional questions. The study will last approximately two months. There are

no direct benefits to the school from taking part in the study, the information you will provide will inform school heads on matters concerning sanitation in their schools through the City Education Department.

Procedures

The study will involve two questionnaires, one giving general information such as the number of pupils and teachers. The second will involve visiting the sanitary facilities in the schools. The informants can be the Head Teacher or Teacher in charge of sanitation in the school, no pupil will be asked to participate. Participation is voluntary. I hope you can participate in this study as your cooperation is important.

Risk, Stress or Discomfort

I shall be inspecting all the sanitary facilities in the school. This may be uncomfortable to you.

Confidentiality

The information collected will be kept in a secure place, only people involved with the study will have access to the information. The information you will give will be treated as private and confidential. The name of the school or participant will not appear in any of the papers or documents related to the research. You may refuse to participate, and this will not affect your school in any manner.

Other Information

There will be no payment for participating in the study. A copy of the study will be given to the City Education Department as regulation purposes.

Information on researcher

Name: Dr Stella Nyawira Mwangi

University of Nairobi Registration Number: H57/70621/07

Telephone number: 0720280795

Signature:

Date:

Participants Statement

The purpose of the study has been explained to me. I volunteer to take part in this research. I have had a chance to ask questions. If I have further questions about my rights as a participant, I can call the Kenyatta National Hospital Ethics and Research Committee Tel; 020 2726300. I give my permission to the researchers to inspect the sanitary facilities as described in this consent form. I have received a copy of this consent form.

Printed Name of Subject:

Signature of the subject:

Date:

APPENDIX 3

List of all the Schools in Embakasi

APPENDIX 3

List of all the Schools in Embakasi

PRIVATE

1. Agalo junior
2. Agape starlight academy
3. Al Mak Toum
4. Anne Rose
5. Bema School
6. Blessing Day Academy
7. Blue sky
8. Bright Beginers
9. Bright Light
10. Bright Morning Star
11. Brook Lane School
12. Busy simo
13. By faith junior
14. By grace
15. Cathsam
16. Cedar progressive
17. Chalaw
18. City day
19. Dandora IV prep
20. Dandora junior
21. Darlings
22. Day spring
23. Divine Mercy Catholic Sch.
24. Donholm catholic
25. East End
26. East Gate Prep

27. El shadai
28. Elimu Star Academy Tena
29. Elo-him Academy
30. Embakasi Benedicta
31. Emmanuel jrn Foundation
32. Epress
33. F.P.F.K Union Academy
34. Fadhili
35. Faith junior
36. Favours jnr Academy
37. Fountain Junior
38. Fridom junior
39. Future Gate
40. Galilee
41. Gatoto
42. Genesis school
43. God's Favour Academy
44. Graciuos Day
45. Gramo Joy
46. Grandmark
47. Great Commission Academy
48. Great Love
49. Growland Academy
50. Halisi
51. Happy kids
52. Harvest now
53. High Rock Academy
54. Horizon
55. Immaculate
56. Immanuel Springs
57. Imperial Junior School
58. Infill
59. Jabet Junior School
60. Jabhet Primary School
61. Jam Ridge Junior
62. Jitegemea
63. Jolica Academy
64. Josnah

65. Jospers
66. Joviol Academy
67. Joy villa
68. Joylife Academy
69. Jubilant
70. Junior campus
71. Jupiter junior
72. Kayole Hekima Academy
73. King David
74. Kinyago
75. Komarock rd
76. Kwa Njenga Needy Academy
77. Lake view
78. Little Angels
79. Little Friends Academy
80. Lucky Junior School
81. Maggu Hill
82. Mercury Academy
83. Mighty minds junior sch
84. Milly Josty Jnr Sch
85. MJ Elimika Preparatory
86. Mother of mercy
87. Moyo Academy
88. Naliz School
89. Nectaline
90. Newdawn
91. Newlight
92. Nileyce
93. Njokim Junior Academy
94. Orbit school
95. P.C.E.A K/South Academy
96. Palace Academy
97. Perfect care
98. Precious gift
99. Promise Day School
100. Red Root Academy

101. Reuben Vision School

102. Riara Springs
103. Ricken Day School
104. River of Life Academy
105. Riverine
106. Rockfields
107. Ruai Boys Town
108. Ruben Baptist School
109. Rudiania Day Care
110. Ruben Baptist School
111. Sharp Minds Junior School
112. Sheep care
113. Sibiah's Star Academy
114. Silvergate
115. Sinai Preparatory
116. Sky Rock
117. Som Academy
118. Soweto Academy
119. Springfields
120. St. Anjo Silverbridge School
121. St. Charles
122. St. Emma
123. St. James Dandora
124. St. James Spring Valley
125. St. Josephine Junior
126. St Lucia Academy
127. St. Mary's Academy
128. St. Veronica Soweto
130. St. Alloys F.P. Academy
131. St. Charles Lwanga
132. St. Joseph Freinametz
133. St. Justine
134. St. Vincent De Paul Academy
135. St. Vincent Junior Academy
136. Summer Springs Academy
137. Sunrise
138. Tammy Agape Day Care
139. Tania School
140. Tanin Bird
141. Tender Care
142. The Kings
143. Timane
144. Top Star Junior School
145. Tristar Academy Complex
146. True vine

147. Twilight Junior
148. Uchumi day
149. Unity Centre School
150. Vickland Junior School
151. Vickmary
152. Villa Teag Academy
153. Wanford
154. Zarepeth Academy

INFORMAL

1. Baseroot Edu Centre
2. Bethlehem Comm Center
3. Blessed preparatory Centre.
4. Brich Jrn Sch Centre
5. Bright Junior Centre
6. Calvary Cor. Comm. Centre
7. Charisma Tumaini Centre
8. Charity Pupils Centre
9. CMF Excellence EDC
10. Comido Edu.Centre
11. Dandora minorates Ed. Centre
12. Dandore PCEA Centre
13. Daylight Edu. Centre
14. Desai Community Centre
15. Elmond Edu. Centre
16. Embakasi Rehab Centre
17. Geonan Day Centre
18. Good Day Centre
19. Good Start C. Academy
20. Goodwill Centre
21. Guardian Comm. Sch .Centre
22. Jirani Children. Centre
23. Jobenpha Comm Sch
24. Joyday Children Centre
25. Juhudi Edu. Centre
26. Kayole Comm Sch
27. Kwa watoto Centre
28. Litrose Comm Dev Day Centre
29. Maendeleo Learning Centre

30. Magbet Comm. Centre
31. Mandela complex Centre
32. Mukuru Comm Centre
33. Mzeza Day Care Centre
34. Neema Devpt Centre
35. Njiro`s Education Centre
36. Pehuki Rehab Centre
37. Peular Comm Centre
38. Purposeful Comm School
39. Ramah Care Centre
40. Rofra Edu. Centre
41. Shiner Edu Centre
42. St.Agnes jnr Sch. Centre
43. St.Benedict Comm. Centre
44. St.Elizabeth O.S Centre
45. St.Francis Day Centre
46. St.Michael Centre
47. Star light Comm.Centre
48. Stevens Academic Comm Centre
49. Steward Day Care Centre
50. Tira Day Care Centre
51. Torah Educational Centre
52. Twinstar Education Centre
53. Umoja Land Children Centre
54. Uzima Welfare Youth GP Ed.Centre
55. Vessel of Hope Centre
56. Virgjoie Junior Centre
57. Vision Achievers Edu. Centre
58. Wema Edu Centre
59. Wisdom Edu. Centre

PUBLIC

1. A.E.F Reuben
2. Bondeni
3. Busara

4. Donholm
5. Edelvale
6. Embakasi Garrison
7. Embakasi primary
8. Gatoto
9. Imara
10. Kayole 1
11. Kifaru
12. Komarock
13. Kwa njenga
14. Mwangaza
15. O.L.Nazareth
16. Peter kibukusya
17. Thawabu
18. Tumaini
19. Umoja
20. Unity
21. Utawala
22. Athi
23. Dandora
24. Gitumba
25. James Gichuru
26. Jehovah Jireh
27. Kariobangi south
28. Kayole North
29. Maua
30. Mihango
31. Ngundu
32. Njiru
33. Ronald ngala
34. Ruai
35. St.Dominic
36. Tom Mboya
37. Ushirika
38. Wangu

APPENDIX 4

List of Schools selected to participate in the study

PRIVATE

1. Agalo junior
2. Agape starlight academy
3. Bema School
4. Blessing Day Academy
5. Bright Begginers
6. Bright Morning Star
7. Busy Simo
8. By Grace
9. Chalaw
10. Dandora IV prep
11. Dandora Junior
12. Day spring
13. Divine Mercy Catholic Sch.
14. Elimu Star Academy
15. El Shadai Elimu Star Academy Tena
16. Epress
17. Elo-him Academy
18. Embakasi Benedicta
19. Fadhili
20. F.P.F.K Union Academy
21. Faith Junior
22. Favors Junior Academy
23. Future Gate
24. Genesis School
25. Gracious Day
26. Grandmark
27. Great Commission Academy
28. Great Love
29. Growland Academy
30. Halisi
31. Happy kids

32. Harvest now
33. Imperial Junior School
34. Infill
35. Jam Ridge Junior
36. Jolica Academy
37. Josnah
38. Jospur
39. Jovial
40. Joy villa
41. Jubilant
42. Jupiter Junior
43. Kayole Hekima Academy
44. King David
45. Lake view
46. Little Angels
47. Lucky Junior School
48. Maggu Hill
49. Mercury Academy
50. Mighty minds Junior School
51. Moyo Academy
52. Naliz School
53. Nectaline
54. Newdawn
55. Newlight
56. Nileyce
57. Palace Academy
58. Precious Junior
59. Promise Day School
60. Red Root Academy
61. Reuben Vision School
62. Riara Springs
63. Ricken Day School
64. River of Life Academy
65. Riverine
66. Rockfields
67. Sharp Minds Jnr Sch.
68. Sibiah's Star Academy
69. Silver gate

70. Sinai Prep
71. Sky rock
72. Som Academy
73. Soweto Academy.
74. Spring fields
75. St. Anjo Silverbridge School
76. St. Charles
77. St. Emma
78. St. James Dandora
79. St. James Spring valley
80. St. Josephine Jnr
81. St. Lucia Ac
82. St. Mary's Academy
83. St. Alloys F. P. Academy
84. St. Charles Lwanga
85. St. Justine
86. St. Vincent Junior Academy
87. Summer Springs Academy
88. Sunrise
89. Tammy Agape Day Care
90. Tania School
91. Tanin Bird
92. Tender care
93. The Kings
94. Timane
95. Tristar Academy Complex
96. Twilight Junior
97. Uchumi day
98. Unity Centre School
99. Villa Teag Academy
100. Zarepeth Academy

INFORMAL

1. Baseroot Edu. Center
2. Blessed Preparatory Center
3. Brich Jnr Sch. Center

4. Bright Jnr. Center
5. Charisma Tumaini Center
6. Charity Pupils Centre
7. CMF Excellence EDC
8. Comido Edu.Centre
9. Dandora Minorates Edu. Center
10. Daylight Edu. Center
11. Desai Community Center
12. Embakasi Rehab. Center
13. Geonan Day Center
14. Good Day Center
15. Goodwill Center
16. Jirani Children Center
17. Jobenpha Comm. Sch.
18. Joyday Children Center
19. Juhudi Edu. Center
20. Kayole Comm. Sch.
21. Magbet Comm. Center
22. Mukuru Comm. Center
23. Njiro's Edu. Center
24. Peculiar Comm. Center
25. Purposeful Comm. Sch
26. Ramah Care Center
27. Rofra Edu. Centre
28. St. Benedict Comm. Center
29. St. Elizabeth O. S. Center
30. St. Michael Center
31. Stevens Academic Comm. Center
32. Torah Edu. Centre
33. Umoja Land Children Centre
34. Uzima Welfare Youth G.P. Edu. Centre
35. Vision Achievers Edu. Centre
36. Wema Edu. Centre
37. Wisdom Edu. Centre

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10. Mwangaza
11. Peter Kibukusya
12. Thawabu
13. Tumaini
14. Utawala
15. Athi
16. Dandora
17. James Gichuru
18. Kayole North
19. Mihango
20. Ngundu
21. Njiru
22. Ruai
23. Tom Mboya
24. Wangu

APPENDIX 5: WORK PLAN

The following is a work plan showing the activities to be carried out, the person responsible and the given time frame.

Principal Investigator	Jun 2014	Jul	Aug	Sept	Oct	Nov	Dec
Proposal Writing	X						
Approval from Ethics and Research Committee	X						
Approval from City Education Department		X					
Hire and Train Research Assistants		X					
Collect Data		X	X				
Data Analysis			X	X			
Thesis Writing			X	X			
Approval of Thesis				X	X		
Defending of Thesis						X	
Research Assistant							
Collection of Data		X	X				
Analysis of Data			X	X			

APPENDIX 6: BUDGET

S/No	Item	Quantity	Price	Amount (KShs)
1.	Research Assistants	3	15,000	45,000
2.	Printing-paper rims	3	600	1,800
3.	-colour ink	2cartridges	1,500	3,000
4.	-black and white	4cartridges	1,500	6,000
5.	Transport	4persons	100per day	16,000
6.	Writing pens	1box	500	500
7.	Airtime	4persons	1,000	4,000
8.	City Council Approval			3,000
9.	Contingencies	15%	79,300	11,895
	Total			91,195