

**ASSESSMENT OF WATER, SANITATION AND HYGIENE SITUATION IN PUBLIC
SECONDARY SCHOOLS IN BLANTYRE CITY**

MSc (WATER RESOURCES AND SUPPLY MANAGEMENT) THESIS

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**UNIVERSITY OF MALAWI
THE POLYTECHNIC**

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SECONDARY SCHOOLS IN BLANTYRE CITY**

MSc (Water Resources and Supply Management) Thesis

By

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**Submitted to the Department of Physics and Biochemical Sciences, Faculty of Applied
Sciences, in partial fulfilment of the requirements for the degree of Master of Water
Resources and Supply Management**

**UNIVERSITY OF MALAWI
THE POLYTECHNIC**

January, 2018

DECLARATION

I hereby declare that this thesis is my original work and has not been presented and accepted in substance of any degree nor it is concurrently submitted in candidature for any degree other than Master of Science in Water Resource and Supply Management of University of Malawi- The Polytechnic.

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CERTIFICATION OF APPROVAL

We the undersigned certify that we have read and hereby recommend for acceptance by the University of Malawi, “Assessment of Water, Sanitation and Hygiene Situation in Public Secondary Schools in Blantyre City.”

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Head of Department:

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Date :

DEDICATION

I dedicate this thesis to my dear wife, **Ellen Kapeta** and son, **Harris Hanleck Dalison**. Without their support, understanding and motivation, I would not have been able to carry out this study.

To so many people that have helped, inspired and assured me throughout my academic life. For many of them, it has either not been possible or too late for me to say thank you.

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ABSTRACT

Background: There is a growing demand on school hygiene and sanitation facilities given the growing number of school enrolments in Malawi. The provision of safe water, improved sanitary facilities and good hygiene practices in schools has been established to improve health, boost educational achievement, and promote gender equity which has a positive impact on the society. It is really important to regularly expose and document the status of water, sanitation and hygiene (WASH) in schools so that improvements may be done accordingly, if any required. Very often, however, most of the studies on WASH in Malawi have directed their attention on primary schools and insufficient attention is paid to secondary schools. For this reason, it is documented that Malawi has a lot of data pertaining to the status of WASH in primary schools and no country statistics are available for secondary school sanitation.

Aim of the study: The study aimed at assessing the current situation of water, sanitation and hygiene (WASH) in public secondary schools in Blantyre City.

Methods: A total of 10 secondary schools in Blantyre City were selected using stratified and purposive sampling techniques. Samples of 37 students and 8 teachers from each school were also selected using systematic and simple random sampling methods respectively. Semi-structured questionnaire containing open-ended questions was used to collect qualitative data on knowledge of WASH among learners and teachers. Structured questionnaire containing close-ended questions was used to collect quantitative data on basic school information and number of WASH facilities from head teachers.

Observation checklist incorporating international standards for WASH in schools by UNICEF and recommendations by the Ministry of Education Science and technology (MoEST) was used as the guiding principles to evaluate the adequacy of the various WASH components in the selected schools. Record reviews were also done to collect secondary data on various WASH projects recently implemented in schools throughout Malawi.

Results: In terms of availability of drinking water, all 10 public secondary schools visited had water supply systems connected to the Blantyre Water Board. However, the majority (7 schools) had no alternative water source (borehole or tanks) in case of water crisis. Additionally, in 8 schools, non-functional water access points outnumbered functional ones. The overall water access points to student ratio was 1:239, which was about twice less and significantly lower ($\alpha=$

0.05, $p \leq 0.03$) than the recommended ratio of 1:150. This meant that 8 of the 10 schools did not comply with the recommended water access point to students' ratio.

In terms of availability of improved sanitation and hygiene facilities, in 8 schools (80%) toilet ratios for boy and girls were less than the recommended ones, especially in Community Day Secondary Schools (CDSSs). The average toilet ratios for boys and girls in the sampled secondary schools were 1:74 and 1:43 versus the recommended ones of 1:50 and 1:25 respectively. The ratio for female students was significantly lower ($\alpha = 0.05$, $p \leq 0.04$) than that for males. In 6 of the 10 schools visited, toilet hygiene was not satisfactory. Faecal matter and urine were observed around the drop-holes or the seats of flush toilets such that 33% of the students could not use the toilet facilities because they were always dirty and produced unpleasant odour.

Hand washing facilities were completely not available in 3 of the 10 public secondary schools, especially in CDSSs. Where the hand washing points were available, 86% of them, in total, were in a deplorable state and no soap was provided to students for hand washing in all schools. School-based WASH committees and clubs were unheard of in all schools, indicating a lack of hygiene promotion and education.

Conclusion: The results from this study indicate that the present status of WASH in secondary schools within Blantyre City, especially CDSSs, is not satisfactory due to inadequate access to potable water by students, inadequate and deplorable sanitation and hygiene facilities, and absence of hygiene promotion and education. Therefore, the study vividly recommends that there should be a deliberate programme/project on WASH in secondary schools that will work towards: (a) provision of additional functioning water access points/ repairing non-functional ones (b) installation of water tanks to ensure continuous water availability even during water crisis (c) building additional toilets especially for female students giving priority to CDSS (d) provision of hand washing facilities where the facilities are not available, and (e) promotion of good hygiene practices by involving students in health clubs and WASH education.

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ACRONYMS/ABBREVIATIONS

BWB	-	Blantyre Water Board
CDSSs	-	Community Day Secondary Schools
C.I	-	Confidence Interval
Ecosan	-	Ecological Sanitation
GoM	-	Government of Malawi
HWPs	-	Hand washing points
I.E.C	-	Information Education Communication
MDGs	-	Millennium Development Goals
MGDS	-	Malawi Growth and Development Strategy
MoEST	-	Ministry of Education, Science and Technology
NEAP	-	National Environmental Action Plan
NGOs	-	Non-Governmental Organisations
NSP	-	National Sanitation Policy
PSLCE	-	Primary School Leaving Certificate Examinations
REC	-	Research and Ethical Committee
SDGs	-	Sustainable Development Goals
UNICEF	-	United Nations Children's Fund
WASH	-	Water, Sanitation and Hygiene
WHO	-	World Health Organisation

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CHAPTER ONE

BACKGROUND AND INTRODUCTION

1.0 Introduction

This chapter contains background information to the study, problem statement, justification of the study, objective of the research and research questions.

1.1 Background

Water and sanitation remain essential basic needs for a healthy life. According to the United Nations Children's Fund (UNICEF, 2006), water and sanitation related diseases such as diarrhoea kill about 4500 children in Malawi every year. The United Nation's Millennium Development Goals (MDGs) included a target to reduce by half the number of people without sustainable access to safe drinking water and basic sanitation by the year 2015. In response to this, the Government of Malawi (GoM) also included water and sanitation in its developmental agenda stipulated in the second "Malawi Growth and Development Strategy (MGDS II) (GoM, 2012).

In 2008, the Government of Malawi implemented a National Sanitation Policy (NSP) with guidelines to improve access on water and sanitation. On the same, WHO and UNICEF Joint Monitoring Programme Report of 2015 shows that 90% of Malawians have access to clean and safe water whilst only 41% have access to improved sanitation facilities. This implies that Malawi has managed to improve on access to safe water while access to sanitation still lags behind. According to UNICEF (2012), prioritisation of water over sanitation had led to the sanitation subsector being neglected and lagging behind MDGs targets. This prompted implementers to simultaneously consider water supply and sanitation during implementation since they are inter-related. The report further indicates that Malawi is undergoing rapid urbanisation, with growing informal settlements comprising 60% of the urban population. These informal settlements are not accounted for in terms of water and sanitation services as the government is reluctant to encourage growth in such areas (WHO/UNICEF, 2014).

Now, water, sanitation and hygiene are tackled as one item in broader term called Water Sanitation and Hygiene (WASH). WASH constitutes provision of safe water, improved sanitary facilities and hygiene promotion, and it has to be encouraged in all government sectors and social

services such as schools, health centres, markets and bus depots. However, since the onset of the WASH in Malawi, very little information is available on its performance in various sectors or institution such as schools.

UNICEF (2012) defines WASH in school as a strategic approach of providing schools with safe drinking water, improved sanitation facilities and hygiene education in order to encourage the development of healthy behaviours for life. Globally, it is estimated that 49% of schools in low income settings have inadequate access to water, and 55% have inadequate access to sanitation (UNICEF, 2012). This has resulted in WASH related diseases, which are a huge burden in developing countries. It is also estimated that 88% of diarrhoeal diseases in schools are caused by unsafe water supply and inadequate sanitation facilities and poor hygiene practices (WHO, 2010). So far, WASH gaps in Malawi primary schools have been exposed by assessment studies (by UNICEF, WaterAid, and MoEST), which were not equally done in secondary schools. It is therefore, important to assess how Malawian secondary schools are doing on their WASH activities.

The Ministry of Health estimates that about 56% of school going children in Malawi lack safe drinking water and sanitation, leaving many of them infected with or dying of diarrhoea from water borne diseases (GoM, 2012). Looking at this WASH related statistics, it is clear that significant improvements are required in Malawi since WASH related diseases are prevalent in most schools and throughout the population, causing poor health, school absenteeism, loss of productivity and chronic poverty (UNICEF, 2012). The National Environmental Action Plan (NEAP) identified water quality deterioration and inadequate sanitation facilities as major environmental problems that threaten public health in Malawi (GoM, 2013). It is common for public places such as schools, particularly those in rural areas, to lack safe drinking water and sanitation facilities completely, or if they do exist then they are inadequate both in quality and quantity. Nevertheless, the statistics that are currently available are for primary schools. Those for secondary schools can hardly be found. This study, therefore, intended to provide such missing information.

1.2 Problem Statement

The importance of potable water, good sanitation facilities and hygienic practices in national development has been recognised in most developed countries. Unfortunately, most developing countries, like Malawi, have in the past years not given or attached enough consideration to the provision of safe water, good sanitation facilities, and promotion of good hygienic practices in schools (GoM, 2008). For this reason, the promises of school health and hygiene programs have not always been fulfilled. Despite the inclusion of water and sanitation in Malawi Growth and Development Strategy (MGDS), and the formulation of National Sanitation Policy (NSP) in Malawi, it is abundantly documented that there is still a challenge in provision of WASH of acceptable standard in schools (GoM, 2012; WHO & UNICEF, 2015).

However, from 2008, schools have been making strides in improving their WASH activities as compared to the situation in the early 1990's (Kalenga, 2012). This is because some NGOs have come in to implement WASH projects in various schools as a response to results of several WASH assessment studies done only in primary schools by UNICEF, WaterAid, and MoEST. Nevertheless, observation has shown that most of these WASH interventions have been directed to primary schools with little attention to secondary schools. This may imply that WASH in secondary schools is good. However, such information can hardly be found in literature. Kalenga (2012) observes that primary schools are a priority as far as provision of WASH facilities is concerned. This may be behind connotation that WASH challenges greatly affect primary school learners (younger learners). More importantly, children who have adequate WASH conditions at school are more able to integrate hygiene education into their daily lives, and can be effective agents for change in their families and the wider community (Cairncross et al., 2010). However, safe water, improved sanitary facilities and good hygiene practices are crucial at all ages and levels. For this reason, provision WASH is equally important to secondary school going students since the importance of WASH in schools is to improve health and learning performance as well as reducing the incidence of WASH related diseases. As such, there was a need to conduct WASH assessment study to provide WASH information in secondary schools as well.

In addition, Malawi has a lot of data pertaining to the state of WASH in primary schools and no country statistics are available for secondary school sanitation (MoEST, 2008; Water Aid, 2012). This could be as a result of little attention to secondary school sanitation as described above. For this reason, there are scanty data and unrevealed gaps for WASH in secondary schools.

1.3 Justification

The provision of safe water and good sanitation facilities in schools has been established to improve health, boost educational achievement, and promote gender equity which has a positive impact on the society (Olukanni, 2013).

Absent, inadequate, or inappropriately managed WASH services expose individuals to preventable health risks (UNICEF, 2014). Therefore, improved WASH improves health through decreased incidence of diarrhoea, intestinal worms and other hygiene-related illnesses (WHO 2002; WHO 2004). According to WHO (2004), schools with improved WASH conditions are good environments for learners and staff, and minimise learners' particular susceptibility to environmental health hazards.

Improved WASH conditions in schools also help improve educational achievement by maximising learners' ability to learn, and teachers' efficiency (Cairncross et al., 2010). According to WHO (2004), learners' ability to learn and teachers' efficiency may greatly be affected by WASH-related infections that ultimately bring about pain and discomfort to both teachers and learners hence high rate of absenteeism. This means that improved WASH conditions in schools may prevent diarrhoeal diseases, as discussed above, which increases class attendance by both teachers and learner hence improving performance.

Additionally, girls and boys are likely to be affected in different ways by inadequate WASH conditions in schools, and this may contribute to unequal learning opportunities (Cairncross et al., 2010). For example, lack of adequate, separate and secure toilets and washing facilities may discourage parents from sending girls to school, and lack of adequate facilities for menstrual hygiene can contribute to girls missing days at school or dropping out altogether (Kalenga, 2012).

It is, therefore, important to undertake assessment studies of WASH in schools so that the available gaps (if any) can be identified. Very often, however, most of the studies on WASH in schools have directed their attention on primary schools and insufficient attention is paid to secondary schools. For example, in 2010 and 2015, UNICEF conducted assessment studies on WASH in primary schools only. In both studies, it is documented that most primary schools in Malawi do not have sanitation facilities of desired level (UNICEF, 2010; UNICEF, 2015). In addition, other studies by Kalenga (2012) and GoM (2012) revealed that toilet-pupil ratio is higher in most primary schools in Malawi. To the knowledge of the researcher, no study has

been undertaken to assess the current situation of WASH in secondary schools, and this is the first study to assess the current situation of WASH in secondary schools in Malawi.

The results from this assessment study add to the literature in that they expose WASH gaps in secondary schools. Despite focusing on a single city, Blantyre, the results of this study may be useful to many stakeholders. South West Education Division (SWED), secondary schools, government officials and the general public may find the results useful. Broadly, the results would ultimately push the Ministry of Agriculture, Irrigation and Water Development, Ministry of Health and Ministry of Education into mitigating the current scenario. In addition, the findings may also form a platform for planning sanitary facilities in the study area, and also district and national developments in the case of findings that are not area specific.

1.4.1 General Objective

The general objective of the study was to assess the current state of WASH in public secondary schools in Blantyre City.

1.4.2 Specific Objectives

The specific objectives for the study were to:

- Determine the adequacy of water, sanitation and hygiene facilities in public secondary schools according to international standards and/ or the recommendations by the MoEST,
- Assess the physical state of water, sanitation and hygiene facilities in public secondary schools according to international standards and/ or the recommendations by the MoEST,
- Examine levels of WASH knowledge among students attending public secondary school in Blantyre City.

1.5 Research Questions

The study was designed to answer the following questions:

- Were water, sanitation and hygiene facilities in secondary schools adequate in accordance with UNICEF and MoEST standards?
- In what working condition were the water, sanitation and hygiene facilities in secondary schools?
- What was the level of WASH knowledge among students attending public secondary school in Malawi?

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews literature relevant to the research questions. Books, journals, newspapers, academic publications, magazines, government statistics and any other available relevant sources were reviewed.

2.1 School sanitation and hygiene

School sanitation and hygiene refers to the combination of “hardware” and “software” components that are necessary to produce a healthy school environment and to develop or support safe hygiene behaviours (Adams *et al.*, 2009). The hardware components include drinking water, hand washing and sanitary facilities in and around the school compound among others. The software components are activities that promote conditions at school and practices of students and staff that help to prevent water and sanitation-related diseases (UNICEF, 1998).

A review of literature, both globally and locally, highlights three broad issues in school sanitation and hygiene. First, there is variation in the definition of access to water and sanitation. Second, both donors and national governments emphasise water supply over sanitation and hygiene, despite the close linkages between the two, resulting in less policy and fewer laws for sanitation compared to water supply. Third, there is a gap between knowledge and practice on personal hygiene, which is the major link between water and sanitation in school premises. These three issues are discussed in the following sections.

2.2 Access to safe water supply in schools

There are various definitions of access to safe water. The debate is around availability, quantity, quality, distance, time taken to access the facility and types of facilities. What is clear is that there is no agreement on definitions of ‘potable,’ ‘basic,’ ‘safe’ and ‘proper’ with regards to water. In this case, ‘safe’ can signify quality and ‘accesses to quantity. However, safe drinking water can be achieved through: (1) ensuring that the water comes from a protected water source; (2) is safely handled, for example safely transported, safely stored, and safely ingested; (3) is treated at the point of use, for example through boiling, filtering or adding chlorine or (4) through a

combination of all of the above. In this study, the question of whether the water in schools was safe or not was determined by the water source, and the concept of water access was determined by availability of adequate and proximal functioning water access point.

2.2.1 Water quality in schools

The GoM (2012) categorises water supply sources as protected or unprotected. Protected water sources include tap water distributed by authorised agencies such as water boards; boreholes; protected hand dug wells with hand pumps; and protected springs. Unprotected sources include hand dug wells without a hand pump; uncovered springs; and all surface water bodies which have not undergone treatment, such as rivers and lakes. Official statistics for water provision in the urban areas of many low- and middle-income nations indicate very good provision in many cases (Manda, 2009). For instance, in Malawi primary schools, the situation on use of protected water sources is rather encouraging. About 81.5% of primary schools use protected sources for drinking water. However, there are still 18.5% that have to use water from unprotected source (GoM, 2012). Although the national primary school coverage for protected water sources is high, there is a marked disparity between the urban and rural schools. According to MoEST (2008), in the urban education districts, 94.8% of primary schools use drinking water from a protected water sources compared to 80.6% of primary schools in rural areas. Unfortunately, no official report currently exists for such information in secondary schools (MoEST, 2008, Water Aid, 2012).

2.2.2 Water quantity in schools

It is important that drinking water is available throughout the school day (continuously rather than intermittently), and that learners are encouraged to drink, as even minor dehydration may reduce learners' ability to concentrate (Cairncross et al., 2010). Many learners walk long distances to school, often after having carried out household chores, and may arrive at school thirsty. UNICEF (2012) and WHO (2010) recommend that sufficient water should be available at all times for drinking and personal hygiene, and for food preparation, cleaning and laundry when applicable. In schools without adequate and safe drinking-water supply, learners and staff may have to carry their drinking water with them to school which is really tiresome. Tables 1 and 2 below indicate the recommended water quantities in schools for students and staff members.

Table 1: Recommended water quantities in schools

Type of School	Basic quantities required
Day schools	5 litres per person per day for all learners and staff
Boarding schools	20 litres per person per day for all residential learners and staff

Source: (WHO, 2010).

The following should be added to the basic quantities as necessary. Figures given are for day schools. They should be doubled for boarding schools (UNICEF, 2012).

Table 2: Additional water quantities in schools

Other Uses	Basic quantities required
Flushing toilets	10–20 litres per person per day for conventional flushing toilets/1.5–3 litres per person per day for pour-flush toilets
Anal washing/cleansing	1–2 litres per person per day

Source: (WHO, 2010).

These guideline figures include water used for drinking, hand washing, cleaning and, where appropriate, food preparation and laundry should be used for planning and designing of water-supply systems in schools. However, the actual quantities of water required will depend on a number of factors, such as climate, availability, type of water-use facilities and local water-use practices (WHO 2010). This study was not limited to the above figures but also explored other WASH indicators and guidelines.

2.3 Access to sanitation in schools

UNICEF (2010) defines sanitation as the safe disposal of faeces away from human contact. Adequate sanitation can be achieved by having the necessary sanitary facilities and having practices that ensure that such facilities are used consistently (UNICEF, 2010). As described above, Olukanni (2013) observes that the provision of good sanitation in schools has many positive impacts on students. Therefore, good sanitation in schools is also a significant contributor to achieving the SDGs and fulfilling children’s rights to health, education and participation (UNICEF, 2015). In regards to the provision of good sanitation in school settings, it is important to consider both the quality and the quantity of sanitary facilities in order to ensure that each learner’s right to a healthy learning environment is fulfilled (Cairncross et al., 2010).

On quality, the NSP for Malawi provides a guide to the difference between basic sanitation and improved sanitation (GoM, 2012).

The NSP spells out characteristics for ‘basic’ and ‘improved’ sanitation. As laid out in the policy, basic sanitation should allow for safe disposal of faeces; be located at least 30 meters from a ground water source, be functional and not full and offer the user safety and privacy. On the other hand, improved sanitation is defined similar to basic sanitation with the addition that there should be an impermeable floor and a tight-fitting lid to the latrine, or in the case of ecological sanitation (*ecosan*) latrine design where no lid is needed, the latrine should be properly looked after with the regular addition of soil, ash and other organic materials. The policy encourages separate and adequate improved latrines or toilets and urinals for boys and girls, and also provision of functioning hand washing facilities with soap and running water” (NSP, strategy 3.4.5.1). According to UNICEF and WHO; sufficient, accessible, private, secure, clean and culturally-appropriate sanitary facilities (toilets) should be provided for learners and staff. Since sanitary facilities are provided according to gender in schools, and the enrolment figures for girls and boys often differ at a particular school, it is important to analyse the availability of sanitary facilities in respect of girls and boys separately (MoEST, 2008). The following subsections are indicators for adequate and improved sanitary facilities:

2.3.1 Toilet-learner/staff ratio

The number of toilets and urinals required for each school depends on the numbers of learners and staff, but also on when the learners and staff have access to the toilets. If access is restricted to break times, then peak demand could be high, particularly if all the classes have breaks at the same time (Zomerplaag & Mooijman, 2005). However, UNICEF and WHO recommend 1 toilet (drop hole) per 25 girls or female staff, and 1 toilet (drop hole) per 50 boys or male staff. Since the introduction of urinal blocks for girls as well as boys, it is widely recognised that these ratios may not be necessary. Instead, 1 improved latrine per every 60 learners is seen to be a minimum acceptable as long as urinal blocks for both boys and girls are available (GoM, 2012). Urinals for girls and women, as well as for boys and men, have been used with success in some countries (DeGabriele *et al.*, 2004). They are quicker and cheaper to build than toilets, they reduce smells in latrines and they are easy for younger learners to use. The provision of urinal blocks lessens traffic and congestion at, and dependency on latrines and flush toilets. They lessen congestion

during school break times and extend the life of latrines (MoEST, 2008). Most times when learners go to relieve themselves, they just go to urinate. It is considerably more cost effective to build urinal blocks and ensure a 1:60 latrine-learners ratio rather than having no urinal blocks and building more latrines. Therefore, it is recommended that all schools have at least 1 improved urinal block for boys and 1 for girls. Currently, more than half of the primary schools nationwide have some urinal blocks of either basic or improved type. However, they are more common for boys than for girls, and improved urinal blocks are still few for both genders (GoM, 2012). Chatterley (2011) defines ‘improved’ urinal blocks as those with an impermeable (concrete) floor and urine drainage and ‘basic’ urinal blocks as those without impermeable floor and urine drainage. From general knowledge, it is very rare to find urinals for girls, which is against the new development (provision of urinals for girls).

2.3.2 Toilet location and distance

In principle, toilets should be as close as possible to classrooms and playing areas to ensure they can be accessed easily, conveniently and safely used. Entrances should be positioned to provide maximum discretion in entering and leaving a toilet block. In pre-school facilities, toilets may need to be adjacent to the child-care space, as young children frequently need supervision when going to the toilet. The location of toilets should also take into account the need to minimise odours (taking account of prevailing winds) and avoid contamination of water supplies and food. Particular care should be taken when locating latrines and septic tanks with soakaway pits or infiltration trenches. UNICEF and WHO recommend that all latrines and infiltration systems should be located within 30 metres from class blocks and any groundwater source and at least 1.5 metres above the groundwater table (Franceys *et al.*, 1992). According to Kalenga (2012), most toilets in primary schools are located within the recommended distance. However, such information could hardly be found for secondary schools.

2.3.3 Safety and privacy to all users

A child-friendly toilet is the one that is expected to guarantee security, privacy and hence is appropriate to local cultural, social and environmental conditions (Water Aid, 2012). Therefore, to ensure sufficient privacy and security, toilets should be carefully located, designed and their access routes should be adequately lit if they are used at night. They should be lockable from the

inside (to protect users) but should be left unlocked when not in use, to ensure they are always accessible.

The cultural and social conditions prevalent in the community to which the learners belong should be taken into account in the design and siting of toilets. The segregation of boys' and girls' toilets is one of the most common requirements by parents. Separate toilet blocks or toilet areas separated by solid walls and with separate entrances should be provided, rather than separating boys' and girls' facilities by lightweight partitions. Doors should reach down to floor level for privacy (Chatterley, 2011). In Kenya, baseline data from a cluster-randomised trial of school-based WASH interventions stress that design of latrine facilities has a stronger correlation with level of absenteeism (Dreibelbis *et al.*, 2013). These results may also be a factor in Malawi looking at higher cases of absenteeism and truancy in primary school as reported by Kalenga (2012). Obviously, absenteeism and truancy may also be prevalent in secondary schools though no literature on the same could be found.

2.3.4 Cleaning

As suggested by Zomerplaag and Mooijman (2005), toilets should be cleaned whenever they are dirty, at least once per day, with a disinfectant used on all exposed surfaces. They further suggest that strong disinfectants should not be used in large quantities, as this is unnecessary, expensive, potentially dangerous and may damage the sanitation system. Alternatively, plain cold water should be used with a brush to remove visible wastes if disinfectant is not available (Zomerplaag & Mooijman, 2005). In primary schools, GoM (2012) observes that disinfectants, if available, are used to clean staff toilets only. In this case, only water is used to clean learners' toilets. The situation may be similar to some secondary schools especially CDSSs that use the primary school premises i.e. same class rooms and toilet facilities. In such schools, classrooms and toilet facilities are cleaned once in the morning for primary school learners before secondary schools take over the facilities.

2.4 Hygiene in schools

Hygiene in schools is a combination of: (1) appropriate facilities available, (2) staff and learners having appropriate knowledge about hygiene, and (3) safe hygiene practices actually being carried out. According to Kalenga (2012), hygiene practices are more likely to improve when both the facilities and the knowledge are there. As stated by Bethany *et al.* (2012), the three key

hygiene practices known to most effectively reduce hygiene related diseases are: (1) drinking safe water, (2) consistent use of sanitary facilities, and (3) hand washing with soap. Therefore, hygiene of acceptable level in schools can be achieved through the use of safe water, presence of facilities for hand washing and hygiene education. A study by Kalenga (2012) revealed that hygiene in most primary schools in Malawi is not satisfactory. Open defecation and urination is prevalent in most primary school premises. In addition, an assessment study by UNICEF (2015) recommends that water access and hand washing points be increased to improve water access and hygiene by learner in primary schools.

2.4.1 Safe water in schools

As described above (section 2.2), all schools should provide school learners with safe water, making sure that: (1) the water comes from a protected water source (tap water distributed by authorised agencies such as water boards, boreholes, protected hand dug wells with hand pumps, and protected springs); (2) water is safely handled, for example safely transported, safely stored, and safely ingested; (3) water is treated at the point of use, for example through boiling, filtering or adding chlorine; or (4) through a combination of all of the above. According to GoM (2012), most of schools in urban areas are connected to piped water system. Tap water (connected to water board supply system) is considered acceptable for human consumption because it undergoes necessary treatment by the water board that strives to meet national standards (UNICEF, 2011).

2.4.2 Facilities for hand washing

All schools should provide learners with suitable facilities for washing their hands after they visit the latrine and before they eat (UNICEF, 2011). It is recommended that such facilities be located in very close proximity to the latrines or toilets, and that at least one is located inside an individual girls' latrine compartment, in order to alleviate challenges related to proper menstrual hygiene during the school day, thus contributing to improved attendance for older girls during those days (UNICEF, 2011). Furthermore, it is recommended that all hand washing facilities must provide water which is running or in a pour system. That is, the water must be used by only 1 person and communal basins should be discouraged. All schools should also provide soap at the hand washing facilities, in order to allow the learners to hygienically clean their hands, and learn to practice consistent use of soap for hand washing.

According to UNICEF (2011), school hand washing facilities may come as many types of technology. In schools where there is no piped water supply, permanent tanks with taps may be provided close to the latrines and the tank is filled every morning by the learners themselves from a duty roster. In some schools, such tanks are connected to a roof-top rainwater harvesting system for easier refill during the rainy season. Taps may be welded to the tank in order to avoid theft. Although permanent hand washing facilities are recommended, schools can also make use of low technology solutions made from locally available materials in order to provide learners with facilities to wash hands close to the latrines while awaiting more sophisticated technologies. As observed by de Hoop (2010), for example, some NGOs such as World Vision Malawi advocate the use of cheaper hand washing materials (by improvising with plastic bottles) in schools. He further observed that this cheaper alternative is working especially in rural schools, while the school management anticipates a provision of sophisticated facilities from other stake holders. On the same, the situation may be different in urban secondary schools for even these improvised hand washing materials are hardly observed. May be, the facilities are available in some urban schools. It is high time that the government prioritised urban in addition to rural schools. However, the question remains as in what condition are hand washing points (HWPs), if any, in urban secondary schools. Generally, school-based hand washing interventions have shown reductions in learners' absenteeism of 21 to 54% and interventions that include both hand washing and water treatment have shown reductions in absenteeism of 26 to 58%, specifically for girls (Blanton *et al.*, 2010).

2.4.3 Hygiene education

Many learners learn some of their most important hygiene skills at school, and for many, this is where they are introduced to hygiene practices that may not be known or promoted in the home. Teachers can be very effective hygiene promoters through hygiene education and act as role models for learners (Manda, 2009). However, good hygiene behaviour and the effectiveness of hygiene promotion in schools are severely limited where water supply and sanitation facilities are inadequate or inexistent (Manda, 2009). For instance, teachers cannot credibly convey the importance of hand washing if there is no water in the school or promote the use of latrines if they themselves avoid using their latrines because they are dirty or unsafe. It is, therefore, important to achieve the right balance between hygiene education and ensuring acceptable

environmental health conditions. WHO (2010) stresses that one cannot be effective in promoting health without the other. The NSP states that every person should be encouraged to wash hands with clean running water and soap. However, Water Aid (2012) noted that most school curricula in developing countries have inadequate content on sanitation and hygiene. Consequently, Kalenga (2012) and UNICEF (2015) observed that school hygiene in Malawi primary schools is not satisfactory due to poor hygiene practices i.e. open defecation and urination. The prevalent open defecation and urination in primary schools may be attributed to the lack of good hygiene knowledge by both teachers and learners. According to WHO (2010), hygiene education should be a core part of teacher training, and refresher trainings should be carried out regularly to sustain knowledge and awareness using a variety of participatory and other learning methods in order to enable learners develop the knowledge, attitudes and life skills they need for adopting and maintaining healthy lifestyles, particularly, with respect to water, sanitation and hygiene.

CHAPTER THREE

RESEARCH METHODS

3.0 Introduction

This chapter describes the scope of the research project, study area and design, sample size and sampling techniques, data collection methods, data management, data analysis and ethical consideration.

3.1 Scope of the research study

Although there are several areas that could be researched about WASH, this research project was limited to the tasks presented in Table 3 below.

Table 3: Scope of the research study

Item	Task	Importance
Water	Checking water sources, a source that is likely to provide safe water.	Reduces water related diseases.
	Checking adequacy and reliability of water facilities by working out the ratio of water point to student.	Ensures adequate and sustainable supply.
	Checking the distance from water access points to classes.	Ensures that safe water is accessible for all at all times.
	Checking hygiene at water access points.	Prevents water related diseases.
Sanitation	Checking adequacy of toilets by calculating toilet-learner ratios.	Increases class attendance.
	Checking privacy by observing that separate toilets are provided for boys and girls.	Provides girls' privacy needed during menstruation periods.
	Convenience: checking that toilets are positioned at proper distance from water and classes.	To avoid water contamination and affecting school attendance.
	Checking the cleanliness of toilets and school premises.	To avoid water related diseases.

Item	Task	Importance
Hygiene	<ul style="list-style-type: none"> • Checking presence of shower, laundry hand washing facilities. 	<ul style="list-style-type: none"> • Prevents water related diseases.
	<ul style="list-style-type: none"> • Checking the extent of WASH practices and promotion. 	<ul style="list-style-type: none"> • Enhances the use of WASH practices.
	<ul style="list-style-type: none"> • Checking the level of students' knowledge on WASH and WASH education. 	<ul style="list-style-type: none"> • Promotes WASH education.

3.2 Study design

The study was cross-sectional in nature. It employed both quantitative and qualitative approaches.

3.2.1 Quantitative approach

Kumar (2005) defines quantitative approach as a research approach that deals with numbers and anything that is measurable in a systematic way of investigation of phenomena and their relationships. It is used to quantify attitudes, opinions, behaviors, and other defined variables (Kumar, 2005). Additionally, Bailey (2000) stresses that this approach can be used to answer questions on relationships within measurable variables with an intention to explain, predict and control a phenomenon.

According to Bailey (2000), quantitative approach typically begins with data collection based on a hypothesis or theory and it is followed with application of descriptive or inferential statistics. Surveys and observations are some examples that are widely used with statistical association (Bailey, 2000). This study used survey and observations. During a survey, questionnaires containing close-ended questions were used to collect quantitative data. In addition, on-site observations were also conducted to verify responses given.

Kumar (2005) observes that in quantitative approach, data collected from questionnaires or other instruments have to be analysed and interpreted using statistical approaches. In this study, t-tests

have been used as statistical approach where significant differences between two means were tested.

Quantitative approach was employed in this study because the study was designed to quantify WASH facilities and population of students that has access to improved WASH conditions. In addition, this approach was also employed to describe the situation in terms of the condition of WASH facilities in secondary school.

3.2.1 Qualitative approach

On the other hand, qualitative approach is primarily exploratory method. According to Bailey (2000), this approach is used to gain an understanding of the experiences, knowledge, attitudes and opinions of a population. Borg & Gall (2003) stress that this approach also uncovers trends in thought and opinions, and dive deeper into the problem.

According to Bailey (2000), qualitative data collection methods vary using unstructured or semi-structured techniques. Some common methods include questionnaires, focus groups (group discussions), individual interviews, and participation/observations. This study used participation and individual interviews to solicit qualitative data on WASH knowledge and practices among secondary school students and teachers in Blantyre city. In this case, open-ended questions were used as guiding questions during the interviews.

Qualitative approach was employed in this study because the study was also designed to qualify the condition of WASH facilities in secondary schools. In addition, this approach was also employed to describe secondary school students in terms of WASH knowledge.

3.3 Study area

The study was conducted in selected subset of secondary schools within Blantyre City where there are 28 secondary schools of which 2 are national (boarding), 6 are conventional and 20 are community day. These schools are distributed in different areas of Blantyre City. However, WASH standards in schools do not necessarily depend on whether a school is a national, conventional or a community day secondary school, but importantly depend on whether it is a boarding or a day school.

3.4. Sample sizes and sampling techniques

Stratified random, systematic random and purposive sampling techniques were used in this study. A sample of at least 30% of a population is assumed to be representative (Borg & Gall, 2003). To allow detailed assessment within the available period, 10 secondary schools were chosen from a population of 28 schools in Blantyre City, representing 36%. Since there were only 2 boarding schools, the researcher purposively chose both of them. The other 8 day schools were selected by stratified random sampling technique of 2 strata (conventional day and community day schools), where simple random sampling was made from each stratum. As such, the study involved all the 2 boarding and 8 day secondary schools (4 conventional day schools and 4 community day schools).

The study population of students was obtained by systematic random sampling in which a fixed starting point from attendance register was chosen and the following participant name was obtained after specific interval number of names depending on the total number of students in the school to get a minimum sample of 37 from each school.

To estimate the minimum sample size necessary for the survey, a precision (minimum error of estimate) of 5% and 95% confidence were used. Guided by the past surveys or general knowledge of public opinion, the researcher used 44% as the current estimate of the proportion of students in Malawi that has access to safe drinking water and sanitation. The minimum sample size of 369 participants was obtained using the following formula, as stated by Daniel (1999).

$$n = Z^2 pq / d^2$$

Where:

n= sample size,

p = sample proportion of school going children who do have an access to safe drinking water and sanitation,

q= sample proportion of school going children who do not have access to safe drinking water and sanitation (1-p),

Z= Z statistic for a level of confidence, and

d= precision (minimum error of estimate).

Considering that these schools all serve highly populated communities, a constant number of questionnaires (at least 37) capturing water, sanitation, and hygiene related issues were administered to each school.

3.5 Data sources and collection methods

To ensure that data from each objective is effectively collected, different data collecting tools such as structured questionnaire, semi-structured questionnaire, on-site observation and desk review were developed. During the development, the international standards for WASH in schools by UNICEF and WHO were used as the guiding principles to evaluate the condition and adequacy of the various WASH components in the selected schools.

3.5.1 Primary data collection

Primary data were collected directly from questionnaires and field observation (inspection visits). Quantitative data, particularly on the school enrolment, number of teachers, and WASH facilities for students and teachers (first objective) were collected through structured questionnaire (appendix 1) and on-site observation. In this case, separate guiding close-ended questions were used to collect data from the head teachers. According to Borg & Gall (2003), quantitative data collection tools are used to generate numerical data or data that can be transformed into usable statistics. In this study, structured questionnaire with close-ended questions was used to collect quantitative data. However, responses especially on number of sanitary facilities were also physically verified through on-site observations to ensure the credibility of the collected data.

On-site observations involved moving around the schools to physically count WASH facilities and access their conditions on the ground (second objective). In this case, the observation checklist (appendix 2) was used. This checklist incorporated the school WASH guidelines UNICEF (2011) for a successful and an effectively managed school WASH program. These guidelines were used to evaluate the adequacy and condition of various WASH components.

On the other hand, qualitative data collection tools were used to generate data that uncovered trends in thought and opinions of participants. Borg & Gall (2003) stress that qualitative data collection methods vary using unstructured or semi-structured techniques. However, this study used participation and individual interviews to solicit qualitative data on WASH knowledge and practices among secondary school students and teachers in Blantyre city (third objective). In this

case, questionnaires containing open-ended questions (appendix 3) were used as a guiding tool during the interviews.

3.5.2 Secondary data collection

A review of reports and other documents about WASH projects recently implemented in different schools and communities was conducted. These documents were sourced from government and NGOs that were in one way or the other involved in the implementation or evaluation of WASH projects such as Blantyre Water Board (BWB), Water Development Headquarters (Tikwere House) and Water for People.

3.6 Data management and analysis

Quantitative data were analysed using Microsoft Excel and IBM-SPSS packages. Analysis was done with descriptive statistics mode which computed frequencies, crosstabs, tables and graphs.. Qualitative data were analyzed manually based on recurrent themes and patterns (categorisation and theme-based analysis). The questionnaire administered to students and teachers captured three basic concepts of WASH. Responses from students and teachers were marked, and knowledge level was rated ‘very good’ when an understanding of all three concepts was manifested, ‘good’ for two concepts, ‘average’ for one concept and ‘poor’ if not able to describe any concept.

3.7 Evaluation of WASH facilities and assessment of students’ knowledge on WASH

The criteria used to evaluate WASH facilities and assess students’ WASH knowledge are given and explained below.

3.7.1 Evaluation of WASH facilities

The condition of WASH facilities was evaluated based on the criteria in Table 4 and Table 5 below.

Table 4: Criteria used to evaluate conditions of water access points and hand washing facilities

Condition	Criteria
Good (functioning condition)	Running water, taps available, no visible damage and trash, no report of malfunctioning, no improvement necessary and presence of drainage
Poor condition	Running water, absence of taps, presence of visible damage and dirt, report of malfunctioning, repairs required and absence of drainage

Table 5: Criteria used to evaluate condition of toilets

Condition	Criteria
Good (functioning condition)	No blockage, full doors available, concrete floor with foot rest, water available if flush toilets, absence of dirt, urine or faecal matter, no foul odor
Poor condition	Visible blockage, half or no doors, absence of water in flush toilets, presence of dirt, urine or faecal matter, intolerable odor

3.7.2 Criteria for assessing level of knowledge of WASH among students

In order to assess level of knowledge on WASH, the respondents were expected to show clear understanding of the meanings of safe water, good sanitation and personal hygiene by defining or describing them. As defined by MoH (2003), safe water is potable water free from harmful microorganisms and substances. Personal hygiene includes cleaning all areas of the body on a daily or regular basis to prevent odour and keeping up with one's appearance. On the other hand, sanitation is a set of policies and practices designed to protect the public health through disease and infection prevention and control (WHO, 2002).

3.8 Ethical considerations

Before the study, the researcher sought approval from the University's Research and Ethical Committee (REC). In addition, some of the ethical issues, which this study took into consideration were: permission, voluntary participation, anonymity and confidentiality.

3.8.1 Permission

Before conducting this study, permission was sought from the Education Division Manager, who authorised the researcher to visit different schools to collect data from the head teachers and other participants (appendices 4 & 5). An explanation of the purpose and intended possible uses of this study was made at the beginning, and respondents were assured of privacy.

3.8.2 Anonymity and confidentiality

In this study, anonymity and confidentiality were maintained by not collecting personal identifiers. Participants were requested not to mention or write down their names. Instead, codes were assigned to every questionnaire. Participants were also assured that their responses would never be used for any purposes other than this study. All filled-in questionnaires were kept under lock and processed data were protected by a password in the computer.

3.9 Statistical tests

One sample t-tests at 95% Confidence Interval were performed to compare the obtained values and those of UNICEF standard in order to establish whether there were significant differences between them (appendix 6).

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0 Introduction

In this chapter, the study findings and observations are discussed. The chapter presents the results on adequacy and condition of water facilities, sanitation facilities, situation of hygiene and level of WASH knowledge in 10 secondary schools in Blantyre City.

4.1 School information and enrolment

There were 10 secondary schools sampled in Blantyre City of which 2 were boarding schools, 4 were conventional day schools and 4 were community day secondary schools. The total enrolments for all sampled secondary schools ranged from 250-400 students for CDSS, 500-700 for boarding schools and 900-1150 students for conventional day schools. The average enrolments for boys and girls, respectively were; 156 and 145 in CDSSs, 351 and 339 in boarding schools, and 441 and 420 in conventional day schools. However, there was no significant discrepancy ($p < 0.05$, $\alpha = 0.05$) between the enrolments for boys and girls in all the schools. This indicates there was gender consideration in respect to enrolment. These results agree with findings of a similar assessment in Nigeria which indicates that enrolment for boys was similar to that of girls especially in urban setting (Olukanni, 2013). According to UNICEF (2010), WASH adequacy in schools greatly depends on enrolment for boys and girls for the number of students affects the number of WASH facilities.

4.2 Water facilities in secondary schools in Blantyre city

This section presents results on water facilities in terms of water sources, reliability of water sources, condition of the water access points, availability of alternative water sources and water access points to students' ratio. Water supply in this context was considered to be in three categories: Schools with continuous supply, schools with intermittent supply and schools with no water supply, or where water supply was disconnected. Table 6 summarises the results on water facilities for selected secondary schools in Blantyre city.

Table 6: Water facilities in secondary schools in Blantyre city

Parameter	Measure	Number of schools	Percentage
Primary Water source	tap	10	100%
	borehole	0	0%
Type of Water supply	continuous	7	70%
	intermittent	2	20%
	Disconnected (no supply)	1	10%
Alternative (Secondary) water source	tank	2	20%
	borehole*	1	10%
	none	7	70%
Condition of water facilities	good	4	40%
	poor	6	60%
Distance from water access point to classes	less than 20 m	8	80%
	greater than 20 m	2	20%

**Students used the borehole meant for a nearby community not specifically for their school.*

4.2.1 Water source

The results from on-site observations, presented in the Table 6 revealed that all 10 schools were connected to piped water supplied by Blantyre Water Board and used it as their primary drinking water source. This means that all the schools in the study area had access to safe water. This is so because tap water (connected to water board supply system) is considered acceptable for human consumption as it undergoes necessary treatment by the water board that strives to meet national standards (UNICEF & WHO, 2011). However, at the time of data collection, 1 school had no access to safe water within the campus. After further investigations, it was revealed that the tap water supply was disconnected due to failure of the school to pay for water bills and then some of water facilities were vandalised. Unfortunately, this school had no alternative water source. As such, learners devised their own way of having drinking water; 62% bought their drinking water sold by vendors within the school premises in home-packed sachets, 34% brought it from home in plastic bottles, while 4% had no any other option.

“We bring water from home or sometimes buy from vendors”- Said one student.

Nevertheless, a question still remained as to whether water in the home-packed sachets sold in school premises was of good quality for consumption or not as its actual source posed a challenge to verify the quality after packing as it needed some laboratory determination, which was outside the scope of this study. The situation is similar to that in some primary schools in Malawi. As observed by UNICEF (2011) and Kalenga (2012), learners bring drinking water from home or buy from vendors because most tap water sources are not properly working. Alternatively, some schools are using boreholes found close to the school premises. Additionally, other assessment in Nigeria found that out of 10 schools sampled, 2 schools had no tap water running (Olukanni, 2013). According to WHO (2004), inadequate water access in schools greatly affects performance by exacerbating learners' particular susceptibility to WASH-related diseases hence high rate of absenteeism. In agreement, Fogden et al., (2009) stress that good performance in schools is dependent upon adequate access to safe drinking water.

4.2.2 Reliability of water sources

The results in Table 6 show that the water supply was reliable in most secondary schools unless otherwise. Seven of the 10 schools manifested continuous water supply. Two schools experienced intermittent water supply and 1 school had no water supply (disconnected) due to unpaid bills as discussed in section 4.2.1.

Thorough observation also revealed that the schools with intermittent water supply were CDSSs. This may be attributed to the locations that most of the CDSSs were sited in Blantyre City. It was observed that all the sampled CDSSs were located in high-density areas such as Ndirande and Chirimba, where water demand was always higher during the day when school activities are in progress. Probing into the problem, it was further found out that this intermittent water supply affected not only the schools but also the whole respective locations. Unfortunately, documented information on the same could hardly be found in literature. However, the situation was similar when compared to other public places such as primary schools, markets and healthy centres where intermittent water supply was equally prevalent.

4.2.3 Water access points and their conditions

The results from on-site observations for water access points and their conditions are also presented in Table 6. From these results, the condition of water access points is poor in many (over a half of the 10) schools based on the definitions/criteria outlined in Table 4. As defined by UNICEF (2011), water access points include classroom water buckets, drinking water fountains, running water taps (not used for hand washing), well pumps, and storage tank tap. In this study, the majority of the observed water access points had no taps and no proper drainage system, hence permanent water stagnation as shown in Figures 1a and 1b. Stagnant water encourages breeding of insect vectors that cause water related diseases such as diarrhoeal (Khan, 1997). The absence of taps makes water over-flow (flow uncontrollably) hence wet the whole area if not constructed with concrete.



Figure 1: Condition of water access points in some secondary schools in Blantyre City

However, in the remaining schools, the water access points were in good working condition and conveniently positioned as shown in Figure 2. In some schools students had access to drinking water right within the classrooms. One school had taps on a sink in classrooms (Figure 2a), and 2 schools had buckets and cups (Figure 2b). Where taps were available, it was observed that the majority of the students drank water by using their hands. This raises hand hygiene questions since this practice is safe only if the hands are clean. According to Bennett et al., (2014), poor hand hygiene has been known to be a contributing risk factor for the occurrence of WASH-related infections. The observed alternatives were using bottles, using their own plastic cups or drinking directly by mouth.



(a)



(b)

Figure 2: Classroom-located water access points in some secondary schools in Blantyre City

The presence of drinking water in the classrooms is good because learners are not expected to travel a long distance to a drinking water access point, a situation that would affect their class attendance. According to UNICEF (2011) the recommended distance from water access points to

classes in secondary schools should be less or equal to 20 metres. However, where water buckets were improvised, it was observed that these buckets had no taps and students shared cups when drinking water. This situation may raise some hygiene questions for one cannot be sure that no residue from the previous user remains behind (Talaat, 2011).

Thorough observation also revealed that in some schools water access points were sufficient in terms of numbers, but very few were functional. Figure 3 shows the number of functional and non-functional water access points observed in the school premises. These results show that non-functional water access points outnumbered functional water access points in the majority of the schools. Unfortunately, these non-functional water access points were completely ignored by the management and left unrepaired. This situation compromised adequate safe water access by learners. For this reason, learners would be seen queuing for drinking water especially during break time. This may also force some learners to buy drinking water from venders though its quality cannot be guaranteed as discussed in section 4.2.1.

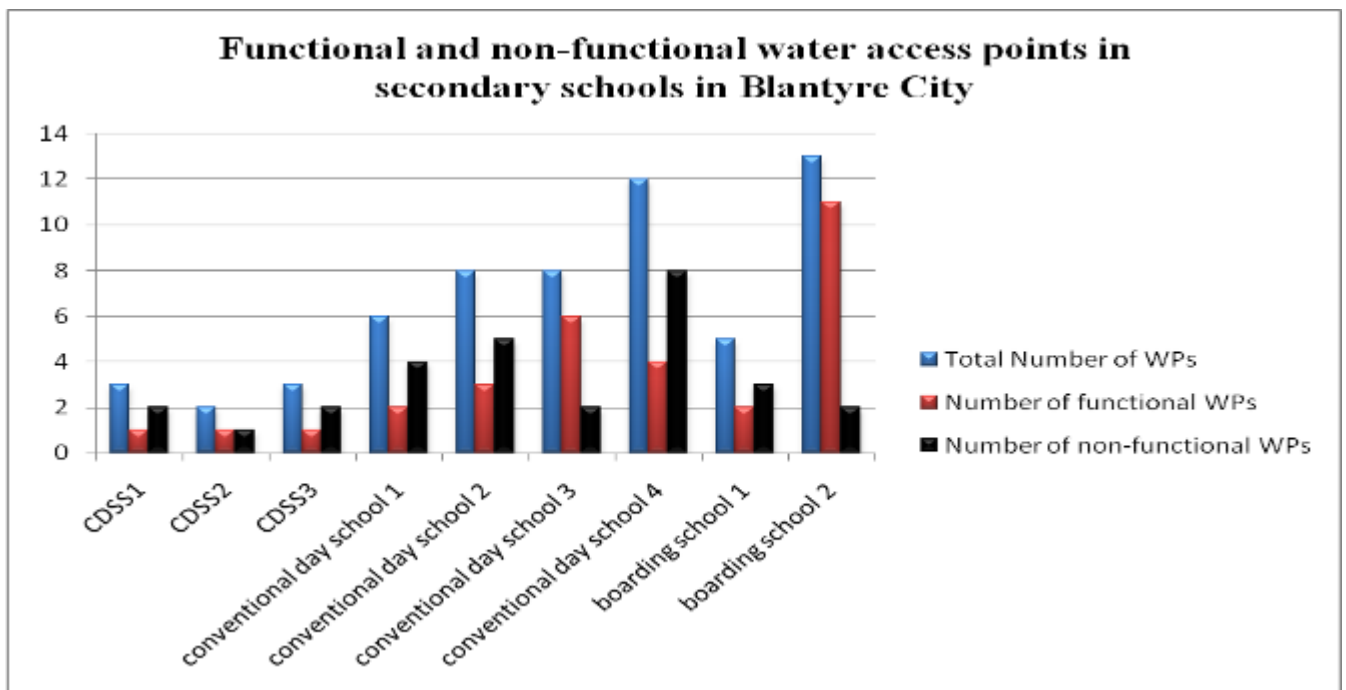


Figure 3: Number of functional and non-functional water access points in sampled secondary schools in Blantyre City

As noted by Save the Children (2008), lack of technical knowledge of how to repair WASH facilities once they are broken is a challenge faced by most schools in Malawi. This is true looking at what is actually on the ground in secondary schools in Blantyre City. Figure 4 (a, b and c) show some of abandoned non-functional water access points observed in conventional day secondary schools in Blantyre City.



Figure 4: Abandoned water access points in some secondary schools in Blantyre City

4.2.4 Water access point to student ratio

The results of water access points to student ratio in individual schools are presented in Figure 5. From this figure, it was observed that in 7 of the 9 schools which had functional water access points, the ratio ranged from 1:184 to 1:371. These schools had an average ratio of 1:239. This average ratio is less than and also significantly different ($p < 0.03$, $\alpha = 0.05$) from that of the global standard of 1:150 (UNICEF, 2011).

From Figure 5 again, it was also observed that 8 of all the 10 schools visited did not comply with the recommended water access point ratio of at least 1 water access point for every 150 students as stipulated in the international guidelines by UNICEF (2011). This implies that there were insufficient water access points for students in these schools, a situation that may also compromise drinking water access by students.

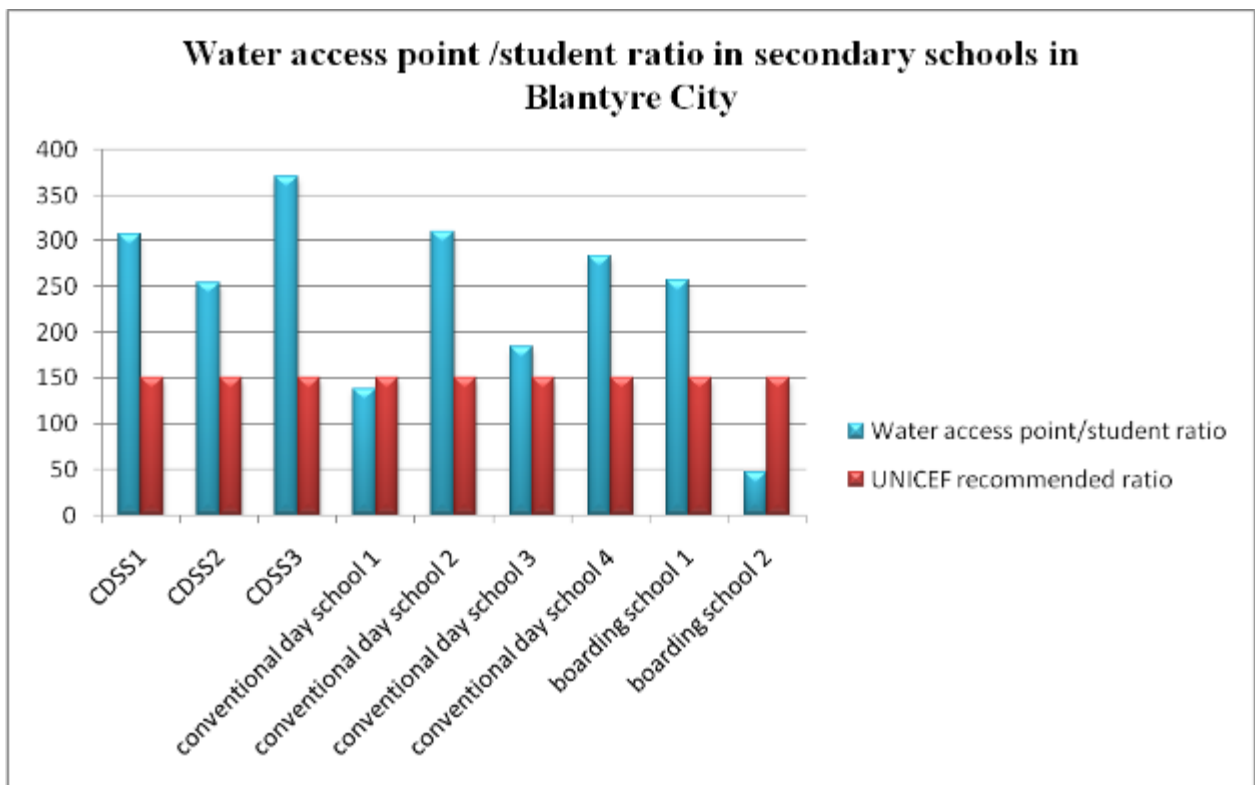


Figure 5: Water access point to student ratios in secondary schools in Blantyre City

4.2.5 Alternative water sources

On alternative water sources, it was observed that out of all 10 schools only 3 had alternative water sources of which 2 had water storage tanks and 1 used a borehole meant for nearby community not specifically for the school (positioned about 100 metres away from the class room blocks). These water tanks were for water accumulation and storage, especially during the night when demand for the general tap water was low. These results clearly showed that the majority of the schools had no alternative water source in case of water crisis. This situation was terrible because sporadic tap water supply was a prevalent problem in Blantyre City. As put in the Nation Newspaper dated October, 24, 2015, Blantyre residents and surrounding communities endure intermittent water supply as Blantyre Water Board (BWB) frequently shuts down its system due to problems at the main water intake, Walkers Ferry. In this case, schools in Blantyre City were equally affected hence water tanks were of great importance. As pointed out by Murthy *et al.* (2015), water tanks installed in the school premises ensure that water is available for school learners and are a practical solution, especially for schools without municipal water connections. This initiative ensures that learners' school attendance is not disturbed due to water problems that induce WASH-related diseases. As observed by Hunter *et al.* (2015), there was a strong association between the provision of safe water and reduced absenteeism in schools. They further observed that every 6 of 10 absentees were due to WASH-related problems, particularly, water borne diseases. This may also be a case in Malawi though such information could hardly be found documented. However, the Ministry of Health, as cited in Nkawihe (2006), estimates that about 80% of school going children in Malawi lack clean and safe drinking water leaving many of them infected with or dying of diarrhoea from water borne diseases. It was further reported that 3,000 were infected with diarrhoea in 2005 and 1,000 of them died. On the same, Kaluwa and Chipeta (2005) conclude that, in Malawi, nearly 50% of all illness in schools is related to water borne diseases. Jabu and Grimason (2007) reported that 43 % of the population obtains water from wells, streams and other unreliable water sources leaving them prone to water-related diseases including cholera.

4.3 Sanitation facilities

This section presents results on sanitation facilities in terms of toilet to student ratio, condition of the toilets, their convenience and privacy.

4.3.1 Availability of sanitation facilities and their conditions

This study found that all 10 sampled secondary schools had sanitary facilities. Flush toilets were the predominant facilities for faecal disposal used by more than half of the 10 schools, with the rest using simple pit latrines. However, it was observed that one CDSS had no functional toilets for boys. As a result, boys used toilets in a nearby primary school. At this school, the head teacher explained that the absence of toilets for boys was due to blockages and vandalism. Obviously, the issue was left unaddressed until the day of data collection.

“This development brings about inconveniences and shame to us for we are forced to sneak into pupils’ toilets- Complained a male learner.

He further complained that this situation compromised privacy and convenience when they were at the school premises. Figure 6 shows the blocked and vandalised toilet block for boys in one of the sampled secondary schools in Blantyre city.



Figure 6: blocked and vandalised toilet for boys in one of the school premises

4.3.2 Toilet to student ratio

The results for toilets to student ratios are presented in Figure 7. These results show that in many schools, the toilet to student ratios for both boys and girls were less than the standards recommended by UNICEF of 1:50 and 1:25 for boys and girls respectively. Even the average toilet ratios for boys and girls in the sampled secondary schools, at 1:74 and 1:43, respectively, were less than recommended. Furthermore, there was a significant difference between the average toilet to girls ratio and the recommended ratio ($p < 0.04$, $\alpha = 0.05$), but no significant difference between the average toilet to boys ratio and the recommended standard ($p < 0.06$, $\alpha = 0.05$). The ratio for female students was significantly lower ($p < 0.03$, $\alpha = 0.05$) than that for males. From these results it can be deduced that there was a shortage of toilets, especially for girls in the majority of secondary schools in Blantyre City. These lower toilet ratios could be a result of lack of proper maintenance in schools as it was observed that in most schools, toilets were broken and never replaced or repaired. This had resulted into some schools having more than 150 students per drop-hole.

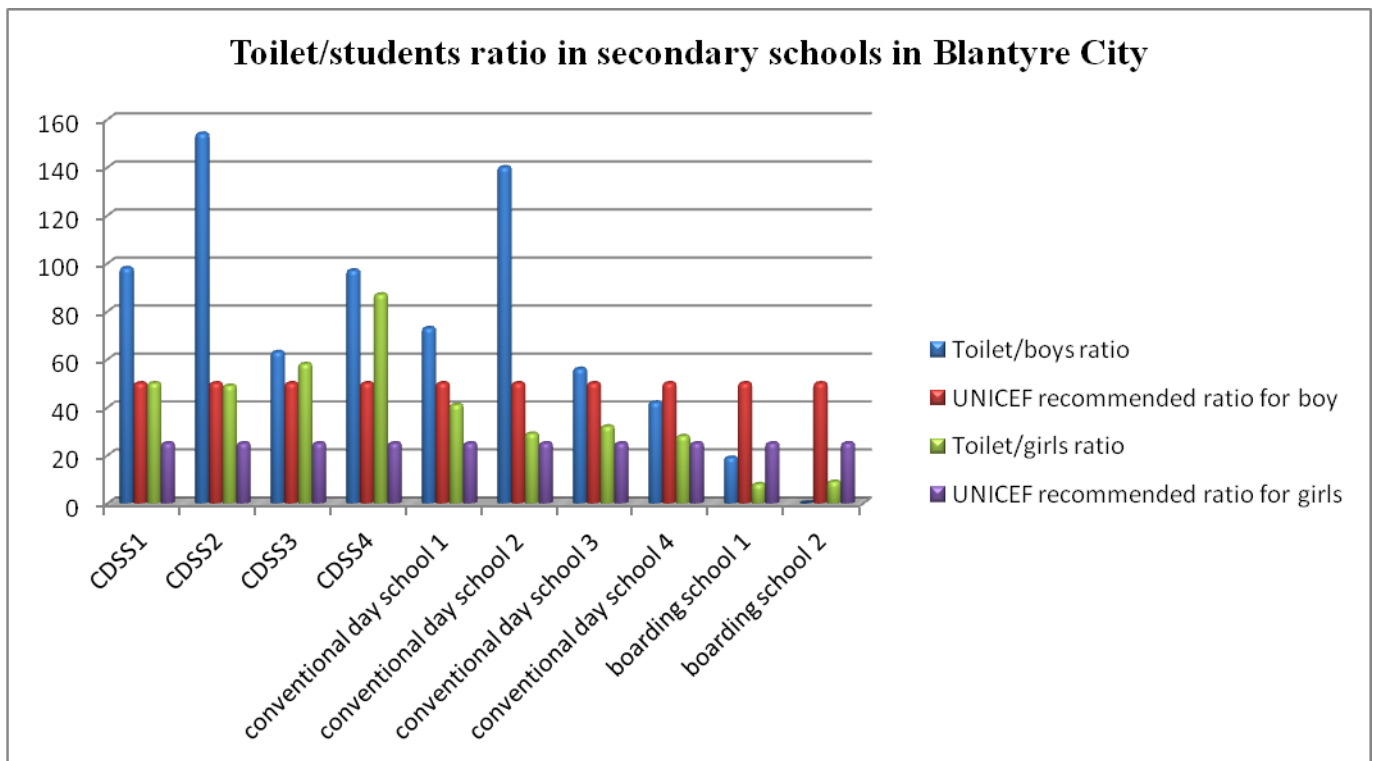


Figure 7: Toilet to students ratio in the sampled secondary schools in Blantyre City

In general, this study revealed that in the studied secondary schools the access to toilets by girls was unsatisfactory as compared to that of boys. These results were in agreement with those found by Seid and Kumie (2010) in Ethiopia, who reported a wide disparity in toilet access by male and female students; having toilet average ratios of 1:164 for boys and 1:177 for girls. Another assessment in Nigeria revealed a similar situation pointing out that girls are the most disadvantaged in accessing latrines in schools. The disparity in the toilet ratio was significant by sex (Olukanni, 2013).

On the same, it was also observed that members of staff in all the sampled secondary schools had sufficient access (with toilet to staff ratio below 1:25 for females and 1:50 for males) and functioning toilets with water flushing systems, whereas learners in some schools, especially community day ones had simple pit latrines. This situation was similar to primary schools where Kalenga (2012) also observes that Malawi government provides good and adequate toilets for staff rather than students. This opinion was arrived at when the nature and design of teachers' and pupils' toilets provided in most primary schools were assessed. In agreement to the findings above (section 4.3.2), Kalenga (2012) also observed that members of staff in all the sampled primary schools had sufficient (with toilet to staff ratio below 1:25 for females and 1:50 for males) and good toilets with water flushing systems, whereas learners in some schools (majority) had simple pit latrines. One may say that staff toilets are prioritised than learners' toilets.

4.3.3 Toilet hygiene in secondary schools

Most of the toilets were in good condition structurally, and in all the schools, caretakers cleaned the toilets in the morning every day. However, upon onsite observation, it was noted that in some secondary schools (6 of 10), the toilets were not clean, hence sanitation was not good based on the definitions/criteria outlined in Table 5. In some of these schools, faecal matter could be observed around the drop-holes or the seats of flush toilet as shown in Figure 8.



(a)

(b)

(c)

Figure 8: Improper use of toilets by students in some sampled secondary schools in Blantyre City

The presence of faecal matter around the drop-hole simply tells that in these schools, learners were not able to properly and responsibly use the toilets. For instance, in Figure 8a, water was available in this toilet but the user did not flush. In Figure 8b, the user did not bother to check whether or not the drop hole was targeted for proper use. Additionally, in Figure 8c, it seems that the previous user squatted instead of sitting on the seat and missed the hole. All these scenarios were attributed to inadequate hygiene promotion in schools and lack of WASH knowledge as described in the sections 4.4.3 and 4.5.1, respectively. In agreement to this, it is reported that there are still some students more than 30% in Palestinian schools that seem not to know how to properly use their school toilets (MoE & UNICEF, 2012).

In addition to faecal matter, urine could also be observed around the drop-hole. This open urination may also be attributed to improper and irresponsible use of the toilets, predominantly due to the absence of urinals for boys and girls in some schools. Consequently, in these schools, 33% of the students indicated that they did not use the toilet facilities because they were always dirty and produced unpleasant odour. These findings are in line with the survey results in Palestine that show that 44.1 % and 42% of West Bank and Gaza students, respectively, refuse to use dirty school toilets and prefer to wait until they go home instead. According to MoE and UNICEF (2012), refusal to use the existing toilets is higher among students in secondary school compared to those in primary schools.

On the same, Seid and Kumie (2010) observed that the status of school sanitation is similar in developing countries; toilet ratios are extremely high, existing school latrines are always dirty but are cleaned every day hence at least 30% of students shun the toilets.

Similarly, poor sanitation and hygiene is also manifested in primary schools in Malawi. Save the Children (2008) indicates that although some primary schools have WASH facilities, some pupils in Malawi could not use them because they are unhygienic. This poor hygiene in these schools could be as a result of both inadequate toilets to adequately serve school population that encourages frequent use by learners than cleaning, and also improper use of the toilet facilities by pupils.

4.3.4 Convenience of sanitation facilities

The convenience of the sanitation facilities was interpreted in terms of distance the students had to cover to access toilets. It was observed that the toilets in all sampled secondary schools were conveniently positioned, 20 to 25 metres from the furthest classes. According to UNICEF (2011), it is recommended that the toilets should be located in a distance of not more than 30 metres from all users. However, it was observed that in some schools (4 out of 10), especially CDSSs, toilet facilities had no proper doors, ventilation and had no urinals. Such situations exacerbate offensive odour and breeding of house flies (Kalenga, 2012). As such, some students, especially the females shunned using them, as discussed in section 4.3.3 above. Instead, they preferred to use the toilets at home before school time. Proper use of a toilet facility is easier when it is well designed (UNICEF, 2011). It was observed that no urinals for girls were available in any of the schools assessed, which is against new development as discussed in section 2.3.1. On the other hand, urinals for boys were available in 7 of the 9 schools that had toilets for boys. This situation induced open urination as also pointed out in section 4.3.3.

4.3.5 Privacy of sanitary facilities

The privacy of sanitary facilities was interpreted in terms of whether a school had separate toilets for boys and girls, separate toilets for male and female staff members, and toilet doors. It was observed that all the sampled secondary schools had separate toilets for boys and girls. However, in 4 schools male and female staff members shared the toilets. Seid and Kumie (2010) stress that this development compromises privacy of both sexes. It was also observed that in 2 of 10 schools, especially CDSSs, some toilets (2 of 5 toilets in one school and 2 of 6 in another) had no doors. This situation discouraged some students, especially female students from using them. The concept of privacy is of serious concern, especially for women and girls, during menstruation periods. On the same, UNICEF (2011) observed that when toilets have inadequate privacy, female students refrain from attending classes during menstruation. This means that they do not need toilet facilities just for defecation or urination. They also need privacy and dignity. Additionally, sexual harassment and rape are a risk for female students when they have to defecate in the open (Olukanni, 2013). This retards the fight for girl's education and gender equality.

4.4 Hygiene in secondary schools

This section presents results of an assessment of hygiene practices in the sampled secondary schools. This involved assessing the condition and adequacy of hand washing points (HWPs) and hygiene promotion. The results of on-site observations are presented in Table 4 above.

4.4.1 Hand washing facilities and their conditions

Through thorough observation and investigation, it was revealed that hand washing facilities are completely not provided in some of the public secondary schools (3 of 10 schools), especially in CDSSs, and where they were available (7 of 10 schools), 86% of the total HWPs were in a deplorable state and most of them were not functional. Only 1 of 7 schools had satisfactory (good) hand washing points in terms of conditions. It was also observed that hand washing facilities were typically located inside the toilet units (71%) or immediately outside the toilet (29%) in some schools with a distance of less than 10 metres from the toilets in each case. However, Chartterley (2011) observes that outside hand washing facilities are ideal for pupils in lower primary school classes and beneficial for monitoring their hand washing practices and ensuring that they properly use them.

It was further observed that where hand washing facilities were available, no school provided soap to students and only 2 of the 10 schools provided it to members of staff. According to a nationwide 'Soap Campaign' launched in July 2008 by UNICEF and the Ministry of Health in Malawi, hand-washing with soap is essential to prevent cholera and diarrhea at four critical times: after using the latrine, before preparing food, before eating or feeding children, and after changing babies' nappies (Manda, 2009). It is very unsafe for schools to have toilets without hand washing facilities, especially in Malawi, where food is sold and consumed within school premises. Soap not only disinfects or neutralises bacteria, but also acts as a lubricant that causes dirt to easily be lifted or moved off the skin with the help of water (UNICEF, 2012). This means that water alone is not enough to properly cleanse one's hands. However, if it is the only thing available, then a thorough rinsing is better than absolutely nothing.

4.4.2 Hand washing point (HWP) to student ratio

The results for hand washing to student ratios are presented in Figure 9. The results show that only 6 of 7 schools that had hand washing facilities did not comply with the recommended ratios. This means that only 1 of the 10 schools studied had sufficient hand washing points for students. The ratio of HWP to students in the 6 schools ranged from 1:136 to 1:290 for boys and from 1:82 to 1:278 for girls. The average HWP ratios for boys and girls were 1:172 and 1:150, respectively. These average ratios are much less than and significantly different from the global standard of 1 HWP for every 20 students ($p=0.00$ for boys and $p<0.01$ for girls, $\alpha= 0.05$). This means that there were insufficient hand washing points in the sampled secondary schools as the majority of the schools (9 of 10) had their ratios below the recommended one. Sufficient and recommended number of hand washing points is 1 for 1-20 students and 2 for 21-50 students (UNICEF, 2011).

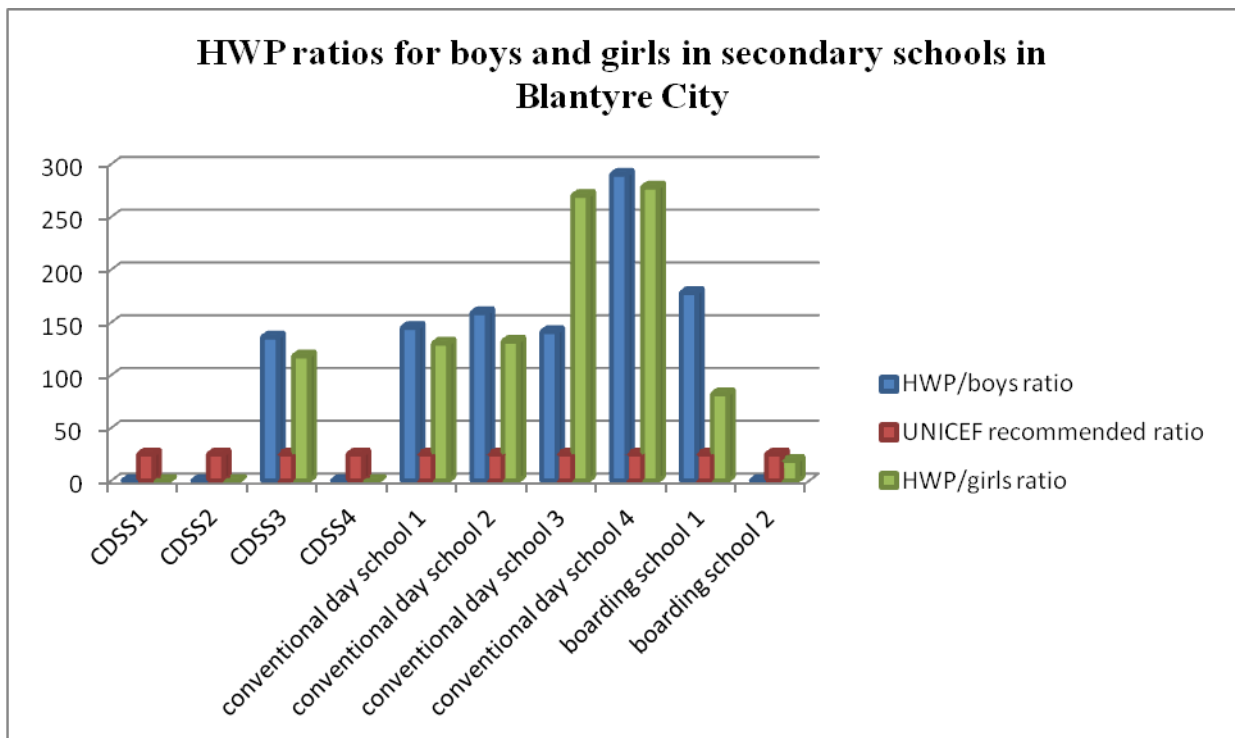


Figure 9: Handwashing ratios for boys and girls in the sampled secondary schools in Blantyre City

These lower ratios may be attributed to the higher enrolment currently manifested in secondary schools since the onset of free primary education, hence a need to increase the number of these facilities and also to repair broken/damaged ones. It was observed that, in most schools, HWPs were broken and never replaced or repaired (as it happened with water and sanitation facilities described in sections 4.2.1 and 4.3.1, respectively). This resulted in some schools having more than 250 students per HWP. These results agreed with findings of a similar assessment in Nigeria which indicated that out of the schools selected for study, 10% had enough hand washing points but without soap (Olukanni 2013). Another assessment results in Ethiopia indicates that for every 4 HWPs available, 1 or 2 HWPs were functional (Seid & Kumie, 2010).

4.4.3 Hygiene promotion in secondary schools

A thorough observation and investigation revealed that Information Education Communication (IEC) materials were not provided in any of the selected secondary schools, though one school indicated to have some in the head teacher's office. The essence of IEC materials is to educate the students on proper hygiene. The major efforts made by the school authorities to improve the health of students are checking student finger nails once a week, and those found with long and untidy nails were punished. The students also expressed that they had been taught hygiene education in schools but not with the perception of WASH program. Hygiene education in schools is very important as this promotes the health of students and learning ability. Students should be encouraged to pass hygiene knowledge to their families and communities. A study by Chatterley (2011) found that hygiene promotion in public places like schools, health centres, bus depots correlates with cleanness and proper use of toilet facilities. It was further found that 9 of the 10 sampled secondary schools did not have hygiene-related clubs. Instead, 6 schools depended on science lessons that had hygiene component, whereas 3 schools disseminated hygiene messages during assembly. As noted by Save the Children (2008), lack of training to school staff and pupils on WASH by professionals is a challenge faced by most of the schools in Malawi.

4.5 Students' knowledge level of basic WASH concepts

The responses from students showed that 91% were able to describe at least a concept. Although the results indicated that the students had some knowledge of WASH-related concepts, only 18% provided all the required definitions/descriptions, 40% described safe water and personal hygiene and the rest of the students (33%) described only personal hygiene. These results are in agreement with other similar studies in south India that revealed that over 86% of the participants (students and staff) had WASH- related knowledge (Murthy *et al.*, 2015). A report by MoE and UNICEF (2012) also shows that the majority (92.6%) of Palestinian students interviewed were able to demonstrate some knowledge of proper hygiene habits by identifying at least one correct way of how to prevent water-related diseases. Students' knowledge of water sanitation and hygiene is the cornerstone of any school health programme (MoE & UNICEF, 2012). Another assessment results in Belizean schools by Charterley (2011) indicated that WASH knowledge correlated with good hygiene practices among students. In agreement, another assessment results in Nyanza Province, Kenya indicate that schools that received education on latrine cleaning plus hand washing (LC+HW) package had significantly cleaner latrines compared with those that did not receive the intervention (Freeman *et al.*, 2012).

4.6 Students' knowledge level on basic WASH concepts according to school type/setting

The results were further analysed according to school type. As shown in Figure 10, students from boarding schools had very good knowledge though contributed the least in the sample size, followed by students from conventional secondary schools. Students from CDSSs had the least knowledge of WASH.

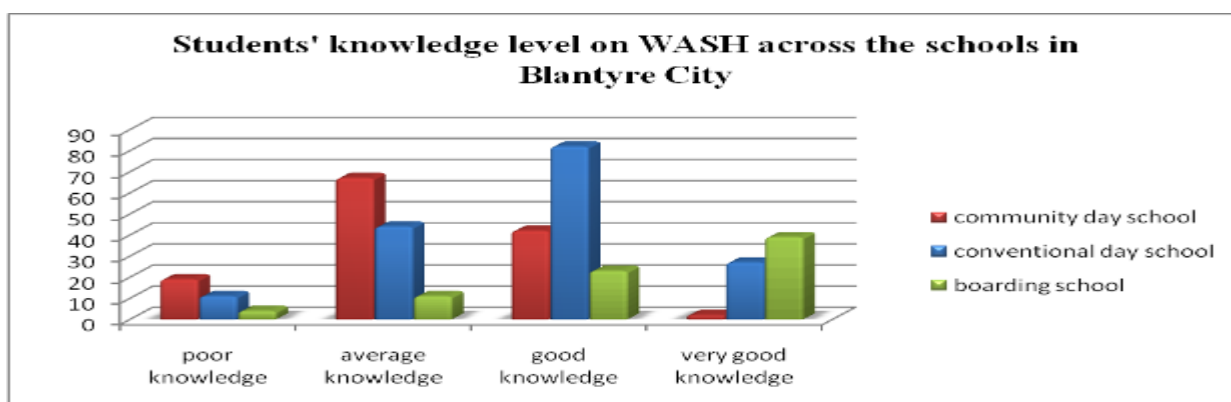


Figure 10: knowledge of students on WASH according to school type

This least knowledge level manifested by CDSS students is obvious, looking at the infrastructure including sanitary facilities found in their schools. One may say that CDSSs are the least prioritised when it comes to government funds and other provisions. Practically, most CDSSs in Malawi fall short of conducive teaching and learning environment as compared to conventional and boarding schools i.e. in most CDSSs teaching and learning materials and classrooms are not adequate as claimed by Jacobus De Hoop (2010). This generally compromised environment, seriously affects the teaching and learning negatively. Secondly, the system of selecting students into which secondary schools greatly depends on pupils' performance at Primary School Leaving Certificate Examinations (PSLCE). After PSLCE, CDSSs are the last to select and therefore pick the lowest performing students (slow-learners) as compared to conventional day and boarding schools. This implies that the top performers are selected into conventional boarding and day secondary schools and the low tier performers are selected into community day schools. This situation to some extent contributes to poor understanding of CDSSs students on several concepts including WASH.

Lastly, despite the government's efforts to improve the quality of the community day schools, most of the CDSSs still have inadequate WASH facilities and resources, as highlighted above. Inadequate and very poor toilets (dilapidated and poor design), lack of hand washing facilities and lack of IEC materials on WASH were prevalent in CDSSs. Jacobus De Hoop (2010) observes that disparities between conventional schools and community day ones in terms of physical structures, teaching/learning materials and human resources are still large. This means that more conventional school students are exposed to WASH related facilities and materials than are CDSS students. This greatly contributes to total poor understanding of WASH among CDSSs students.

As highlighted above, CDSS students had unsatisfactory knowledge even on basic concepts of WASH. It is worth pointing out that many CDSSs operate in borrowed primary school premises, are run by a largely under-qualified teaching force, are characterised by inadequate and overcrowded classrooms, lack essential teaching/learning materials and have no libraries or science facilities. According to African Development Fund (2001), CDSSs students perform poorly because of the environment that these students live in. All these might impact on WASH understanding and practice.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter concludes the research findings and puts forward some recommendations in line with these findings.

5.1 Conclusion

The findings of this study have shown that there is inadequate provision of WASH in public secondary schools in Blantyre City, particularly in CDSSs. The safe water situation in the selected schools is good with respect to quality but not quantity. The majority of the schools visited are supplied with safe water by the public water network, however, water access by students is predominantly compromised by inadequate water access points and lack of alternative sources (in times of water crisis) in the majority of the schools. Overall, there are not enough functioning drinking water access points, especially in community and conventional day secondary schools as many of them are damaged and abandoned.

School sanitation facilities are on average insufficient. The greatest problem in terms of access is that girls do not have enough toilets, especially in CDSSs. In CDSSs again, almost half of students refuse to use school toilets because they are most of the times dirty and smelly due to open defecation and urination although the toilets are cleaned at least once in the morning every day. The findings have also revealed that there are no hand washing facilities provided for students in CDSSs. Thus, very few students use water access points after the toilet which is not hygienic. However, almost all boarding and conventional schools have hand washing facilities, although in many schools (conventional day schools) the numbers of HWPs do not meet both the international and national recommendations. In these schools no detergent or soap is provided for hand washing.

On the part of hygiene promotion, it is not done in secondary schools as evidenced by the absence of health lessons, WASH clubs and IEC which promote the importance of WASH in school premises. The findings have also shown that students' level of knowledge on WASH is

different across school type/setting. Students from CDSSs have the least knowledge of WASH as compared to those from boarding and conventional day schools.

In a nut shell, the available WASH facilities and practices in many of the secondary schools surveyed are unsatisfactory. The possible underlying reasons for unsatisfactory WASH in the public secondary schools surveyed can be connected to inadequate and dilapidated WASH facilities, lack of WASH education and lack of stipulated own school WASH policies. These might be exacerbated by insufficient budget allocations from government, lack of awareness and understanding on the part of the school management system, lack of trained personnel in respective schools and importantly WASH sector in Malawi has a weak monitoring and evaluation systems.

5.2 Recommendations

The above-mentioned findings lead to important recommendations concerning WASH in secondary schools in Malawi, particularly in Blantyre City, where the study was conducted. Any WASH intervention requires both “hardware” like building infrastructure and procuring supplies and “software” covering teaching good habits, behavioural change and advocacy. In view of the above findings, the following recommendations are put forward:

- Provide additional water access points particularly in CDSSs and conventional schools and fix the damaged water access point to ensure the recommendations of MoEST on minimum water access points in schools are met. This will also improve the compromised drinking water access by students.
- Provide good drinking water reservoirs (like bucket with a tap and tanks where possible), especially in day secondary schools. However, larger water tanks must be installed in boarding schools as an alternative source in times of water crisis. Where possible, borehole can perfectly work as an alternative.
- Additional toilets should be built especially for female students and broken/blocked ones should be rehabilitated, giving priority to CDSSs to ensure the recommendations of UNICEF/WHO and MoEST on minimum toilet ratios for students in schools are met.
- Since the findings revealed that all CDSSs did not have hand washing facilities, it is strongly recommended that school management source funds for the provisions of these facilities as soon as possible. Temporarily and alternatively, cheaper methods can be

improvised like by using hand washing bottles. In addition, damaged HWPs should be repaired to ensure the recommendations of MoEST on minimum HWPs in schools are met.

- Nationally, hygiene promotion should constitute part of school action plan every academic year in secondary school.
- Health clubs should be encouraged in schools in order to promote WASH in schools and IEC materials must be pasted at conspicuous and strategic places in the school premises.
- Schools should provide orientation programmes at the beginning of every term to remind their students on the need to managing well the available WASH facilities.

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APPENDICES

Appendix 1: Structured Questionnaire

School code.....

Date.....

I wish to appreciate your participation in this very important area of study. This questionnaire is designed to solicit for your responses on the status of Water, Sanitation and Hygiene (WASH) in your school. The findings for this study will expose the gaps in water supply, sanitation and hygiene in secondary schools in Malawi. Please feel free to express your opinions as all responses will be treated with total confidentiality.

Instructions

- This tool is to be used by enumerators to gather data on water supply, sanitation and hygiene.
- Enumerators are to interview the school head teacher/deputy head teacher.
- Where applicable, please respond by ticking in the last column against each question. For some questions you may wish to use the space provided

1.	Title of respondent	Head teacher	
		Deputy head teacher	
		Other Teacher	
2.	Type of school	Boarding school	
		Conventional Day school	
		Community Day school (CDSS)	

3. Enrolment

Form	Present			Dropped out		
	Boys	Girls	Total	Boys	Girls	Total
1						
2						
3						
4						

4. If any, why do learners, especially girls drop out of school? *Use the space provided.*

.....
.....
.....

5. Staff

Staff	Male	Female	Total
Teaching			
Non-teaching			
Grand total			

6. What type of toilets/latrines do you have in the school?

Simple pit latrine	
Ventilated improved pit latrine	
Flush toilet	
Pour-flush toilet	
Ecosan	
Other (specify)	

7. Does the school have separate toilets for boy and girls?

Yes	
No	

8. Latrine usage. *Please respond by ticking in the last column against each question.*

Are the learners given lessons on how to use latrine facilities?	Yes	
	No	
Does the school health teacher/school authority conduct periodic inspection of latrines	Yes	
	No	
Do learners practise open defecation	Yes	
	No	
Do learners practise open urination	Yes	
	No	

9. Has the school had any contact and interaction with any NGO staff, school inspector, in the last 6 month on WASH issues? (if **No** skip to question No. 11)

Yes	
No	
Do not remember	

10. If yes, what did the staff talk about (*do not prompt to see if they can mention any thing on WASH*)

Issue talked about	Yes	No
Water sources		
Toilets		
Hand washing facilities		
Personal hygiene		
Other (specify)		

11. What is the primary drinking water source for the school?

Water sources	
Tap water	
Protected Well	
Unprotected Well	
Protected spring	
lake/river	
unprotected spring	
Other (specify)	

12. How far is the water source from class blocks?

Location	
Less than 20m	
More than 20m	
Other (specify)	

13. Does the school have drinking water storage facilities?

Yes	
No	

14. If yes, what type of drinking water storage facilities are used in school? *Tick all applicable.*

Storage facility	
Bucket with a tap	
Bucket with no tap	
School tank	
others (specify)	

15. Is hygiene promotion being done at this school?

Yes	
No	

16. If **yes**, which method of hygiene promotion is being used?

posters	
drama	
Portfolios	
Other (specify)	

17. Does the school provide any WASH-related subject to students?

Yes	
No	

18. If yes, what key areas do you teach about sanitation?

Key Area	Yes	No
Disposal of rubbish		
Proper Latrine Use		
Hand washing		
Personal hygiene		
Other (specify)		

19. Health Clubs Activities in schools

Is there a school health club	Yes	
	No	
Is there any trained School Health Teacher in the school	Yes	
	No	
Are there regular hygiene educations sessions conducted for all classes by School Health Teacher	Yes	
	No	
Are there scheduled hygiene education sessions for the school by Ministry of Health officials? E.g. nurses, public health inspectors	Yes	
	No	
Are there scheduled hygiene education sessions for the school by Ministry of Education e.g. Education Directors and Inspectors	Yes	
	No	

20. In an effort to promote sanitation and hygiene, what are the gaps that need to be addressed in your school and what are your recommendations?

Gaps

.....

Recommendations

.....

THANK YOU FOR YOUR TIME

Appendix 2: Observation Checklist

OBSERVATION CHECKLIST

School code.....

Date.....

Instructions

- This tool is to be used by researcher/enumerator to gather data on water supply, sanitation and hygiene.
- Enumerator/researcher is to interview the school head teacher/deputy head teacher.

SECTION A: School information

(Information can be obtained from form teachers)

1.	Title of respondent	Deputy head teacher	
		Head teachers	
		Form teacher	
		Other Teacher	
2.	Type of school	Boarding school	
		Conventional Day school	
		Community Day school (CDSS)	

3. Enrolment

Form	Present			Dropped out		
	Boys	Girls	Total	Boys	Girls	Total
1						
2						
3						
4						

SECTION B: Water Supply and facilities questions

(Information to be obtained through on-site observation)

4. Does the school have access to an improved water source (a source that is likely to provide safe water)? Please tick.

Yes	
No	

5. If **Yes**, what is that source?

Tap water	
borehole	
Protected spring	
Protected well	

6. If **No**, what is that source?

unprotected spring	
unprotected well	
lake/river	
others (specify)	

7. How many water access points does the school have, not including taps on hand washing facilities? *(A water access point includes classroom water buckets, drinking water fountains, running water taps not used for hand washing, well pumps, and storage tank taps)*

	Total	functional	not functional
Number of water access points			

8. What is the ratio of water point to student? *(the recommended is 1 for every 150 students).*

No. of students	No. of functional points	Water point ratio

9. Are the water access points in good working condition at all times?

Yes	
No	

10. Are the water access points accessible for all at all times?

Yes	
No	

11. What is the distance from the water access points to classes? Measure the distance (*no more than 20 m from all users*).

>20m	
<20m	

12. Is water available throughout the day at this school? (*Continuous supply not intermittent supply: must be available at least 24 hours/day for boarding school and at least 8 hours/day for day schools*). Please tick.

always	
Some times	

13. If **not always**, what is the other alternative source? Please tick.

Lake/river	
Borehole	

Bottled/plastic tube water	
No any alternative	
Other (specify)	

14. Are shower points available in this boarding school? (*applicable to boarding school only*)

Yes	
No	

15. If **yes**, what is the ratio of shower point to student? (*1 shower for 20 students*).

Number of Students		No. of functional showers	Shower ratio
Boys			
Girls			

16. Are laundry facilities with detergent available in boarding schools? Please tick.

Laundry facilities with detergent available	
Laundry facilities without detergent available	
No laundry facilities are available	

SECTION C: Sanitation questions

(Information to be obtained through on-site observation)

17. What type of toilets does the school have? Please tick.

Simple pit latrine	
Ventilated Improved Pit latrine (VIP)	

Flush toilet	
Pour-flush toilet	
Ecosan	
Other (specify)	

18. Does the school have separate toilets for boy and girls?

Yes	
No	

19. How many toilets does the school have for boys and for girls? (*A toilet is defined as an individual stall/seat/squat-plate/drop-hole where a single learner can defecate in private. Functional means that at the time of filling out this questionnaire, the toilets are not broken and can be used by the learners. Not functional means that the toilet is broken, full, or damaged in such a way that it cannot be used.*)

	Total	Not functional	Functional
For boys			
For girls			
For staff			

20. What is the ratio of toilet to student at this school? (*1 per 25 girls / female staff, and 1 toilet plus 1 urinal (or 50 cm of urinal wall) per 50 boys / male staff*).

Number of individuals	Number of toilets	Toilet ratio
Boys		
Girls		
Staff		

21. Are there sufficient toilets available at this school? (*Determined by the ratio in (17) above*).

	Yes	No
For boys		
For girls		
For staff		

22. Do the toilet blocks have the following facilities? Please tick.

	Yes	No
Urinal for boys		
Urinal for girls		

23. On average, are the toilets in good condition and accessible to all students? (Check one for each category).

	Yes	No
Adequate ventilation (screened ventilation pipes/windows)		
Adequate privacy (secure lock and building structure)		
Clean (no urine or feces on the seat, walls or floor)		
Accessible to students with physical disabilities		
Walkway to an area around toilet is clean (grass is cut short, etc.)		
Adequate lighting (can see clearly with the door closed)		

24. What is the distance from toilets for both boys and girls to class rooms (*no more than 30 m from all users*)?

	> 30m	< 30m
For boys		
For girls		

SECTION C: Schools Hygiene questions

(Information can be obtained through on-site observation and interviewing any staff)

25. How often are the classes, toilets and school compound cleaned?

	Every day	Once a week	Other(specify)
Classes			
Toilets			
School compound			

26. Who cleans the classes, toilets and school compound?

	Students	Caretakers	Other(specify)
Classes			
Toilets			
School compound			

27. Are there separate hand washing facilities available at this school for staff, boys and girls?

Separate	
Not separate	
None	

28. If separate, how many hand washing points does the school have for staff, boys and for girls?

	Total	Not functional	Functional
For staff			
For boys			
For girls			

29. If not separate, how many hand washing points, in total, does the school have?

Total	Not functional	Functional

30. What is the ratio of hand washing point (HWP) to student at this school? (*Sufficient number of running water hand washing facilities- 1 for 1-20 students, 2 for 21-50 students*).

	Number of individuals		No. of functional HWP	HWP ratio
If separate	Boys			
	Girls			
	Staff			
If not separate				

31. What is the distance from toilets to hand washing facilities? (*the recommended is within 10 meters to the toilets*)

	> 10m	< 10m
For boys		
For girls		

32. Does the school have soap or any detergent for hand washing?

	yes	no
For boys		
For girls		

33. If **yes**, who is responsible for providing that soap/detergent?

Head teacher (office)	
teachers	
students	
WASH club	
Social welfare	
Other (specify)	

SECTION D: Hygiene Education questions

34. Is hygiene promotion being done at this school?

Yes	
No	

35. If **yes**, which method of hygiene promotion is being used?

posters	
drama	
Portfolios	
Other (specify)	

36. Does the school provide any WASH-related subject to students?

Yes	
No	

37. Does the school have any WASH-related clubs?

Yes	
No	

38. If **yes**, does the club have any member of staff (trained or untrained) as a patron?

Trained	
Not trained	
Non	

OBSERVED BY.....TIME.....SIGNATURE.....

Appendix 3: Questionnaire for Students

QUESTIONNAIRE FOR STUDENTS AND TEACHERS

School code:.....

Questionnaire No.....

I am a Master of Science student in Water Resources and Supply Management at - The Polytechnic (University of Malawi).

I wish to request for your participation in this study. This questionnaire is designed to solicit for your responses on issues about water supply, sanitation and hygiene (WASH) in your school. In fact, your responses will ultimately help the researcher to find the gaps in secondary school WASH in Malawi. Therefore, be assured that the information given will only be used for academic purposes and for the purposes of this research.

Participation in this study is upon your acceptance to do so. However, we hope that you will participate in this study since your views are important. Please feel free to express your opinions as all responses will be treated with total confidentiality.

Instructions

- This tool is to be used by enumerators to gather data on WASH.
- Enumerators are to administer the questionnaire to students and teachers.
- Respondents should be asked for consent before administering the questionnaire.

SECTION A: Respondent and School Information

(Please answer by ticking against each applicable answer in the last column, and where necessary, write the answer in the space provided.)

1.	Date of data collection	<i>(Please write the date below)</i>	
2.	Age of respondent	10-13	
		14-17	
		18-21	
		Above 21	
3.	Gender of respondent	Male	
		Female	
4.	Type of school	Boarding school	
		Conventional Day school	
		Community day school (CDSS)	

SECTION B: Questions on water supply

(Please answer by ticking against each applicable answer in the last column, and where necessary, write the answer in the space provided.)

5. Where do you get drinking water during classes/at the school premises? *Please tick against each applicable answer in the last column.*

Water sources	
Tap	
Protected Well	
borehole	
Bottled water	
Plastic (tube) water	
Other (specify)	

6. (a) Do you think that source provides safe water? (if **No idea** skip to question No. 8). *Please tick against each applicable answer in the last column.*

Yes	
No	
No idea	

(b) If **yes**, why do you think that the source provides safe water? *Please write the answer in the space provided.*

.....

.....

.....

(c) In your understanding, what is safe water? *Please write the answer in the space provided.*

.....

.....

7. (a) If **No**, why do you think that the source does not provide safe water? *Please write the answer in the space provided.*

.....

.....

.....

(b) In your understanding, what is safe water? *Please write the answer in the space provided.*

.....

.....

8. (a) Do you access water from showers every day? (*Applicable to boarding schools only*). *Please tick against each applicable answer in the last column.*

Some times	
Yes	
No	

(b) If **no**, what do you think is the problem? *Please tick against each applicable answer in the last column.*

Problem	
Pipes are broken	
Few showers are working	
There are no showers	
Other (specify)	

(c) Where do you take baths from? *Please tick against each applicable answer in the last column.*

Source	
River/lake	
Use buckets	
Tap	
Other (specify)	

9. Do you have any alternative source close to the school premises in case of water crisis?

Yes	
No	

10. (a) If **yes**, what is that source? *Please tick against each applicable answer in the last column.*
(Respondent can give more than one answer).

Water sources	
Borehole	
Well	
Lake/river	
School tank	

Other (specify)	
-----------------	--

(b) How long is this alternative source from your school? *Please tick against each applicable answer in the last column.*

Less than 1 km	
More than 1 km	

11. If **No**, where do you get drinking water from during water crisis time? *Please tick against applicable answers in the last column. (Respondent can give more than one answer).*

Water sources	
Bottled water from home	
Bottled water from shop	
Plastic (tube) water bought outside	
Other (specify)	

SECTION C: Questions on sanitation

12. Does this school have toilets in the school premises?

Yes	
No	

13. If yes, do you use the school toilets when you are in the school premises? (If **yes** go to question No. 15)

Yes	
No	

14. (a) If **no**, why do you not use the toilets? *Please tick against applicable answers in the last column. (Respondent can give more than one answer).*

Reason	
They are dirty	
There is congestion	
There are no doors (no privacy)	
There is always no water (if flush toilet)	
Other (specify)	

(b) If **no**, where do you go for urination? *Please tick against applicable answers in the last column. (Respondent can give more than one answer).*

Alternative	
Open urination	
I leave classes and go home	
I use surrounding toilets	
I wait till after classes	
Other (specify)	

(b) If **no**, where do you go for defecation? *Please tick against applicable answers in the last column. (Respondent can give more than one answer).*

Alternative	
Open defecation	
I leave classes and go home	
I use surrounding toilets	
I wait till after classes	
Other (specify)	

15. What do you think can be done in order to improve the toilets at your school? *Please write the answer in the space provided.*

.....
.....
.....

SECTION D: Questions on hygiene

16. What do understand by personal hygiene? *Please write the answer in the space provided.*

.....
.....
.....

17. Do you wash your hands after using the toilet? (If **no**, go to question 19). *Please tick Yes or No.*

Yes	<input type="checkbox"/>
No	<input type="checkbox"/>

18. If **yes**, what do you use to wash your hands with? *Please tick against applicable answers in the last column.*

Material used	
Soap	<input type="checkbox"/>
Ash	<input type="checkbox"/>
Nothing	<input type="checkbox"/>
Others (specify)	<input type="checkbox"/>

19. Explain any **four** (4) good hygiene practices that you observe at this school. *Please write the answer in the space provided*

.....
.....
.....
.....

20. Have you ever received health education messages/lessons related to water and sanitation? (If **no**, go to question 22). *Please tick Yes or No.*

Yes	
No	

21. If **yes**, from what source? *Please tick against applicable answers in the last column. (Respondent can give more than one answer).*

Source	
Posters	
Trained teacher	
NGO	
Healthy expert	
Other (specify)	

22. Do you participate in any health club at this school? *Please tick against the column containing applicable answer.*

Yes	
No	
No health club at this school	

23. If **yes**, what key areas do you learn from this club? *Please tick Yes or No column against applicable answer.*

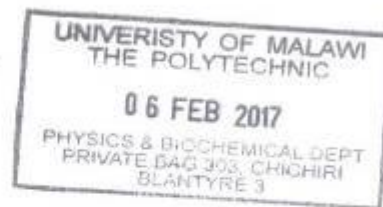
Key Area	Yes	No
Disposal of rubbish		
Proper Latrine Use		
Hand washing		
Personal hygiene		
Other (specify)		

THANK YOU FOR RESPONDING TO THIS QUESTIONNAIRE

Appendix 4: Request Letter

FROM : Hanleck John Dalison,
Nyambadwe CDSS,
P.O. Box 1914
Blantyre
Phone: 0884 356 912
Email: henleckdalison@gmail.com

THROUGH: The Postgraduate Coordinator
University of Malawi- The Polytechnic
Private Bag 303
Chichiri
Blantyre 3



TO : District Education Manager
South West Division
P. O. Box 30217
Blantyre 3

DATE : 3rd February 2017

Dear sir/madam,

**APPLICATION FOR PERMISSION TO COLLECT RESEARCH DATA FROM
SELECTED SECONDARY SCHOOLS IN BLANTYRE CITY**

I am a student studying Master of Science in Water resources and Supply management with the University of Malawi- the polytechnic.

As part of the programme, I would like to conduct a research on Water, Sanitation and Hygiene (WASH) gaps in Malawi urban secondary schools. The findings from this research will provide recommendations to stakeholders on how WASH challenges can be addressed based on the researcher's knowledge and literature review.

In this research, data will be collected from the head teachers and students using questionnaires. In addition, some information will be collected through on site observation. I would therefore like to request for your authority to enable me collect data from secondary schools that are under your jurisdiction.

I will appreciate the permission granted on the same.

Regards,

STUDENT SIGNATURE  DATE 03/02/17

POSTGRADUATE COORDINATOR SIGNATURE  DATE 4/2/17

Appendix 5: Permission Letter

Telephone: (265) 01 952 437/870 677
Fax: (265) 01 870 821
E-mail: swed@sndp.org.mw

All correspondences should be addressed to:
The Education Division Manager



in reply please quote: Ref. No. SWED/1/144

SOUTH WEST EDUCATION DIVISION
PRIVATE BAG 386
CHICHIRI
BLANTYRE 3
MALAWI

6th February 2017

TO WHOM IT MAY CONCERN

Hanleck John Dalison is a final year student at the Polytechnic, one of the constituent colleges of the University of Malawi. He is pursuing a course in Water Resources and Supply Management.

As part of his programme, he would like to conduct a research at your institution. The purpose of this letter, therefore, is to request you to assist him accordingly. Please find attached details of his research topic.

Your assistance will be highly appreciated.



Henry Gwede

EDUCATION DIVISION MANAGER (SWED)



Appendix 6: Tables of t-test results

One-Sample Test

	Test Value = 264					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
enrolment for boys	.639	8	.541	40.556	-105.76	186.87

One-Sample Test

	Test Value = 150					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Water access point ratio	2.679	8	.028	89.222	12.41	166.04

One-Sample Test

	Test Value = 50					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Toilet/boys ratio	-.091	8	.062	-1.035	-27.28	25.21

One-Sample Test

	Test Value = 25					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Toilet/girls ratio	1.977	9	.043	15.003	-2.17	32.17

One-Sample Test

	Test Value = 20					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
HWP/boys ratio	7.517	6	.000	152.310	102.73	201.89
HWP/girls ratio	3.613	6	.011	129.606	41.83	217.38