SCHOOL HYGIENE PROMOTION APPROACHES AND THEIR INFLUENCE ON PUPIL'S HYGIENE PRACTICES IN PUBLIC PRIMARY SCHOOLS IN DAGORETTI, NAIROBI CITY COUNTY, KENYA

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DECLARATION

This thesis is my original work and has not been presented for a degree or award in any other University.

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DEDICATION

To my parents, Japheth and Hildah for their inspiration. My wife Grace and children, Kyle and Makena for bringing joy to my life.

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ABBREVIATIONS AND ACRONYMS

BCC	Behavior Change Communication
CHAST	Child Hygiene and Sanitation Transformation
CLTS	Community Led Total Sanitation
MOE	Ministry of Education
MOPHS	Ministry of Public Health and Sanitation
PHAST	Participatory Health and Sanitation Transformation
PHO	Public Health Officer
PPS	Probability Proportional to Size
SLTS	School Led Total Sanitation
SPSS	Statistical Packages for Social Scientists
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
UNICEF	United Nations International Children's Emergency Fund

ABSTRACT

Hygiene promotion in schools is an area of focus for public health practitioners in a bid to mitigate spread of water, sanitation and hygiene related diseases. There exist several hygiene promotion approaches that can be used in similar or different situations. Research indicates that selection and application of different approaches yields varied outcomes. The absence of clear guidelines on selection of hygiene promotion approaches, as is the case in Kenya, can lead to varied adoption of hygiene practices. The objective of this study was to examine the influence of hygiene promotion approaches on pupil's hygiene practices. The study sought to establish the proportion of pupils practicing safe hygiene practices and the hygiene promotion approaches being employed by public primary schools in Dagoretti North and South Sub Counties in Nairobi City County. The study applied a descriptive cross-sectional design. Eligible schools in the study area had a population of 14,505 pupils and probability proportional to size was used to distribute the sampled 384 pupils across the schools. Questionnaires were administered to pupils with the aim of collecting data on hygiene knowledge and practices. Questionnaires were also used to collect data on selection of hygiene promotion approaches from 32 school health teachers. Pupil's demographic data was collected from school head teachers. Five key informant interviews were conducted with Nairobi City County public health and education officers and a non-governmental organization staff. Observation checklists were used to triangulate information on hygiene practices by pupils. The data collected was entered and analyzed using Statistical Packages for Social Scientists to determine association and significant differences between variables through Chi-Square and Fisher's exact tests. For comparison of quantitative variables, one-way analysis of variance test was used. Results indicate that 95.6% of the pupils practiced hand washing at critical times, 98.7% used the toilet while 85.4% safely disposed solid waste. The study reveals that water, sanitation and hygiene in school approach is implemented by 31.3% of the school health teachers. There is a significant relationship between school health clubs approach and hand washing at critical times (p=0.04) and proper solid waste disposal (p=0.02). One way analysis of variance established that there is a statistically significant difference among hygiene promotion approaches and pupils hygiene knowledge, $F(5, 162) = 6.41$, $p < 0.05$ $\eta^2_p = 0.076$. Majority of the school health teachers (62.5%) noted that the school's management support to a particular approach was the major factor influencing selection of the approach. There is a significant relationship between selection of an approach due to the factor that non-governmental organization or government officers came with the approach and a combination of school health clubs, Water Sanitation and Hygiene in schools and No Strings approaches *(p=0.02)*. The study concludes that different hygiene promotion approaches have potential to influence hygiene practices and in particular, hand washing at critical times and proper solid waste disposal amongst pupils in public primary schools in Dagoretti. The study recommends formation of school health clubs and involvement of school's management in selection and implementation of hygiene promotion approaches.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

Globally, some 842,000 people are estimated to die each year from diarrhea because of unsafe drinking water, sanitation and hand hygiene (WHO, 2017a). About 27% of diarrhea deaths occur among children younger than 5 years, with about 90% of diarrhea deaths occurring in South Asia and sub-Saharan Africa (Mohsen *et al*, 2017). Diarrhea diseases are a leading cause of death in children under 5 years in developing countries (Bartram & Cairncross, 2010). Young children are especially vulnerable bearing 68% of the total burden of diarrhea disease (Bartram, 2003), which is also detrimental to the health of school-aged children (UNICEF, 2012). Water, sanitation and hygiene in schools lack attention despite its impact on children's health, school attendance, particularly for girls, and its contribution to fostering lifelong healthy hygiene habits (WHO, 2014).

In sub-Saharan Africa, evidence shows that poor WASH is a common phenomenon within the school environment (Jewitt & Ryley, 2014). In 2011, only 52% of the schools in Africa had access to water and 48% of schools had access to sanitation (Piers & Yolande, 2014). There is increasing attention towards the impact of improved water, sanitation, and hygiene conditions in low-income school settings; where poor conditions are thought to result in disease transmission among pupils (UNICEF, 2010). The school environment represents an important setting because many children's social habits and behaviors are learned at school (Christian *et al*., 2012). This calls for preventive measures geared at raising awareness on cost effective interventions that can contribute to the reduction of water, sanitation and hygiene related diseases.

Primary school access in Kenya has improved, increasing the importance of school services (Halliday *et al*, 2014), such as handwashing, which has been shown to reduce school absenteeism (Talaat *et al*, 2011). Schools provide an efficient and effective channel to reach large portions of the population for introducing health promotion practices (MoPHS & MoE, 2009a), with studies noting a modest transfer of hygiene messages from children to parents (MoE & Care International, 2010). The success of hygiene promotion interventions requires strategic partnerships aimed at sustainably expanding hygiene projects to attain wider coverage and improve on service delivery (Care International, 2012). Such strategic partnerships were observed in a study in Western Kenya, which revealed that 76% of the schools reported to have received Water, Sanitation and Hygiene (WASH) support from a non-governmental organization (Kelly *et al*, 2014).

Numerous hygiene promotion approaches have been used to improve hygiene behaviors amongst pupils, which include school led total sanitation (Vincent, 2013), child hygiene and sanitation transformation (Bockhorn-Vonderbank, 2004), child to child (Farah, 2007) and school health clubs (Population Service International, 2009). The existence of so many alternative approaches to hygiene promotion, makes it difficult for programmers to select the most appropriate approach (Peal *et al.*, 2010). This study examined the influence of hygiene promotion approaches on hygiene practices of public primary school pupils.

1.2 Problem Statement

Health promotion in schools improves children's health and well-being (Stewart-Brown, 2006). In Kenya, the national school health guidelines stipulated that hygiene education

should be organized at least every four months in collaborations with ministry officers, school administrators, teachers, health workers and community leaders who organize activities aimed at identifying health issues and take steps through the school to improve and learn (MoPHS & MoE, 2009b, MoPHS & MoE, 2009c). However, Peal *et al.*, (2010) notes that there are many hygiene promotion approaches and there is often confusion over what a particular approach is designed to achieve, what it comprises, when and where it can be used, how it should be implemented and how much it costs.

Various stakeholders have implemented small and large-scale school health programs in Kenya, whereby most of the efforts have been piece meal and not planned on a sustainable basis (MoPHS & MoE, 2009a). Kenya is listed as one of the countries that does not monitor hygiene indicators in the education management information system (UNICEF, 2015). Njuguna (2008) notes that the interface of software and hardware deserves further investigation in the design of hygiene promotion interventions, which this study aims at.

The existence of numerous hygiene promotion approaches and absence of monitoring mechanisms in the education system in Kenya, may hamper the realization of the full benefits that would have emerged if appropriate hygiene approaches were selected and monitored. Use of effective health promotion strategies and approaches eliminates the use of ineffective trial and error approach (Stephen & Bjarne, 2005). This study examines hygiene promotion approaches employed in public primary schools and whether the approaches influence hygiene practices amongst pupils in public primary schools in Dagoretti North and South Sub Counties, Nairobi City County.

1.3 Research Questions

1. What is the proportion of pupils who practice safe hygiene amongst pupils in public primary schools in Dagoretti North and South Sub Counties?
2. What are the hygiene promotion approaches employed to improve hygiene practices amongst pupils in public primary schools in Dagoretti North and South Sub Counties?
3. Which factors influence selection of hygiene promotion approaches employed in public primary schools in Dagoretti North and South Sub Counties?
4. What is the relationship between hygiene promotion approaches and hygiene practices in public primary schools in Dagoretti North and South Sub Counties?

1.4 Broad Objective

To examine the influence of hygiene promotion approaches on hygiene practices in public primary schools in Dagoretti North and South Sub Counties, Kenya.

1.4.1 Specific Objectives

1. To determine the proportion of pupils who practice safe hygiene amongst public primary pupils in Dagoretti North and South Sub Counties.
2. To assess the hygiene promotion approaches employed by public primary schools to improve hygiene practices amongst pupils in Dagoretti North and South Sub Counties.
3. To determine factors that influence selection of hygiene promotion approaches employed in public primary schools in Dagoretti North and South Sub Counties.
4. To determine the relationship between hygiene promotion approaches and hygiene practices in public primary schools in Dagoretti North and South Sub Counties.

1.6 Significance and Anticipated Output

The study sought to establish the hygiene promotion approaches being employed by schools and the influence of the selected approach on pupil's hygiene practices. The study will be useful to stakeholders in the WASH sector such as the schools' management, county governments, non-governmental organizations, donors and community members when selecting sanitation and hygiene promotion approaches in schools to improve health outcomes. The information gathered in this study may inform policy makers in formulating policies and strategies that guide selection of sanitation and hygiene promotion approaches. Finally, the study will add to the existing body of knowledge on hygiene promotion approaches and for future reference.

1.7 Conceptual Framework

This study is guided by the conceptual model (Figure 1.1). In the model, independent variables are hygiene promotion approaches that promote safe hygiene practices amongst pupils in a school. These included school health clubs, school led total sanitation, child hygiene and sanitation transformation, WASH in schools, child to child and No Strings. Dependent variables are hygiene practices that pupils adopt to reduce exposure to hygiene related illnesses e.g. proper hand washing, safe disposal of solid waste and use of sanitation facilities. The intervening variables constitutes functionality, adequacy and accessibility to WASH facilities that aid pupils to practice safe hygiene. These WASH facilities also determine whether a particular hygiene promotion approach is viable for implementation in a school whereby, some approaches may not be appropriate in schools lacking WASH facilities. Determinants of selection of a hygiene promotion approach also constitute

intervening variables to the independent variable. They include, the school health teacher being knowledgeable on the approach, pupil's preference to the approach, non-governmental organization or government proposed the approach, prior successful experience with the approach in the school and the school management supports the approach. Additionally, these determinants are also intervening variables to the dependent variable (hygiene practices). For example, the pupil's preference to the approach could influence their adoption of safe hygiene practices.

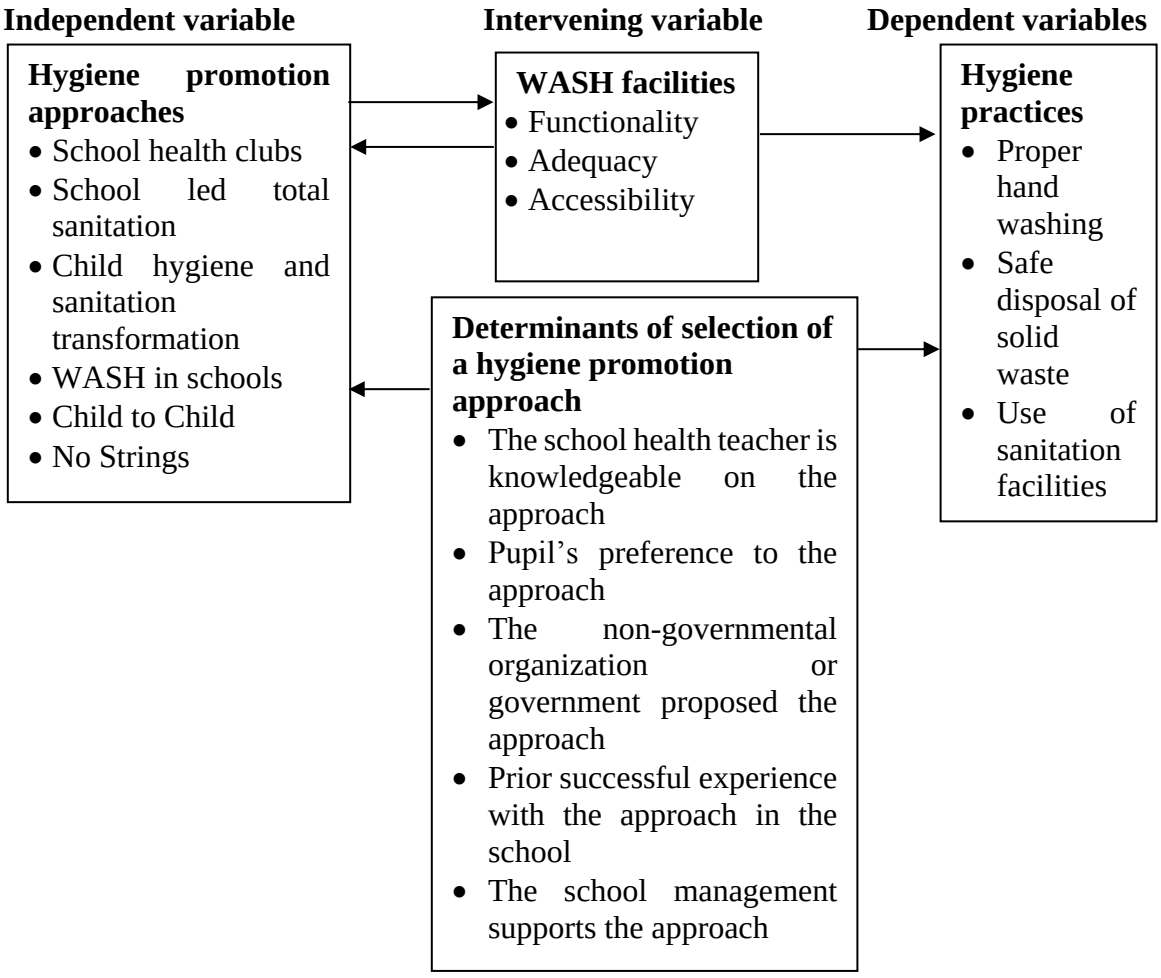


Figure 1.1 Influence of hygiene promotion approaches on hygiene practices (modified from Global WASH Cluster, 2009).

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents the review of literature on existing hygiene promotion approaches and the policy environment related to selection of an approach. The chapter also presents a review of literature on hygiene practices in schools and WASH disease burden, particularly in Dagoretti North and South in Nairobi City County.

2.2 Policies Informing Selection of Hygiene Approaches in School

Each year, children lose 272 million school days due to diarrhea (Hutton & Laurance, 2004). Globally the convention on rights of the child stipulates that state parties should ensure that all children are supported in the use of basic knowledge of child health, hygiene and environmental sanitation (UN, 1989). In Kenya, every person has the right to the highest attainable standards of health and the Children's Act, recognizes that every child has a right to health and medical care, the provision of which is the responsibility of the parents and the government (CoK, 2010, RoK, 2001). The National Early Childhood Development policy identifies the Ministry of Health as a key stakeholder in the provision of hygiene education (MoE, 2006).

Schools are focal points for promotion and empowering of children to be agents of hygiene behavior change (MoH, 2016a). Pupils centered hygiene promotion is an ongoing process aimed at positively influencing behavior change (MoPHS & MoE, 2009b). Promotion of health status of the pupils is a function of the Board of Management and Parents Association for pre-primary schools and secondary schools respectively (RoK, 2013).

School clubs should be established to enhance participation and learning of school children on hygiene and environmental sanitation (MoH, 2016a). However, amidst the policy framework environment, Kenya is classified amongst the countries that do not have a government defined financing plan or budget for the WASH sector which is published and agreed (WHO, 2014) therefore, school WASH activities could be lacking the necessary financial support for their successful implementation.

2.3 Hygiene Promotion Approaches in Schools

2.3.1 School health clubs approach

Students who are interested in health and hygiene issues at their schools and in their communities come together to form school health clubs, through which they identify health risks and devise their own activities to address them (Catholic Relief Services, 2009). The club also affords the pupils the opportunity to become 'Agents of Change' who carry home and translate into action healthy habits and information they learn at school; thus, influence their sibling, parents and friends who might be out of school (Annemarieke *et al.*, 2013).

In 2007, Safer Water Clubs were launched in 11 schools in Neno district, Malawi, achieving a 90% reduction in absenteeism due to diarrhea diseases in the participating schools and a 35% reduction in diarrhea cases at the community clinic (Population Services International, 2009). However, Njuguna *et al.* (2008) noted that there is no evidence that schools with active WASH clubs have better handwashing practice, cleaner facilities or more soap available for children hence, pointing to mixed outcomes in the use of school health clubs approach.

2.3.2 School Led Total Sanitation approach

School Led Total Sanitation (SLTS) approach emphasizes the complete elimination of open defecation from the catchments of the schools as a pre-requisite for improving hygiene and sanitation (Kamal, 2010). SLTS sees children as ready recipients for new learning and ambassadors of hygiene and sanitation messages to peers, families and their community members (Vincent, 2013). The sequential activities such as capacity development, school selection, use of ignition tools, monitoring and follow up are accomplished in partnership with concerned stakeholders (UNICEF & SCNSA, 2006).

The approach has been applied with success in various countries including Nepal where SLTS reached approximately 90,000 households and 500,000 people in 15 districts through 300 schools with more than 1,000 settlements in 67% of the districts being declared open defecation free (Adhikari, 2008). In Indonesia, India, Bangladesh, Malawi and Ethiopia, children sensitized through SLTS approach have played a successful role in influencing the achievement of open defecation free villages (Setiawan *et al*., 2010). In Kenya, despite there not being an SLTS program, Plan International takes school catchment areas as a starting point for Community Led Total Sanitation activities (CLTS.org, 2010). SLTS thus is relevant in a study that examines outcomes of school hygiene promotion.

2.3.3 Child hygiene and sanitation transformation approach

Child Hygiene and Sanitation Transformation (CHAST) approach encourages children to work independently, in pairs or in small groups, and then to present their thoughts and findings to the larger group (Peal *et al*., 2010). CHAST tools are meant to be fun - involving

games, exercises and role-plays that prompt the children to discuss and genuinely understand the key issues related to personal cleanliness and hygiene (De Vreed, 2004).

Bockhorn-Vonderbank (2004) enumerates introduction, problem identification, problem analysis, practicing good behavior and monitoring as the five steps for changing children's hygienic behavior using the CHAST approach but minimal documentation exists on the successes and limitations of the approach. Peer reviewed papers on effectiveness of CHAST as an intervention are not available online and therefore there is need to conduct objective evaluations aimed at investigating effectiveness of CHAST in promoting adoption of proper hygiene and sanitation practices among children in the developing world (Nzioki & Korir, 2020).

2.3.4 Child to Child approach

This approach facilitates children's understanding of healthy behavior and allows them to identify health and development priorities in a fun, challenging and interesting way (WaterAid, 2013). This approach was first implemented in 1978 and has contributed to key health activities in hygiene, water and sanitation and disease prevention (Peal *et al.*, 2010). In Tajikistan, more than 40,000 children in 100 schools benefitted from child to child peer education, specialized hygiene education materials, provision of hand washing stands and construction of latrines resulting to hand washing after toilet use increasing from 12% to 94% while diarrhea rates were reduced from 37% to 11% (Save the Children, 2009). This finding and other literature reviewed do not evaluate child to child approach without the provision of infrastructure, which is not a component of the approach.

2.3.5 WASH in schools

WASH in schools is a holistic approach that deals with both hardware and the software aspects needed to bring about changes in hygiene behavior of students and in the community at large (Peal *et al.*, 2010). Therefore, the approach focuses on provision of WASH infrastructure that includes latrines, hand washing points and waste disposal points, while simultaneously delivering hygiene education to pupils. In this approach emphasis is made on teaching the pupils basic life skills based on their knowledge, attitudes and practices with the aim of changing their hygiene behavior and the hygiene behavior of their families and wider community with a view to improving their quality of life (Mooijman, 2012).

The approach has been implemented in schools in Tanzania where Antwi-Agyei *et al.* (2017) note that there was active participation by key actor though poor planning and coordination, inadequate funding and budgeting, and a lack of spare parts for repairs and maintenance were found to be the main challenges to improved WASH in schools in Tanzania. Peal *et al.,* (2010) concurs that this is a moderately expensive approach due to the infrastructure provision, teacher's training and provision of training materials.

2.3.6 No Strings

No Strings approach uses puppetry whereby children need to make active connections after watching a film, interpreting messages in ways that fit with their own experiences through a range of hands-on puppet activities that are fun, age appropriate and inclusive (No Strings International, 2019). Under this approach, puppets are used as teaching aids. From the roll

out of puppet-based hygiene promotion activities in Nairobi, Kenya, Elrha (2018) notes that children loved the puppet approach which gave them a whole magical and creative experience that they have never had in school and a way of getting to the heart of faecal oral disease transmission.

2.4 Selection of Hygiene Promotion Approaches

WHO (2005), notes that in the implementation of hygiene promotion, good programming flows from a solid understanding of the current situation, a realistic assessment of what is possible, and through drawing in expertise from many actors. To be viewed as health promoting, a school must portray certain features, which include the recognition that specific contextualized local needs will determine the selection of strategies and methods for health promotion (Stephen & Bjarne, 2005). Therefore, school health programs that were effective were likely to be complex, multifactorial and involve activity in more than one component of the health promoting school (Peter, 2007).

Stephen and Bjarne (2005) further noted that to assess and select approaches, teachers must have a basic understanding of concepts of social science and public health, which were not widely taught in educational courses for educators. The Kenya environmental sanitation and hygiene policy (MOH, 2016a) points at the establishment of school clubs as the only hygiene promotion approach to enhance participation and learning of school children on hygiene and environmental sanitation.

2.5 Hygiene Practices in Schools

Inadequate sanitary conditions and poor hygiene practices play major roles in the increased burden of communicable disease within developing countries (Hedge *et al*., 2016). Safe hygiene practices including hand washing have a positive effect in reducing disease burden and improving health indicators. For example, when hand washing is practiced in facilities such as day care centers and primary schools, studies show a 30% reduction in diarrhea cases (Ejemot *et al.*, 2009). Greene *et al.*, (2012) illustrated that hygiene conditions improved substantially in many intervention schools compared with control schools in a cluster randomized trial conducted in Western Kenya. Freeman *et al.*, (2011) have shown a decrease in absenteeism among girls after water and hygiene interventions. These studies illustrate the positive outcomes of safe hygiene practices but do not link the outcomes to a particular hygiene promotion approach.

Access to functional WASH infrastructure however is important. A study by Keidar *et al.*, (2008) revealed that 9 out of 10 students do not use soap when washing hands in school and about 4 out of 10 do not wash hands when out of school. In this study, the lack of access to soap at the schools' water point and lack of adequate water at home was a major contributor to fewer students practicing proper hand washing. Ogola (2010), noted that toilets are lacking in schools and wherever they exist, they are inadequate and in poor condition. These studies illustrate WASH infrastructure as an intervening variable to safe hygiene practices and selection of particular hygiene promotion approaches.

2.6 WASH Related Disease Burden in Study Area

Githuka *et al.*, (2015) noted that 16.5% of all reported cholera cases in Kenya are in Nairobi City County accounting for the second highest number of cholera cases in the country after Wajir County (22%). Alouch (2016) reported that a visit to clinics in the Kawangware area in Dagoretti revealed that 48% of patients seeking medical attention are women and children under twelve years who portray signs of respiratory and stomach infections associated with poor sanitation and hygiene practices. WHO (2017b) noted that continuous transmission of cholera in the affected communities accounted for around 70% of the total cases, with most of the cases coming from the Nairobi City County therefore, the county was purposively selected for this study.

In 2017, Kibra Sub County had the highest number (10.4%) of all reported cases of diarrhea amongst sub counties in Nairobi City County, while cumulatively, Dagoretti North and South Sub Counties were second with 10% of all cases (MoH, 2018). Notably, in January 2018, Dagoretti North and South had the highest number (10.6%) of reported diarrhea cases in Nairobi City County (MoH, 2018) hence, they were purposively selected for the study.

2.7 Research Gap

From the literature reviewed, it was evident that hygiene promotion approaches have a direct association to change in hygiene practices. However, there was limited documentation on selection of hygiene promotion approaches. Additionally, no research had been conducted to establish the hygiene promotion approaches being used and the influence of the approaches on hygiene practices in the proposed study area. Therefore,

this research aimed at establishing the hygiene promotion approaches being employed in public primary schools in Dagoretti North and South Sub Counties, Nairobi City County and whether the approaches influenced hygiene practices amongst pupils.

CHAPTER THREE: RESEARCH METHODOLOGY AND STUDY AREA

3.1 Introduction

This chapter provides a description of the research methodology for the study. This includes the research design, target populations, study population, data collection, data analysis and ethical considerations.

3.2 Study Area

3.2.1 Location of the study

The study was undertaken in public primary schools in Dagoretti North and South, Nairobi City County as shown in figure 3.1. Dagoretti North and South have a population of 364,546 and covers 54.3km², incorporating Dagoretti North and South constituencies that are divided into 10 administrative wards, namely, Kileleshwa, Kilimani, Ngando, Uthiru, Gatina, Kawangware, Mutu-ini, Riruta, Waithaka and Kabiro (NCC, 2016). Dagoretti North and South have a cool climate with gently rolling terrain, several valleys that facilitate drainage into seasonal streams and black cotton and red soils being the dominant types of soils (NCC, 2018).

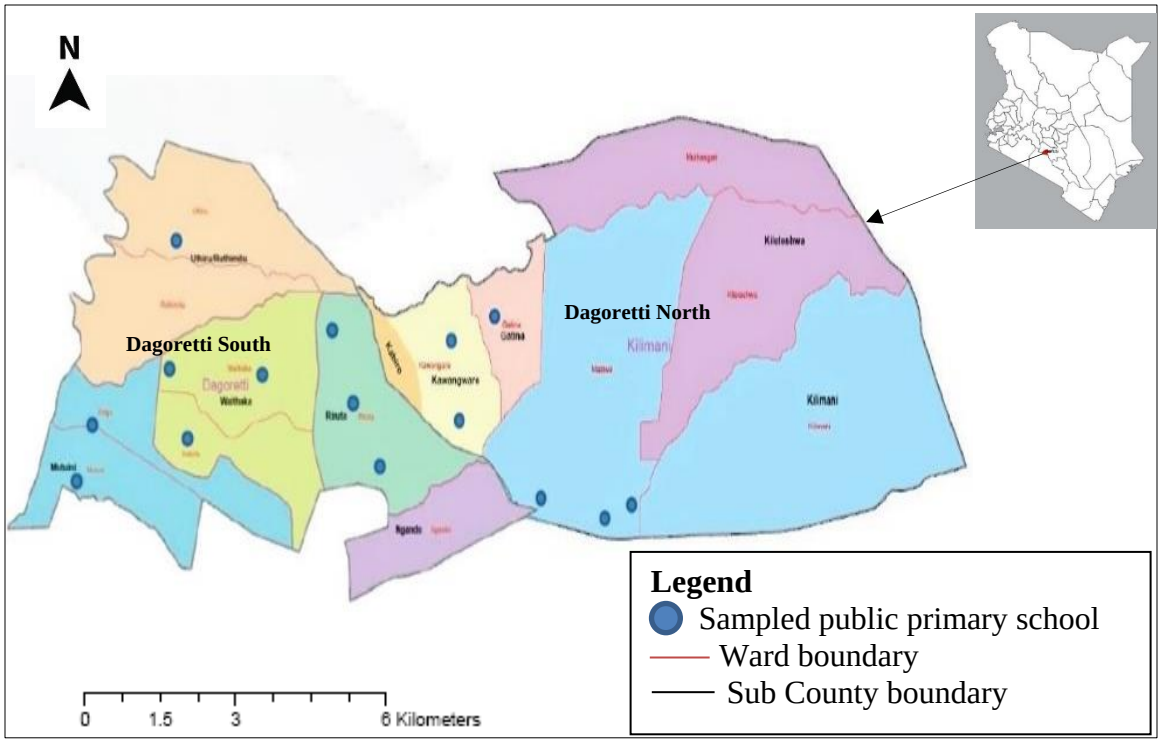


Figure 3.1 Map of Dagoretti North and South Sub Counties in Nairobi City County
Source: NCC (2018)

3.2.2 Study population

Nairobi City County has 2,000 private and 205 public primary schools with a total enrolment of 452,957 pupils, of which, 198,481 (97,817 boys and 100,664 girls) are in public primary schools (NCC, 2018). The study focused on 25 public primary schools in Dagoretti North and South Sub Counties. However, three of the schools exclusively serve pupils with special needs while one serves nursery pupils hence, are excluded from the study. Six schools that were not implementing hygiene promotion activities, were excluded from the study. Therefore, 15 schools were eligible for the study with an enrolment of 14,505 pupils (6,904 boys and 7,601 girls).

Pupils in class 4 to 8 participated in the study. Pupils in lower classes were exempted due to the data collection methods that were employed in this study. Data collection amongst

pupils in lower classes would require the use of child friendly tools, which were not within the scope of this study. To triangulate and validate the research findings, data was also collected from key informants who include school head teachers, school health teachers, county and sub county education and health staff and non-governmental organization staff.

3.3 Variables

All the variables were measured quantitatively. The independent variables were hygiene promotion approaches while dependent variables were hygiene practices that pupils adopted. The study focused on three hygiene practices namely hand washing, toilet use and solid waste disposal. Hand washing practice was measured dichotomously while toilet use and solid waste disposal practices had multiple choices but a single response. The intervening variables constituted functionality, adequacy and accessibility to WASH facilities and determinants of selection of hygiene promotion approaches. Multiple responses were accepted in the questions on intervening variables.

3.4 Research Design

The study applied a descriptive, cross sectional design. A descriptive design is used to collect data on people's opinions, attitudes, habits or any relevant variable or social issue from a cross section of a population with similar characteristics (Orodho, 2014). Cross-section design provides a snapshot of the variables in the study at one point in time (Collis & Hussey, 2009).

This design was chosen because, the researcher was seeking information from a large population over a short period. Quantitative approach was the primary focus in the design data research, but qualitative data was incorporated for corroboration and triangulation (Creswell, 2003). The quantitative approach employed cluster sampling method using probability proportional to size (Skinner, 2016) based on the school population.

3.5 Sample Size and Sampling Procedure

Nairobi City County and Dagoretti North and South Sub Counties were purposively sampled due to the high incidence of WASH related diseases (MoH, 2018). Fifteen public primary schools in Dagoretti North and South were selected for the study (Table 3.1). Though Dagoretti North and South have 10 administrative wards, the 15 sampled schools are distributed in seven wards as follows: three in Kilimani, one in Gatina, one in Uthiru, two in Kawangware, two in Mutu-ini, three in Riruta and three in Waithaka. Enrolment data was collected from the school records through the school head teacher whereas data on selection of hygiene approaches was collected from a teacher in charge of school health. Probability proportion to size sampling technique was used to identify the respondents from the pupil population.

The choice of a sample size is vital to avoid wastage by not being too large and to give confidence to the results of the study by not being too small (Kothari, 1990). To establish the number of pupils for interview, the sample size was determined by using the formula of Fisher *et al.,* (1991):

$$n = \frac{z^2 pq}{d^2}$$

Where:

n - The desired sample size (assuming the population is greater than 10,000)

z - The standard normal deviation, set at 1.96, corresponding to 95% confidence level

p - The proportion in the target population estimated to have a particular characteristic. If there is no reasonable estimate, then use 50 percent (the study used 0.50).

q = 1.0 – p

d = the degree of accuracy desired, here set at 0.05 corresponding to the 1.96.

In substitution, $n = \frac{1.96^2 \times 0.5 \times (1-0.5)}{0.05^2} = 384$

The respondents were drawn from the 15 schools based on probability proportional to size as illustrated in table 3.1.

Table 3.1 Sample size distribution of pupils in Dagoretti North and South Sub Counties target schools

Ward	No	Name of the school	Boys enrolment	Girls enrolment	Total enrolment	PPS % on total pupils	PPS on total pupils	PPS on total boys	PPS on total girls
Kawangware	1	Dagoretti Muslim	413	433	846	6%	22	11	11
	2	Kawangware	663	785	1,448	10%	39	18	21
Gatina	3	Gatina	304	312	616	4%	16	8	8
Kilimani	4	Jamhuri	396	431	827	6%	22	11	11
	5	Joseph Kangethe	281	207	488	3%	13	7	6
	6	Toi primary	323	312	635	4%	17	9	8
Mutu-ini	7	Kirigu	333	361	694	5%	19	9	10
	8	Mutuini	427	399	826	6%	22	11	11
Riruta	9	Ndurarua	681	722	1,403	10%	37	18	19
	10	Riruta HGM	650	832	1,482	10%	39	17	22
	11	Riruta Satellite	797	900	1,697	12%	45	21	24
Uthiru	12	Ruthimitu	122	387	509	4%	13	3	10
Waithaka	13	Gitiba	502	504	1,006	7%	26	13	13
	14	Kabiria	520	512	1,032	7%	28	14	14
	15	Nembu	492	504	996	7%	26	13	13
Total			6,904	7,601	14,505	100%	384	183	201

At classroom level, cluster sampling using systematic picking of samples was used for selection of pupils with a sampling interval of 'k_i□'. This was determined based on the total number of pupils in the class register. Purposive sampling was used in selecting teachers involved in hygiene promotion in the selected schools. A total of 32 teachers participated in the research.

Table 3.2 Sample size distribution of school health teachers in Dagoretti North and South Sub Counties target schools

Ward	No.	Name of the school	Number of school health teachers
Kawangware	1	Dagoretti Muslim	2
	2	Kawangware	4
Gatina	3	Gatina	2
Kilimani	4	Jamhuri	2
	5	Joseph Kangethe	2
	6	Toi primary	2
Mutu-ini	7	Kirigu	2
	8	Mutuini	2
Riruta	9	Ndurarua	2
	10	Riruta HGM	2
	11	Riruta Satellite	2
Uthiru	12	Ruthimitu	2
Waithaka	13	Gitiba	2
	14	Kabiria	2
	15	Nembu	2
Total			32

Officers working on school health activities in Dagoretti North and South Sub County were also purposively sampled for triangulation purposes. These respondents were a non-governmental organization staff and four key county officers from the following offices; county education, county health, sub county education and sub county health.

Table 3.3 Sample size distribution for officers working on school health in Dagoretti North and South Sub Counties

No.	Designation	Number of officers
1	Non-governmental organization staff	1
2	County Education officers	1
3	Sub County Education officer	1
4	County Health Officer	1
5	Sub County health officer	1
	Total	5

3.6 Construction of Research Instruments

3.6.1 Questionnaires

A questionnaire was the main tool used for collecting data from the pupils and school health teachers. Structured questionnaires were administered to 384 school pupils. The pupil's questionnaire had three sections consisting of questions on demographic characteristics, knowledge and practices of hygiene behaviors and knowledge on hygiene approaches. The school health teacher's questionnaire covered questions on knowledge, selection and implementation of hygiene promotion approaches. The questionnaire was administered to 32 school health teachers. In each of the 15 schools, a questionnaire was also used to collect enrolment data from the school's head teacher.

3.6.2 Key Informant Interviews

An interview guide was used to collect data from 5 key informants. The tool covered questions on WASH activities that they supported in the study area, types of hygiene promotion approaches that they were implementing and the factors that led to the selection of a particular approach.

3.6.3 Observation Checklist

An observation checklist was used to cross check hygiene practices amongst the pupils in the schools. The tool was also used to capture data on WASH facilities in a particular school which included the number of toilets, presence of solid waste within the school and functionality of hand washing points.

3.7 Pilot Study

To ensure that data collection instruments are well refined and respondents do not have a problem in answering the questions, ease recording and analysis of data (Saunders *et al.*, 2003), a pilot study was conducted. Pre-testing of the data collection instruments was done in the pilot study to assess clarity of the instrument items, so that those found to be inadequate in measuring the variables were discarded or modified to improve the quality of the research instrument. The pilot study was conducted in two schools in Kibra Sub County targeting 10% of the pupil sample size (Connelly, 2008) and four teachers. Three officers were also interviewed as key informants: a non-governmental organization staff, a sub county public health officer and education officer. Two observation checklists were filled. Kibra Sub County had similar characteristics with Dagoretti North and South. From the pilot study, three questions in the pupil's questionnaire we edited for clarity and additional multiple choices included in four other questions.

3.8 Validity

Validity is the degree to which results obtained from the analysis actually represents the phenomenon under study (Kothari, 2012). To measure construct validity, the researcher defined hypothetical concepts and provided specific measures to be studied. During pilot testing, factor analysis was used to check construct validity. Content validity, on the other hand was realized by providing instructions against questions to ensure the questionnaire collected data that measures the specified research question. To manage extraneous variables and ensure internal validity, data collection was conducted within the same school

term. External validity was ensured through a balanced representation and exposure whereby use of appropriate sampling technique and respondent selection was done.

3.9 Reliability

Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials hence ascertaining whether scores are stable over time when the instrument is administered a second time (Creswell, 2003). To ensure that the research instruments are reliable for the study, Cronbach's Alpha analysis was run on the piloted questionnaires and an acceptable alpha level (0.7 and above) was achieved (Nunnaly & Bernstein, 1994).

3.10 Data Collection Techniques

3.10.1 Questionnaires data collection techniques

Five trained research assistants visited the schools and sort consent from the school head teachers. Using the school enrolment records that were presented by the school head teachers, the research assistants recorded the pupil's enrolment data for the day of the visit. Using the daily enrolment records, the research assistants selected the pupils that would participate in the research with a sampling interval of 'k_i□' (the k^{th} student in the i^{th} school of the j^{th} grade). In all the schools, the school's management allocated a room where a questionnaire on knowledge, attitude and practices was administered to all the respondent pupils within a 30 minutes' session. The pupils filled the questionnaire and on completion, handed it to the research assistants.

Prior to the data collection day, the researcher mobilized the school health teachers in each of the 15 school to avail themselves for a 30 minutes' session where they would fill a questionnaire. During the day of pupil's data collection in a specific school, a questionnaire was also administered to the school health teachers who filled it and handed it to the research assistants. The data collection exercise was coordinated and supervised by the researcher and was completed in 15 days.

3.10.2 Key Informant Interviews data collection Techniques

An interview guide was used to guide the collection of qualitative data from the county health and education officers and a non-governmental organization staff. The researcher visited the staff in their offices and took lead in asking the questions, while a trained research assistant took notes from the interview. Each of these respondents was interviewed separately.

3.10.3 Observation Checklist data collection Techniques

An observation checklist was used to guide the observation of hygiene practices among the pupils. The trained research assistants walked around the school to observe the water, sanitation and hygiene infrastructure. They also observed whether pupils were using latrines and washing their hands after latrine use. The observation checklist was filled on the same day as the pupil's and teacher's questionnaires for each school.

3.11 Data Analysis

The study used qualitative and quantitative techniques for analysis. Data processing and analysis included preparation of data, editing, coding, classification and analysis. The data analysis technique involved the use of both descriptive and inferential statistics which included frequency tables and cross tabulation. Quantitative data was analyzed using descriptive statistics (frequencies and measure of central tendencies) in Statistical Package for Social Scientists software (SPSS). In each school, the most common hygiene approach (independent variable) in the teacher's responses was picked as the dominant approach used by the school.

The frequencies of the independent variables are cross tabulated with dependent variables (hygiene practices amongst pupils). These frequencies are then subjected to Chi-square test of independence. The Chi- square test is also used to establish the influence of intervening variables on the selection of a hygiene promotion approach (independent variable). The Chi-square tests generated p-values for significance. Any p-value less than the set 0.05 level was taken to be significant. Analysis of variance test was used to evaluate if there is a relationship between hygiene knowledge test scores of pupils and the independent variable (hygiene promotion approaches). Results are presented through percentages, means, frequencies and *p*-values. Qualitative data was coded thematically and then analyzed.

3.12 Logistical and Ethical Considerations

Assent from pupils was obtained besides notifying them that they are free to end their participation at any time during the interview if they feel uncomfortable. Since the study involved data collection from school children, a consent was obtained from the County and Sub County Education Directors and respective school's management before interviewing the pupils. The pupils were enlightened on the aim, methods, intention and possible outcomes of the research. To protect confidentiality, records did not contain names or other personal identifiers.

Informed consent was obtained from the other study participants including school health teachers and government and NGO staff. Care was taken not to raise expectations that the participants, schools, family, or community will receive material benefits such as money because of their participation. A research permit was obtained from National Commission for Science, Technology and Innovation while ethical clearance was sought from Kenyatta University's Ethics and Review Committee.

CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter outlines detailed data analysis of the study, interpretation and comparison with other similar studies. Data analysis was based on the specific objectives and research questions of the study and presented using tables, graphs and pie charts.

4.1.1 Social demographic characteristics of the study population

Table 4.1 represents a summary of the social demographic characteristics of the study population. The study had a 100% response rate. As per the sample size distribution 52.3% (201, n = 384) of the respondents were girls while 47.7% (183, n = 384) were boys. The mean age of the pupil respondents was 12.2 years. Majority of the school health teachers (75%) were female.

Table 4.1 Social demographic characteristics of study population

Variable	N or mean	Percent
Population in target schools		
Boys	9,483	49.9%
Girls	9,524	50.1%
Total	19,007	100%
Pupils interviewed		
Boys	183	47.7%
Girls	201	52.3%
Pupils mean age in years	12.2	
Pupils interviewed per grade		
Grade 4	61	15.9%
Grade 5	69	18.0%
Grade 6	95	24.7%
Grade 7	81	21.1%
Grade 8	78	20.3%
School health teachers interviewed		
Male	8	25%
Female	24	75%

4.2 Proportion of Pupils Who Practice Safe Hygiene Practices

The research sought to establish if pupils practice safe hygiene behaviors using three indicators, hand washing at critical times, toilet use and safe disposal of solid waste. Results indicate that 95.6% of the pupils practice hand washing at critical times, 98.7% use the toilet while 85.4% safely dispose solid waste. However, 4.7% of the respondents only use the toilet at home while 7.8% do not practice safe disposal of solid waste both at school and home. Table 4.2 illustrates that 87.2% of the pupils were practicing all three safe

hygiene practices while 12% were practicing at least two safe practices. Less than 1% of the pupils were practicing one safe hygiene practice.

Table 4.2 Number of safe hygiene practices reported to be practiced by the pupils

Number of safe hygiene practices	Boys	Percentage of boys	Girls	Percentage of girls	Total pupils	Total percentage of pupils
One safe hygiene practice	0	0.0%	3	100.0%	3	0.8%
At least two safe hygiene practices	22	47.8%	24	52.2%	46	12.0%
All three safe hygiene practices	161	48.1%	174	51.9%	335	87.2%
Total	183		201		384	100.0%

From the key informant interviews with sub county and county education and health officers, it was noted that school WASH infrastructure is not adequate based on Ministry of Education standards. From the pupil's responses 39.8%, 45.1% and 71.4% noted that hand washing facilities in school are adequate, functional and accessible respectively (table 4.3). Water shortages were noted to be the main reason for non-functionality of hand washing points in 40% of the schools.

Table 4.3 Comparison of hand washing at critical times and adequacy, functionality and accessibility of hand washing points in school.

		We have adequate hand washing points in school		We have functional hand washing points in school		We have hand washing points in school but they are not accessible	
		Disagree	Agree	Disagree	Agree	Disagree	Agree
Do you wash your hands at critical times	No	16	1	11	6	12	5
	Yes	215	152	200	167	262	105
Total		231	153	211	173	274	110
Percent		60.2%	39.8%	54.9%	45.1%	71.4%	28.6%
p-value		0.03		0.41		1.00	

There was a significant relationship between hand washing at critical times and adequacy of hand washing points, $\chi^2(1) = 8.6$, $p<0.05$. There was no significant relationship between hand washing at critical times and functionality of hand washing points in school $\chi^2(1) = 0.68$, $p>0.05$ and between hand washing at critical times and accessibility of the hand washing point in school ($p=1.00$).

From the pupil's responses 77.9%, 86.2% and 57% noted that their school had toilets and they are adequate, accessible and clean respectively (table 4.4). Through the observation check list, the average toilet to pupil ratio is 1:55 for boys and 1:43 for girls. Pupils were observed using toilets. There was a significant relationship between toilet use and adequacy of toilets, ($p=0.02$). There was no significant relationship between toilet use and accessibility to the toilets ($p=0.47$) and cleanliness of the toilets in school ($p=0.59$).

Table 4.4 Comparison of toilet use and adequacy, accessibility and cleanliness of toilets in school.

		We have toilets in school but they are not adequate		We have toilets in school but they are not accessible		We have toilets in school but they are not clean	
		Disagree	Agree	Disagree	Agree	Disagree	Agree
Do you have a habit of using the toilet when in school and at home	Yes, in school and at home	275	83	307	51	207	151
	Yes, in school only	1	2	3	0	2	1
	Yes, at home only	18	0	16	2	8	10
	Not at all	5	0	5	0	2	3
Total		299	85	331	53	219	165
Percent		77.9%	22.1%	86.2%	13.8%	57%	43%
p-value		0.02		0.47		0.59	

4.3 Hygiene Promotion Approaches in Schools

This study aimed at establishing the hygiene promotion approaches employed by public primary schools in Dagoretti North and South Sub Counties to improve hygiene practices amongst pupils. Figure 4.1 illustrates the dominant hygiene promotion approaches that were implemented in the 15 schools.

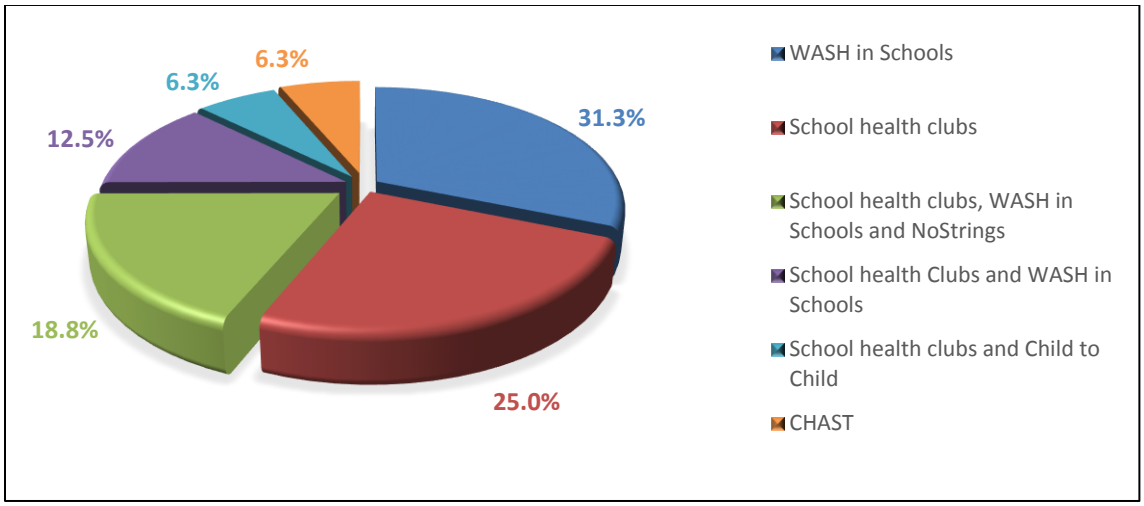


Figure 4.1 Dominant hygiene promotion approaches applied in public primary schools in Dagoretti North and South Sub County, Nairobi City County.

Results indicate that 31.3% of the school health teachers are implementing WASH in schools approach while school health clubs approach is implemented by 25% (figure 4.1). A combination of school health clubs, WASH in schools and No Strings is implemented by 18.8% of the school health teachers. A combination of school health clubs and WASH in schools is implemented by 12.5% of the school health teachers. A combination of school health clubs and Child to Child approaches is implemented by 6.3%, with CHAST being implemented by 6.3% of the school health teachers. None of the teachers is applying SLTS.

The study sort to establish if the school health teachers perceived the approaches they are using as successful in improving hygiene practices amongst pupils in their respective

schools. It was noted that 50% of the school health teachers perceived the hygiene promotion approach they use as being successful while, 46.9% and 3.1% perceive it is partially successful and not successful respectively.

Results from analysis of the pupil's questionnaire indicate that 92.7% of the pupils reported to have received hygiene messages in the current school term while in school. This was affirmed by 90.6% of the school health teachers who agree to having held hygiene promotion activities in their respective schools in the current school term. Multiple messages were received by the pupils with the most common hygiene message being the need for hand washing with soap at critical times (77.1%). Other messages received include, good food hygiene (60.2%), water treatment (60.2%), proper solid waste disposal or management (52.3%), latrine use (48.2%) and safe disposal of infants' faeces (46.1%).

4.4 Factors Influencing Selection of Hygiene Promotion Approaches in Schools

One of the study objectives was to establish the factors influencing the selection of hygiene promotion approaches by public primary schools in Dagoretti North and South. The study sought to understand the hygiene approaches that teachers knew. Results indicate that 87.5% of the school health teachers reported knowledge of WASH in schools approach as illustrated in figure 4.2.

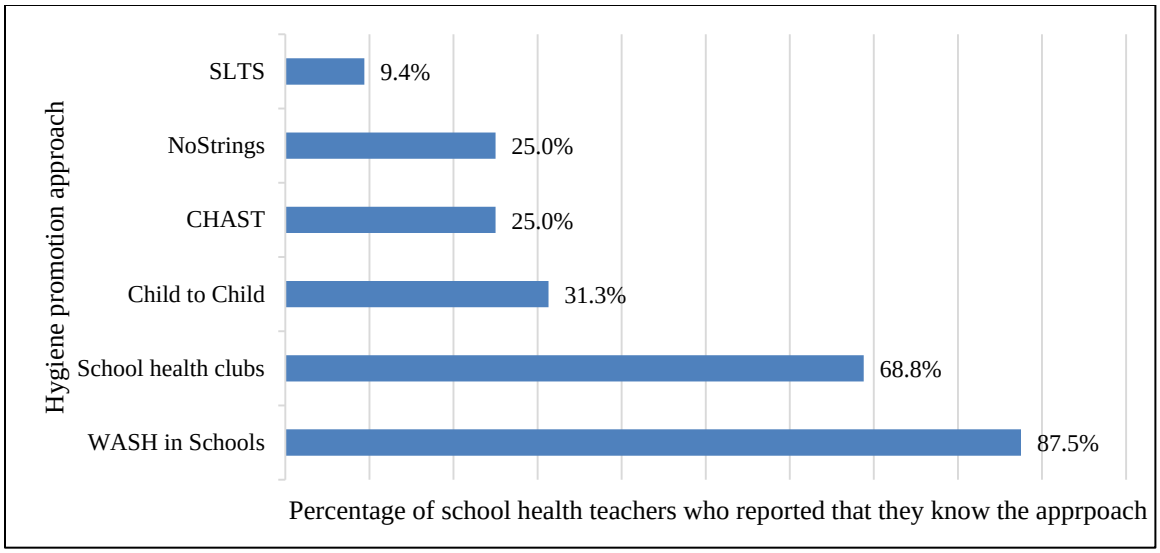


Figure 4.2 Hygiene promotion approaches known by school health teachers in public primary schools in Dagoretti North and South Sub County, Nairobi City County.

To understand the factors influencing selection of hygiene promotion approaches, the study sought to establish if the teachers were trained on hygiene promotion and if they perceived that their respective schools had adequate capacity to select appropriate hygiene promotion approaches. Results reveal that 34.4% of the school health teachers are not trained on hygiene promotion while 90.6% feel that either their school does not have adequate capacity or requires support in selection of appropriate hygiene promotion approaches.

The study also established that hygiene promotion activities are selected and implemented by different stakeholders in the school. Majority of the respondents (84.4%) noted that the school's health teacher is involved in selection of hygiene approaches. However, about a half (51.9%) of the respondents revealed that whenever the school health teacher is involved in selection of a hygiene promotion approach, he/she does so in consultation or with the support of non-governmental organization and government officers.

After selection of a hygiene promotion approach, majority (90.6%) of the respondents noted that the school health teacher is involved in the implementation of the approach. As was the case with selection of the approach, most of the respondents (68.8%) revealed that the school health teacher implements the approach with support from non-governmental organization and government officers. This was further confirmed by the non-governmental organization, sub county and county health and education officers who noted that in most cases, they support the school health teachers during selection and implementation of hygiene promotion approaches in schools.

The study delved into understanding the perceived factors that influence the selection and implementation of the approach. Figure 4.3 illustrates that 62.5% of the school health teachers perceive that the main factor that led to the selection and implementation of a specific hygiene promotion approach is, if the school's management supported the approach. The non-governmental organization, sub county and county health officers also noted that the involvement of school head teachers is critical in implementation of hygiene promotion in schools in Dagoretti North and South Sub Counties. They further noted that availability of funds to finance sanitation and hygiene infrastructure is key in the implementation of WASH in schools approach and that schools implementing this approach have support from either a non-governmental organization or government.

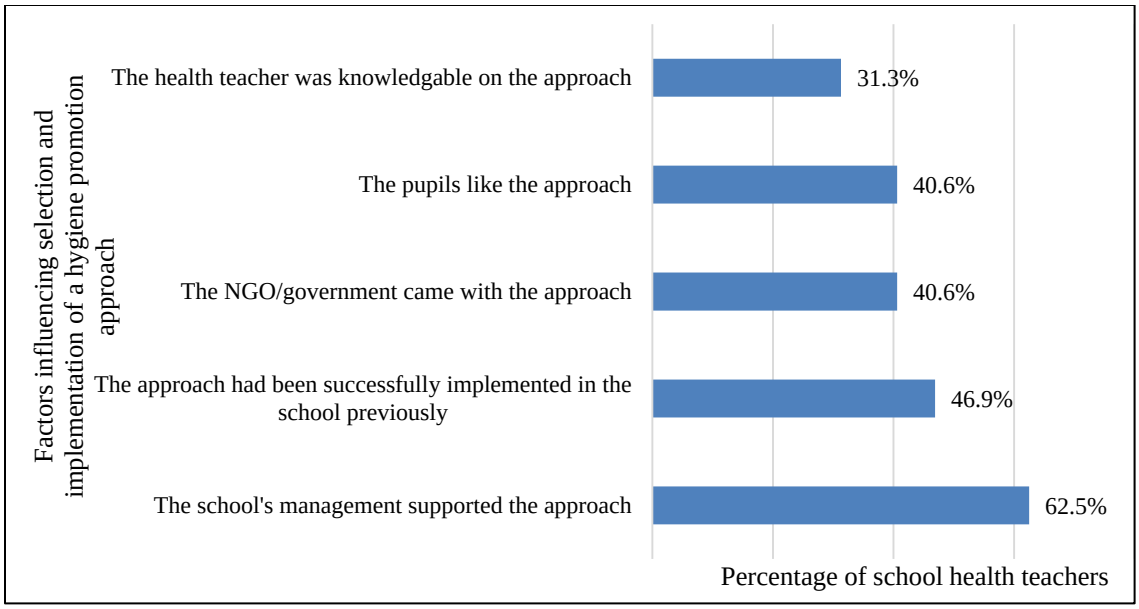


Figure 4.3 Factors that influenced selection and implementation of a hygiene promotion approach.

Multiple responses from the school health teacher on factors that could have influenced selection of a hygiene promotion approach were compared with the selected approach. As illustrated in figure 4.4, the study established that 19% of school health teachers that implemented a combination of school health clubs, WASH in schools and No Strings approaches select the approaches because the non-governmental organization or government officers came with the approach. A quarter (25%) of the school health teachers that implemented WASH in schools select the approach because the school management supported the approach. Thirty-two percent of the school health teachers that implemented school health clubs select the approach because the approach had been successfully implemented in the school previously and the school health teacher was knowledgeable on the approach.

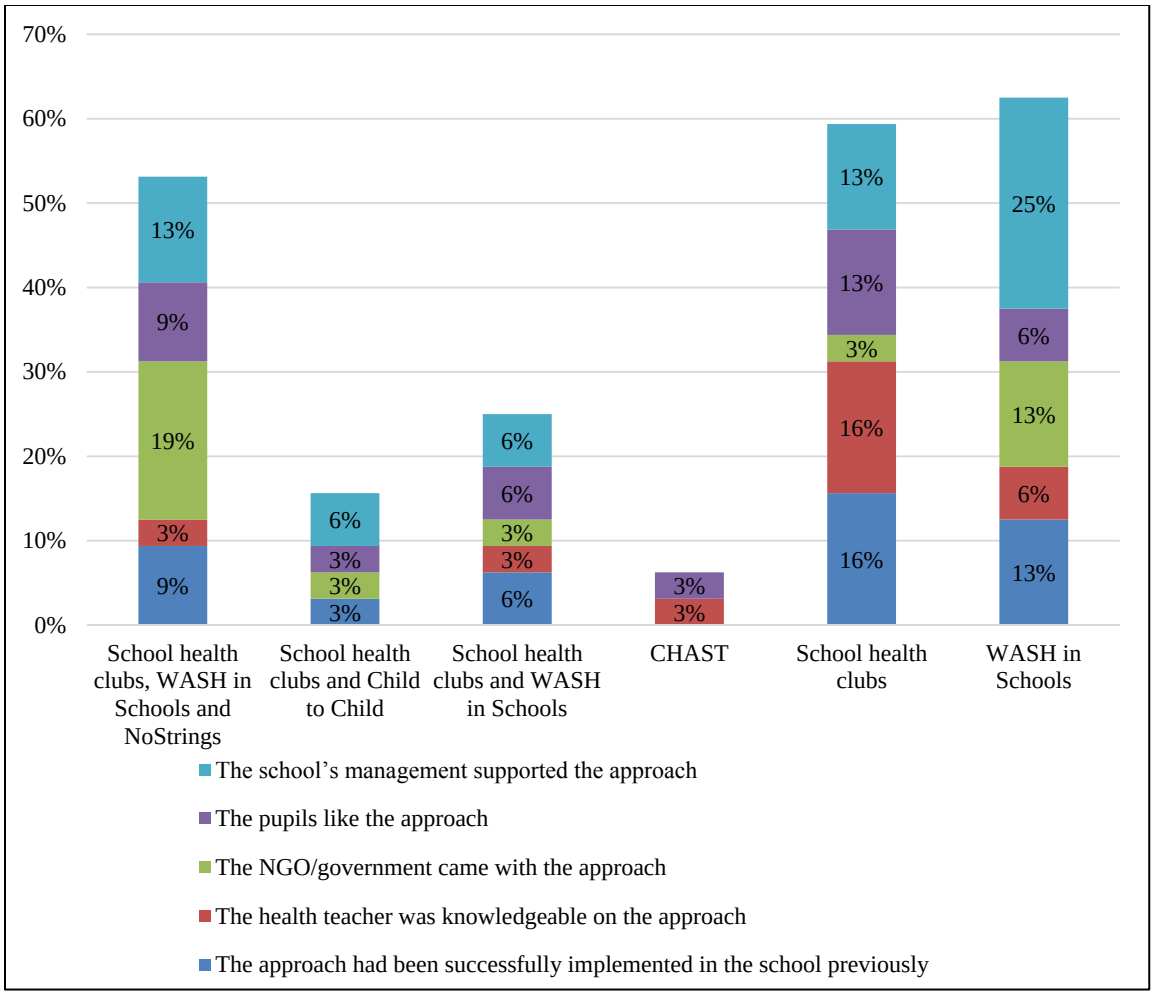


Figure 4.4 Comparison of factors that influenced selection of a hygiene promotion approach and the selected approach.

Factors influencing selection and implementation of a hygiene approach were tabulated against the dominant hygiene approach as illustrated in table 4.5. Fisher's exact test was then applied to establish if there is a significant relationship between the perceived factors that could have influenced selection of a hygiene promotion approach and the selected approach. There was a significant relationship between selection of an approach due to the factor that the non-governmental organization or government came with the approach and a combination of school health clubs, WASH in schools and No Strings ($p=0.02$).

Table 4.5 Comparison of factors influencing selection and implementation of hygiene promotion approach and the dominant hygiene approach

Factors influencing selection and implementation of a hygiene promotion approach		Dominant hygiene approach						Total
		School health clubs, WASH in Schools and No Strings	School health clubs and Child to Child	School health clubs and WASH in Schools	CHAST	School health clubs	WASH in Schools	
The approach had been successfully implemented in the school previously	Disagree	3	1	2	2	3	6	17
	Agree	3	1	2	0	5	4	15
Total		6	2	4	2	8	10	32
p-value		1.00	1.00	1.00	0.49	0.42	0.71	
The health teacher was knowledgeable on the approach	Disagree	5	2	3	1	3	8	22
	Agree	1	0	1	1	5	2	10
Total		6	2	4	2	8	10	32
p-value		0.64	1.00	1.00	0.53	0.07	0.44	
The NGO/government came with the approach	Disagree	0	1	3	2	7	6	19
	Agree	6	1	1	0	1	4	13
Total		6	2	4	2	8	10	32
p-value		0.02	1.00	0.63	0.50	0.10	1.00	
The pupils like the approach	Disagree	3	1	2	1	4	8	19
	Agree	3	1	2	1	4	2	13
Total		6	2	4	2	8	10	32
p-value		0.67	1.00	1.00	1.00	0.68	0.14	
The school's management supported the approach	Disagree	2	0	2	2	4	2	12
	Agree	4	2	2	0	4	8	20
Total		6	2	4	2	8	10	32
p-value		1.00	0.52	0.62	0.13	0.43	0.25	

Further, there was no significant relationship between selection of an approach due to the factor that it had been previously implemented in the school and a combination of school health club, WASH in schools and No Strings (*p=1.00*), a combination of school health clubs and Child to Child (*p=1.00*), a combination of school health clubs and WASH in schools (*p=1.00*), CHAST (*p=0.49*), school health clubs (*p=0.42*) and WASH in schools (*p=0.71*).

There was no significant relationship between selection of an approach due to the factor that the school health teacher was knowledgeable on the approach and a combination of school health club, WASH in schools and No Strings (*p=0.64*), a combination of school health clubs and Child to Child (*p=1.00*), a combination of school health clubs and WASH in schools (*p=1.00*), CHAST (*p=0.53*), school health clubs (*p=0.07*) and WASH in schools (*p=0.44*).

There was no significant relationship between selection of an approach due to the factor that the non-governmental organization or government officer came with the approach and a combination of school health clubs and Child to Child (*p=1.00*), a combination of school health clubs and WASH in schools (*p=0.63*), CHAST (*p=0.50*), school health clubs (*p=0.10*) and WASH in schools (*p=1.00*).

There was no significant relationship between selection of an approach due to the factor that pupils liked the approach and a combination of school health club, WASH in schools and No Strings (*p=0.67*), a combination of school health clubs and Child to Child (*p=1.00*),

a combination of school health clubs and WASH in schools (*p=1.00*), CHAST (*p=1.00*), school health clubs (*p=0.68*) and WASH in schools (*p=0.14*).

There was no significant relationship between selection of an approach due to the factor that the school's management supported the approach and a combination of school health club, WASH in schools and No Strings (*p=1.00*), a combination of school health clubs and Child to Child (*p=0.52*), a combination of school health clubs and WASH in schools (*p=0.62*), CHAST (*p=0.13*), school health clubs (*p=0.43*) and WASH in schools (*p=0.25*).

4.5 Relationship Between Hygiene Approaches and Practices Amongst Pupils

Hygiene practices were then compared with the hygiene promotion approach that was used to pass hygiene messages to the pupils. From figure 4.5, hand washing (99.1%) and safe solid waste disposal (92.5%) practices are highest amongst pupils who had received hygiene messages through the school health clubs. Toilet use is highest (97.4%) amongst pupils who received hygiene messages through a combination of school health clubs and WASH in schools.

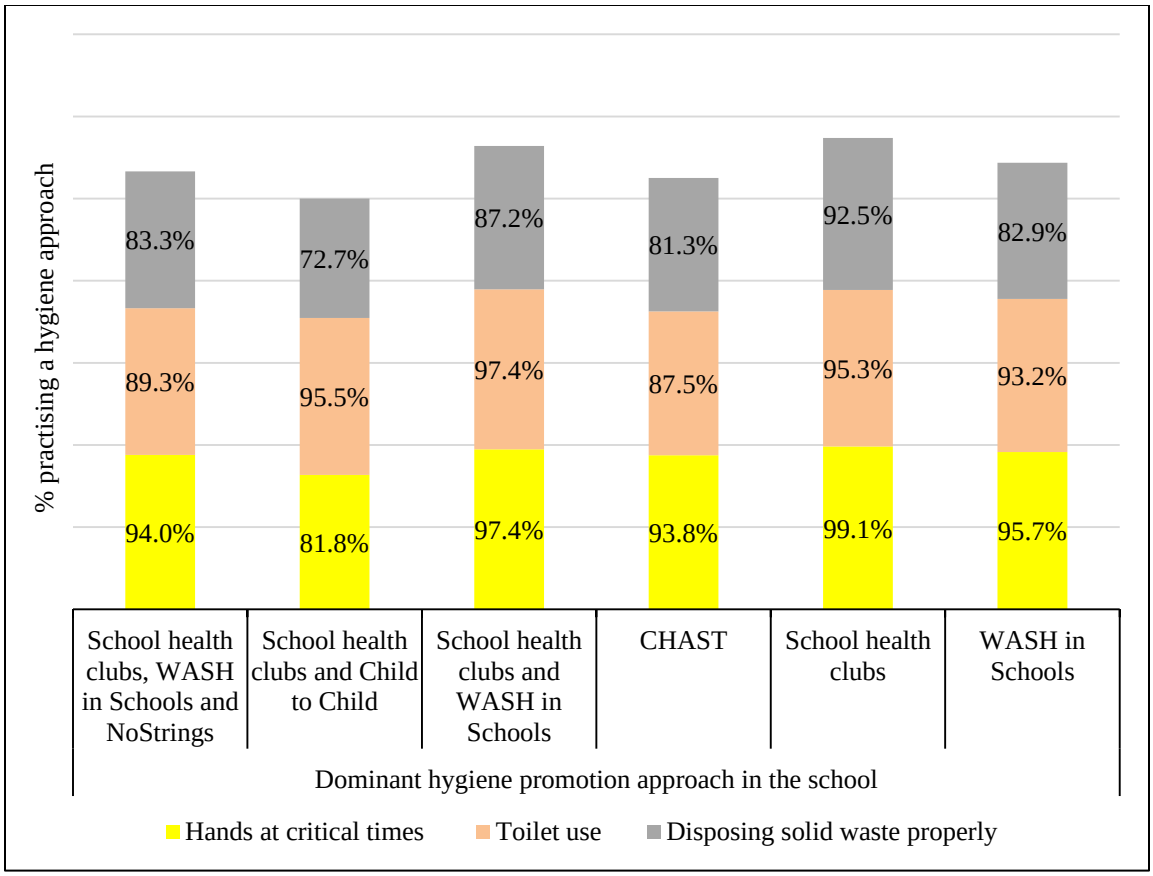


Figure 4.5 Comparison of dominant hygiene promotion approaches and hygiene practices.

From figure 4.5, school health clubs approach had a reduced percentage outcome to hand washing at critical times when combined with Child to Child (81.8%), WASH in Schools (97.4%) and No Strings approach (94%). School health clubs approach (95.3%) and WASH in school (93.2%) had a synergistic support (97.4%) to toilet use when implemented concurrently. WASH in schools (82.9%) had a synergistic support to proper solid waste disposal when implemented with School health clubs (87.2%). School health clubs (92.5%) had a reduced percentage outcome to proper solid waste disposal when implemented with Child to Child (72.7%) and a combination of WASH in schools and No Strings (83.3%).

Table 4.6 Comparison of hygiene practices and hygiene promotion approach

		Dominant hygiene promotion approach in the school					
		School health clubs, WASH in Schools and No Strings	School health clubs and Child to Child	School health clubs and WASH in Schools	CHAST	School health clubs	WASH in Schools
Do you wash your hands at critical times	No	5	4	1	1	1	5
	Percent	6.0%	18.2%	2.6%	6.3%	0.9%	4.3%
	Yes	79	18	38	15	105	112
	Percent	94.0%	81.8%	97.4%	93.8%	99.1%	95.7%
	Total	84	22	39	16	106	117
	p-value	0.54	0.01	1.00	0.52	0.04	1.00
Do you have a habit of using the toilet when in school and at home	Yes, in school and at home	75	21	38	14	101	109
	Percent	89.3%	95.5%	97.4%	87.5%	95.3%	93.2%
	Yes, in school only	2	0	0	0	0	1
	Percent	2.4%	0.0%	0.0%	0.0%	0.0%	0.9%
	Yes, at home only	6	1	1	2	3	5
	Percent	7.1%	4.5%	2.6%	12.5%	2.8%	4.3%
	Not at all	1	0	0	0	2	2
	Percent	1.2%	0.0%	0.0%	0.0%	1.9%	1.7%
	Total	84	22	39	16	106	117
	p-value	0.24	0.81	0.52	0.52	0.32	0.97
Do you have a habit of disposing solid waste properly while in school and at home	Yes, in school and at home	70	16	34	13	98	97
	Percent	83.3%	72.7%	87.2%	81.3%	92.5%	82.9%
	Yes, in school only	5	2	0	0	0	3
	Percent	6.0%	9.1%	0.0%	0.0%	0.0%	2.6%
	Yes, at home only	4	1	2	0	3	6
	Percent	4.8%	4.5%	5.1%	0.0%	2.8%	5.1%
	Not at all	5	3	3	3	5	11
	Percent	6.0%	13.6%	7.7%	18.8%	4.7%	9.4%
	Total	84	22	39	16	106	117
	p-value	0.22	0.3	0.52	0.25	0.02	0.8

From table 4.6, there was a significant relationship between school health clubs approach and hand washing at critical times (p=0.04) and proper solid waste disposal (p=0.02).

There was no significant relationship between toilet use and all the hygiene promotion approaches (School health clubs, WASH in Schools and No Strings (p=0.24), School health clubs and Child to Child (p=0.81), School health clubs and WASH in Schools (p=0.52), CHAST (p=0.52), School health clubs (p=0.32), WASH in schools (p=0.97)).

From table 4.7, 327 (85.2%) pupils practicing hand washing at critical times and 237 (61.7%) using a toilet, noted that these practices are influenced by the training they had received on the importance of hand washing and toilet use while in school respectively. There was a significant relationship between hand washing at critical times and training on importance of hand washing (*p=0.00).*

Table 4.7 Comparison of hand washing at critical times, toilet use and training on the importance of hand washing and toilet use respectively.

		I practice because I have been trained on the importance of hand washing		
		Disagree	Agree	Total
Do you wash your hands at critical times?	Yes	40	327	367
	No	9	8	17
	Total	49	335	384
	p-value			0.00
		I practice because I have been trained on the importance of using toilets		
		Disagree	Agree	Total
Do you have a habit of using the toilet?	Yes	142	237	379
	No	1	4	5
	Total	143	241	384
	p-value			0.66

To test the pupil's knowledge on hygiene, questions on general understanding of hygiene, how to maintain good hygiene, critical hand washing times, signs of poor hygiene and causes of diarrhea were posed to each of the respondent through a questionnaire. Results indicate that 53.1% of the respondents scored more than 75%, with 29.7% of the

respondents scoring between 50% and 75%, while 17.2% scored below 50%. A one-way analysis of variance test was conducted to evaluate if there was a difference between hygiene knowledge test scores of pupils (n = 384) and the hygiene promotion approaches.

Prior to conducting the ANOVA, the assumption of homogeneity of variance was tested and failed to satisfy Levene's F test, $F(5, 378) = 4.89$, $P < 0.05$, hence Brown-Forsythe F test was applied. The independent variable hygiene promotion approach included types of approaches: school health clubs, WASH in schools and No Strings (M = 21.14, SD = 3.91, n = 84), school health clubs and Child to Child (M = 18.23, SD = 6.87, n = 22), school health clubs and WASH in schools (M = 16.10, SD = 5.56, n = 39), CHAST (M = 17.58, SD = 2.57, n = 19) and No Strings (M = 17.05, SD = 3.11, n = 84). There was a significant difference among the hygiene promotion approaches on hygiene knowledge, $F(5, 162) = 6.41$, $p < .05$ $\eta^2_p = 0.076$.

4.6 Discussion

4.6.1 Hygiene practices amongst pupils

The study findings established that pupils in Dagoretti North and South Sub Counties widely practice safe hygiene (95.6% of the pupils practice hand washing at critical times, 98.7% use the toilet while 85.4% safely dispose solid waste). There was a significant relationship between hand washing at critical times and adequacy of hand washing points however, there was no significant relationship between hand washing at critical times and functionality or accessibility to hand washing point. Though 95.6% of the respondents practice hand washing at critical times, only 39.8% indicated that handwashing facilities

were adequate. The findings concur with conclusions from a study conducted in schools in Tanzania that found that although WASH facilities were available in some of the schools, they were inadequate (Antwi-Agyei *et al*., 2017).

There was significant relationship between toilet use and adequacy of toilets with the average toilet to pupil ratio of 1:53 for boys and 1:43 for girls. MoE (2008) recommends a ratio of 1:30 for boys and 1:25 for girls. Regardless of the low toilet to pupil ratio, the study established that majority (98.7%) of the pupils use the toilet. Noting that WASH in schools which incorporates construction of toilets was implemented by a third of the schools, these findings agrees with Joshua *et al* (2014), that schools with worst ratios, are most likely to benefit, in terms of increased toilet use, from the addition of even a small number of toilets.

There was no significant relationship between toilet use and cleanliness of the toilets in school. Although toilet use was high (98.7%) among the respondents, 43% of them indicated that the school toilets were not clean. This finding agrees with Joshua *et al* (2014), that many pupils are not discriminating which facilities they used based on toilet cleanliness. However, this finding differs with a previous study in India which detected both a meaningful and statistically significant associations between toilet cleanliness and toilet use (Mathew *et al*, 2009). The difference between the two studies can be attributed to the time bound software and hardware interventions (trainings and construction of toilets) that were implemented in India just before the research was undertaken.

4.6.2 Hygiene promotion approaches in school

The study observed that majority of the schools were delivering hygiene messages to pupils through the WASH in schools approach, which is a comprehensive approach that integrates teachers and pupils trainings and construction of WASH facilities. The study also established that 87.2% of the respondents practiced all the three safe hygiene practices. This agrees with a study that observed that there was evidence that a comprehensive school-based WASH intervention can have a positive impact on pupil health (Trinies *et al*, 2016). The choice of WASH in schools approach and the presence of non-governmental organizations and government support in these schools point at external financial support to implement this approach.

A study by Julie *et al* (2017) points at the importance of organizational support as a key factor in the sustainability of health service interventions especially in school- based handwashing promotion interventions whereby WASH infrastructure and maintenance, will impact the sustainability of these interventions. School health clubs approach was also widely used in delivering hygiene messages to pupils. This observation agrees with a previous study that noted that there were more children's clubs for WASH/health in the input schools than in the other schools and they met more frequently, according to both the teachers and the children (Njuguna *et al*, 2008).

4.6.3 Factors influencing selection of hygiene promotion approaches in schools

The study found out that the major factor influencing selection of a hygiene promotion approach, was support by the school's management. This illustrates the importance of

recognizing and utilizing the established decision-making structure in learning institutions. Javaid (2009) notes that school head teachers who are the managers of schools can play an important role of serving as examples and leaders even though majority lack the necessary training.

The study established that the school health teacher was involved during the selection and implementation of the hygiene promotion approach. This points at the school health teacher playing a critical role in the success of a hygiene promotion approach. A Canadian study concerning hygiene promotion programs implementation factors showed similar results: teachers who believe that they have a role in promoting healthy lifestyles and teachers who perceive their interventions as a means of school improvement are more favorably disposed to implementing hygiene promotion programs (Deschesnes *et al*, 2010).

The preference to use school health club approach could be due to the ease of formation of clubs and delivering messages which is almost similar to common teaching methods applied by teachers while delivering the education curriculum. This observation is supported by Jourdan *et al* (2002) who notes that teacher's views of their role in hygiene promotion are closely linked to teacher's professional identity.

There was also a significant relationship between selection of an approach due to the factor that the non-governmental organization or government came with the approach and a combination of school health clubs, WASH in schools and No Strings. This could be attributed to the structured nature of WASH in schools and No Strings approaches and linked to the study findings, that most school health teachers felt that either their school

did not have adequate capacity or required support in selection of appropriate hygiene promotion approaches. This finding further points to external support which includes government and other agencies who bring financial and material support hence, school health teachers prefer to get support in the selection and implementation of WASH in schools and No Strings approaches.

Though about a third (34.4%) of the school health teachers are not trained on hygiene promotion, this may not be a prerequisite to implementing successful hygiene promotion in schools. This observation is supported by an evaluation of an intervention in Kenyan schools that found no evidence that teacher trainings and school health club activities improved handwashing behavior (Njuguna *et al*, 2008).

4.6.4 Relationship between hygiene approaches and practices amongst pupils

There was a significant relationship between school health clubs and hand washing at critical times. A further analysis revealed that pupils receiving hygiene messages through the school health club approach were more likely to practice hand washing at critical times. Hand washing at critical times was the most common message received by pupils and there was a significant relationship between hand washing and training on importance of hand washing. These findings agree with Stewart-Brown (2006) that programs to promote some aspects of health are more effective than those that promote other aspects. Training on importance of hand washing is an intervention through the various hygiene promotion approaches. Ejemot et al. (2009) notes that the intervention group reported hand washing seven times a day compared with four times daily in the control group.

The research findings established that there was no significant relationship between toilet use and any of the hygiene promotion approaches. This observation agrees with earlier studies that noted that a school-based sanitation education intervention did not have a significant impact on pupils' open defecation behaviors (Gyorkos et al, 2013).

There was no significant relationship between proper solid waste disposal and most of the hygiene promotion approaches. This result contradicts Kola-Olusanya & Ahove (2015) findings that environmental health education has positive influence on Nigerian pupils' attitude and belief towards solid waste disposal. In the Nigeria study, structured trainings on waste disposal were conducted and thereafter, pre and post training results were compared. Further, the study findings established that there was a significant difference among the hygiene promotion approaches on hygiene knowledge. This finding agrees with George *et al* (2018) who observed that the mean score of posttest was greater than pretest amongst upper primary school children who had received personal hygiene messages through Child to Child approach.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter outlines the summary of the findings, conclusion and recommendations of the study based on the research objectives.

5.2 Summary

The study found out that majority of pupils in Dagoretti North and South Sub Counties practice safe hygiene. Adequacy of hand washing facilities and toilets was also found to significantly influences hand washing at critical times and toilet use respectively. Further, functionality and accessibility to hand washing facilities does not significantly influence hand washing at critical times. Similarly, cleanliness and accessibility of toilets does not significantly influence toilet use amongst pupils in Dagoretti North and South Sub Counties.

The study found out that WASH in schools approach is the most widely used hygiene promotion approach in public primary schools in Dagoretti North and South Sub Counties. School health clubs approach is also used by a significant number of schools. Majority of the teachers and pupils confirmed that hygiene promotion activities were being held in their respective schools with the most common hygiene message being hand washing with soap at critical times.

On factors influencing hygiene promotion approaches, the study found out that the support of the school's management was a major factor during selection of an approach. Further,

the school health teacher was a critical factor in the successful selection and implementation of hygiene promotion approaches. The teachers were found to be knowledgeable on hygiene promotion approaches though most of them prefer getting support from non-governmental organizations and government officers during selection of the approaches. This can be attributed to provision of funds and materials that accompanies such support. The teachers were found to have a tendency of selecting hygiene promotion approaches which they are knowledgeable on.

Finally, the study found out that different hygiene promotion approaches have the potential to influence hand washing at critical time and proper solid waste disposal amongst pupils in public primary schools in Dagoretti North and South Sub Counties. School health club approach was found to be the most successful in leading pupils in the study area towards practicing hand washing at critical times and proper solid waste disposal.

5.3 Conclusion

This study came up with four main conclusions. First, from the findings that majority of pupils had received hygiene promotion messages and practice safe hygiene it is logical to conclude that most pupils in the study area understand the importance of safe hygiene. The study also concludes that adequacy of WASH facilities is a critical factor in encouraging pupils to practice safe hygiene.

Secondly, WASH in schools and school health club approaches are widely used by schools in the study area. It is worthwhile to note that WASH in schools approach entails active

school clubs with children in school (Peal *et al.,* 2010). From this finding, the study concludes that school health clubs are widely used to channel information on safe hygiene to pupils in the study area.

Thirdly, the involvement of the school's management and school health teacher were found to be critical factors in successful selection and implementation of hygiene promotion approaches. The importance of the school health teacher can further be attributed to the significant contact time with pupils and their perceived understanding of the school environment, which includes the WASH infrastructure, pupil's behaviors and school management preferences.

Finally, different hygiene promotion approaches were found to influence hand washing at critical time and proper solid waste disposal amongst pupils. This leads to the conclusion that different hygiene promotion approaches have varying levels of success when used to improve specific hygiene practices.

5.4 Recommendations

5.4.1 Recommendations from the study

a) School's management in public primary schools should provide adequate WASH facilities in line with the Ministry of Education guidelines in order to encourage pupils to practice safe hygiene.
b) School's management in public primary schools in Dagoretti North and South Sub Counties should embrace the formation of school health clubs since they have the

potential to improve hygiene practices amongst pupils. This approach can also be easily transformed to WASH in schools approach when WASH infrastructure construction commences in the school.

c) Any organization or persons seeking to implement hygiene promotion activities in public primary schools should ensure that the school's management and health teacher are involved in all the activities or project processes for realization of intended behavior change amongst pupils.

d) Non-governmental organizations and the ministries of health and education should endeavor to support school health teachers in selection of appropriate hygiene promotion approaches in public primary schools in Dagoretti North and South Sub Counties.

5.4.2 Recommendations for further research

a) It is desirable to establish to what extent the retention of hygiene knowledge influences practicing of safe hygiene behaviors amongst pupils in public primary schools. This could be useful in design of hygiene promotion activities and help school health practitioners understand barriers to practice of safe hygiene amongst pupils.

b) A study to establish the cost of implementing WASH in schools and school health club approaches in public primary schools should be conducted as this would be useful in planning for holistic implementation of the approaches.

REFERENCES

Adhikari, S., & Namaste, L.S. (2008). School Led Total Sanitation: A successful model to promote school and community sanitation and hygiene in Nepal. London and Delft: WaterAid and IRC.

Alouch, K. (2016). Schools hand WASH initiative proposal. Retrieved from www.tippytap-kenya.org/img/resource.pdf

Annemarieke, M., Harold, E., & Vincent, T. (2013). School health clubs in Ghana. Accra: Ghana Education Service.

Antwi-Agyei, P., Mwakitalima, A., Seleman, A., Tenu, F., Kuiwite, T., Kiberiti, S. & Roma, E. (2017). Water, sanitation and hygiene in schools: Results from a process evaluation of the National Sanitation Campaign in Tanzania. *Journal of Water, Sanitation and Hygiene for Development*, 7(1): 140-150.

Bartram, J. (2003). New water forum will repeat old message. *Bulletin of the World Health Organization*, 83 (3): 158.

Bartram, J., & Cairncross, S. (2010). Hygiene, Sanitation, and Water: Forgotten Foundations of Health. *PLOS Medicine*, 7(11): e1000367.

Bockhorn-Vonderbank, M. (2004). Children's Hygiene and Sanitation Training - A practical guide. Luxembourg and Switzerland: Caritas Luxembourg and Caritas Switzerland.

Care International. (2012). Understanding safe water system and hygiene. Nairobi: CARE International.

Catholic Relief Services. (2009). How-to Guide Series: Child-led school health education programs. Accra: Catholic Relief Services.

Christian, J., Thanh-Tam, L., & Jamie, B. (2012). Water and sanitation in schools: A systematic review of the health and educational outcomes. *International Journal of Environmental Research and Public Health*, 9, 2772-2787.

CLTS.org. (2010). Workshop on School-led Total Sanitation and children's involvement in CLTS. Retrieved from (https://www.communityledtotalsanitation.org)

CoK. (2010). Constitution of Kenya. Nairobi: Government Printer.

Collis, J., & Hussey, R. (2009). Business Research: A practical guide for undergraduate and postgraduate students. New York: Palgrave Mackmillan.

Connelly, L. M. (2008). Pilot studies. *Medsurg Nursing*, 17(6), 411-2.

Creswell, J. W. (2003). Research design: Qualitative, quantitative, and mixed method approaches. California: Sage Publications.

De Vreed, E. (2004). CHAST "Children's Hygiene and Sanitation Training" in Somalia. Netherlands: School Sanitation and Hygiene Education Symposium.

Deschesnes, M., Trudeau, F., Kébé, M. (2010). Factors influencing the adoption of a health promoting school approach in the province of Quebec, Canada. *Health Education Research,* 25 (3), 438-450.

Ejemot, R. I., Ehiri, J. E., Meremikwu, M. M. & Critchley, J. A. (2009). Cochrane review: Hand washing for preventing diarrhea. *Cochrane review journal*, 4, 893–939.

Elrha. (2018). Our final blog: Reflections from Kawangware and Cox's bazar. Retrieved from https://www.elrha.org/project-blog/our-final-blog-reflections-from-kawangware-and-coxs-bazar/.

Farah, B. (2007). Child-to-Child: A review of the literature (1995 – 2007). London: The Child-to-Child Trust.

Fisher, A.A., Laing J. E., Stoeckel, J.E., & Townsend, J.W. (1991). Handbook for family planning operations research design (2nd ed.). New York: Population Council.

Freeman, M.C., Greene, L.E., Dreibelbis, R., Saboori, S., Muga, R., Brumback, B., & Rheingans, R. (2011). Assessing the impact of a school-based water treatment, hygiene and sanitation programme on pupil absence in Nyanza Province, Kenya: A cluster-randomized trial. *Tropical Medicine International Health*, 17, 380–391.

George, D., Ram. R., Joy, S., Simon, S., & Thomas, S. (2018). Effectiveness of child to child approach and knowledge on personal hygiene among peer group students of selected upper primary school, Kollam. *International Journal of Nursing Education and Research,* 6(2), 208-209.

Githuka, G., Rotich, J., & Kigen, H., (2015). Notes from the Field: Ongoing Cholera Outbreak - Kenya, 2014–2016. *Morbidity and Mortality Weekly Report*, 65, 68–69.

Global WASH Cluster. (2009). Introduction to Hygiene Promotion: tools and Approaches. New York: UNICEF.

Greene, L. E., Freeman, M. C., Akoko, D., Saboori, S., Moe, C., & Rheingans, R. (2012). Impact of a school based hygiene promotion and sanitation intervention on pupil hand contamination in Western Kenya: A cluster randomized trial. *The American Society of Tropical Medicine and Hygiene,*87(3), 385–393.

Gyorkos T.W., Maheu-Giroux M., Blouin B., & Casapia M. (2013). Impact of health education on soil-transmitted helminth infections in schoolchildren of the Peruvian

Amazon: a cluster-randomized controlled trial. *PLoS Neglected Tropical Diseases*, 7(9), e2397.

Halliday, K., Okello, G., Turner, E., Njagi, K., McHaro, C., Kengo, J., Allen, E., Dubeck, M., Jukes, M., & Brooker, S. (2014). Impact of intermittent screening and treatment for malaria among school children in Kenya: A cluster randomized trial. *PLOS Medicine*, 11(1), e1001594.

Hedge, A., Kar, A., Lekshmi, R., & Mathew, M. (2016). Knowledge attitude and practices of oral and personal hygiene to prevent communicable diseases among students in and around the city of Mangalore: An epidemiological survey. *Journal of Health Science,* 6 (2), 35-39.

Hutton, G., & Laurance, H. (2004). Evaluation of the costs and benefits of water and sanitation improvements at the global level: Water, Sanitation and Health Protection of the Human Environment. Geneva: WHO.

Javaid, N. (2009). Teacher Motivation: An area of Neglect. Pakistan: CIDA Programme.

Jewitt, S., & Ryley, H. (2014). It's a girl thing: Menstruation, school attendance, spatial mobility and wider gender inequalities in Kenya. *Geoforum*, 56, 137-147.

Joshua, V., Bethany, A., Carolyn, D., Michael, R., Babette, A., Richard, D., & Matthew, C. (2014). Factors associated with pupil toilet use in Kenyan Primary Schools. *International Journal of Environmental Research and Public Health*, 11, 9694-9711.

Jourdan, D., Piec, I., Aublet-Cuvelier, B., Berger, D., Lejeune, M., & Laquet-Riffaud, A., (2002). Health education in schools: practices and representations of primary school teachers. *Santé Publique*, 14, 403-423.

Jourdan, D., Stirling, J., Mannix, P., & Pommier, J. (2011). The influence of professional factors in determining primary school teachers' commitment to health promotion. *Health Promotion International,* 26 (3), 302-310.

Julie, A., Jeroen, H., Monica, R., Prisca, B., Elizabeth, H., Robert, D., & Oliver, C. (2017). Does targeting children with hygiene promotion messages work? The effect of handwashing promotion targeted at children, on diarrhoea, soil-transmitted helminth infections and behaviour change, in low- and middle-income countries. *Tropical Medicine and International Health*, 22(5), 526-538.

Kamal, A. (2010). School led total sanitation: principles and practices. *Journal of Water, Sanitation, Health and Environment,* 8(1), 8-10.

Keidar, O., Elliot M. B., Alex E., & Milka, D. (2008). Determining appropriate entry point for health promoting schools intervention in Nairobi's informal settlements. Africa Population and Health Research.

Kelly, T. A., Clifford, O., Elizabeth, N., Kayla, F., Nyaguara, A., Alie, E., Linda, M., Richard, R., Caryl, B., Aisha, M., Maurice, O., David, O., Frank, O., Robert, Q., & Penelope, A. (2014). Water, Sanitation and Hygiene conditions in Kenyan rural schools: Are schools meeting the needs of menstruating girls? *Water,* 6(5), 1453-1466.

Kenya National Bureau of Statistics. (2009). The 2009 Kenya population and housing census. Nairobi: Government Printer.

Kenya Open Data. (2014). Enrollment of primary school children by, gender, class, public or private schools and county level. [online] [accessed June 16, 2017] https://www.opendata.go.ke/ECD-and-Primary-EDU/Enrollment-of-Primary-School-Children-By-Gender-Cl/t3xp-5ce7.

Kola-Olusanya, A., & Ahove, M. (2015). Effect of environmental education on African school children's waste disposal practices. Retrieved from http://citation.allacademic.com/meta/p_mla_apa_research_citation/1/2/4/8/2/p124823_index.html

Kothari, C. (1990). Research Methodology: Methods and techniques. New Delhi: New Gate International Publishers.

Kothari, C. (2012). Research Methodology. New Delhi: New Gate International Publishers.

Mathew, K., Zachariah, S., Shordt, K., Snel, M., Cairncross, S., Biran, A. & Schmidt, W. (2009). The sustainability and impact of school sanitation, water and hygiene education in southern India. *Waterlines*, 28, 275–292.

Maoulidi, M. (2008). Education needs Assessment for Kisumu City, Kenya. *MCI Social Sector Working Paper Series*, No. 01/2008.

MoE. (2006). National early childhood development policy. Nairobi: Government Printer.

MOE. (2008). National School Water, Sanitation, and Hygiene Promotion Strategy: 2008 – 2015. Nairobi: Government Printer.

MoE, & Care International. (2010). Induction training pack on WASH module for primary school teachers. Nairobi: CARE International.

MoH. (2016a). Kenya environmental sanitation and hygiene policy (2016 -2030). Nairobi: Government Printer.

MoH. (2016b). Kenya environmental sanitation and hygiene strategic framework (2016 – 2020). Nairobi: Government Printer.

MOH. (2018). District Health Information Software 2. [online] [accessed February 19, 2018] https://hiskenya.org/dhis-web-commons/security/login.action

Mohsen, N., Amanuel, A., Cristiana, A., Kaja, M., Foad, A., Semaw, F., … Christopher, J. (2017). Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet*, 390, 1151-1210.

Mooijman, A. (2012). Water, Sanitation and Hygiene (WASH) in schools - A companion to the Child Friendly Schools Manual. New York: UNICEF.

MoPHS, & MoE. (2009a). National school health policy. Nairobi: Government Printer.

MoPHS, & MoE. (2009b). National school health guidelines. Nairobi: Government Printer.

MoPHS, & MoE. (2009c). Kenya comprehensive school health implementation handbook. Nairobi: Government Printer.

Myriam, S., & Val C. (2002). Water and sanitation programme hygiene Promotion in Burkina Faso and Zimbabwe: New approaches to behavior change. Nairobi: World Bank.

Nairobi City County. (2018). County integrated development plan. Nairobi: Government Printer.

Nairobi City County. (2016). County annual development plan 2016/2017. Nairobi: Government Printer.

Njuguna, V., Beth, K., Mishek, T., Kathleen, S., Marielle, S., Sandy, C., Adam, B., Wolf-Peter, S., (2008). The sustainability and impact of school sanitation, water and hygiene education in Kenya. New York and Delft: UNICEF and IRC.

No Strings International. (2019) About No Strings. Retrieved from http://www.nostrings.org.uk/about-no-strings/

Nunnaly, J. C., & Bernstein, I. H. (1994). Psychometric theory. Sydney: McGraw-Hill.

Nzioki, J.M. & Korir, A. (2020). Effective methods for community sanitation and hygiene promotion in the developing works: A scoping review. *Africa Journal of Technical & vocational Education & Training* 5(1), 175-185.

Ogola, F.O. (2010). Free education in Kenya's public primary schools: Addressing the Challenges. Addis Ababa: Organization for social science research in Eastern and Southern Africa.

Orodho, A. J. (2014). Element of educational and social research methods. *International Journal of Development Research*.

Peal, A., Evans, B., & Voorden V. C. (2010). Hygiene and sanitation software: An overview of approaches. Geneva, Switzerland: Water Supply & Sanitation Collaborative Council.

Peter, P. (2007). 20 Years of health promotion research in and on settings in Europe - the case of School Health Promotion. *Italian Journal of public health*, 4(4).

Piers, M. & Yolande, C. (2014). Sanitation and Hygiene in Africa: Where do we stand? London: IWA Publishing.

Population Services International. (2009). Learning about safer water in Neno District, Malawi. Washington D.C.: PSI.

RoK (2001). Children Act, 2001. Nairobi: Government Printer.

RoK (2013). Basic Education Act, 2013. Nairobi: Government Printer.

Saunders, M., Lewis, P., & Thornhill, A. (2003). Research Methods for business students. New York: Prentice Hall.

Save the Children. (2009). Case study: School WASH improves hygiene behaviors and health. USA: Save the Children USA.

Setiawan, E., & Rahman, Z. (2010). School Led Total Sanitation and Children's Involvement in CLTS. In International Workshop on School-Led Total Sanitation (SLTS) and Children's Involvement in CLTS, Nairobi.

Skinner, C. J. (2016). Probability proportional to size (PPS) sampling. Retrieved from Wiley StatsRef: Statistics Reference Online, 1–5: https://doi.org/10.1002/9781118445112.stat03346.pub2

Stephen, C., & Bjarne, B. (2005). The health promoting school: International advances in theory, evaluation and practice. Copenhagen, Danish University of Education Press.

Stewart-Brown, S. (2006). What is the evidence on school health promotion in improving health or preventing disease and, specifically, what is the effectiveness of the health promoting schools approach? Copenhagen, WHO.

Talaat, M., Afifi, S., Dueger, E., El-Ashry, N., Marfin, A., Kandeel, A., Mohareb, E., & El-Sayed, N. (2011). Effects of hand hygiene campaigns on incidence of laboratory-confirmed influenza and absenteeism in school children, Cairo, Egypt. *Emerging Infectious Disease Journal,* 17, 619–625.

Trinies, V., Garn, J. V., Chang, H. H., & Freeman, M. C. (2016). The Impact of a School-Based Water, Sanitation, and Hygiene Program on Absenteeism, Diarrhea, and

Respiratory Infection: A Matched-Control Trial in Mali. *The American Journal of Tropical Medicine and Hygiene*, 94(6), 1418-25.

UN. (1989). Convention on the rights of the child. Geneva: United Nations.

UNICEF, & National Steering Committee for National Sanitation Action. (2006). Guidelines on school led total sanitation. Nepal: Department of water supply and sewerage.

UNICEF. (2009). Water, sanitation and hygiene annual report 2008. New York: UNICEF.

UNICEF. (2010). Raising Clean Hands: Advanced Learning, Health and Participation through WASH in schools. New York: UNICEF.

UNICEF. (2012). Water, Sanitation and Hygiene in schools: A companion to the child friendly schools manual. New York: UNICEF.

UNICEF. (2015). Advancing WASH in schools monitoring. New York: UNICEF.

Vincent, O. (2013). School-Led Total Sanitation: Enquiring child participation in School-Led Total Sanitation (SLTS) programs in Ghana (Master's thesis, Wageningen University). Retrieved from https://www.ircwash.org/resources

WaterAid. (2013). Technical brief: Sanitation and hygiene approaches. Retrieved from www.wateraid.org/technologies

WHO. (2005). Sanitation and hygiene promotion: programming guidance. Geneva: WHO.

WHO. (2014). UN-water global analysis and assessment of sanitation and drinking-water report: Investing in water and sanitation: increasing access, reducing inequalities. Geneva: WHO.

WHO. (2017a). Fact sheet: Drinking water. [online] [accessed August 10, 2017] http://www.who.int/mediacentre/factsheets/fs391/en/

WHO. (2017b). Cholera Kenya: Disease outbreak news. [online] [accessed February, 2018] http://www.who.int/csr/don/11-december-2017-cholera-kenya/en/

APPENDICES

Appendix 1. Informed Consent

My Name is Styvers Kirimi Kathuni. I am a masters student from Kenyatta University. I am conducting a study on "Influence of school hygiene promotion approaches on hygiene practices in Dagoretti, Nairobi City County''. The findings from this study could be used by various stakeholders including primary schools, Ministries of Education and Health to improve hygiene promotion in primary schools in Dagoretti North and South Sub Counties.

Procedures to be followed

Participation in this study will require that I ask you some questions. I will record the information from you in a questionnaire. You have the right to refuse participation in this study. Please remember that participation in the study is voluntary. You may ask questions related to the study at any time. You may refuse to respond to any questions and you may stop an interview at any time. You may also stop being in the study at any time without any consequences.

Discomforts and risks

Some of the questions you will be asked are on hygiene practices and may be embarrassing or make you uncomfortable. If this happens, you may refuse to answer these questions if you choose so. You may also stop the interview at any time. The interview will be conducted during the co-curriculum activity break and may cause a 20-minutes delay before you can join the activity for the day.

Benefits

If you participate in this study, you will help in furthering the understanding of how hygiene promotion approaches influence hygiene practices. If your school management adopts the

findings from this study, you will benefit by receiving hygiene promotion through the most appropriate approach.

Reward

If you agree to participate in this study, no rewards will be provided.

Confidentiality

The interviews will be conducted in a private setting within the school. Your name will not be recorded on the questionnaire. The questionnaire will be kept in a locked cabinet for safe keeping at Kenyatta University. Everything will be kept private.

Contact information

If you have any questions you may contact Dr. Esther Kitur on 0722717101 or Dr. Sammy Letema 0725672255 or the Kenyatta University Ethical Review Committee Secretariat on chairman.kuerc@ku.ac.ke.

Participant's statement

The above information regarding my participation in the study is clear to me. I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that whether I decide to leave the study or not, my decision will not affect the education and treatment I get from my school today and in the future.

Code of participant…….

…… ……

Signature or thumb print Date

Investigator`s statement

I, the undersigned, I have explained to the volunteer in a language she/he understands, the procedures to be followed in the study and the risks and benefits involved.

Name of interviewer……..

……. …….

Interviewer signature Date

Appendix 2. Pupils Questionnaire

I: Demographic data

Name of your school:_____

Gender: { } Female { } Male Age: ____ Class: ____

Are you a member of the school health club? { } Yes { } No

II. Knowledge and practices on hygiene behaviors.

1. What is your understanding of good hygiene? Tick all that apply.
   { } Hand washing at critical times
   { } Proper food handling
   { } Safe disposal of human faeces
   { } Clean / safe water
   { } Disposal of solid waste
   { } Maintaining good personal hygiene
   { } I don't know

2. How do you ensure that you maintain good hygiene? Tick all that apply.
   { } Washing hands with soap and water
   { } Use of toilets
   { } Bathing
   { } Covering food and water properly
   { } Treating drinking water
   { } Cleaning the environment
   { } I don't know

3. a) When are the critical times to wash your hands? Tick all that apply.
   { } After defecation
   { } After cleaning children's bottom
   { } Before preparing food
   { } Before feeding the baby
   { } Before eating
   { } I don't know

3. (b) Do you wash your hands at critical times? Tick one option.

{ } Yes { } No

3. (c) What influences you to wash your hands while in school? Tick all that apply.

{ } We have functional hand washing points in school

{ } We have adequate hand washing points in school

{ } I have been trained on the importance of hand washing

{ } The teachers insists that we have to wash our hands

{ } Other, specify_____

3. (d) What influences you not to wash your hands while in school? Tick all that apply.

{ } We do not have hand washing points in school

{ } We have hand washing points in school but they are not adequate

{ } We have hand washing points in school but they do not have water

{ } We have hand washing points in school but they are not accessible

{ } Other, specify_____

4. What are the signs of poor hygiene in your surrounding environment? Tick all that apply.

{ } Presence of adult and infant faeces

{ } Presence of animal faeces

{ } Garbage and wastewater in surroundings

{ } Bad smell in the environment

{ } I don't know

5. (a) Do you have a habit of using the toilet when in school and at home? Tick one option.

{ } Yes, in school and at home

{ } Yes, in school only

{ } Yes, at home only

{ } Not at all

5. (b) What influences you to use the toilet when in school? Tick all that apply.

{ } We have functional toilets in school

{ } We have clean toilets in school

{ } We have adequate toilets in school

{ } I have been trained on importance of using toilets

{ } The teachers insists we have to use the toilet

{ } Other, specify_____

5. (c) What influences you not to use the toilet when in school? Tick all that apply

{ } We do not have toilets in school

{ } We have toilets in school but they are not adequate

{ } We have toilets in school but they not operational

{ } We have toilets in school but they are not accessible

{ } We have toilets in school but they are not clean

{ } I do not know any benefit of using toilets

{ } Other, specify_____

6. Do you have a habit of disposing solid waste properly while in school and at home? Tick one option.

{ } Yes, in school and at home

{ } Yes, in school only

{ } Yes, at home only

{ } Not at all

7. How does a person get diarrhea disease? Tick all that apply.

{ } Lack of hand washing before eating

{ } Lack of hand washing after defecation

{ } Drinking untreated or uncovered water

{ } Eating fruits that are not washed

{ } Eating contaminated foods that are sold by the road side

{ } I don’t know

II. Knowledge on hygiene approaches.

8. (a) In the previous and current school terms, have you seen or received any messages or materials on hygiene while in school? Tick one option.

{ } Yes { } No

(If response is No, the interview ends).

8. (b) If yes, what hygiene messages did you see or receive while in school? Tick all that apply.

{ } Good food hygiene

{ } Always use a latrine and stop open defecation

{ } Hand washing with soap

{ } Water treatment

{ } Safe disposal of infants' faeces

{ } Proper solid waste disposal/ management

{ } Cannot remember

{ } Other, specify: _____

8. (c) If yes, how did you receive these messages while in school? Tick all that apply.

{ } Through the school health teacher { } At school hygiene events or parade

{ } Through a government/NGO officer { } From fellow pupil

{ } Posters or leaflets { } TV in school

{ } Radio in school { } Murals in the school

{ } Cannot remember { } Other, specify: _____

Appendix 3. School Health Teacher Questionnaire

Name of school: _____Date: _____

Gender: { } Male { } Female

1. What are your roles in relation to hygiene promotion in the school? Tick all that apply.
   { } Representing the school in health forums/trainings/meetings/workshops
   { } Coordinating hygiene related activities in the school
   { } Passing hygiene promotion messages to pupils at the health club only
   { } Passing hygiene promotion messages to pupils in the entire school
   { } Other, specify: _____

2. (a) Have you had hygiene promotion activities in your school in the previous and current school term? Tick one option.
   { } Yes { } No
   (If response is No, skip to question 3)

2. (b) What were the activities? Tick all that apply.
   { } School health club sessions
   { } Hygiene promotion at the school parade
   { } Hygiene promotion in classrooms
   { } Hygiene competition or contest
   { } Other, specify: _____

2. (c) Who led the implementation of the activities? Tick one option.
   { } School health teacher
   { } School health teacher with support from NGO and government officer
   { } School health teacher with support from NGO officer
   { } School health teacher with support from government officer
   { } NGO officer
   { } Government officer
   { } NGO officer and government officers
   { } All school teachers

{ } School head teacher or deputy

{ } Parents

{ } Other, specify: _____

3. (a) Please tick any hygiene promotion approach that you know? Tick all that apply.

{ } School health clubs

{ } Child Hygiene and Sanitation Transformation (CHAST)

{ } School Led Total Sanitation (SLTS)

{ } WASH in schools (hygiene promotion and construction of WASH facilities)

{ } Child to child

{ } No Strings

{ } I do not know any approach

{ } Other, specify: _____

(If response is I do not know any approach, skip to question 4)

3. (b) Has any of these hygiene promotion approaches been implemented in your school in the previous and current school term? Tick one option.

{ } Yes { } No

(If response is No, skip to question 4)

3. (c) If yes, which hygiene promotion approach was implemented in your school in the previous and current school term? Tick all that apply.

{ } School health clubs

{ } Child Hygiene and Sanitation Transformation (CHAST)

{ } School Led Total Sanitation (SLTS)

{ } WASH in schools (hygiene promotion and construction of WASH facilities)

{ } Child to child

{ } No Strings

{ } I do not know any approach

{ } Other, specify: _____

3. (d) Who selected the approach? Tick one option.

{ } School health teacher

{ } School health teacher and government officer

{ } School health teacher and NGO officer

{ } School health teacher, NGO and government officer

{ } NGO officer

{ } Government officer

{ } NGO and government officers

{ } All school teachers

{ } School head teacher or deputy

{ } Parents

{ } I do not know

{ } Other, specify: _____

3. (e) In your opinion, what could have influenced the selection and implementation of the approach? Tick all that apply.

{ } The approach had been successfully implemented in the school previously

{ } The school health teacher was knowledgeable on the approach

{ } The NGO/government came with the approach

{ } The pupils like the approach

{ } The school's management supported the approach

{ } Other, specify: _____

3 (f) In your opinion, was the approach successful? Tick one option.

{ } Yes { } Partially successful { } No

3 (g) Have you noted any positive hygiene related behavioral changes amongst the pupils? Tick one option.

{ } Yes { } No

4. Have you been trained on hygiene promotion? Tick one option.

   { } Yes { } No

5. In your opinion, do you have adequate expertise within the school to support the selection of appropriate hygiene promotion approaches for pupils? Tick one option.

   { } Yes { } Yes, but we need additional support { } No

6. Has the school planned or scheduled hygiene promotion events in the next one month? Tick one option.

   { } Yes { } No { } I don't know

7. Is there any additional information that you would like to share?

_____

_____

_____

_____

_____

_____

_____

Appendix 4. School Management Questionnaire

1. Basic school data

Name of school: _____ Date of data collection: _____

School Head teacher's name: _____ Telephone: _____

2. School enrolment and attendance information (Please use school/class registers).

2 (a) How many streams do you have per class? _____ Total number of streams_____

(If streams vary per class, use a separate sheet to list the streams per class).

2 (b). Total number of streams_____

2 (c). Total number of children enrolled in primary school (Please give total for all classes):

ECD		**Class 1**		**Class 2**		**Class 3**		**Class 4**		**Class 5**		**Class 6**		**Class 7**		**Class 8**	
Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls

Please explain data un-availability if any: _____

3. Information on staff

Teachers: _____Male _____Female

Non-teaching staff: _____Male _____Female

Appendix 5. Key Informant Interview Guide

Name of organization/department: _____

Name and position of interviewee: _____

Date of interview: _____

1. Which WASH activities do you support in schools in Dagoretti North and South Sub Counties? Is the support focused on infrastructure improvement, hygiene promotion or both?
2. Which schools have you supported in the previous and current school terms in hygiene promotion?
3. Does your department/organization apply a specific approach while implementing hygiene promotion activities in schools in Dagoretti North and South Sub Counties? (If none, skip to question 6)
4. If yes, how was this approach selected? What factors led to the selection of the approach?
5. If yes, how successful was this approach in addressing sanitation and hygiene challenges among pupils in the school(s)?
6. Are there hygiene promotion approaches that your department/organization has implemented and were consider unsuccessful? Why were the approaches unsuccessful?
7. Which partners do you work with to support hygiene promotion in schools in Dagoretti North and South Sub Counties? What have been their roles?
8. Which other partners do you know that support hygiene promotion activities within primary schools in Dagoretti North and South Sub Counties? Please mention the name of the school they support if possible.
9. Is there any additional information that you would like to share with us?
10. Do you have any questions for us?

Appendix 6. Hygiene Facilities and Practices Observation Checklist

No	Parameter	Assessment			
		YES	NO	N.A.	Comment
1	**School compound**				
1 (a)	Is the school compound and classrooms clean? (Free from visible garbage on grounds and in classroom)				
2	**Water**				
2 (a)	Is there a water point within the school compound?				
2 (b)	Is the water point functioning at time of visit?				
2 (c)	Are there cups used by pupils and teachers for taking the drinking water?				
3	**Toilets and hand washing points**				
3 (a)	Do toilets exist within the school compound?				
3 (b)	Are the toilet and urinals clean? (Free from visible garbage or faecal matter on floor, no foul smell and no flies).				
3 (c)	Is there a hand washing facility close to the toilets?				
3 (d)	Is the hand washing point functional at time of the visit?				
3 (e)	Is there soap at the hand washing point at the time of the visit?				
4	**Behaviour practices**				
4 (a)	Observe if pupils voluntarily use a toilet during the visit.				
4 (b)	Observe how many pupils voluntarily wash hands after visiting the toilet. (Out of 10 pupils)				
4 (c)	Observe if pupils wash their hands correctly with soap and water after using the toilet. (Out of 10 pupils)				

5. Adequacy of sanitation facilities in the school.

Count and record the number of sanitation facilities

No	Parameter	Number
1	How many toilets are in use for girls?	
2	How many toilets are in use for boys?	
3	How many urinals are in use for boys?	
4	How many toilets are in use for female teachers?	
5	How many toilets are in use for male teachers?	

Appendix 7. Approval Letter from Ministry of Education

Republic of Kenya

MINISTRY OF EDUCATION
STATE DEPARTMENT OF EARLY LEARNING AND BASIC EDUCATION

Telegrams: "SCHOOLING", Nairobi
Telephone: Nairobi 020 2453699
Email: rcenairobi@gmail.com
cdenairobi@gmail.com

When replying please quote

REGIONAL DIRECTOR OF EDUCATION
NAIROBI REGION
NYAYO HOUSE
P.O. Box 74629 – 00200
NAIROBI

Ref: RCE/NRB/RESEARCH/1/64/VOL.I

Date: 14th March, 2019

Styvers Kirimi Kathuni
Kenyatta University
P. O. Box 43844- 00100
NAIROBI

SUB COUNTY DIRECTOR OF EDUCATION
DAGORETTI
P.O. Box 30124-00100, NAIROBI
Sign:..... Date.....

Received
14/5/2019

RE: RESEARCH AUTHORIZATION

We are in receipt of a letter from the National Commission for Science, Technology and Innovation regarding research authorization in Nairobi County on *"Influence of school hygiene promotion approaches on hygiene practices in public primary schools, Dagoretti, Nairobi City County, Kenya"*.

This office has no objection and authority is hereby granted for a period ending **26th November, 2019** as indicated in the request letter.

Kindly inform the Sub County Director of Education of the Sub County you intend to visit.

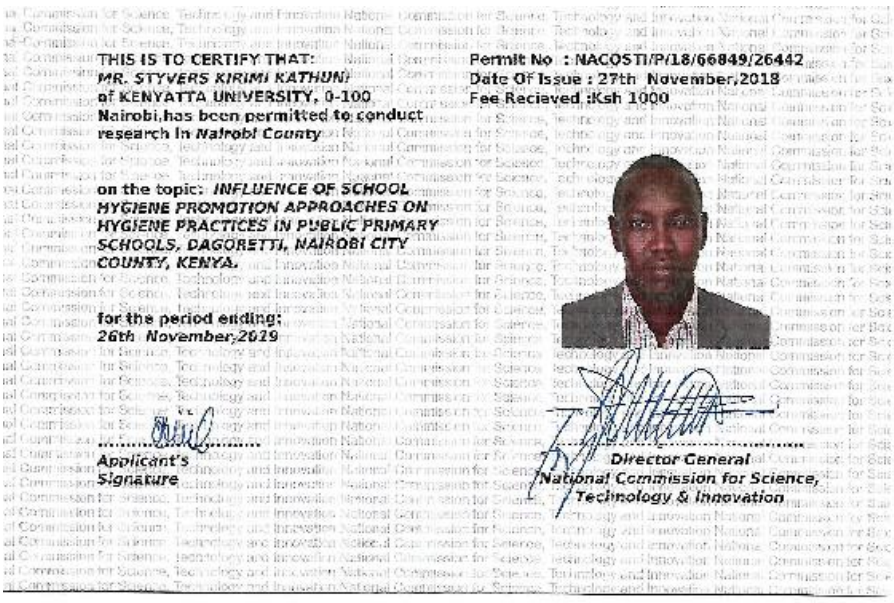
REGIONAL COORDINATOR OF EDUCATION
NAIROBI
14 MAR 2019

Remarks
Granted
15/5/2019.

DRUSCILLA MOSIORI
FOR: REGIONAL DIRECTOR OF EDUCATION
NAIROBI

Copy to: Director General/CEO
National Commission for Science, Technology and Innovation
NAIROBI

Appendix 8. National Commission for Science, Technology and Innovation Permit



THIS IS TO CERTIFY THAT:
MR. STYVERS KIRIMI KATHUNI
of KENYATTA UNIVERSITY, 0-100
Nairobi,has been permitted to conduct
research in *Nairobi County*

on the topic: *INFLUENCE OF SCHOOL HYGIENE PROMOTION APPROACHES ON HYGIENE PRACTICES IN PUBLIC PRIMARY SCHOOLS, DAGORETTI, NAIROBI CITY COUNTY, KENYA.*

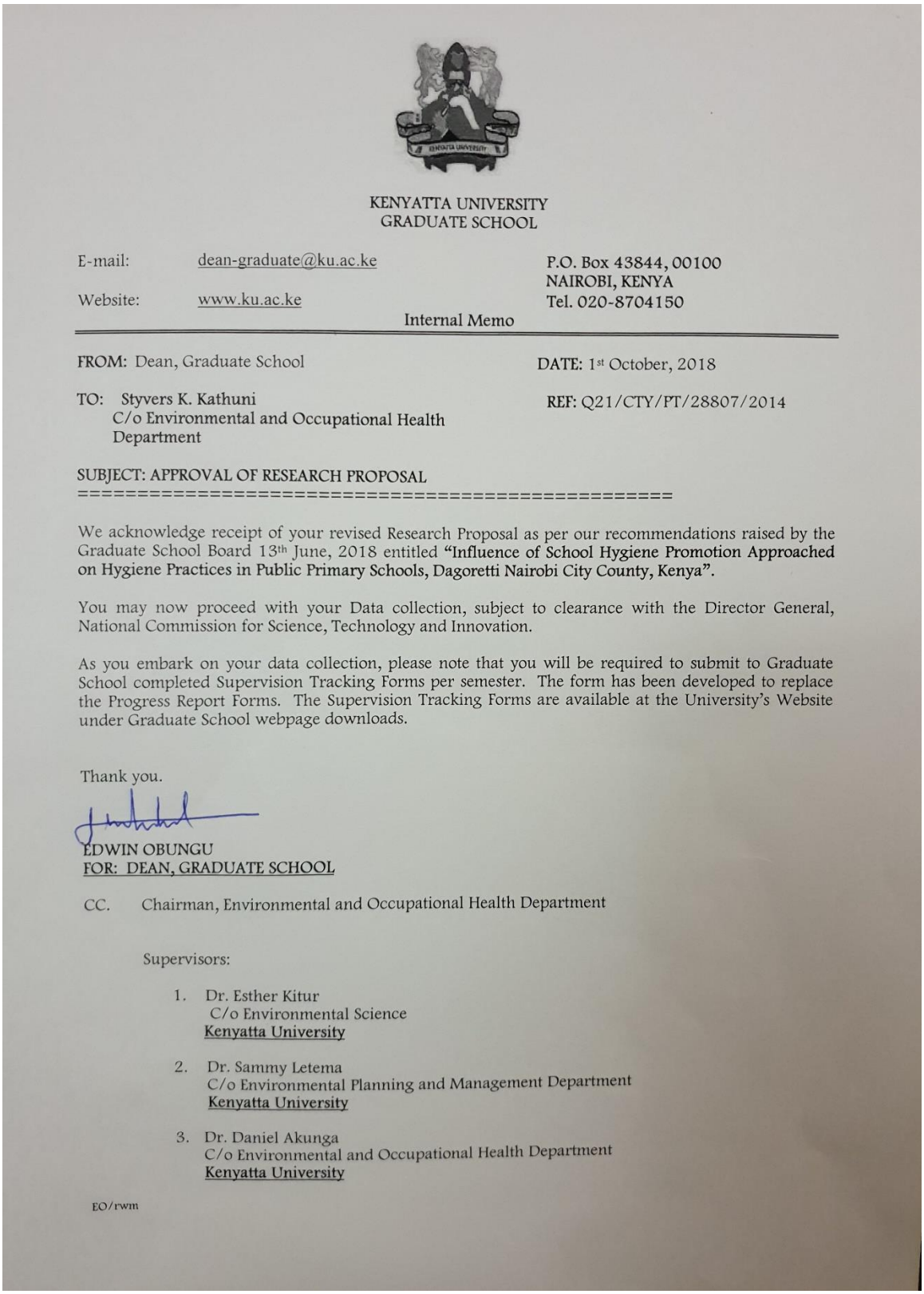
for the period ending:
26th November,2019

Permit No : NACOSTI/P/18/66849/26442
Date Of Issue : 27th November,2018
Fee Recieved :Ksh 1000

Applicant's Signature

Director General
National Commission for Science, Technology & Innovation

Appendix 9. Approval Letter from Kenyatta University Graduate School



KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Internal Memo

FROM: Dean, Graduate School

DATE: 1st October, 2018

TO: Styvers K. Kathuni
C/o Environmental and Occupational Health Department

REF: Q21/CTY/PT/28807/2014

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

We acknowledge receipt of your revised Research Proposal as per our recommendations raised by the Graduate School Board 13th June, 2018 entitled **"Influence of School Hygiene Promotion Approached on Hygiene Practices in Public Primary Schools, Dagoretti Nairobi City County, Kenya".**

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking Forms per semester. The form has been developed to replace the Progress Report Forms. The Supervision Tracking Forms are available at the University's Website under Graduate School webpage downloads.

Thank you.

EDWIN OBUNGU
FOR: DEAN, GRADUATE SCHOOL

CC. Chairman, Environmental and Occupational Health Department

Supervisors:

1. Dr. Esther Kitur
   C/o Environmental Science
   Kenyatta University
2. Dr. Sammy Letema
   C/o Environmental Planning and Management Department
   Kenyatta University
3. Dr. Daniel Akunga
   C/o Environmental and Occupational Health Department
   Kenyatta University

EO/rwm

Appendix 10. Approval Letter from Kenyatta University Ethics Review Committee

Kenyatta University
P.O Box 43844-00100
Nairobi-Kenya

REF: KU/ERC/APPROVAL/VOL1/1

Date: 9th March, 2020

Styvers Kirimi Kathuni
P.0 Box 43844-00100
NAIROBI

Dear Mr. Kathuni,

RE: APPLICATION NUMBER: PKU/2052/I1199 INFLUENCE OF SCHOOL HYGIENE PROMOTION APPROACHES ON HYGIENE PRACTICES IN DAGORETTI, NAIROBI CITY COUNTY

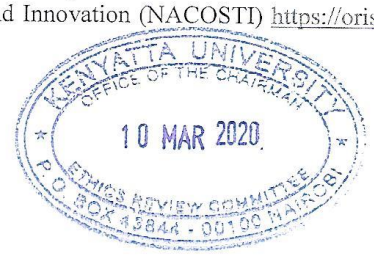
This is to inform you that ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** has reviewed and approved your above research proposal. Your application approval number is **PKU/2052/I1199.** The approval period is ***9th March, 2020 –9th March, 2021.***

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE.***
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE.***

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely



Prof. Judith Kimiywe

CHAIRPERSON- KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE.