

**SCHOOL OF PUBLIC HEALTH
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**ENVIRONMENTAL HEALTH STATUS OF SELECTED BASIC SCHOOLS
AT KPONE KATAMANSO DISTRICT, ACCRA, GHANA**

BY

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DECLARATION

I, Bridget Djabakie Tawiah declare that this dissertation presented for the degree of Master of Public Health is the result of my own original research and that, it has not been submitted in whole or in part in any previous application for a degree except where stated otherwise by reference or acknowledgment.

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(Academic Supervisor)



DEDICATION

I humbly dedicate this dissertation to the Almighty God for His blessings and mercy throughout the entire period of study. My parents Christiana Ameley and Jacob Narh Tawiah for their unconditional support, encouragement and love which continually strengthened me to achieve this academic ambition, my siblings Francisca Djabakwor and Andrew-Stephen Djabanor Tawiah for their love and confidence in me. Natalia Saczina Awuni, for being a great inspiration to me.



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ABSTRACT

Introduction: In Ghana, water, sanitation and hygiene related diseases and environmental hazards have been a cause of worry for stakeholders, policy makers and the population as a whole. Across the world and especially in the sub-Saharan Africa, population growth rate and the provision of environmental health facilities are imbalanced. This research was carried out to assess the environmental health status of selected basic schools at Kpone Katamanso District in the Greater Accra Region of Ghana.

Methods: The study was cross-sectional. Data were collected in forty sampled basic schools using quantitative study technique. Multistage sampling technique was employed in the selection of the schools for the study. Thus, stratified sampling, where schools were divided into proportions at various stages, and simple random sampling using computer generated random numbers, were used to obtain the schools that were administered the structured standardized checklist. Collected data were processed and analyzed with the use of stata14 software to obtain the descriptive statistics. Measures of association were also carried out using chi-square and logistic regression analysis.

Results: Findings showed that majority of basic schools had latrines comprising water closets, pour flush and KVIP. Private owned basic schools generally had more and better sanitary facilities than government owned schools. Open defecation was mostly practiced among government schools. Refuse bins were available at most basic schools of which majority were covered with hand flip. More than half of the basic schools had hand washing points without soap. Safe water sources were found on the premises of most of the basic schools studied. Few basic schools had their refuse separated into organic and inorganic. All public basic schools toilet facilities were

cleaned by pupils whilst those of private schools were mostly cleaned by hired cleaners.

Conclusion: Generally, toilet facilities cleaned by hired cleaners were twelve times tidier than those cleaned by pupils.



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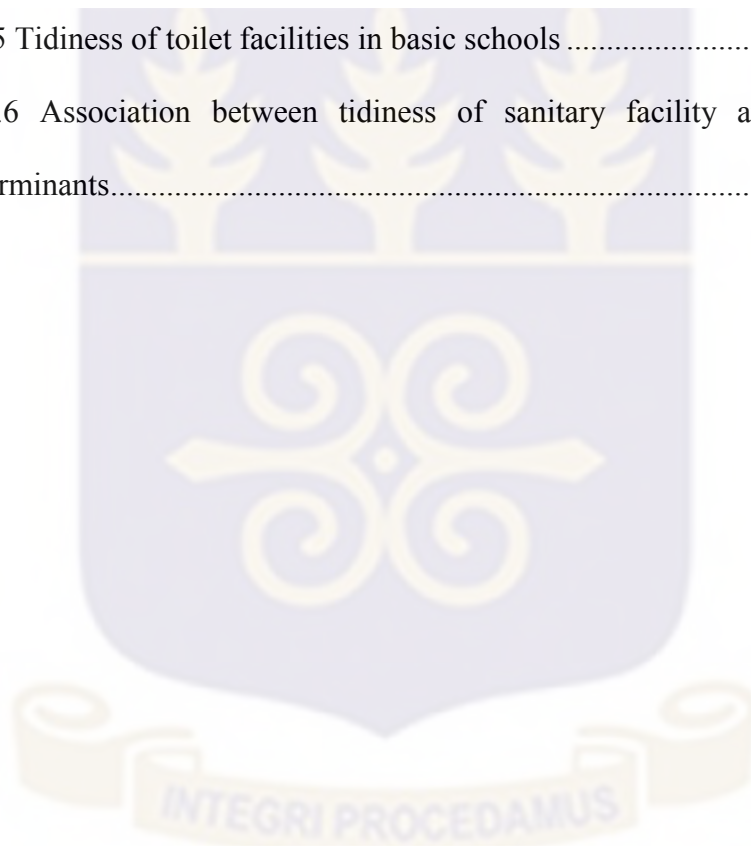
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LIST OF ABBREVIATIONS

CWSA	Community Water and Sanitation Agency
GAR	Greater Accra Region
GDHS	Ghana Demographic Health Survey
GPRS	Ghana Poverty Reduction Strategy
GWSP	Ghana Water Sanitation Program
JHS	Junior High School
KKDEO	Kpone Katamanso District Education Office
KVIP	Kumasi Ventilated Improved Pit latrine
MDGs	Millennium Development Goals
MOE	Ministry of Education
NGO	Non-Governmental Organization
OPD	Out-Patients' Department
SHEP	School Health Education Program
UN	United Nations
UNICEF	United Nations Children's Fund
USAID	United States' Agency for International Development
WASH	Water Sanitation Hygiene
WC	Water Closet
WHO	World Health Organization

WSP

Water Sanitation Program



DEFINITION OF TERMS

Environmental health: Environmental health is anything natural or man-made found outside the human body that impacts or affects the health of humans.

Basic School: Basic school is a place where the bases of formal training or education commence and this comprises of two stages namely, the primary and the junior high school.

Pupil: Pupil refers to basic school children especially those in the primary school.

Double Stream: Double stream in this context refers to a basic school having both primary and junior high school on the same compound.

Single Stream: Single Stream here refers to basic schools having either one of the stages thus, the primary or junior high school on a compound.

Hygiene: Hygiene is the practice of cleanliness by an individual or a group of persons in the maintenance of their physical, mental, cultural and social well-being.

Sanitation: Sanitation is a way in which humans live free of filth thus by promoting healthy living and preventing the contact of waste as well as disease causing agents such as forms of microorganisms.

Safely Managed Toilet facility: Safely managed toilet facility is one which is found on the premises, comfortable to use, not shared with any other household and has its excreta treated safely with example being the water closet.

Safely Managed Water Facility: Safely managed water facility is a drinking water source which is treated, available when needed, located on premises and free of contaminants such as faecal matter and unwanted chemicals.

Basic Toilet Facility: Basic toilet facility is a ventilated pit latrine or pit latrine with a slab, located on the premises and not shared with any other household.

Basic Water Facility: Basic water facility is a drinking water source such as boreholes and protected dug wells located on premises.

Basic Hand Washing Point: Basic hand washing point is a hand washing facility with running water and soap available on premises.

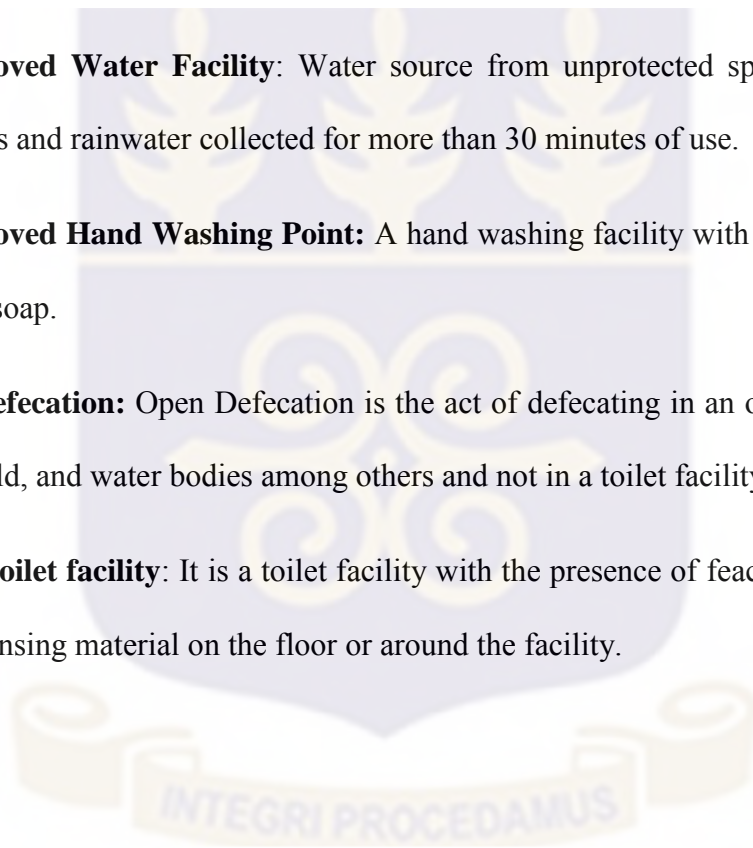
Unimproved Toilet Facility: A toilet facility or pit latrine without a slab.

Unimproved Water Facility: Water source from unprotected springs, unprotected dug wells and rainwater collected for more than 30 minutes of use.

Unimproved Hand Washing Point: A hand washing facility with running water and without soap.

Open Defecation: Open Defecation is the act of defecating in an open space such as bush, field, and water bodies among others and not in a toilet facility.

Untidy toilet facility: It is a toilet facility with the presence of fecal matter, urine or anal cleansing material on the floor or around the facility.



CHAPTER ONE

INTRODUCTION

1.0 Background of study

Good environmental health conditions in schools promote productive learning and serve as a practical learning session of good sanitary practices. Ensuring good environmental conditions in basic schools prevents diseases such as diarrhoea, worm infestation, under-nutrition, and skin diseases among basic school aged children. Globally, efforts have been made to ensure good sanitary conditions in schools, especially basic schools for the prevention of diseases such as diarrhoea. Some of these existing policies in Ghana include the weekly and or daily inspection of children's nails, mouth and hair to promote good personal hygiene. However, factors such as availability of potable water, latrine and drainage system affect these efforts by schools to ensure a healthy school system (Van-Wyk, 2007).

Sanitation in basic schools is well known but realities on the ground do not reflect this knowledge (UNICEF, 1998). Pupils might have adequate knowledge on poor sanitation and its effects on health but may not be able to put it to practice due to the inadequacy of sanitary and hygiene facilities. Generally, schools are not just places for learning and child development but also a place where children develop good attitudes and practices towards the environment. Thus, a school becomes a risky place when sanitation and hygiene facilities are inadequate, absent or poorly maintained because children are likely to grow with unfriendly environmental practices that would be almost impossible to change (UNICEF, 1998).

Good sanitary conditions in schools benefit children as they grow. It serves as a practical learning session on environmental friendly practices which eventually are

permanently developed in school children for life. As Ghana battles with environmental hazards including poor sanitary and hygiene practices, one of the major ways to achieve better results in environmental practices is behavioral change which is not easy to achieve. However, the task becomes lighter when attitudes are developed from the basic schools level. Therefore, when good sanitary and hygiene behaviors are learnt and practiced by basic school children in addition to lessons on the implications of poor environment through constant utilization of sanitary facilities, it will support the fight for good environmental conditions in Ghana. However, is water, sanitary and hygiene facilities available and adequate in basic schools in Ghana?

In the year 2015, the Greater Accra region alone recorded seventeen thousand eight hundred and ninety-eight (17,898) Out Patients Department (OPD) diarrhoea cases among basic school aged children (5 to 14years). Whilst governments strive to achieve universal basic education for all children in Ghana, unequal learning opportunities could still be created by absenteeism in schools due to diseases.

1.1 Problem Statement

According to Ghana Water Sanitation Program (2012), Ghana loses GH¢420 million every year on poor sanitation. A report by UNICEF (1998), also documented that poor sanitation in schools is caused by inadequate training of teachers, absence of functioning water supply and sanitation facilities, inadequate access to appropriate teaching methods and materials, sanitation related courses not examinable and inadequate monitoring and supervision of school sanitation and hygiene activities in schools.

The Kpone Katamanso District Education Service manages thirty eight thousand and eighty-one (38081) children in two hundred and ten (210) basic schools as of 2014 of which fifty-three (53) are government owned and one hundred and fifty-seven (157) private. The state of environmental conditions in the Kpone Katamanso District Assembly (KKDA) schools are not formally available (KKDA, 2014). However, published District Health Service reports of 2014 and 2015 showed that OPD diarrhoea cases in children aged 5-14 years increased from 6% to 10.32% respectively. Within same periods, skin diseases increased from 6.3% to 6.7% and intestinal worms' cases increased from 5.4% to 5.9%. Children of this age group are found in basic schools. Diseases have many effects on children's growth, cognitive development and performance in school.

Issues related to poor sanitary conditions do not only cause diseases, but also result in environmental hazards such as floods which have often been reported in the Greater Accra Region where the Kpone Katamanso District forms a part. The popular June 3rd 2015 flood disaster is largely associated with environmental factors.

The sanitation and hygiene situation in basic schools are determined by the availability of waste disposal facilities, potable water, hand washing points, and the school environment. Thus this study seeks to assess the adequacy of water supply, sanitation and hygiene facilities among selected basic schools in the Kpone Katamanso District.

1.2 Justification

This study was carried out to provide evidence for stakeholders and the general public as a whole to know the sanitary conditions of pupils in selected basic schools in the Kpone Katamanso district. This could also provide the baseline for further research to

access the overall sanitary status of basic schools in Ghana. It will also inform policy makers on the level of implementation of policies in basic schools and need to review standards on sanitation for basic schools in the country.

1.3 Research Questions

1. Are basic schools in Kpone Katamanso equipped with adequate sanitary facilities?
2. Do these basic schools have access to potable water?
3. What are the waste disposal practices in these basic schools?
4. What are the hygiene practices of these basic schools?

1.4 Objectives

1.4.1 General Objective

To determine the environmental health status of selected basic schools in the Kpone Katamanso District.

1.4.2 Specific Objectives

1. To assess the types and adequacy of sanitary provisions in selected basic schools
2. To determine potable water availability in these basic schools
3. To describe the waste disposal practices in basic schools
4. To assess hygienic practices in basic schools

1.5 Conceptual Framework

Availability of waste disposal facilities have a strong influence on how school children dispose of waste. Availability and adequacy of waste disposal facilities such as latrines, urinals, drainage system, waste bins and incinerators determine whether liquid, solid or gas waste are properly disposed. For instance, there is the likelihood

of open defecation if latrines are not available or are available but inadequate or improper. Open defecation not only threaten the health of pupils, school but that of people living around the school environment. Also the inadequacy or absence of waste bins could result in littering of school surroundings.

Poor drainage system could result in filthy or untidy school environment as these drainage trenches could be choked with refuse and stagnant water. An untidy environment affects pupils directly as they play around and could easily pick germs in their hands which might eventually get into their food or water sources. Conditions of school environment such as a fenced school protect both the school environment, and for that matter, the children at large. Fenced schools are most likely to have a healthier environment than those without.

In schools where access to potable water is a challenge, the use of latrines such as water closet and hand washing practices become almost impossible. Children are likely to eat without washing their hands in the absence of hand washing provisions. Therefore, children in schools with poor sanitary conditions stand the risk of diseases including diarrhoea, worm infestation, and gastroenteritis. Figure 1.1 describes the conceptual framework on the environmental health status of basic schools.

Conceptual model of environmental health status of basic schools

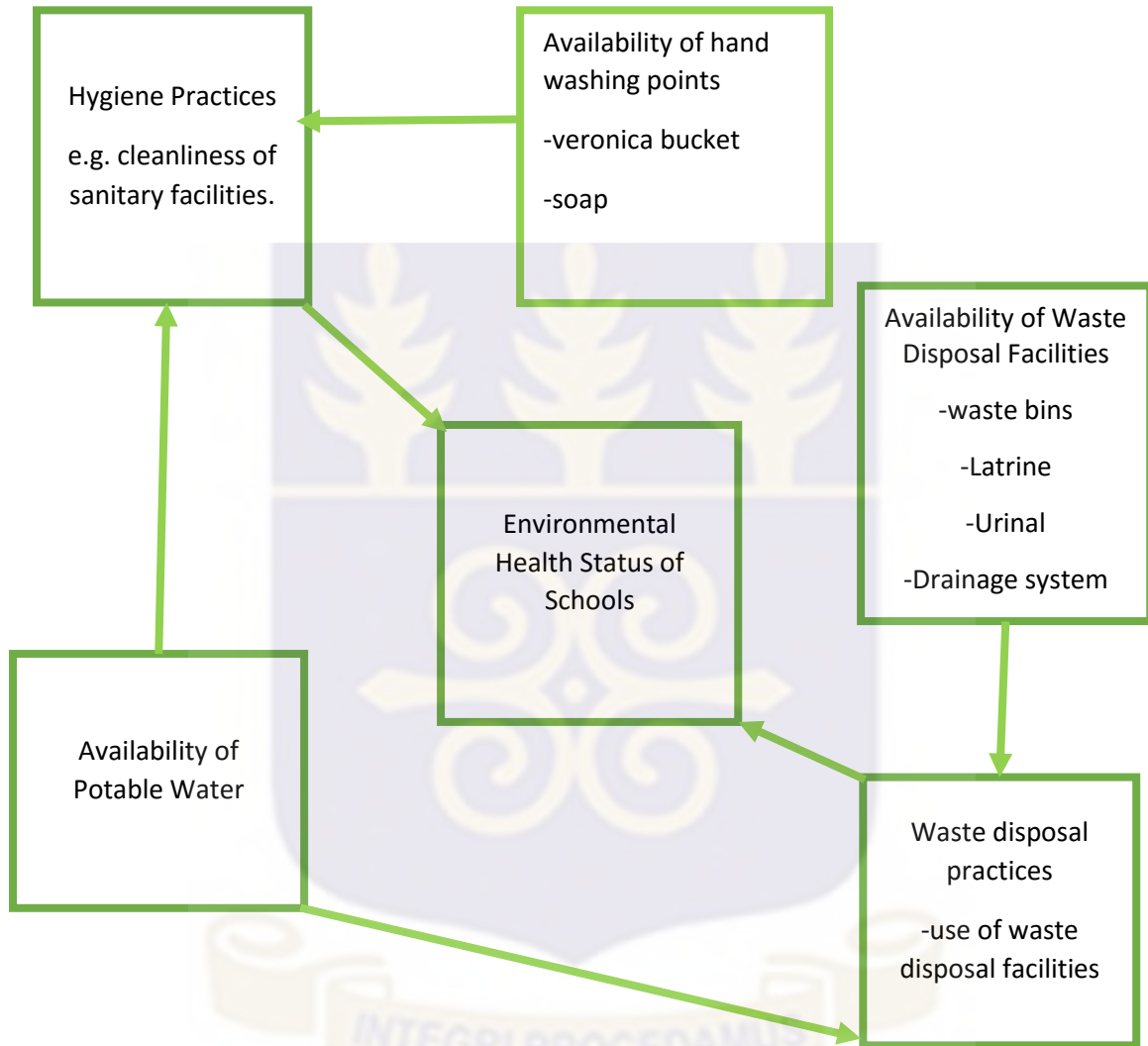


Figure. 1.1 Conceptual framework of environmental health status of schools.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Healthy basic school environment promotes growth and learning. Apart from vacations and holidays, school children spend most of their days in schools while growing up. The dynamics of society has changed due to growing population and technology and there is increasing pressure on resources. Basic schools are not left out as enrolment increases. Sanitary and hygiene facilities at basic schools contribute to the overall health of pupils, the family and the community as a whole (Freeman & Tranter, 2011).

2.1 Environmental Health Policies and Standards in Basic Schools

Environmental health is considered a main component in national development. Medium to long term policies, regulations and legislations are often well laid out in the national development plans of many countries. As countries strive in accelerating growth and reducing poverty, environmental health forms a major part in reducing poverty and diseases. The Ministry of Local Government and Rural development (MLGRD) of Ghana Poverty Reduction Strategy (GPRS)-II has policies to ensure the right to safe drinking water, sanitation and accelerated provision of infrastructure (MLGRD, 2010).

The policy on infrastructure enjoins the state agencies to accelerate the provision of excreta management facilities and to ensure safe disposal of waste by acquiring waste disposal sites. It also encourages waste recycling, cost recovery, and the establishment of fund for environmental sanitation (MLGRD, 2010).

Beder (2013) highlighted on six major environmental policies that have been incorporated into the international treaties including ecological sustainability, the polluter pays principle, the precautionary principle, equity, human rights and public participation. These policies in general, when well implemented, affect the school environment too. In ensuring equity, schools should have adequate sanitary and hygiene facilities to cater for the total enrolment. Overburdened toilet and urinals as well as water and hand washing facilities in schools are worse than none in causing diseases.

The Ghana Education Service (GES) school health policies entreat the formation of school health committees which is to supervise sanitation in schools including the activities of food vendors in schools, oversee the provision of good drinking water and sanitary and hygiene facilities, ensure proper waste disposal, see to the provision of hand washing points, and to develop and implement school health education programs. The various school health committees are overseen by a district School Health Education Program (SHEP) coordinator who links with other departments, especially the Ghana Health Services, to implement health policies in schools. Besides the imparting knowledge, the school environment in its nature trains children emotionally, physically, psychologically, socially and morally.

2.2 Level of Environmental Policy Implementation in Basic Schools

World Health Organization & United Nations-Water (2014) documented that water and sanitation in basic schools are well recognized by politicians and they often put policies in place to monitor the implementation of projects on sanitation and thus sustain water, sanitation and hygiene systems. According to these reports, many countries have not done much fully implement these policies. . Policy implementation

gaps such as inadequate latrines (toilet and urinal) facilities, irregular flow of water in latrines, and inadequate hygiene facilities are common challenges that are easily identified in schools (Dube, 2012). Even where these facilities are available, most are poorly managed due to low supervision and inadequate funds for maintenance. Some countries have difficulties in implementing these policies, with respect to funding, regular monitoring and review.

Also, waste management technologies and policies are not in the same pace with the increase in the waste produced (Fobil et al., 2011). The needs of water, sanitation and hygiene in basic schools have not met the rapidly growing enrolment of basic schools. In developing countries such as Ghana, needs of water, sanitation and hygiene are beyond emphasis. Therefore procedures planned for improving waste management should be reviewed to include short and medium term strategies.

2.3 Water, Sanitation and Hygiene Facilities in Basic Schools

Interventions to improve water quality, hygiene and sanitation facilities in schools reduce absence from school (Freeman et al., 2012). When sanitary facilities are available and adequate, well supervised and maintained school children remain healthy and attend school regularly. Per the Community Water and Sanitation Agency (CWSA) and World Health Organization (WHO) standards for latrines in schools, a four (4) seater KVIP for 240 students, six (6) seater KVIP for 360 students and twelve (12) Water Closet (WC) for 720 students is adequate (ghanawashproject.org, 2017). The practice of good sanitation and hygiene depends on the availability, supervision and maintenance of sanitary and hygiene facilities in schools. A study done by Gisore (2013) in Kenya showed that the ratio of school girls and school boys to latrines with

doors were 45 girls:1 latrine and 71 boys:1 urinal and 2 latrines respectively but did not meet the standard of Kenya which is 25 pupil:1 latrine.

When sanitary facilities are not maintained they are underutilized (Dube, 2012). School children who have much knowledge about good sanitary conditions either learned from school environmental health lessons and or at home. Therefore, they tend to avoid messy places and might resort to the use of open spaces for places of convenience. The Ministry of Education (2015) guideline for inclusive education policy standard requires that every school is fenced. The document also stipulates that toilets and urinal facilities should be available and accessible to students and separated for girls and boys and that, schools must ensure the availability of water and soap for hand washing.

The availability of water also determines the use of sanitary facilities and the practice of hygiene in schools. The barriers in latrine use in schools include limited access to latrines, lack of constant water supply in latrines, and lack of maintenance (Hassan et al., 2014). Hassan et al. (2014) discovered that programs targeted at encouraging latrine use and environmental health in general is mostly not conducted in schools. Children only rely on class room lessons and home knowledge. School children generally perceive existing school latrines as unpleasant and wish to have basic functional, clean and colourful latrines with enough privacy (Le et al., 2012). According to Mara (2003), the gap in water, latrine and hygiene facilities in general can only be bridged when the 2.9 billion people receive improved water supplies and the 4.2 million people have improved sanitation by the year 2025 set by the WHO and UNICEF. Terms such as ‘yellow gallons’ used in Ghana, ‘water crisis’, ‘water short’ used across the streets of many countries describing water shortage and the

desperation for water in communities depict the poor performance of the world in terms of water supply and sanitation.

However, USAID (2014) established in a study in Zambia that up to 71% of schools have access to water regardless of the source. Water coverage as such is encouraging and if achieved by many countries could improve hygiene and waste disposal practices in schools. It is however important to consider the source, storage and maintenance of the water for use. Potable water should be the standard for basic schools in order not to transmit water related diseases.

In recent times, water, sanitation and hygiene in African schools have received greater attention. However, a study in Kenya (Alexander et al., 2014) found that primary schools had insufficient hygiene and sanitary facilities for the menstrual health needs of menstruating girls. Causal factors projected were that schools were not given sufficient resources to construct water, sanitation and hygiene facilities. Schools are only managing with the little available funds to maintain the few infrastructure and are unable to add on new structures to contain the growing school population. The Kenyan study also found that schools with non-governmental organizations' (NGOs) support had better environmental conditions. Thus, it is worth deducing that one of the causes of poor sanitation and hygiene in schools is lack of prioritization of water, sanitation and hygiene facilities.

USAID (2014) found that most schools in Zimbabwe had toilet facilities with a large number of them having a separate toilet for girls. The separation of toilet facilities for girls could improve its usage because there is better privacy for girls especially those menstruating. A related study by Adukia (2014) in Kenya and Tanzania on sanitation and education established that lower primary schools with latrines had better

attendance than those without irrespective of whether the latrines were unisex. It was however found that at the Upper Primary and Junior High School levels, separation made an impact on girls' school attendance. Therefore, unavailability of latrines in schools do not only affect the health of students but also inconvenient those especially menstruating girls and causes absence from schools which results in poor academic performance and eventual dropout.

According to Snell & Wilson (2010), unsafe water causes many diseases in developing countries of which Ghana is not an exception. The 2008 Ghana Demographic and Health Survey (GDHS) report on Millennium development Goals (MDGs) indicated that 84% of the entire population use water from safe sources, an improvement from 56% in 1990. It also reported that 12% of Ghanaians use improved toilet facilities. What are the conditions in basic schools in Ghana since children are most vulnerable with respect to the effects of poor sanitary conditions?

The Ghana Water and Sanitation Program (WSP) report stated that Ghana loses GHC420 million every year on poor sanitation (WSP, 2012). The study found that, more than half of the Ghanaian population use insanitary or shared latrines with the poorest population of about five million people being twenty-two (22) times likely to practice open defecation and that 5,100 children under five years of age die each year from diarrhoeal diseases.

2.4 Waste Disposal and Hygiene Practices in Basic Schools

2.4.1 Waste disposal practices

According to UNICEF (2012) waste disposal is very important for keeping schools clean. It also prevents the spread of illness among students. The UNICEF study found that greater number of schools in Israel had their rubbish being collected by the

municipality with 97.7 per cent in Gaza and 89.6 per cent in the West Bank. Rubbish is burnt when not collected though it is an unacceptable practice. School rubbish is gathered from classrooms and offices on a daily basis which comprises of 86.3 per cent in Gaza and 98.9 per cent in the West Bank. Solid waste is as well collected by municipalities. It was also gathered from the UNICEF (2012) report that all classrooms of schools surveyed had bins but not everywhere on the playgrounds. According to Elemile et al. (2011), paper and plastics are the most frequently generated wastes in school. Common methods of solid waste disposal reported were use of dustbins for collection and open burning. However, inadequate waste management facilities and practices in schools have major waste disposal problems. Elemile et al. (2011) further observed that, the lack of refuse bins contributes to waste spillages and the burning practices in schools. As a result odors arise from both the decay of organic waste and emissions from refuse burning.

Rada et al. (2016) have also suggested that although there are several waste disposal issues in basic schools, the production of waste does not only depend on the size of the school and on the number of occupants, but, especially, on the type of activities carried out in addition to the ordinary classes and on the habits of both pupils and staff. They proposed that promoting the right behavior practices and attitudes among students on waste disposal are important steps that can be taken to handle waste management in schools.

2.4.2 Hygiene practices

Hygiene behavior of school children varies among the different types of schools. USAID (2014) report in Zimbabwe recorded relatively low incidence of open defecation and urination among private schools as compared to Government and

Community schools. It was also reported in the same study that less than 6% of the pupils defecated or urinated in nearby home or church toilet or urinary facilities. Therefore the absence or inadequacy of waste disposal facilities could negatively impact on pupils' behaviours because when efforts to put whatever is being learnt in class or homes into practice fails, the gradual use of unapproved means would remain in them for life. These, cumulatively are the results of the predicament of the world, especially, sub-Saharan African countries in dealing with waste. In the Philippines, 71.4% of school children washed their hands after using toilet and 75.9% washed their hands before eating. In addition, a good number (65.2%) of the school children took daily bath and 63.8% wore slippers and shoes most of the time. (Philippines Department of Health, 1999). On the contrary, school children in India hardly used school sanitary facilities because they are not allowed by policy to use the facilities during school hours and for that matter most schools were not having sanitary facilities (Adukia, 2014).

Sarkar (2013) also found that the female students were more knowledgeable than the male students regarding the maintenance of personal hygiene and also suggested that there was a wide gap between practice and knowledge of personal hygiene among the primary school children living in the slum area. They further claimed that even misconceptions do exist on certain indicators of personal hygiene among the students. This may indicate that any intervention, especially in a form of education that has to be provided has to tailor the needs of the students.

A study by Babalobi (2013) also revealed that while primary-school pupils in Makoko, a slum in Lagos (Nigeria) are fairly knowledgeable about Water Sanitation and Hygiene (WASH) services, they turn to indulging in risky WASH practices due to

helplessness and poverty. Thereby suggesting that developing countries may only overcome their WASH crisis if the problem of poor governance is resolved.

2.5 The Effect of Water and Sanitation Related Diseases on Children Education

Most of the top ten diseases reported in Ghana are water, sanitation and hygiene related. Malaria which has been the leading cause of morbidity and mortality especially in children has its causative agent, the female anopheles mosquito, breed from unclean environment such as bushy areas and stagnant water bodies. Diarrhoea diseases, skin infections, urinary tract infections, respiratory tract infections and worm infestation are diseases with high rates of morbidity in Africa and for that matter, Ghana. All these diseases are caused and transmitted through polluted environment; air, water, food and surroundings. These diseases also degenerate into conditions such as anaemia and under-nutrition which affect children's growth and development.

A survey conducted by Jewkes & O'Connor (1990) in Bloomsbury district in London found that basic schools are the worst hit during community outbreaks of diseases such as gastroenteritis, hepatitis A, and dysentery. These diseases are transmitted through unwholesome water and poor sanitation and hygiene.

The quality of environmental conditions has implications for health. According to Fobil et al. (2011), there is considerable evidence showing the effect of the physical environment on human health. The study, which was conducted in Greater Accra region-Ghana, found a relationship between environmental factors and the risk of diarrhoea. Mølbak et al. (1997) also had similar findings in their study in Guinea Bissau, where prevalence and death due to diarrhoea were found to be influenced by poor hygiene. Adding to these findings is a study by Hassan et al. (2014) in Egypt that

poor personal hygiene are often linked to diarrhoea illness in developing countries. It is thus important to note that diarrhoea is a hygiene fueled disease. Hygiene, to a large extent is affected by the availability of water and sanitary facilities in schools. Therefore, in schools where there are adequate water supply and adequate sanitary facilities, the practice of good hygiene is highly likely among basic school children.

Diarrhoea was also found to be the third leading cause of death among populations of low income countries in 2004, (Hassan et al., 2014). The disease accounts for one out of every four morbidity days and up to fifty percent (50%) of deaths, (Mølbak et al., 1997). According to Mara (2003), the risk of diarrhoea in children in developing countries is high such that in every minute two children die of diarrhoea disease.

Diarrhoea disease spreads from person to person influenced by poor hygiene. A form of diarrhoea causing agent, *Giardia intestinalis* is found to be prevalent among children in developing countries, (Veenemans et al., 2011). The study described its effect as controversial in causing impairment in linear growth and cognitive abilities in children. Walker et al.(2012), quantified the effect of diarrhoea on the cognitive ability in children and found them to have no significant association. Again, contrary to Walker's quantitative findings, Mara (2003) seems to emphasize that diarrhoea in childhood results in poor cognitive function in later childhood and largely contribute to a class of poorly educated workers who will not be able to contribute their full potential to development. It is important to recognize that many researchers concluded on the negative effect of childhood diarrhoea on cognitive abilities without quantitative analysis of the association as Walker did and found a weak linear relationship. There could be other confounders that might introduce a different form of relationship other than linear. Of course other researchers indicated that diarrhoea in

children causes under-nutrition which in regular morbidity could result in nutrient absorption malfunctions.



CHAPTER THREE

METHODS

3.1 Study design

A cross-sectional descriptive study with quantitative method was used in this study. Data collection was done using a screener and a structured checklist at selected schools. The study was carried out among the Kpone Katamanso District Basic Schools. The basic schools comprised of both private and government, and double and single stream.

3.2 Study Area

Kpone Katamanso District is one of the sixteen (16) districts in the Greater Accra Region. The district was carved out of the Tema Municipal Assembly in the year 2012. It is located at the eastern part of Greater Accra region, stretching from the coast towards the southern slopes of Akuapim Mountains. It is 38km away from the capital of Ghana, Accra.

3.2.1 Population

The Kpone Katamanso district as of 2010 had a population of 109,864 with an annual growth rate of 2.6% as compared to the national population growth rate of 2.3% (KKDA, 2014). The district population represents 2.7% of the greater Accra regional population. The Kpone Katamanso District Education Office (KKDEO) had 284 basic schools in the district as of the year 2016 of which 52 were government schools and 232 private schools.

3.2.2 Occupation

The people of Kpone Katamanso district are mainly involved in fishing, fish mongering, salt mining and crop production. Fishing is mainly in the southern portion of the district and crop and livestock farming in the north.

3.2.3 Waste Management

In terms of sanitation the Kpone Katamanso district is not doing badly. The district houses one of the largest Greater Accra Regional land fill sites. About 700 tons of waste thus 44% of waste in Greater Accra Region (GAR) is received from most parts of Accra each day. Hence, GAR generates daily solid waste of up to averagely 1600 tones (KKDA, 2014 & Thompson, 2010).

3.3 Study Variables

The study explored factors that influenced the environmental health status of basic schools. Measurements were taken on these variables using a screener and an observational checklist shown in appendix A. The tidiness of toilet facilities was used as the outcome. Explanatory variables used in this study include toilet capacity, cleaner, availability of potable water and refuse bins. Other demographic data of the school such as school enrolments were collected. These variables were measured using WHO/UNICEF/JMP (2015) recommended WASH indicators description format.

3.4 Sample size determination

The number of schools studied from the population of 284 (Kpone Katamanso District Education Office, 2016) schools was determined using the Cochran's sample size estimation formula. It is assumed that 50% of the schools in the study area have poor sanitary conditions (thus $p = 50\%$).

$$n_0 = (z^2pq)/d^2 \text{ (Cochran, 1977)}$$

$$n_1 = n_0 / (1 + n_0/N) \text{ was used since } n_0 > 5\% \text{ of } N$$

Where n_0 = initial sample size, n_1 = final sample size, N = population size (280)

$z = 1.96$ at 95% confidence level, d = level of significance, 0.05

p = expected proportion of schools with insanitary conditions (assumption) = 50%

$$q = 1 - 0.5 = 0.5$$

$$\begin{aligned} \text{Therefore } n_0 &= (1.96^2 * 0.5 * 0.5) / 0.05^2 \\ &= 0.9604 / 0.0025 \\ &= 384 \end{aligned}$$

Since $n_0 > 5\%$ of 280

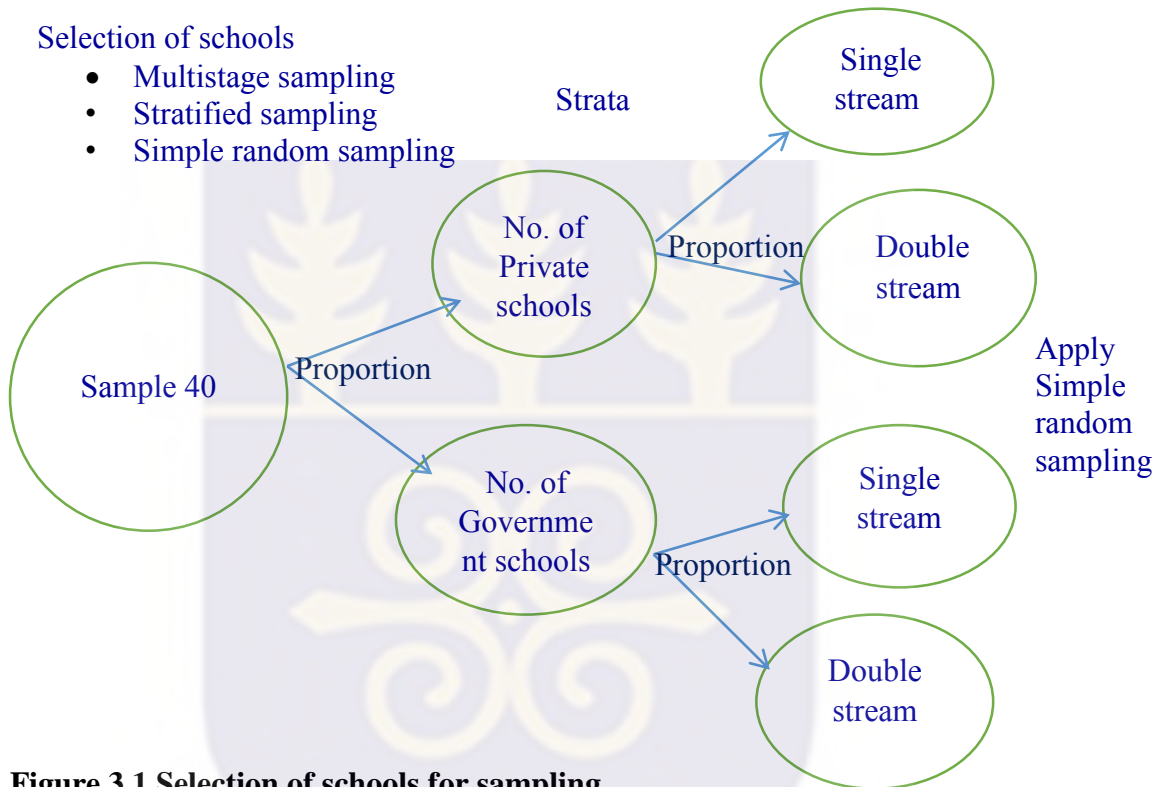
$$\begin{aligned} n_1 &= 384 / (1 + 384/280) \\ &= 161.93 \\ &= 162 \end{aligned}$$

A sample of one fourth (1/4) of the calculated sample size which is 40 was randomly selected for the study. Therefore the study sampled 40 basic schools.

3.5 Sampling procedure

Schools were selected using multistage sampling technique. The sample of 40 schools were proportionally shared into government and private schools, and further proportionally divided into double and single stream schools as shown in Figure 3.1.

Simple random sampling was then used to select the individual schools among the single and double stream schools. The individual schools, single stream and double stream schools for both government and private schools, were assigned integers and random numbers were used to select the required number of schools for the study.



3.6 Quality Assurance

The data collection tool was pretested and validated before final use in collecting the data. The pretesting was done at two basic schools at Ashaiman municipal Assembly and results obtained from the pretest was cross checked with the research objectives and variables to ensure all required data were collected by the instrument. Necessary updates were done to the data collection instrument based on results obtained from pretesting. To ensure quality of the data, the researcher self-collected the data with no or little support from research assistance.

3.7 Data collection method

Data was collected through observing and recording of factors of school environment during school going day. The data collection tool comprised of a screener and an observational checklist. The screener captured data on the background characteristics. Availability of sanitary facilities such as toilet and urinal for students/pupils; waste bins for waste collection; drainage system (possibility of water stagnation), litter on school compound were observed. Water and hygiene facilities including hand washing points, water for Water Closet (WC) latrines and soap at hand washing points were assessed. The conditions of these facilities were used to decide on the adequacies of sanitary facilities.

3.8 Data quality and processing

Data collected was cleaned and all the fields were cross checked. Initial data was cross checked and cleaned for accuracy. It was then entered into Microsoft excel and imported into stata14 to facilitate cleaning and validation

3.9 Data Analysis

Analysis was mainly descriptive to produce frequencies of the variables of interest.

Frequencies and proportions were estimated for types of sanitary facilities using cross tabulation of types of sanitary facilities against school ownership. Chi-square test of association was added to measure the relationship between school ownership and the other variables.

Test of associations were carried out and significant variables were fit in a logistic regression model to examine the strength of association. Tidiness of toilet facilities

was used as the outcome variable measured against other factors of environmental health and basic school characteristics.

3.10 Ethical Considerations

Ethical approval was obtained from Ghana Health Service Ethics Review Committee and permission was obtained from the District Education Office as well as the individual schools.

3.11 Privacy and Confidentiality

Information obtained from schools did not involve any confidential aspects of schools. Individual school's information was handled by only the principal investigator and the academic supervisor to avoid a breach of privacy and confidentiality.

3.12 Consent

The consent of the heads of schools were obtained before data was collected from each school. After the purpose of the study was explained to the head/representative of the participating school, a consent form was given to be endorsed indicating that they understood the purpose of the research and agreed to volunteer information and also to conduct the data collection officer through the observation process.

3.13 Data Storage and Security Usage

Backups have been created on compact disk, external hard drive and on Google drive/drop box. A copy was given to the academic supervisor for safe keeping. Stored data or Information, will be destroyed two years after the research.

3.14 Compensation

Schools participation in the study attracted no compensation.

3.15 Conflict of interest and funding

There was no conflict of interest with regards to the study. The study was self-funded.



CHAPTER FOUR

RESULTS

4.1 Background characteristics of basic schools studied

Data was analyzed from the assessment of the environmental health status from forty (40) sampled Basic Schools in the Kpone Katamanso District in the Greater Accra region of Ghana. The pupil population ranged from a maximum of 900 and a minimum of 60 pupils per school and a mean of 353 pupils per school. Enrolment in government schools ranged from 307 to 900 pupils per school with an average of 554 pupils whereas private schools ranged from 60 to 650 pupils per school with an average enrolment of 304 pupils in a school.

4.2 Types and adequacy of sanitary provisions in basic schools

4.2.1 Sanitary facilities in basic schools

Out of the 40 schools studied 55% (22) were double stream schools. Toilet facilities were available in 90% (36) of the basic schools, of which 74% (30) had WC, pour flush and KVIP toilet facilities whereas 16% (6) had unimproved toilet facilities. The remaining 10% (4) had no toilet facilities. Private schools had 56.2% (18/32) of WC and pour flush latrines as compared to 12.5% (1/8) of government basic schools. Conversely, 37.5% (3/8) of government basic schools studied, either practiced open defecation or used pit latrines without slabs compared to 3.1% (1/32) and 9.4% (3/32) in private basic schools. Therefore 75% (6/8) of government basic schools practiced open defecation and used pit latrines without slabs as against 12.5% (4/32) of private basic schools that practiced open defecation and used pit latrines without slabs. The association between school ownership and availability of toilet facilities was statistically significant with $p\text{-value} < 0.01$. It was also observed that 52.5% (21/40) of

the basic schools studied had urine facilities and these were all separated for boys and girls. Of the private basic schools, 53.1% (17/32) had urine facilities whilst 50% (4/8) of government basic schools had urinals. Liquid waste disposal was mostly through open space, 52.5% (21/40), and piped sewer system, 32.5% (13/40). Table 4.1 shows that 87.5% (7/8) of government basic schools and 43.8% (14/32) of private basic schools practiced open space liquid waste disposal. As low as 10% (4/40) of the schools studied had trenches that drains liquid waste. School compounds are likely to be flooded and with stagnant water during rainy season. The relationship between basic schools drainage system availability and school ownership was not statistically significant.

Both government and private schools had fairly high number of hand washing points with water and soap (basic). Half 50% (4/8) of government and 65.6% (21/32) of private basic schools had hand washing points. Overall, 62.5% (25/40) of schools sampled had basic hand washing points, 15% (6/40) without soap and 22.5% (9/40) had none. Again, there was no statistically significant association between school ownership and hand washing points' availability in basic schools.

Waste bins for waste collection were available in 92.5% (37/40) of the schools studied. Of this, 60% (24/40) were covered with hand flip. All public schools had waste bins, out of which 50% (4/8) were covered with hand flip. Some private schools, 9.4% (3/32) had no waste bins, waste was gathered on a bare ground and packed in sacks later to be disposed. However, 62.5% (20/32) of the private schools had covered waste bins with hand flip.

The boundaries of schools were fenced in 77.5% (31/40) of the basic schools sampled. Fencing protects the school surrounding from the community intrusion. 25% (2/8) of government schools and 90.6% (29/32) of private basic schools were fenced.

Table 4.1: Types of sanitary facilities by school ownership in basic schools at Kpone Katamanso District

Variable	School ownership			P-value
	Government (%)	Private (%)	Total (%)	
Toilet facilities				
Open defecation	3 (37.5)	1(3.1)	4(10.0)	0.002
Unimproved	3 (37.5)	3(9.4)	6(16.0)	
Basic	1 (12.5)	10(31.3)	11(27.0)	
Safely managed	1(12.5)	18(56.2)	19(47.0)	
Urinal				
Separated	4 (50.0)	17(53.1)	21(52.5)	0.874
Combined	0 (0.0)	0(0.0)	0(0.0)	
Not available	4 (50.0)	15(46.9)	19(47.5)	
Drainage				
Piped sewer	0 (0.0)	13(40.6)	13(32.5)	0.105
Onsite septic tank	0(0.0)	2(6.2)	2(5.0)	
Trenches	1(12.5)	3(9.4)	4(10.0)	
Open space disposal	7(87.5)	14(43.8)	21(52.5)	
Hand washing points				
Basic	4(50.0)	21(65.6)	25(62.5)	0.131
Unimproved	3(37.5)	3(9.4)	6(15.0)	
Not available	1(12.5)	8(25.0)	9(22.5)	
Waste bin				
Hand flip	4(50.0)	20(62.5)	24(60.0)	0.398
Uncovered	4(50.0)	9(28.1)	13(32.5)	
Not available	0(0.0)	3(9.4)	3(7.5)	
School boundary				
Fenced	2(25.0)	29(90.6)	31(77.5)	<0.001
Not fenced	6(75.0)	3(9.4)	9(22.5)	

*Chi-square / Fisher's Exact test analysis

4.2.2 Adequacy of sanitary facilities

The adequacy of sanitary facilities in this study was measured using variables including condition of facilities, average number of students per facility, and the capacity of available facilities. As shown in table 4.2, the average enrolment in basic schools was 353.73 (SD = 200.49) with 60 pupils minimum and 900 pupils maximum. From the 36 schools with toilet facilities, the mean number of students per latrine seater was 66.77 (SD=41.96). Half (18/36) of schools with toilet facilities had sixty or less pupils per toilet facility.

Table 4.2: Demographic characteristics of basic schools at Kpone Katamanso District

	Total	Mean ± SD
Number of pupils in schools	14149	353.73 ±200.49
Capacity of toilet facilities	218	6.06 ± 3.16
Students per toilet facility		66.76 ± 41.96

Generally, 62.5% (25/36) of basic schools' toilet facilities observed were tidy with no statistically significant difference between single and double stream schools (p-value = 0.058). The structure of the toilet facilities were mostly in good shape with 82.5% (33/36) having roofs and doors. Though double stream schools had 94.5% (21/22) of their toilet facilities with roofs and doors as compared to 66.7% (12/18) in single stream schools, the difference could be due to chance since there is no statistically significant relationship between school type and structural adequacy as shown in table 4.3 below. There were four (4) schools without toilet facilities and these were all

single stream schools. The adequacy of sanitary facilities enhances separation for boys and girls. From table 4.3, toilet facilities were separated for boys and girls in 75% (30/36) of the schools observed. In six (6) of the schools, toilet facilities were not separated.

Table 4.3: Tidiness of basic school toilet facilities

Condition of toilet facility	Type of school			p-value
	Schools(n) (%)	Single stream (%)	Double stream (%)	
Tidiness				
Tidy	25(62.5)	9(11.3)	16(13.8)	0.058
Untidy	11(27.5)	5 (27.8)	6(27.27)	/
Not available	4(10.0)	4(22.2)	0(0.0)	
Structural adequacy				
Roofed with doors	33(82.5)	12(66.7)	21(94.5)	0.068
Roofed without doors	2(5.0)	1(5.6)	1(4.6)	
No roof and no doors	1(2.5)	1(5.6)	0(0.0)	
Not Available	4(10.0)	4(22.2)	0(0.0)	
Separation of toilet facilities for boys & girls				
Separated	30(75.0)	11(61.1)	19(86.4)	0.055
Not separated	6(15.0)	3(16.7)	3(13.6)	
Not available	4(10.0)	4(10.0)	0(0.0)	

*Statistically significant at $p < 0.05$, Chi-square / Fisher's Exact test analysis

4.3 Availability of potable water in basic schools

All basic schools in the study area had water. Figure 4.1 shows that 80% (32/40) of the safely managed water facilities (pipe water sources) were located on the schools' premises. Further analysis revealed that a slightly larger proportion, 81.3% (26/32), of the private schools had pipe water sources compared to 75% (6/8) of government schools.

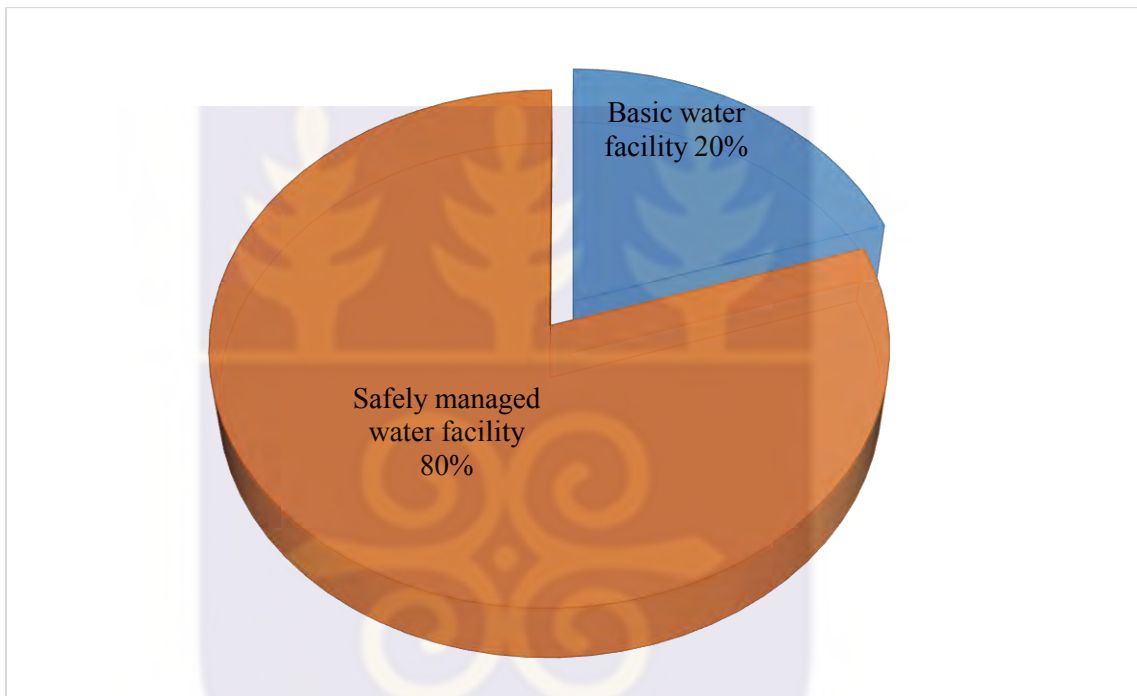


Figure 4.1: Availability of Water in basic schools at Kpone Katamanso

4.4 Waste disposal practices in basic schools

Basic schools at Kpone Katamanso District mostly use dustbins to gather solid waste for scheduled collection by Zoom Lion Limited and other private companies. It was found that 77.5% (31/40) of the schools had their waste collected on schedule whilst very few schools 2.5% used pit dumping and or burning (1/40), as shown in Figure 4.2.

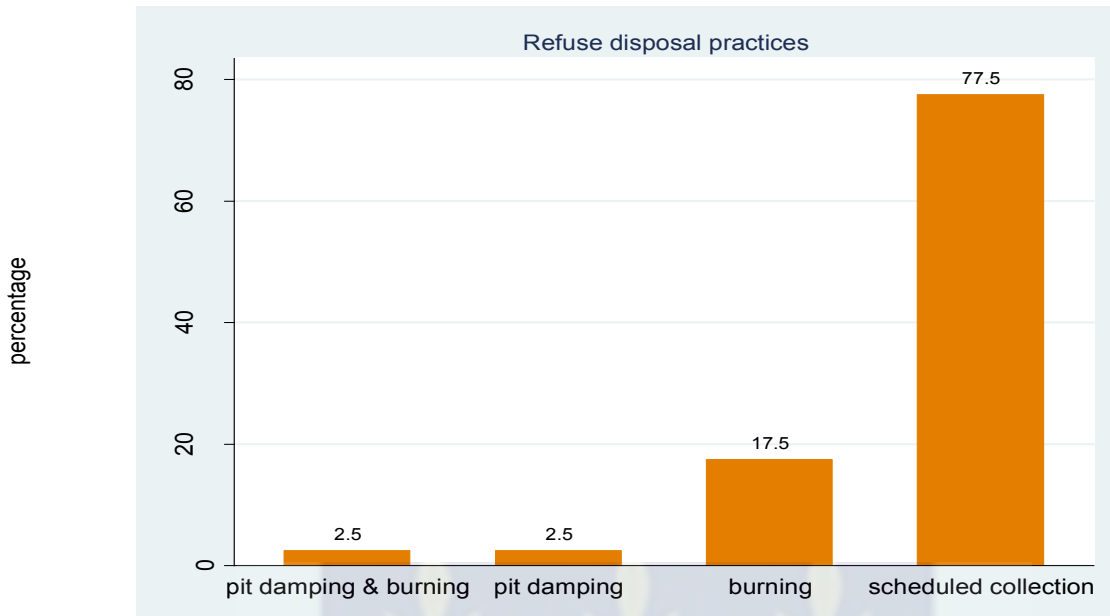


Figure 4.2: Waste disposal practices among basic schools at Kpone Katamanso District

The types of waste bins used in collecting solid waste at basic schools at the study area include hand flip, 24/37(64.9%) and uncovered bins, 13/37(35.1%). Among these 6/37(15%) were lined with polythene as shown in figure 4.3.

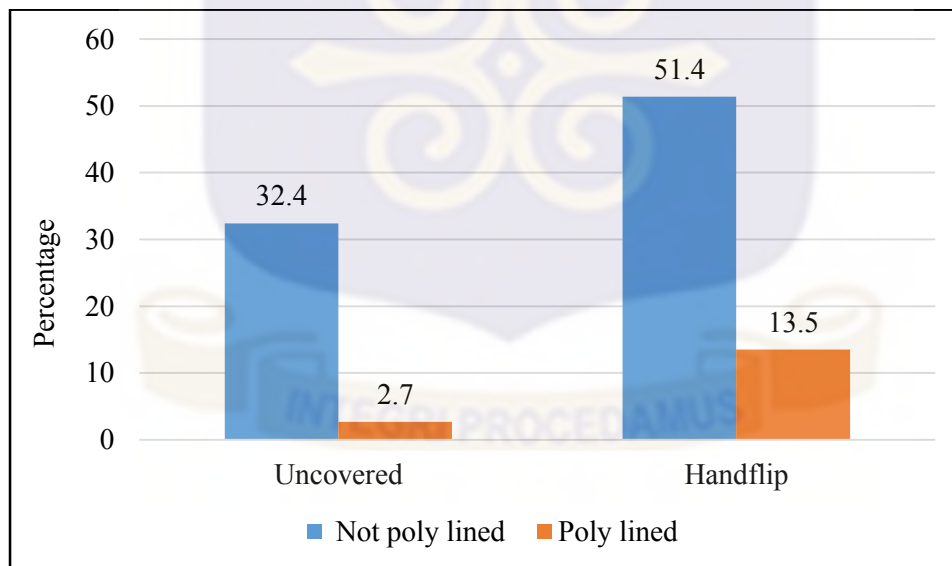


Figure 4.3: Graphs by polythene lining in waste bins

Waste separation is not a common practice among basic schools observed. Out of the 40 schools, 36/40(90%) did not separate organic waste from inorganic waste products.

In some cases fluids were dumped in same containers (bins) with other waste products such as plastic water sachets, plastic containers and paper.

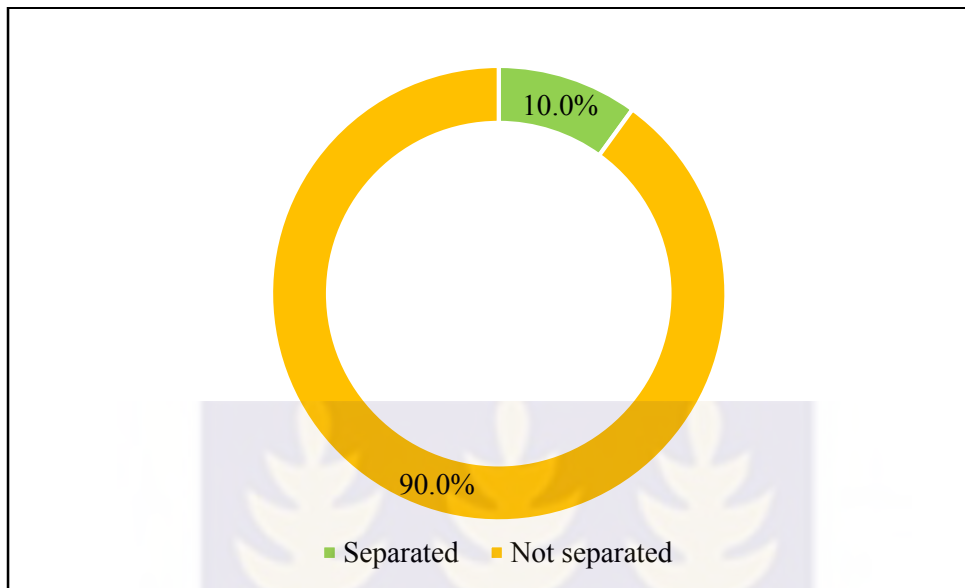


Figure 4.4: Practice of waste segregation among basic schools

4.5 Hygiene practices in basic schools

Hygiene practices in the basic schools were assessed by collecting information on the frequency of the cleaning of the sanitary facilities such as toilets including school compound, safe waste disposal and personal hygiene. This study found that, 20 (50%) of the 40 schools observed had their cleaning of sanitary facilities such as toilets done by pupils. With regards to toilet facilities 16/36(44.4%) of schools with toilet facilities were cleaned by pupils. Among government schools, all cleaning thus, 5/5(100%) was by pupils, compared to private schools where 11/31(35.5%) of their school sanitary facilities was done by pupils as shown in table 4.4. The association between school ownership and the category of persons that cleans the school sanitary facility was statistically significant with $p=0.005$.

Table 4.4: Association between school ownership and type of cleaners used at the basic schools

	Government	Private	p-value
General school cleaning			
Pupils	8 (100.0)	12(37.5)	P=0.005*
Pupils & hired cleaners	0(0.0)	7(21.9)	
Hired cleaners	0(0.0)	13(40.6)	
School Toilet facility cleaning			
Pupils	5(100.0)	11(35.5)	P=0.036*
Pupils & hired cleaners	0(0.0)	7(22.6)	
Hired cleaners	0(0.0)	13(41.9)	

*Statistically significant at $p < 0.05$, Chi-square / Fisher's Exact test analysis

As shown in table 4.5, it was realized that more, 40% (2/5) of the government schools were untidy than private schools, 29% (9/31). Most schools, 72.7% (8/11) where pupils were in-charge of cleaning were untidy and as many as 44.4% (16/20) schools (both government and private) were cleaned by pupils and 50% (8/16) of toilet facilities cleaned by pupils were untidy. The relationship between type of sanitary facility cleaner (pupil, hired cleaner) and the tidiness of the facility were significant statistically ($p=0.04$). Logistic regression was conducted to measure the strength of these associations and the results are presented in table 4.6.

Table 4.5: Tidiness of toilet facilities in basic schools

	Untidy (%)	Tidy (%)	Total (%)	p-value
School ownership				
Government	2(40.0)	3(60.0)	5(100.0)	0.017
Private	9(29.0)	22(71.0)	31(100)	
Person in-charge of toilet cleaning				
Pupil	8(72.7)	8(32.0)	16(44.4)	0.030
Pupil& cleaner	2(18.2)	5(20.0)	7(19.4)	
Hired Cleaner	1(9.1)	12(48.0)	13(36.1)	
Total	11(100.0)	25(100.0)	36(100.0)	

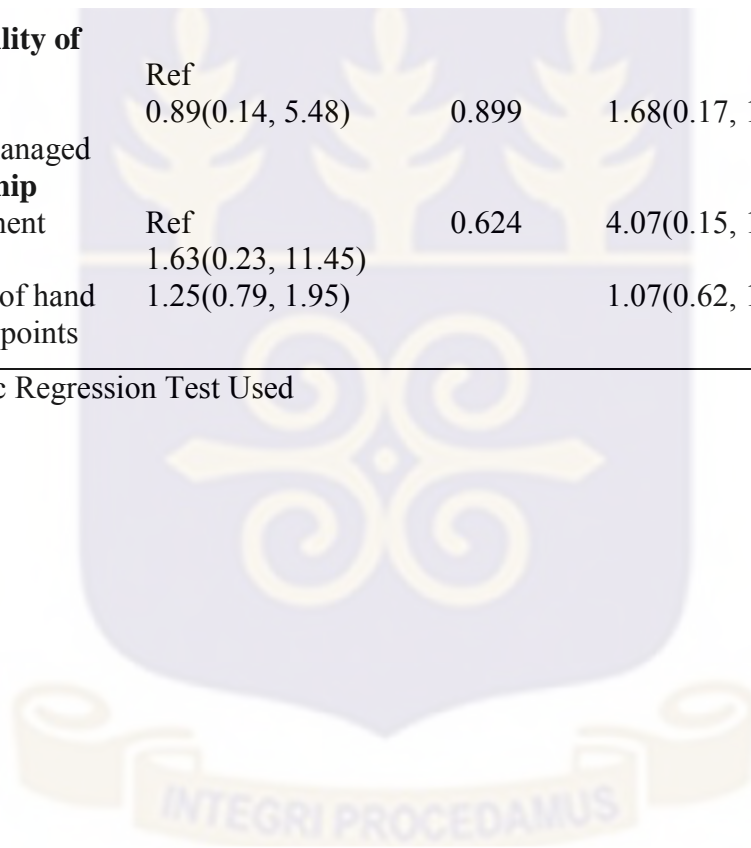
*Statistically significant at $p < 0.05$, Chi-square / Fisher's Exact test analysis

The crude odds of a basic school sanitary facility being tidy was 12.0 (95% CI 1.25-115.36) for schools that hired private cleaners compared to schools toilets that are cleaned by pupils, and this was statistically significant ($p = 0.031$). After adjusting for enrolment, toilet capacity, water availability, and school ownership the odds of tidiness was 10.27 times higher among schools with hired cleaners than schools toilets that are cleaned by pupils. Change in school enrolment on the other hand did not have any effect on the tidiness of sanitary facilities in basic schools. Again this observation was not statistically significant ($p = 0.142$). A unit increase in the capacity of toilet facility, though not statistically significant ($p = 0.448$), increases the unadjusted odds of tidiness of sanitary facilities at basic schools by 1.23 times (OR=1.23, CI 0.92-1.64). Private schools were 1.63 times more likely to be tidy compared to public basic schools (unadjusted OR = 1.63, CI 0.23-11.45).

Table 4.6: Association between tidiness of sanitary facility and some sanitary determinants

	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Person in-charge of toilet cleaning				
Pupils	Ref			
Hired cleaners	12.0(1.25, 115.36)	0.031	10.27(0.66, 159.27)	0.096
Pupil & cleaner	2.5(0.37, 16.89)	0.347	2.13(0.19, 22.78)	0.532
Enrolment	1.003(0.99, 1.01)	0.208	1.004(0.99, 1.01)	0.142
Toilet capacity	1.23(0.92, 1.64)	0.159	1.15(0.79, 1.67)	0.448
Availability of water				
Basic	Ref			
Safely managed	0.89(0.14, 5.48)	0.899	1.68(0.17, 16.20)	0.654
Ownership				
Government	Ref			
Private	1.63(0.23, 11.45)	0.624	4.07(0.15, 108.09)	0.402
Number of hand washing points	1.25(0.79, 1.95)		1.07(0.62, 1.87)	0.803

*Logistic Regression Test Used



CHAPTER FIVE

DISCUSSION

5.0 Introduction

A healthy environmental condition in basic schools prevents diseases and promotes growth and learning. UNCEF (1998) acknowledged the wide understanding of the benefits of good sanitation in basic schools as against a rather poor application in realities. They therefore concluded that a basic school becomes a risky place when sanitation and hygiene facilities were absent, inadequate or poorly maintained. Oloruntoba et al. (2014) have established that inadequate sanitary factors are the major causes of diseases in communities. This study was designed to determine the status of environmental health status of selected basic schools in the Kpone Katamanso District in the Greater Accra Region of Ghana.

5.1 Types of sanitary provisions in basic school Latrines

The Ghana Demographic and Health Survey report (2008) indicated that 12% of Ghanaians use improved toilet facilities. This study established that 91.0% of basic schools had latrines and 75% of these were improved latrines. These findings are consistent with a similar study conducted in Kenya in 2013 which found all basic schools to have latrines (Gisore, 2013). In contrast, Gyabaah & Awuah (2009) found toilet facilities in 47% of basic schools in a study in Tano South, Ghana. There were 25% of public schools with improved latrines in this study. In a period of about 9 years this has become an improvement over what was found by the Ghana demographic and health survey in 2008. Low number of latrines in schools leads to high open space defecation among pupils in public schools as a result, it was realized in this study that up to 87.5% pupils of public schools and 43.8% of private basic schools practiced open defecation. Private basic schools were better in coverage with

up to 87.5% having improved toilet facilities. Alexander et al. (2014) had a similar observation in a Kenyan study where schools with non-governmental organizations' (NGOs) support had better environmental health conditions. Therefore private schools are better with the provision of sanitary facilities as compared to government basic schools. This may be due to private school owners going beyond seeing school only as a knowledge imparting center but also as a business where competition of who offers the best services gets high patronage. It then gives them the edge in ensuring good environmental health in schools.

5.1.1 Urinal facilities

In 52.5% of basic schools studied, urinal facilities were available and these were all separated for boys and girls. Similar to these findings was a research in Kenyan basic schools by Gisore (2013) where 50% of basic schools had urinals. Both private and government schools were not different in the provision of urinal facilities.

5.1.2 Drainage system

The provision of drainage facilities was generally low. Ten percent of basic schools visited in this study had trenches. This could lead to spots of stagnant water on schools' compounds during rainy seasons which would expose pupils to infections and accidents during school hours. Majority (52.5%) of the schools had no drainage facilities whilst others used the pipe sewer system and onsite septic tanks.

5.1.3 Refuse disposal facilities

From literature, the lack of refuse bins contributes to waste spillage and burning practices in schools (Elemile et al., 2011). This research found high coverage (92.5%) of refuse bins provided in the basic schools out of which 60% were covered with hand flip, an improvement over what was found from a study in the Tano South District, where 53% of schools had waste bins out of which 18% had lids (Gyabaah,

2009). All the government basic schools in the current study had waste bins while 9.5% of private schools had no waste bins. This is also similar to the findings by UNICEF which found that all the schools surveyed had dustbins in their classrooms (UNICEF, 2012).

5.1.4 Hand washing facilities

In this research, it was established that more than half thus, 62.5% of basic schools studied had hand washing points with soap. More private than government schools had hand washing points that had soap, 65.6% and 50% respectively. However there was no statistically significant relationship between ownership of schools and the availability of hand washing points. The findings in this research were not different from reports from literature. Gisore (2013), Kenya and Gyabaah & Awuah (2009) Ghana, established that 55% and 60.0% respectively of basic schools had hand washing points.

5.1.5 Fencing

It was found in this study that majority (77.5%) of the schools' boundaries were fenced. Similar to what was found by Gisore (2013) that fencing were available in 75% of basic schools studied.

5.2 Adequacy of sanitary facilities

The CWSA and WHO standards for latrines in schools requires that a four (4) seater KVIP is adequate for 240 students, six (6) seater KVIP for 360 students and twelve (12) seater Water Closet (WC) for 720 students (ghanawashproject.org, 2017). Findings from this research indicate that toilet facilities were adequate for schools that have toilet facilities. Averagely, 267 students used a four seater latrine which is not

too different from the WHO and Ghana standard. The structure of toilet facilities were mostly (82.5%) in good shape with roofs and doors. The guideline for inclusive education policy standard for (Ghana Ministry of Education, 2015) mandates schools to provide adequate toilet facilities and should be separated for girls. United States' Agency for International Development (2014) found that most schools in Zimbabwe had toilet facilities with a large number of them having separate toilet for girls. In this study, separation of toilet facilities was done in 75% of the schools. In six basic schools, one government and five private basic schools, toilet facilities were not separated for girls. The separation of toilet facilities for girls could improve its usage because there is better privacy for girls especially those menstruating.

5.3 Water availability in basic schools

The 2008 GDHS report on MDGS indicated that 84% of the entire population used water from safe sources. Compared to findings from this research, 80% of basic schools sampled used water from safe source located on schools premises of which 81.3% were safe sources among private schools and 75% safe sources among public schools. This was relatively higher than 40% recorded by Gisore (2013) in a research in Kenya that 40% of basic schools had consistent water supply. USAID (2014) established in a study in Zambia that up to 71% of schools have access to water regardless of the source. However, all schools studied had water from at least basic sources such as boreholes.

5.4 Waste disposal practices in basic schools

Mostly waste generated at basic schools are solid. Dustbins were found to be the major means by which solid waste was gathered at the basic schools studied. Fifteen percent of the schools had polythene lining on their bins to keep the bins clean and

make bins emptying easier. In 77.5% of the basic schools, scheduled collection was done by a private waste management company in Ghana, Zoom Lion Limited. In a UNCEF study in Gaza and West Bank, 97.7% and 89.6% of schools had their rubbish collected by the municipality. Among the schools observed, 10% of them had the organic and liquid waste separated from the plastic and other inorganic waste. In most of the schools, waste products such as plastic water sachets and paper waste were found in the same bins.

5.5 Hygiene practices in basic schools

Hygiene practice includes the keeping of both the body and sanitary facilities healthy and free from the danger of infection. At basic schools hygiene is ensured through cleaning of sanitary facilities, safe waste disposal, personal hygiene and safe school compound. According to Gisore (2013), basic schools pupils latrines are mostly cleaned by pupils in 90% of the schools studied in Nairobi, Kenya. In our study, 50% of basic schools toilet facilities were found to be cleaned by pupils. All pupils' toilet facilities in government schools were cleaned by pupils. A test of association indicated a statistically significant association between the kind of persons responsible for school toilet facility cleaning and the tidiness of the toilet facility ($p = 0.04$). Pupils toilet facilities that were cleaned by hired cleaners were by far tidier than those cleaned by pupils (crude OR= 12.0, 95% CI 1.2-115.36). There was however a high (72.7%) number of schools where cleaning of the latrines were done by pupils. On the other hand increase in enrollment did not have a significant association with the tidiness of toilet facilities ($p = 0.208$).

Hand washing among pupils was observed in both the improved (basic) and the unimproved way. Unlike a study conducted in India by Adukia, (2014) where school children were, by policy not allowed to use sanitary facilities during classes hours.

Therefore most school children had no sanitary facilities. The study conducted at the Kpone Katamanso district in Ghana among basic schools had no restrictions on sanitary provisions and usage for school children hence, majority of the schools had sanitary facilities which helped in promoting good hygiene practices.



CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study was carried out to determine the environmental health status of selected basic schools in the Kpone Katamanso District in the Greater Accra Region. Data was collected and analysed on the types and adequacy of sanitary facilities, availability of potable water, waste disposal practices and hygiene practices in basic schools in the study area.

Findings showed that, majority of basic schools have latrines of which high proportion used improved toilet facilities. The private owned basic schools generally had more and better sanitary facilities than government schools. Open defecation was more common amongst public schools. Most of the toilet facilities were separated for both gender thus, boys and girls and all schools with urinals were equally separated for girls. The average number of pupils per latrines use were within the acceptable World Health Organization's standards for latrines. However, the availability of drainage system in basic schools were generally low with most of the schools studied practicing open space disposal of liquid waste.

The research also found high coverage of refuse bins with majority covered with hand flip. However only fifteen percent had polythene lined in them. All public schools had refuse bins. More than half of the schools studied had improved hand washing points (water and soap). More than two-third of the studied schools had fenced boundaries. Few of the toilet facilities observed had no doors and roofs.

Safe water sources were found on premises of most of the schools studied. Insignificant number of schools had their refuse separated, organic from inorganic.

Measuring other hygiene practices among schools, toilet facilities for pupils in up to half the schools studied were cleaned by pupils. All government schools pupils toilet facilities were cleaned by pupils whereas majority of the private schools had theirs cleaned by hired cleaners. It was however realized that a toilet facility cleaned by a hired cleaner was by far tidier than those cleaned by pupils.

6.2 Recommendations

- Hand washing points are essential in ensuring personal hygiene. In this study, most of the schools had hand washing points but not all were the improved type. Therefore, hand washing provisions such as Veronica buckets with water and soap should be provided, with at least two in a school where one can be mixed with soap since pupils may inappropriately use the soap and the other filled with plain water. Both provision will be best positioned at same point to aid in the washing and rinsing of hands.
- Since toilet facilities that were cleaned by hired cleaners were tidier than those cleaned by pupils, schools should consider using hired cleaners for cleaning especially for toilet facilities Government should consider hiring cleaners for their schools latrines since all government schools' latrines were cleaned by pupils and majority were untidy.
- Waste separation is a recommended practice by the ministry of education (inclusive guidelines for schools), however with only four out of forty schools practicing waste separation, schools should be provided with more waste bins

to introduce waste separation with bins labeled organic and inorganic (e.g. paper separated from plastic)

- Open defecation was high among government basic schools and for that matter more improved latrines should be provided for government basic schools to reduce the practice.

6.3 Limitations

- Data collection time at the various schools varied. Schools' sanitary facilities were likely to be tidier in the morning since cleaning was usually done before class sessions as compared to later observations in the day.
- Clustering of single stream schools could influence the various sanitary facilities usage and availability since some with no facilities may use those of other streams'.



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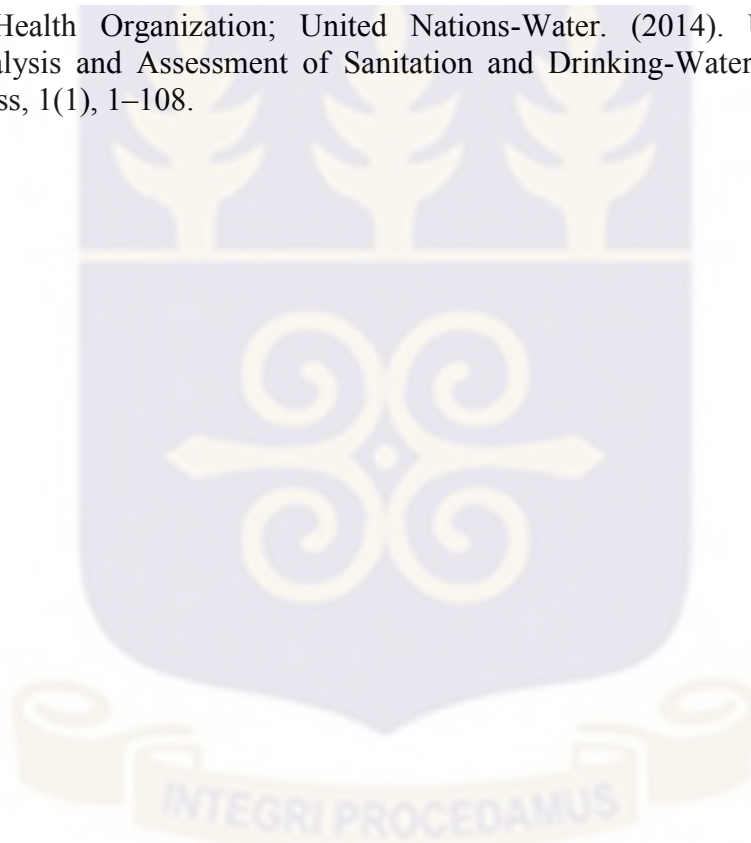
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APPENDICES

Appendix I: Informed consent form

The study is on “Environmental health status of selected basic schools in the Kpone Katamanso District, Accra Ghana”.

My name is Bridget Djabakie Tawiah, a graduate student from the University of Ghana, School of Public Health. I would like your school to participate in the study which aims to determine the environmental health status of selected basic schools at the Kpone Katamanso District. Children spend a lot more of their time in school and on school grounds all year around. It is important that these environments are as safe as possible. Healthy children are more successful learners, and are less likely to be absent from school. School staff also benefit from the clean air, water and land that exist in a healthy school environment.

Schools were randomly selected randomly using the schools list from the district education office, such that all basic schools had equal opportunity to participate. You are required to grant permission for your school environmental health facilities to be observed. You will also be required to assist the study by answering few questions honestly to aid findings on the environmental health situations in basic schools in the district. The confidentiality of you and the school will be ensured. The participation of your school in the study is completely voluntary. For reasons of doubt on any part of the questions or the explanation provided on this form about the study, you are free to contact the investigator on 0242366732/bdtawiah@st.ug.edu.gh or the academic supervisor, Dr. Judith Koryo Stephens, School of Public Health, 0244285224/jstephens@ug.edu.gh, you can also contact the ethical review committee member, Hannah Frimpong, GHS-Ethical Review Committee 0507041223, Hannah.Frimpong@ghsmaail.org/ghserc@gmail.com.

Participant: I have fully understood the objectives of the research and hereby sign undertaking of consent for the school to participate in this study.

Sign/Thumbprint..... Date.....



Appendix II: Environmental Assessment Screener & Checklist for Healthy Schools

Purpose

This Environmental Assessment Checklist for Healthy Schools was developed with the goal of determining the environmental health of selected basic schools at Kpone Katamanso District. Children spend a significant proportion of time in school buildings and on school grounds, it is vital that these environments are as safe as possible. Healthy children make more successful learners, and are less likely to be absent from school. School staff also benefit from the clean air, water and land that exist in a healthy school environment.

This checklist was created to be a tool for schools to:

1. Assess the types and adequacy of sanitary provisions in basic schools
2. Determine potable water availability in basic schools
3. Describe the waste disposal practices in basic schools
4. Identify hygiene practices in basic school

BACKGROUND INFORMATION

Name of School			
Type of School			
Ownership of school			
Address/Location:			
Year Building was Constructed (Age of Building):		Dates of Remodeling, if applicable:	
Number of Students Enrolled:		Grade Levels:	Number of Staff:
School Facilities Manager/ cleaner:			
Date of Walk-Through			
Other Individuals Participating in Walk-Through, if applicable:			
School boundary:			

Waste Management Disposal

Toilet Facility	Safely managed	Basic	Shared	Unimproved	Open defecation
Capacity					
Separated for					
Tidy					
Untidy					
Roofed with doors					
Roofed without doors					
Not roofed & no					
Comments:					

Urine Facility	
Combined	
Separated or boys and girls	
Not available	

Waste disposal practices						
Solid Waste				Liquid Waste		
Incineration	Scheduled collection	Burning	Pit Damping	Trenches (gutters)	Piped sewer system	On-site septic tank
Comments:						

Hand Washing Points			
	Basic	Unimproved	Not available
Number of points			
Comments (e.g. location)			

Waste Bins					
	Foot step	Hand flip	uncovered	Other	Not Available
Polythene lining					
Mixed with Liquid content					
Dry & clean					
Comments:					

Availability Of Potable Water				
Safely managed	Basic	Unimproved	Surface water	Not Available
Comments:				

KEY:

TOILET FACILITY

Safely managed: A basic sanitation facility which is not shared with other households and where excreta are safely disposed in situ or treated on-site

Basic: sewer system, septic tank or pit latrine, ventilated improved pit latrine, composting toilet or pit latrine with a slab not shared with other households

Shared: Sanitation facilities of an otherwise acceptable type shared between two or more households

Unimproved Pit latrines without a slab or platform, hanging latrines and bucket latrines

Open defecation Human faeces disposed open bodies of water, beaches or other open spaces or disposed of with solid waste

HAND WASHING POINTS

Basic: Hand washing facility with soap and water in the household

Unimproved: Hand washing facility without soap or water

No facility: No hand washing facility

POTABLE WATER

Safely managed: A basic drinking water source which is located on premises and available when needed; free of faecal and priority chemical contamination

Basic: Piped water, boreholes or tube wells, protected dug wells, protected springs and rainwater provided collection time is no more than 30 minutes for a roundtrip including queuing

Unimproved: water from unprotected dug wells, unprotected springs and carts with small tank/drum, tanker trucks or basic sources with a total collection time of more than 30 minutes for a roundtrip including queuing

Surface water: River, dam, lake, pond, stream, canal or irrigation channel.

Source: WHO/UNICEF/JMP-2015



Appendix III: Ethical Approval

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.



Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Tel: +233-302-681109
Fax + 233-302-685424
Email: ghserc@gmail.com

MyRef. GHS/RDD/ERC/Admin/App/ 475
Your Ref. No.

Tawiah Bridget Djabakie
University of Ghana
School of Public Health
Legon, Accra

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	GHS-ERC: 19/02/17
Project Title	Environmental Health Status of Selected Basic Schools at Kpone Katamanso District, Accra, Ghana
Approval Date	10 th May, 2017
Expiry Date	9 th May, 2018
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report **after completion** of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....
DR. CYNTHIA BANNERMAN
(GHS-ERC CHAIRPERSON)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra

GHANA EDUCATION SERVICE

In case of reply the number and date of this letter should be quoted

My Ref. No: GES/GAR/KKD
Your Ref. No:



REPUBLIC OF GHANA

DISTRICT EDUCATION OFFICE
KPONE KATAMANSU
KPONE
geskkded2013@yahoo.com

17TH JANUARY, 2017

LETTER OF INTRODUCTION

BRIDGET DJABAKIE TAWIAH (ID 10599340)

I am pleased to introduce to you Miss Bridget Djabakie Tawiah, a Masters student from the University of Ghana (Department of Biological, Environmental and Occupational Health, School of Public Health), Legon.

As part of the requirement for the award of Masters of Public Health Degree, she is conducting a research on "Environmental Health status of selected Basic Schools at Kpone Katamanso District, Accra-Ghana"

It is my hope that you will give her the necessary assistance.

Thank you.

A handwritten signature in black ink, appearing to read 'Rosina Adobor', written over a dotted line.

ROSINA ADOBOR (Ms)
DISTRICT DIRECTOR

