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DECLARATION

I, **Miranda Hamatanga**, do hereby declare that this dissertation is my own original work. It has been presented in accordance with the guidelines for the MPH dissertation of the University of Zambia.

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CERTIFICATE OF COMPLETION OF DESERTATION

I, Miranda Hamatanga do hereby certify that this dissertation is the product of my own work and in submitting it for my MPH program further attest that it has not been submitted in part or in whole to another University

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I, Dr Hikabasa Halwindi, having read this dissertation, I am satisfied that this is the original work of the author under whose name it is being presented. I confirm that the whole work has been completed satisfactorily and is hereby ready for presentation to the examiners.

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CERTIFICATE OF APPROVAL

The University of Zambia approves this dissertation of **Miranda Hamatanga** in partial fulfilment of the requirement for the award of the master of public health degree by the University of Zambia.

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ABSTRACT

Background: Schistosomiasis though considered a neglected tropical disease puts 779 million people at risk of being infected while about 200 million people are infected in the world. In Zambia 2 million people are infected putting the prevalence at 16%. The prevalence and factors associated with *S. haematobium* infection among school going children were investigated in the schools of Kafue District in Zambia.

Methods: A cross sectional study using 480 randomly selected school going children was conducted. A structured questionnaire was used to collect information so as to determine the factors associated with Schistosomiaisis. Single urine specimens were also obtained from children and screened for *S. haematobium* ova to determine the prevalence of Schistosomiasis
Results: The prevalence of *Schistosoma haematobium* was 21.7% (104/480); 95% confidence interval (CI) = 18.0 – 25.4). Among the 8 schools, Soloboni had the highest prevalence of 86.7% while Hetty Denin had the lowest with 1.7%. Girls had a higher prevalence of 22.4% compared to boys at 20.9%. The age groups 6-9, 10-12 and 13-15 years had prevalence of 26.1%, 25% and 10.7% respectively. Children that played in streams were 14.5 more likely to be infected compared to children that did not play in water bodies (OR 14.5, 95% CI 3.1-68.5: p=0.001). Children that indicated painful urination as a symptom of Schistosomiasis infection reflected a 50% reduction in the risk of Schistosomiasis infection compared to those who didn't know any symptoms (OR 0.5, 95% CI 0.2-0.9; p=0.038). Children who were seen by a health worker at their school once, twice, and thrice were 5, 4, and 8 times, respectively, more likely to be infected compared to children that were never attended to by health worker (OR 5.1, 95% CI 2.1-12.2: p= 0.001; OR 3.8, 95% CI 1.3-11.1: p= 0.017; OR 7.6, 95% CI 1.7-32.9: p= 0.007, respectively).

Conclusion: The prevalence of *S. haematobium* infection among school going children of Kafue District was high and calls for public health concern. Knowledge gap on the symptoms for Bilharzia, Play site (stream) and inadequate school health services came out as the significant factors associated with *Schistosoma haematobium* infection among school going children. These findings suggest that there is need for strengthening health education on *S. haematobium* disease, dangers of playing in the stream through consistent implementation of school health services according to guidelines.

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ABBREVIATIONS/ACRONYMS

DHMT	District Health management Team
HIMS	Health Information Management System
HIV	Human Immune Virus
HPV	Human Papilloma Virus
MCDMCH	Ministry of Community Development Mother and Child Health
MDG	Millennium Development Goal
MOH	Ministry of Health
NTD	Neglected Tropical Disease
PR	Principle Researcher
RA	Research Assistant
SCI	Schistosomiasis Control Initiative
SHN	School Health and Nutrition
WHO	World Health Organisation
ZBCP	Zambia Bilharzia Control Program
ZDHS	Zambia Demographic Health Survey

DEFINITION OF TERMS

Schistosomiasis:	This refers to a disease presenting with blood in urine and stool caused by blood flukes. It is also known as Bilharzia
School going Children:	This refers to children aged 6 to 15 years attending school in Kafue district at the time of study.
Prevalence:	The number of positive urine samples among school going children divided by the population under study
S. haematobium:	Refers to the presence of blood in urine or presence of Schistosoma ova's in urine as detected by microscope
Pavwa:	A local term which refers to a risk water body were school going children go to swim
Safe Water Supply:	Will refer to borehole or Tap water
Community School:	A school that receives no government funding and has no government paid teachers
Government School:	A school that receives government funding and has teachers paid by government

CHAPTER 1: INTRODUCTION

1.1. BACKGROUND

Health is among the many important priorities of livelihood and is a useful resource for a productive and satisfying life. A major goal of any health care delivery system today is to preserve and maximise human capital by ensuring that disease is avoided by offering up to date diagnosis, treatment and rehabilitation services (Chitsulo et al., 2000).In the effort to meet the demands of the World Health Organisation (WHO) definition of health many changes and approaches to the health care service delivery have been put in place. This is seen in the many health goals like the Millennium Development Goals set out to be met by all nations. Apart from this global initiative, the Zambian government has come up with the National health strategic Plan (NHSP) which the nation follows in order to meet the millennium development goals. Despite all the effort many diseases and health problems still exists and cause problems to society. These many diseases and health problems are attributed primarily to personal behaviour and environmental factors (MOH, 2010). One of these diseases is Schistosomiasis (also known as Bilharzia) which is still prevalent in some countries including Zambia to which Kafue district is no exception.

Schistosomiasis is a disease caused by a parasitic worm or fluke, a trematode, which completes its life cycle partly in humans and partly in snails. The pathophysiology results from the reaction of human tissue to the eggs and the fibrotic scarring of the bladder, urethra, ureter and/or the descending colon, depending on the type of organisms as it is caused by different Schistosoma species, (Bruijning, 2003).Adetokundo and Gilles (2003) and Brown (1980) state that Schistosomiasis is closely associated with water as snails carry the parasite. Thus all infected humans have been in close contact with infected water. Water forms the basic requirement for daily living hence forcing people to maintain close contact with available water resources.

According to MOH (2011a), Kafue's ground water resources are abundant, estimated at 800, 000 million cubic metres with ground water discharge estimated at 160, 000 million cubic metres per year. The district further has two major rivers, the Kafue and Zambezi running

through the district with a sizable number of perennial rivers. This abundance in water makes it possible for the intermediate host snails to thrive especially that a lot of Kafue population is into farming, gardening and fishing which puts the inhabitant population at risk of infection from Schistosomiasis as the infection in human beings enables the completion of the Schistosomes life cycle. Figure 1 below refers to Kafue district Map;

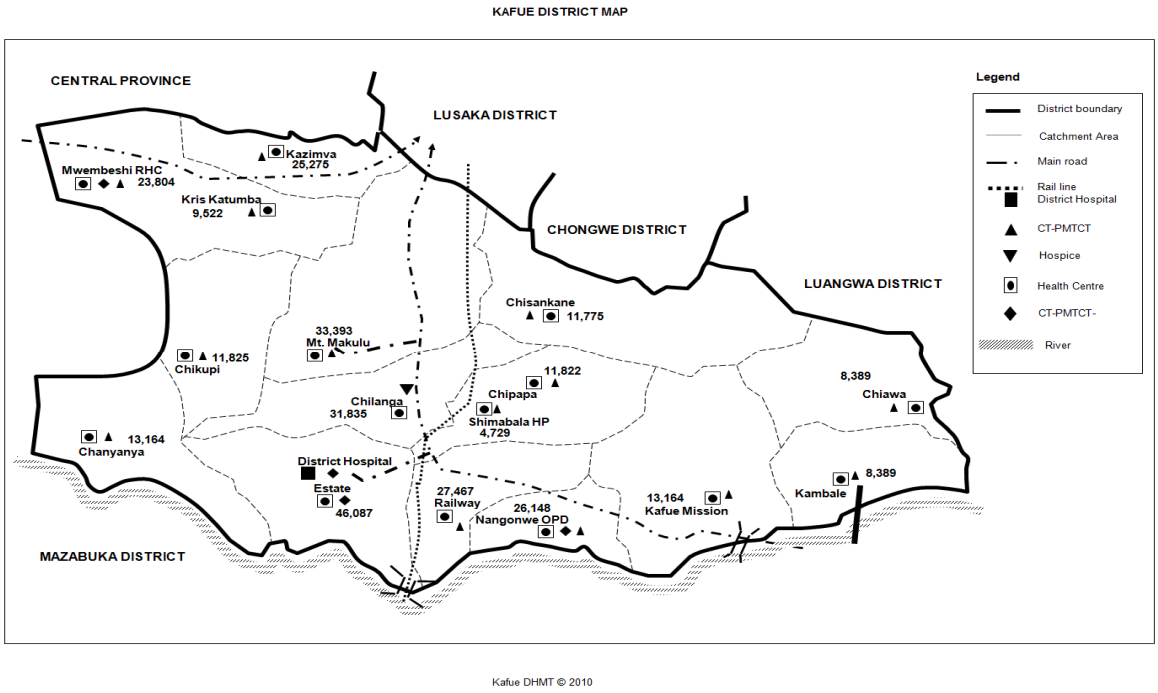


Figure 1: Kafue District Map

1.2. Problem Statement

According to Kachemba (2011), parasitic diseases such as Schistosomiasis have been referred to as the Neglected Tropical Diseases (NTD) because of the attention they lack at both local and international level. They have remained low on countries' public health agendas and do not receive the same levels of program support attention with diseases such as HIV/AIDS, Tuberculosis and Malaria.WHO recommended that efforts to achieve the Millennium Development Goals (MDGs) should prioritize on intensified control of NTDs in that this would help reduce poverty (Kachemba, 2011). According to the Hotez et al (2008) periodic treatment of at-risk populations will cure mild symptoms and prevent infected people from developing severe, late-stage chronic disease. However, a major limitation to Schistosomiasis

control has been access to praziquantel with less than 14% of people requiring treatment being reached.

Many pieces of literature reviewed show that there are environmental and social economic factors that put people at risk of contracting Schistosomiasis. Environmental factors include inadequate safe water supply, distance to water source, frequency of water contact and lack of sanitary facilities. Social economic factors predisposing people to contracting Schistosomiasis include whether one stays in urban or rural, education level, knowledgeand attitude, income of household and occupation of the head of household. According to Kachemba (2011), Schistosomiasis is prevalent in rural areas and affects the underprivileged living near large masses of water in Zambia. Due to the prevailing unsatisfactory environmental and social economic conditions in Zambia, especially in rural areas, majority of the population are at risk of Schistosomiasis where the disease is endemic.

According to CSO, MOH and MII (2009), the Zambia Demographic Health Survey (ZDHS) statethat only 10% of the Zambian population have access to improved water sources with the rural communities mostly affected with only 46% compared to 87% of urban population with access to improved water. Most of the rural population including some portions of the urban population resort to drawing water from unsafe water sources which put them at risk of contracting Schistosomiasis. The ZDHS (2007) also indicates that only 63.7% females are literate compared to 81.9% males with only 50% literate in rural areas compared to 71% literate in urban areas. In terms of employment, 47.2% of women have formal employment compared to 76% of men. In terms of occupation, 49% of women and 48% of men are into agriculture which is almost half of the population in Zambia.

The above information shows that about 50% of the Zambian population could be at risk of contracting Schistosomiasis especially that it is engaged into agriculture which requires frequent contact with water. It was hence important to explore these factors so as to come up with preventive measures which would address the problem.According to Kachemba (2011), in children, Schistosomiasis can cause malnutrition, damage the liver, bladder and kidney of the infected person if treatment is not administered on time. The Zambia Bilharzia Control Program (ZBCP) reports that heavy infestation with intestinal worms can also cause anaemia in children and pregnant mothers. A recent study by the Ministry of Health suggests that

Schistosomiasis reduces the child's potential to perform well in class and in various activities (Kachemba, 2011).

Intestinal Schistosomiasis can result in abdominal pain, diarrhoea, and blood in the stool. Bladder cancer is also a possible late-stage complication. In women, urogenital Schistosomiasis may present with genital lesions, vaginal bleeding, and pain during sexual intercourse and nodules in the vulva. In men, urogenital Schistosomiasis can induce pathology of the seminal vesicles, prostate and other organs. This disease may also have other long-term irreversible consequences, including infertility. The economic and health effects of Schistosomiasis are considerable. In children, Schistosomiasis can cause stunting and a reduced ability to learn, although the effects are usually reversible with treatment. Chronic Schistosomiasis may affect people's ability to work and in some cases can result in death. (WHO, 2012).

1.3. Study Justification

According to Hurlimann et al (2011), as of January 2011 there had been a total of 495 articles published on Schistosomiasis in Zambia with the following breakdown; 185 0n *S. mansoni*, 311 on *S. haematobium* and 1 on *S. mathei*. Most of the surveys currently included in their database focused on school-aged children (70.1%), whereas less than a third (29.9%) of the surveys included all age groups. Despite the seemingly large number of studies carried out in Zambia, there had only been one study conducted in Kafue entitled "The epidemiology and small-scale spatial heterogeneity of urinary Schistosomiasis in Lusaka province, Zambia" by Simoonga et al (2009), which only focused on the prevalence distribution, environmental and ecological factors.

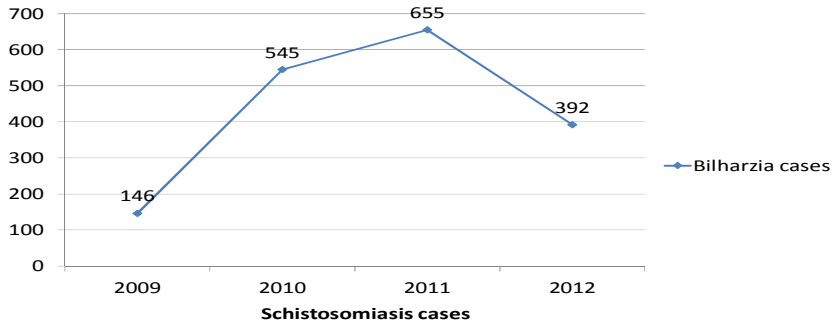
The study only concentrated in ten schools of one out of elevencatchment area of Kafue district which left out other schools in other catchment areas of the district. This study sampled participants from all the catchment areas and is able to generalise the results to the rest of the district. Apart from the environmental factors, the study was also able to establish the socioeconomic and service delivery factors associated with *S. haematobium* infection among school going children of Kafue District.

According to MOH (2011b), the Health Information Management System (HMIS) report indicated that Schistosomiasis was prevalent among school going children of Kafue district. The HMIS data had a lot of gaps and could not give the actual disease prevalence of the district prior 2008, available data was starting from July 2009 to 2012. The available Schistosomiasis data showed that the disease incidence had been increasing as follows: 0.52, 2.3 and 3 cases per 1000 diagnosis in the years 2009, 2010 and 2011 respectively with a noted reduction of 1.5 cases per 1000 diagnosis in2012.

The above data showed how the disease had been going up even in Kafue just as was the case with the Zambian and the global picture. According to WHO standards, any disease with a prevalence of 10/1000 (1%) of the population is considered public health problem (WHO, 201). According to Simoonga, (2009), the prevalence of Schistosomiasis was found to be 10% when the Kafue HMIS data recorded no cases. This suggested that despite the seemingly few Bilharzia cases recorded in the Kafue HMIS data base, the situation could have been serious hence the need of establishing the true prevalence of the disease.

Below is the diagram depicting the bilharzia absolute cases for 2009 to 2012;

Figure 2



The study will contribute to the body of knowledge and the identified risk factors will help in developing means of reducing the disease burden which will ultimately curb adverse effects like infertility which could have a future bearing on the population. It has also shown the magnitude of Schistosomiasis which is much neglected and yet able to bring about adverse outcomes or complication. The study has also provided an important update on the status of

infection among school going children in kafue district and will contribute to the success of deliberate national efforts to advance active participation in Schistosomiasis prevention and control activities.

CHAPTER 2: LITERATURE REVIEW

This section discusses the literature from global, continental and Zambian point of view among others. It also outlines the prevalence and factors that may be associated with *S. haematobium* among school going children according to available literature reviewed by the researcher.

2.1. Global and Continental Scenario

The estimates of morbidity and mortality due to Schistosomiasis vary considerably. In mid 2003, about 779 million people which is more than 10% of the world's population were at risk of being infected with Schistosomiasis. In the tropical and subtropical zones, approximately 200 million people are infected with about 120 million being symptomatic out of which 20 million will develop severe disease. Schistosomiasis is endemic in 76 countries and territories with active transmission in 67 countries out of which 46 are in Africa which accounts for 85% of all Schistosomiasis transmission globally with a growing discrepancy between sub-Saharan Africa and the rest of the world (WHO, 2013). It is also estimated that more than 200,000 deaths due to Schistosomiasis occur per year in Sub-Sahara Africa. The Global Burden of Disease Study attributes a disability weight of 0·06. Based on 200 million infected people worldwide, the total number of Disability Adjusted Life Years (DALY) lost to Schistosomiasis is estimated at 1·532 million per year, of which 77% are in sub-Saharan Africa. (Davies, 2004; Bruun et al 2008; WHO, 2013; Gryseels, 2006).

According to WHO (2013), in 2011 reports were received from 24 countries on preventive chemotherapy for Schistosomiasis. It is estimated that 243 million people needed treatment (90% of which are in Africa) and 28.1 million received treatment which is 10% of the people requiring treatment. The number of people reported treated for Schistosomiasis increased from 12.4 million in 2006 to 28.1 million in 2011, down from 33.5 million in 2010, representing a decrease of 20% in the number of people treated (WHO, 2013).

Five species infect the human host i.e. *S. haematobium*, *S. mansoni, S. japonicum, S. intercalatum and S. mekongi* while several others species rarely do so. Many have reservoir hosts, making eradication efforts nearly impossible in some cases. All species of Schistosomes employ freshwater snails as intermediate hosts that are essential to the completion of their life cycle. The ecology of Schistosomiasis includes tropical lotic (lakes and reservoirs) and lentic environments (rivers), and the behaviour of people and their domestic animals that live near these aquatic environments. Economic growth of many African countries especially the Sub-Saharan countries is dependent on agriculture and fishing which is water related. This makes people more vulnerable to Schistosomiasis infection (Davies, 2004; Trivedi, 2003)

2.2. Schistosomiasis Prevalence and Distribution In Zambia

Schistosomiasis remains one of Zambia's public health problems especially that it is one of the least developed countries in the southern region (Kachemba, 2011). It is estimated that close to two million people (approximately 16% of the population)in Zambia are infected with Schistosomiasis and that the prevalence rate is as high as 90 per cent in some communities (Kachemba, 2011). According to Chambari et al (2007), the number of children infected with Bilharzia far outweigh the number of adults. Children were more likely to pass the disease than adults. The study found that 17% of the dulliest children in class had the Bilharzia infection.

Despite the facts, the disease is classified as a Neglected Tropical Disease (NTD) (Kachemba et al, 2011). To combat Schistosomiasis, the Zambian government through Schistosomiasis Control Initiative (SCI), an organisation which supports African countries with treatment of the NTD in collaboration with the Ministry of Education and other co-operating partners established the Zambia Bilharzia Control Programme (ZBCP) in 2002.Its main aim was to treat approximately two million infected people and was receiving funding since 2004 (Fenwick, 2009; Kachemba, 2011; MOH, 2007a).

According to Fenwick (2009), the Zambia bilharzia control program failed to meet its target of treating 2 million school aged individuals and had only achieved 25% of this target by July 2007. SCI then opted to hand over the project to MOH in hope that it would continue to

support the School health and Nutrition programs SHN. Currently, the government through the Ministry of Health and Ministry of education has continued controlling Bilharzia through the school health and Nutrition (SHN) program whose main aim is to give micronutrients to school going children and also praziquantel to all children in high risk areas (Kachemba, 2011).Despite government efforts to combat or reduce the disease burden among school going children especially through SHN activities, the disease burden continues to rise with a lot of school going children living with the disease as shown from the MOH (2011b) Schistosomiasisdata. Looking at this increase of the disease burden in Kafue, it was hence important to determine the disease prevalence and the factors that may be associated with *Schistosoma haematobium* infection among school going children in Kafue district.

According to Boating et al (1985) in the study, "the prevalence and distribution of Schistosomiasis in Zambia", the prevalence of *S. haematobium* infection ranged from 14% to 40% and that for *S. mansoni* to range from 0-7%, in the Northern and Luapula Provinces. A national overall prevalence of *S. haematobium* was also found to be about 16%. The Gwembe Valley in the South, had the highest *S. haematobium* prevalence of 57.9% while theNorthern Province showed*S. mansoni* prevalence of 45-77%. A study carried out by Mungomba et al (1993)in Lusaka showed that the prevalence of *S. haematobium* had dropped from 69% to 17%. There was variability in the infectivity of contact sites and this had an impact on prevalence. In another study by Mungomba et al (1995), in Lusaka showed an overall prevalence of 20.9% for *S. haematobium* which shows that, although clearly related to water sources, Schistosomiasis distribution is very focal and neighbouring communities in apparently similar ecological situations can vary in terms of prevalence, the intensity of infection and the clinical symptoms associated with infection (WHO, 1995).Kafue being in Lusaka province and surrounded by a lot of water bodies could have a high prevalence hence the study.

In the study conducted in Kafue and Luangwa districts by Simoonga et al (2009), the mean prevalence rate for the two districts was 9.6%. The mean prevalence was slightly higher in Kafue than that in Luangwa district 10.9% *versus* 8.4%. There was also a significant difference in the mean intensity of infection, with 40.2 eggs/10 ml of urine observed in Kafue district and 22.6 eggs/10 ml of urine in Luangwa district. Despite the findings of 10% Schistosomiasis prevalence in Kafue in 2008, the MOH/HMIS did not capture any data on Schistosomiasis hence the need to establish the current prevalence.

2.3. Factors associated with *S. haematobium* infection among School going children

There are a lot of factors that may be associated with *S. haematobium* infection among school going children. Many studies conducted on the factors associated with *S. haematobium* have cited demographic factors such as gender, age and location as being some of the factors. In a study done by Uneke et al (2007) and another done by Kapito et al (2009), boys were more likely to be infected than girls. Significant differences were observed between young and older children, and between children from valleys and the plateau. These observed differences were associated with the increased-risk behaviour of older schoolchildren who frequently contacted Schistosome-infested water for both domestic and livestock purposes. The age group between 6 to 13 years was at an increased risk with a decline from 14 years. Location of household and schools also had an association where those in the poorer townships had higher prevalence rates for Schistosomiasis than those in the richer townships even if Mungomba et al (1995) shows that Schistosomiasis can be found anywhere with no significant effect on age and prevalence (Boatin et al 1985, Mungomba et al, 1995, Uneke et al, 2007, Kapito et al, 2009).

2.3.2. Environmental and Social Economic Factors

According to reviewed literature, other factors associated with *S. haematobium* were environmental and socioeconomic. Poverty, ignorance, poor living conditions, inadequate sanitation and water supplies as well as deplorable personal and environmental hygiene characteristic of many rural communities of developing tropical countries were identified as important factors which contributed to increasing transmission of Schistosomiasis (Uneke et al, 2007). The major factors that may have been responsible for the endemicity of urinary Schistosomiasis in most studies were low literacy level, lack of basic amenities, the inadequate and indiscriminate disposal of human sewage and high water contact activity with snail infested pond, rivers and streams. Kapito et al, (2009) also states that school proximity to open water source showed a very strong association with infection which is both agreeable and contradictory with other studies, a factor that needs to be verified in Kafue district.

The implications of these epidemiologic findings were relevant to the understanding of the dynamics of the infection and its control in the communities studied. Additional studies that are immunologically and ecologically based, as well as information on the extent of interaction between Schistosomes and other pathogenic agents , were required for development of specific, effective and sustainable *S. haematobium* control and management strategies. The studies identified that the search for risk factors, i.e. behavioural and environmental determinants will have to be more localized if the extent of their influence on transmission dynamics should impact on control programs. Public health interventions tailored to improving the water sources should be complemented with effective health education in both schools and communities on participatory hygiene and sanitation. Most study results showed that the risk of infection with urinary Schistosomiasis was heterogeneous, and therefore there was need to undertake further localized studies, based on questionnaires, to establish exposure risk factors (Uneke et al, 2007; Kapito et al, 2009).

2.3.3. Service Delivery Factors

2.4. Transmission

The presence of water plays an important role in the transmission of Schistosomiasis. The disease principally affects people who are unable to avoid contact with water which may be due to lack of a reliable source of safe water for drinking, washing or bathing. In a study conducted in Nigeria, it was concluded that children were at greatest risk of becoming infected as the disease is usually contracted during bathing, swimming or wading in contaminated water and when performing daily chores of washing laundry and utensils, fetching water and herding cattle (MOH, 1998; Adetokumbo et al, 2003).

2.5. Life cycle

Humans are the principle hosts for the major species. Persistence of Schistosomiasis depends on the presence of an appropriate snail as an intermediate host. Eggs excreted in stool or urine into fresh water hatch into motile miracidia which infect snails *(Bulinus* spp., e.g. *B. globosus*, *B. forskalii*, *B. nyassanus* and *B. truncatus*). After development in the snails, cercariae emerge and penetrate the skin of humans encountered in the water. The cercariae pass through the lungs to the liver where they mature, mate and pass down into mensentric or vesicle venules to begin egg production. Communicability lasts as long as live eggs are excreted in the urine and faeces. The female fluke lays

as many as 30 eggs per day which migrate to the lumen of the urinary bladder and ureters. The eggs are eliminated from the host into the water supply with micturition.The incubation period is variable but is approximately 8 weeks for *S. haematobium* and 4 weeks for *S. mansoni* and *S. japonicum* (Black, 2005 and Roberts, 1996).

Below is the figure showing the life cycle of Schistosomiasis as adopted from Center for Disease Control (CDC):

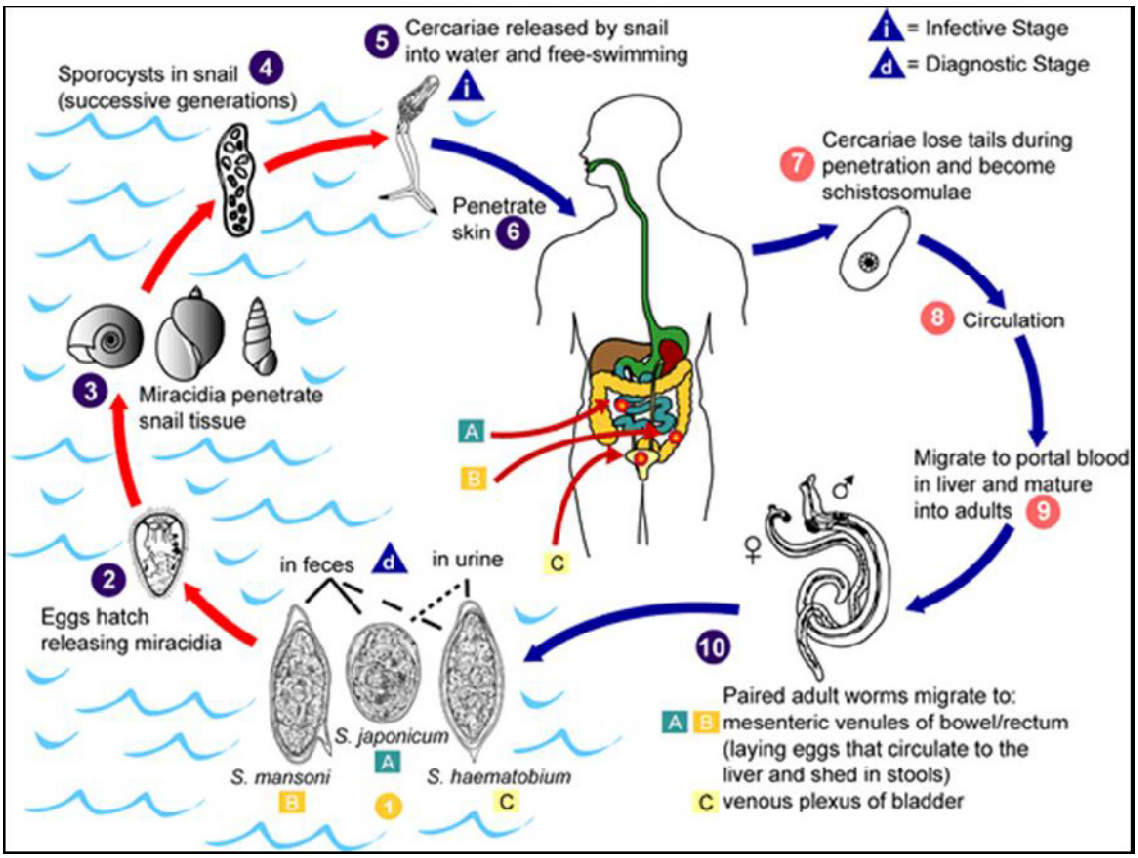


Figure 3 Schistosomiasis life cycle
(Adopted from CDC; http://www.dpd.cdc.gov/dpdx/html/schistosomiasis.htm; accessed on 25th June 2011)

2.6. Clinical signs

According to Khuranaet al, (2005);Leutscher*et al*, (2005) andTrivedi, (2003), there are 3 known clinicopathologic stages of Schistosomiasis as follows:

2.6.1. Early stage

This is the initial penetration of the skin by cercariae which results in hypersensitivity and a transient pruritic, papular skin rash known as swimmers itch (cercarial dermatitis). Manifestation include mild to moderate pruritis at the penetration site a few hours after exposure, followed in 5 to 14 days by an intermittent pruritis, sometimes papular eruption.

2.6.2. Intermediate Stage

After penetration, the organism enters the blood stream and migrates through the lungs. Each of the Schistosome parasite lives in some part of the venous plexus that drains the intestines or the bladder depending on the species. Four to 8 weeks after exposure, an acute illness can develop, manifested by fever, malaise, cough, rash, abdominal pain, diarrhoea, nausea, lymphadenopathy and eosinophilia (Katayama fever). In acute infection with heavy infection due to *S. japonicum* or *S. mansoni*, a mucoid bloody diarrhoea accompanied by tender hepatomegaly occurs.

2.6.3. Chronic Schistosomiasis

Retained eggs induce the formation of eosinophilic granulomas, fibrosis and scaring, probably mediated by cytokines and involve T helper lymphocytes. The severity of symptoms associated with chronic disease is related to the worm burden. Persons with low to moderate worm burdens can be asymptomatic. Obstruction to blood flow is common.

In the bladder *S. haematobium* produces bladder lesions with haemorrhage and obstruction. The bladder becomes inflamed and fibrotic causing symptoms and signs which include dysuria, urgency, terminal microscopic and gross haematuria, secondary urinary tract infections and nonspecific pelvic pain. Chronic urinary carriage and bacteraemia with salmonella can occur.

In the bowel, *S. mansoni* and *S.japonicum* produce congestion and ulceration of the bowel wall. Long term involvement of the colon produces abdominal pains and bloody diarrhoea.Eggs deposited in the intestinal veins are carried by the portal blood flow to the liver, inflammatory reactions results in periportal fibrosis and hepatic enlargement. Portal hypertension can develop and cause hepatosplenomegaly, ascites and esophageal varices.

Other organ systems can be involved from eggs embolised e.g. the lungs causing pulmonary hypertension. Inflammation of the genitals due to *S. haematobium* may contribute to the propagation of HIV. Studies have shown the relationship between *S. haematobium* infection and the development of squamous cell carcinoma of the bladder. (Khurana et al, 2005;Leutscher *et al*, 2005 and Trivedi, 2003).

2.7. Diagnostic Techniques

The bilharzia control program in Zambia uses simple techniques to identify children and communities infected with Schistosomiasis, in which blood in urine is a common symptom (MOH, 2007a). In the laboratory, *S. haematobium* is diagnosed by examining filtered urine for eggs and it has been recorded that egg excretion often peaks between noon and 3pm hence collection best during this very period of time. Biopsy of the bladder mucosa may also be necessary and serologic tests may be used to detect light infections or before eggs appear in the urine (Brown, 1980; Mendel et al, 1995).

According to Mendel et al, (1995), detection of eggs either in the urine or stool will demonstrate the presence of Schistosomes. This is done by microscopic or parasitological examination. Mandel et al (1995) states that in addition to collection of urine specimen, proper diagnosis should include obtaining detailed information about any history of water contact, skin rash or an acute febrile episode.

2.8. Treatment of Schistosomiasis

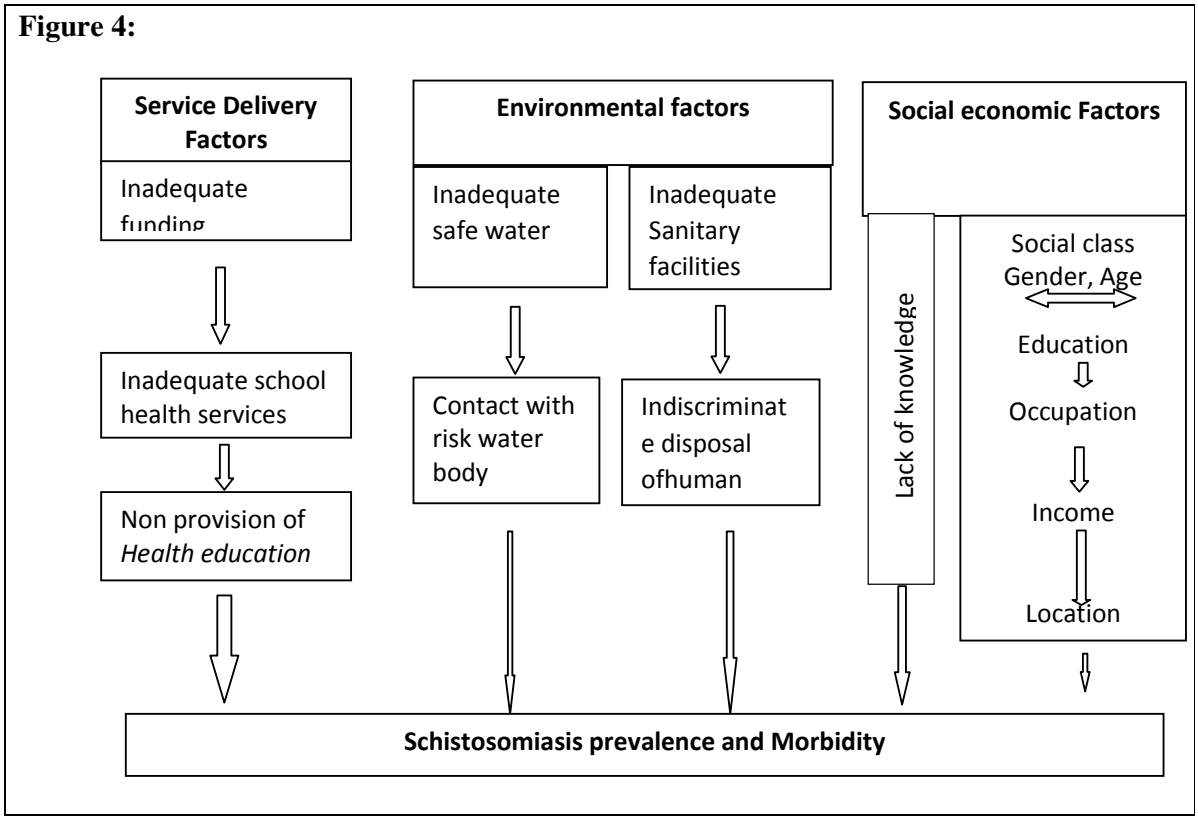
All people are susceptible to infection but children have a higher rate of reinfection after treatment than adults. The goal of the Zambian Bilharzia Control Programme is to reduce Schistosomiasis morbidity to levels where it ceases to be of public health significance through reduction of the numbers of people affected in the intervention areas by 50% in five years (MOH, 2007a).

The current control strategy of Schistosomiasis recommends provision of praziquantel in areas of high prevalence through school health services or through routine primary health care services. Mass treatment repeated annually is advocated for in schools where prevalence is over 50% to ensure that levels of infection are kept below those associated with severe morbidity (Hotez et al, 2008). WHO however recommends regular treatment of high burden

areas with praziquantel administration to school going children and high risk groups (Chitsulo et al, 2004). This approach is believed to reduce the *S. haematobium* infection and ultimately the overall prevalence of the Schistosomiasis.

CHAPTER 3: CONCEPTUAL FRAMEWORK

Figure 4:



The conceptual framework described above was developed from the various literature that was read during preparation of this dissertation. It describes the factors that may be associated with *S. haematobium* infection among school going children. Service delivery factors can be affected due to inadequate funding to carryout activities that can reduce the prevalence of Schistosomiasis. Poorfunding can lead to inadequate provision of school health services like SHN which includesgiving health education to the school going children. Inadequate health education will ultimately lead to children getting the *S. haematobium*

infection unknowingly. Environmental factors that may be associated with *S. haematobium* infection is lack of safe water which leads to children getting in contact with risk water bodies as they are playing or as they go to fetch water from the river or streams.Social economic factors that were explored include gender and age. Most literature has shown that gender and age are risk factors that may determine the infection for Schistosomiasis. Education status can also determine the occupation of a person, which also determines the income status and also the residence of an individual and thereby put them at risk of infection from Schistosomiasis.

3.1 OBJECTIVES

3.2. General Objective

To determine the prevalence and factors associated with *Schistosoma haematobium*infection among school going children in Kafue district

3.3. Specific Objectives

1. To determine the prevalence of *S. haematobium* among school going children of Kafue district
2. To identify the social economic factors associated with the prevalence of *S. haematobium* among school going children of Kafue district.
3. To determine the environmental factors that may be associated with the prevalence of *S. haematobium* among school going children of Kafue district.
4. To determine the service deliverycharacteristics associated with the prevalence of *S. haematobium*infection among school going children of Kafue District.

3.4. Main research Question

What factors are associated with *Schistosoma haematobium* infection among school going children in Kafue district.

CHAPTER 4: METHODOLOGY

4.0. Study Site and Population

Kafue District is situated in the Southern part of Lusaka Province at the tip of Lusaka District and is forty-five (45) kilometers away from the capital city, Lusaka. The district shares borders with Chongwe District in North East Lusaka Urban in the North, the South Western part borders Mazabuka and Chirundu districts. Climatic conditions are typical of the Central African Plateau with three distinct seasons; a dry, cool season lasting from mid-April to mid-August; a hot dry season lasting from mid-August to October, and a hot rainy season lasting from November to early April.Ground water resources are abundant, estimated at 800, 000 million cubic metres with ground water discharge estimated at 160, 000 million cubic metres per year. Kafue district further has two major rivers the Kafue and Zambezi River running through the district with a sizable number of perennial rivers. This abundance of water creates several pockets of water bodies where children go to swim and later are infected with bilharzia.

Most of the district population is settled along the Zambezi and Kafue River where subsistence agriculture and artisan fishing is an important activity such that people from other parts of Zambia migrate to Chanyanya and Chiawa during the fishing season. Fishing and farming puts majority of the population at risk of contracting Bilharzia as they are in constant contact with risk water bodies including school going children who usually help their parents to earn a living. Due to lack of recreational facilities in Kafue most School going children aged 6-15 years frequent streams and shallow water bodies for swimming after they knock off from school. Kafue district has several natural streams and dam like water bodies termed as *Pavwa* where children like playing from.

Kafue district has a challenge in terms of sanitation which is at 32% in terms of coverage for households with sanitation (HMIS, 2011). This means that most households are at risk of infection especially if they are likely to urinate in water as is usually the case in most areas where there are sanitation challenges. Water coverage is at 62% putting 38% of the population at risk of infection as they fetch water from other water sources like the streams and the river (HMIS, 2011).

The Department of Community Development and Social Welfare estimate that women constitute 87.2% of the illiterate people in the district. This might pose a challenge when it comes to child health seeking behaviors. Illiteracy contributes to people not having information on the dangers of children going to swim in these risk water bodies. Illiterate mothers will also not understand the benefits of seeking medical treatment early as stated by Champo (2013).

Kafue district is coming from a background of industrial closures which resulted in high poverty levels. However, the last three years has seen the reopening of Nitrogen Chemical of Zambia and the opening of Albidon Mining Company, Rubex, Kafue Sugar and Kafue Steel plant. These are the major employers in Kafue district. However, Nitrogen Chemicals has been operating at 1/3 capacity. These poverty levels have made majority of the population to engage in fishing and farming occupation which puts the bread winners and their children at risk of contracting Bilharzia.

The study was conducted in the eight selected schools in three out of four zones of the District-Kasenje, Chikupi and Kafue Zones. Chiawa zone was excluded from the study due to inadequate funding and distance (190km) from Kafue district town center. The district has a total of 47 schools distributed as follows; Kafue zone 14 schools, Kasenje zone has 14 schools, and Chiawa zone has 9 schools while chikupi zone has 10 schools. Three schools were picked from Kasenje and Kafue zones while two schools were picked from Chikupi zone.

The study population was sampled from the school going children aged 6 to 15 years in Kafue district. A total of 60 children was sampled from each of the eight schools that were randomly selected giving a total of 480. The sample was composed of 246 females and 234

boys. 142 of the sampled children were aged 6 to 9 years, 216 were aged 10 to 12 years while those aged between 13 and 15 years were 122. The children in grade 1 to grade 4 were 305, in grade 5 to 7 were 159 while those in grade 8 and above were only 16 as indicated in Table 1.

4.1. Research Design

The study was a cross sectional study among school going children aged 6 years to 15 years conducted from 21st November 2013 to 4th January 2014. A total of 480 children were randomly selected using a multistage sampling method as follows:

Firstly the study area was divided by following the existing four administrative zones of the District namely Chiawa, Kasenje, Chikupi and Kafue Zones and the schools in each zone were identified.

Stage 1

Stratified random sampling of schools from the zones. The schools in each selected zone were stratified into GRZ and community schools. Using simple random sampling procedure, a total of eight (8) schools were picked from Kasenje, Kafue and chikupi zone as follows, 1 community and 2 GRZ schools from Kasenje, 1 GRZ and 2 community schools from Kafue zone,the remaining two schools were picked from Chikupi zone were 1 was GRZ while the other one was a community school. This was done by first writing the names of all the schools according to category i.e. being either GRZ or community, on a piece of paper. The pieces of paper where then rolled up and all put in a box and then drawn one by one through a raffle until the sample size was reached. Initially the study was designed in such a way as to pick two schools in each zone i.e. one GRZ and the other community.

Stage 2

This stage involved systematic random sampling of 60 participants from each selected school. A list of all eligible children i.e. children aged 6 to 15 years, was drawn using the school registers. To determine the sampling interval, the total number of eligible children was

divided by the required sample size after which pupils were selected according to the range obtained until the sample size of 60 children per school was obtained.

Sample Size

The sample size of 480 (after adjusting for nonresponse of 10% and multiplying by 2 to account for study cluster design effect) was calculated using the formula:

$$n = \frac{Z^2 PQ}{d^2}$$

Where **P** is the Schistosomiasis prevalence at 16%, **Z** = 1.96, α = confidence level at 0.05, **d** = desired width of confidence interval at 5% and **Q** = 100-P

$$n = \frac{1.96^2 \times 16 (100-16)}{5^2} = 230 \times 2 \text{ (cluster design effect)} = 460$$

Sample size increased from 460 to 480 so as to obtain equal numbers of pupils in each of the 8 schools

4.2. Data collection Tools

Data was collected using a structured questionnaire for the children and collection of a urine sample from each child. The urine sample was then taken to Kafue district Hospital laboratory were a trained Laboratory Technician checked for the presence of *S. haematobium* ova using a microscope examination after sedimentation using a centrifuge. The trained Research Assistants interviewed the children using the structured children's questionnaire which included questions about past exposures as well as current exposures.

4.2.1. Questionnaires

The questionnaire was pre-tested and modifications were made after discussions with research assistants, teachers and district health office staff. Risk factors included

demographics (i.e. Age, Sex, Religion, Residence, Grade, Guardian), Social economic factors (Knowledge about Bilharzia, occupation of parents, family size), Environmental Factors (availability of sanitary facility at school and household, availability of water source at school and household and Frequency of risk water contact) and Service delivery factors (Provision and frequency of School health services, provision of health education services).

4.2.2. Laboratory Diagnosis

For urinalysis School going children were given sterile specimen bottles to bring their urine samples the same day of data collection while at school. To lessen sample contamination, the children were advised to collect only terminal urine samples, put them in the hazard bags provided to them, and return immediately. The collections of samples in all the schools was carried out between 10 am and 2 pm, when eggs of *S. haematobium* were more likely to be passed in urine (Lucas and Gilles, 1990). This was achieved by making sure all the children were given labelled specimen bottles at 10hrs, requested to collect the urine specimen and return immediately within the school premises. A qualified Laboratory Technician based at Kafue district Hospital tested the urine specimen by using a microscope to detect the presence of*S. haematobium*ova in the urine after centrifuge sedimentation. After urine analysis, the urine specimen was discarded following the standard of specimen disposal procedure by the hospital laboratory.

To ensure confidentiality, names of students were omitted and only number codes were used on both the questionnaire and specimen bottles. This assisted in making sure no one could tell which specimen belonged to whom and reduced the potential of being stigmatized. Coding the urine sample also helped to link the specimen to the questionnaire so as to be able to relate the two for further procedure in case the sample came out positive. All participants whose urine tested positive to *S. haematobium* were referred to the nearest clinic for treatment and health education regarding infection, prevention, signs and symptoms of Bilharzia. Health education sessions were also organised for the PTAs after dissemination of results in May 2014.

4.3. Variables of the Study

The following Variables were measured;

4.3.1. Dependent Variables

Presence or absence of*Schistosoma haematobium*was used as the dependent variable

4.3.2. Independent Variables

Independent Variables in this study included the following;

4.3.2.1. Demographic characteristics:

- Sex, Age, Grade, Guardian, Residence, Religion

4.3.2.2. Social Economic Characteristics

- Employment status of Guardian
- Household size
- Knowledge about Bilharzia signs and symptoms
- Knowledge about Bilharzia transmission
- Knowledge about Bilharzia Prevention

4.3.2.3. Environmental Characteristics

- Use of Toilet
- Availability of sanitary facility at school
- Availability of Sanitary facility at the household
- Type of water source at school
- Type of water source at household
- Frequency of water contact on transit to school
- Frequency of water contact when playing at home
- Type of play site

4.3.2.4. Service Delivery characteristics

- Frequency of health workers visiting the school
- Provision of health education services at school
- Type of diseases learnt at school

4.4. Data Entry and Analysis

Data was collected using the structured questionnaire and was checked and verified for completeness, consistence and correctness.This was done by going through all the questionnaires on a daily basis, checking if at all responses where entered correctly and if all the required information was captured. The data was then entered in Epidata and transferred to STATA version 11 for analysis.

Univariate Analysis

Individual variables were analysed for proportions and frequencies which yielded the results as shown in table 1.

Bivariate Analysis

Bivariate analysis was used to determine associations between the dependent and individual independent variables. Variables showing some associations in the bivariate analysis were then included in multiple logistic regression to take account of the effects of different variables and come up with the actual factors associated with *S. haematobium* infection among school going children in Kafue District.

Multiple logistic regression Analysis

Multiple logistic regression was used to determine the factors associated with *S. haematobium* infection among school going children using the following steps;

Step 1

In step 1, bivariate analysis of the effect of individual independent variables on child bilharzia infections odds ratios was performed and 95% CI were computed.

Step 2

In step 2, multivariate analysis was done by including all the independent variables that showed any level of significant impact in step 1 followed by the likelihood ratio test to determine the impact of each independent variable on the model. This was done by comparing two logistic model, one with the variable we want to test included and one without it. The same analysis for the variable that had no effect during bivariate analysis was also done and the final model describing the factor influencing bilharzia among school going children in Kafue was then arrived at.

4.5. Data Quality

All Research Assistants underwent a two days training so as to ensure reliability and validity of the data collected. The training was meant to familiarize them with the tool and data collection techniques to ensure upholding of quality work. During implementation, the principle researcher made sure that data collected was checked for consistency, correctness and completeness on a daily basisand allidentified gaps were addressed there and then. This helped in making sure all the needed data was captured without any missing information.

4.6. Ethical Considerations

Prior to Data collection, the principle researcher obtained ethical clearance and approval from ERES Converge (Annex 7). The researcher also obtained study approval from Ministry of Community Development Mother and Child Health (MCDMCH) (Annex 8), Ministry of Education (Annex 8) and from the School of Medicine, Department of Public Health (Annex) After authorization to conduct the study from the ethics committee was given, the study was then discussed with relevant authorities in the study area such as the District Community Medical Office, District Education Board Secretary's Office (DEBS) and Parents Teachers Association (PTA).

The information included the aim of the study, the methods of data collection to be used, and the treatment that would be given to the children whose urine tested positive, the duration of the study, the potential advantages and disadvantages of the participation, and the expected benefits of carrying out the research. They were also informed that participation was not mandatory but voluntary, and that they were free to withdraw from the study at any time without any penalty. The study population and participants were assured of confidentiality. Copies of the Permission letters from Ministry of health, Ministry of Education and other relevant authorities were given to the selected schools and shown to the participants. After discussion of the details of the study, the Researcher obtained written informed consent and assent from all participants in the study.

Apart from the interviews, urine sample specimens were collected from all the eligible children for analysis at Kafue District Hospital. Participants were informed that the urine was only going to be used for the intended purpose i.e. checking for Schistosoma ova and would be discarded like any other specimen in the laboratory at the hospital after obtaining results and interpretation made. During this whole process the researcher ensured that participants were not exposed to any undue physical or psychological harm.

The researcher was honest, respectful and sympathetic towards all participants and made necessary referralsto all the children who needed further assistance. Children whose urine samples tested positive were referred to the nearest health centre were they received appropriate treatment. Apart from treatment, health education on preventive measures, signs and symptoms was given to the children and parents. Names of participants were kept confidential, only numbers were used on labelling the urine specimen sample and questionnaire so as to link the participant to the school register.

The researcher ensured that both the data collectors and the participant had a clear understanding regarding the confidentiality of the results and the findings of the study. All participant information and responses shared during the study were kept confidential and were only used for the study purposes.

4.7. Pre-test/Pilot Study

Prior to commencing the study, two (2) research assistants were trained for two days to familiarize them with the questionnaire. Day 1 was dedicated to going through the questionnaire and analysing each question in order to understand the context. Day 2 was field work in which the researcher and the two data collectors went to KasenjeBasic School to administer the questionnaire to the eligible target group. During the pre-test data collection, each Research Assistant administered 10 questionnairesto the target group at Kasenje Basic School.The Researcher took time to listen to some of the interviews conducted so as to hear if the context of the questions was understood. After the pre-test data collection, findings were discussed with theResearch Assistants and the identified gaps in the data collection tool were amended so as to make sure all the salient issues were captured by the questionnaire.

CHAPTER 5: RESULTS

5.0. Prevalence and Distribution of *S.haematobium* among school going children

The study results shows that more girls compared to boys had a high prevalence at 22.4% and 20.9% respectively though not significantly different (p< 0.001). The age variable was statistically significantly with p-value = 0.001 while the age group had the highest prevalence of 26.1% compared to the 10-12 years (25%) and 13 – 15 years (10%).The urban population had the highest prevalence of 77.2% compared to 22.1% of the rural population. Soloboni School had the highest prevalence of 86.7% compared to the rest of the schools as indicated in Table 1 below:

Table 1: Prevalence and characteristics of the school going children in the eight selected schools

	n	Prevalence of Schistosomiasis (%)				
		Prevalence	SE	95% CI		*p* Value**
Sex						
Male	234	22.4	2.7	17.1	27.6	0.707
Female	246	20.9	2.7	15.7	26.2	
Age (years)						
6-9	142	26.1	3.7	18.8	33.3	0.001
10-12	216	25.0	3.0	19.2	30.8	0.823
13-15	122	10.7	2.8	5.1	16.2	<0.001

Residence						
Urban	300	77.9	5.1	20.1	90.1	0.915
Rural	180	22.1	2.9	13.6	41.2	
School						
Hetty Denin	60	1.7	1.7	0.6	4.9	
Holy Saviour	60	20.0	5.2	9.8	30.2	
Mary Mother	60	5.0	2.8	0.6	10.6	
Nakatete	60	18.3	5.0	8.4	28.2	
Soloboni	60	86.7	4.4	78.0	95.4	
St. Johns	60	6.7	3.2	0.3	13.0	
Chanayanya	60	26.7	5.8	15.4	38.0	
Chikola	60	8.3	3.6	1.3	15.4	
Overall	**480**	**21.7**	**1.18**	**18.0**	**25.4**	

A total of 480 school going children participated in the study with no one having any missing information.Figure 5 shows the age distribution in survey sample of school going children which shows that majority of children were between the ages of 8 to 13 years.

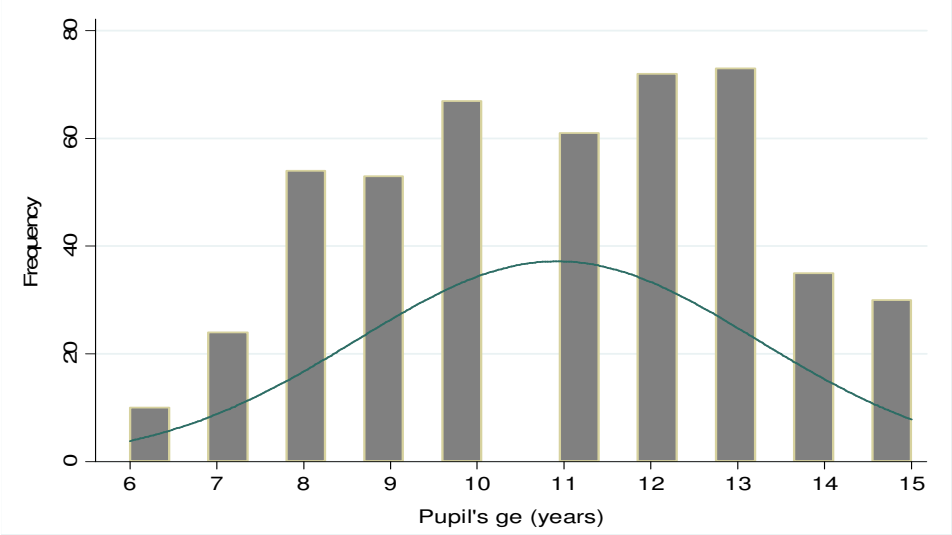


Figure 5: Age distribution in survey sample of school going children

Figure 6 shows the Age distribution in survey sample across gender of school going children, it shows that majority of the children where between 9 and 13 years in both female and male

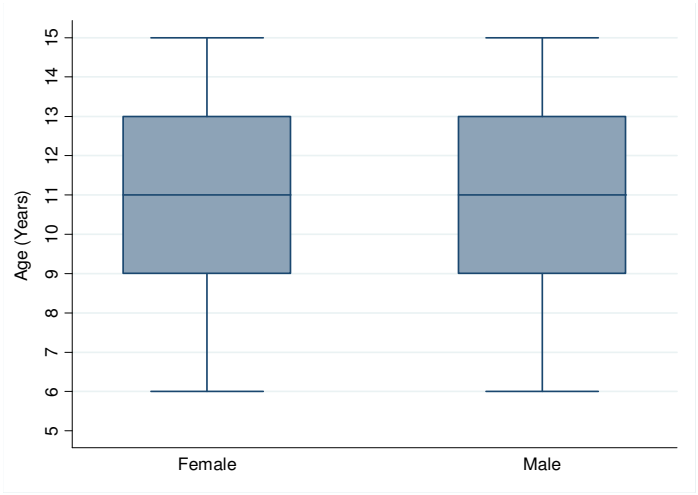


Figure 6: Age distribution in survey sample across gender of school going children

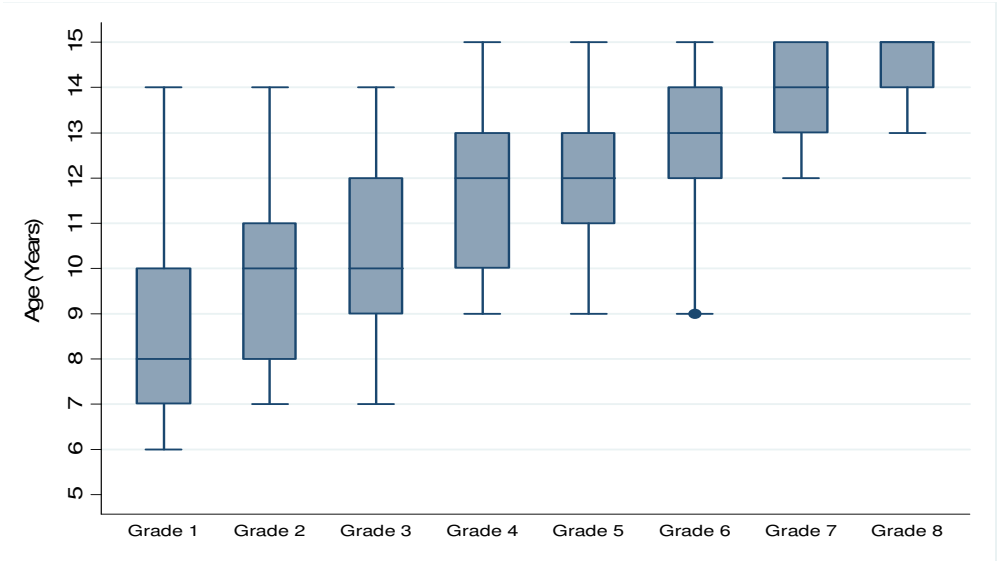


Figure 7: Age distribution in survey sample across school grade

Figure 7 shows that majority of the sampled children's age range in all grades were as follows; grade 1 was between 7 and 10, grade 2 between 8 and 11, grade 3 between 9 and 12, grade 4 between 10 to 13, grade 5 between 11 and 13, grade 6 between 12 to 14 years, grade 7 between 13 and 15 while those in grade 8 were between 14 and 15 years.

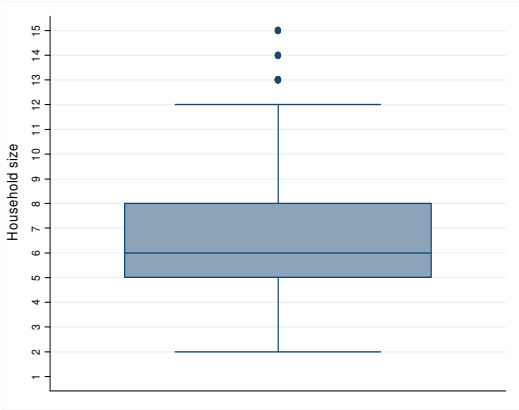


Figure 8: Distribution of Household size in home of school going children

Figure 8 shows the household size in homes of sampled children of which majority ranged from 6 to 8. The outliers were children coming from orphanages were they were above 13 household members.

Table 2: Mean age, school grade, and household size

Variable	Mean	95% CI	
Age (years)	10.9	10.7	11.1
School grade	3.6	3.4	3.7
Household size	6.7	6.4	6.9

5.2. Schistosomiasis Prevalence

The overall prevalence of Schistosomiasiswas 21% with the females having a higher prevalence at 22.4% compared to 20.9% for the boys. The age range 6-9 years had the highest prevalence of 26%, followed by the 10-12 (25%) and the 13-15 with only 10.7%. Soloboni school had the highest prevalence of 86.7% followed by Chanyanya (26.7), Holly

saviour(20%), Nakatete (18.3%), Chikoka at 8.3%, St Johns school was at 6.7%, Mary mother of God at 5% while Hetty Denin was the lowest with 1.7%.

5.3. Factors associated with *S. haematobium* Infection among school going children

The results from the final model shows that the following variables were statistically significant,knowledge about Bilharzia signs and symptoms, play site and being attended to by health worker at school were statistically significant.Children that played in streams had 14.5 times more likely to be infected compared to children that did not play in water bodies (OR 14.5, 95% CI 3.1-68.5; *p*=0.001). Children that indicated painful urination as a symptom of Schistosomiasis infection reflected a 50% reduction in the risk of Schistosomiasis infection compared to who did not know (OR 0.5, 95% CI 0.2-0.9; *p*=0.038). Children who were seen by a health worker at their school once, twice, and thrice were 5, 4, and 8 times, respectively, more likely to be infected compared to children that were never attended to by health worker (OR 5.1, 95% CI 2.1-12.2: *p*= 0.001; OR 3.8, 95% CI 1.3-11.1: *p*= 0.017; OR 7.6, 95% CI 1.7-32.9: *p*= 0.007, respectively) as shown in table 3 below.

The variables sex, age, residence religion, household size, knowledge about transmission, knowledge about prevention, toilet use, have toilet at home, home water source, school water source, water contact in transit and water contact when playing variables did not show any statistical significance as each one presented with p-value greater than 0.05, as shown in Table 3 below.

Table 3: Multilevel logistic regression for analysis of child and school-level factors governing Bilharzia infection in school-going children in Kafue district

NO.	Variables	PRESENCE OF *S. haematobium* YES n (%)	Bivariate Odds Ratio (95% CI)	P value	Multivariate Odds Ratio (95% CI)	P value
1	**Sex:**					
	Female	55 (52.88%)	1			
	Male	49 (47.12%)	0.91 (0.55-1.59)	0.749		
2	**Age:**					
	6-9 years	37 (35.58%)	1			

	10-12 years	54 (51.92%)	1.05 (0.55-2.01)	0.903
	13-15 years	13 (25.42%)	1.03 (0.46-2.36)	0.756
3	**Residence:**			
	Rural	23 (22.12%)	1	
	Urban	81 (77.88%)	1.14 (0.10-12.6)	0.915
4	**Religion:**			
	Protestant	87 (83.65%)	1	
	Catholic	17 (16.35%)	0.61 (0.29-1.27)	0.189
5	**Household size:**			
	Below 6	56 (55.75%)	1	
	Above 6	46 (44.23%)	0.74 (0.42-1.30)	0.293
6	**Knows Transmission:**			
	Don't Know	64 (61.54%)	1	
	drinking dirty water	3 (2.88%)	0.19 (0.01-2.24)	0.189
	Swim contaminated water	34 (32.69%)	1.86 (0.34-10.12)	0.471
	Handshake infected person	1 (0.92%)	1.97 (0.21-18.40)	0.551
	Walk in contaminated water	64 (61.54%)	0.74 (0.39-1.38)	0.343
7	**Knows Prevention**:			
	Don't Know	76 (73.08%)	1	
	Don't Play in water	14 (13.46%)	0.69 (0.29-1.63)	0.394
	Don't Urinate in water	14 (13.46%)	0.60 (0.27-1.31)	0.201
8	**Toilet Use**:			
	Use Toilet	73 (70.19%)	1	
	Bath shelter	30 (28.85%)	0.92 (0.47-1.82)	0.82
	Bush	1 (0.96%)	0.22 (0.02-2.56)	0.224
9	**Have Toilet at Home**:			
	No	14 (13.46%)	1	
	Yes	90 (86.54%)	0.66 (0.22-1.97)	0.459
10	**Home Water source**:			
	Tap	84 (80.77%)	1	
	Borehole	12 (11.54%	1.16 (0.49-2.73)	0.739
	Well	8 (7.69%)	0.61 (0.21-1.73)	0.35
11	**School water source**:			
	Tap	51 (49.04%)	1	
	Borehole	12 (11.54%)	1.20 (0.85-4.68)	0.059
12	**Water contact on transit** :			
	No	88 (84.62%)	1	
	Sometimes	14(13.46%)	1.80 (0.96-3.38)	0.068
	Always	2 (1.92%)	1.17 (0.17-7.80)	0.876
13	**Water contact when playing**:			

	No	64 (61.54%)	1			
	Sometimes	38 (36.54%)	1.72 (0.67-4.43)	0.081		
	Always	2 (1.92%)	0.24 (0.03-1.89)	0.173		
14	**Play site**:					
	Don't Play	65 (62.50%)	1			
	Stream	6 (5.77%)	9.70 (2.52-37.08)	**0.001**	14.5 (3.1-68.3)	**0.001**
	Canal	2 (1.92%)	0.27 (0.03-2.79)	0.286	0.3 (0.02-3.0)	0.192
	Dam	27 (25.96%)	1.50 (0.69-3.40)	0.297	1.6 (0.7-3.6)	0.423
	Pavwa	4 (3.85%)	0.62 (0.16-2.39)	0.503	0.8 (0.2-3.0)	0.619
15	**Knows Symptoms**:					
	Don't know	81 (77.88%)	1			
	Bloody urine	19 (18.27%)	0.58 (0.06-5.60)	0.642	0.26 (0.02-3.03)	0.279
	Painful urine	4 (3.85%)	0.48 (0.25-0.93)	**0.029**	0.50 (0.20-0.90)	**0.038**
16	**Attended to by health worker at school**:					
	Never	46 (44.23%)	1			
	Once	34 (32.62%)	4.10 (1.78-9.46)	**0.001**	5.1 (2.12-12.18)	**0.001**
	Twice	16 (15.38%)	2.73 (0.96-7.73)	0.059	3.8 (1.32-11.14)	**0.017**
	Thrice	8 (7.69%)	5.26 (1.31-21.00)	**0.019**	7.6 (1.71-32.90)	**0.007**

5.4. Discussion

5.4.1 Bilharzia Prevalence

The results from this study have shown that the overall prevalence of *Schistosoma haematobium* in Kafue Districtis at 21.9% while some schools like Soloboni was very high at 86.7% while Hetty Dennin school was the lowest with 1.7%. The highprevalence in Soloboni could be attributed to the close proximity to Kafue River compared to other schools that were further located from the river. The school is also located in a poorer township which confirms the findings in Mungaomba *et al*, (1995) study which stated that poorer townships were at an increased risk.Bilharzia prevalence among girls was higher compared to boys different from the findings by Uneke *et al,*(2007) and a study done by Kapito *et al*, (2009) in which boys were more prone to Bilharzia infection. There was however an insignificant difference in

prevalence between boys and girls.The results could be attributed to the fact thatschool going children regardless of sex usually play in infected water bodies.

Such high prevalence of Schistosomiasis has the potential of impacting negatively on service delivery in health care. This could result in government having to spend a lot of money on buying drugs and paying logistics for health workers who attend to these children in their schools instead of building more schools. This high Schistosomiasis prevalence can also negatively impact on the communityeconomic status becauseguardians will be required to take their children to the hospital instead of working on the field.

Since Schistosomiasis affects the children's potential to perform very well in school, the long term effects can contribute to having a huge population of illiterate adults in future. High illiteracy levels affects economic growth of a nation and ultimately retards development in that, the nation will have a lot of unskilled workers who are unable to contribute positively especially in this modernised economy of technology. When majority of the children who are future leaders are unable to get educated due to Schistosomiasis, the economy will have to import skilled labour which in turn drains the much needed scarce resources for development purposes.

Children aged between 6-9 years and 10 to 12 years had a high prevalence compared to those in the 13-15 years old range. This finding is similar to those of Uneke *et al*, (2007) and Kapito *et al*, (2009) who state that the age-group 6-13 was at an increased risk with a decline from 14 years.This shows that as the child gets older, they shun to play in the open water bodies and hence their chances of infection are reduced.

The results of this study concludes that there is no significant difference in the Bilharzia prevalence between children in the urban to those in rural areas. This finding is similar to that reported by a multi-country study by WHO, (1995) which states that Schistosomiasis distribution is very focal and neighbouring communities in apparently similar ecological situations can vary in terms of prevalence, intensity of infection and clinical manifestations of the disease.Despite the insignificant results, the urban sample had a higher prevalence compared to the rural children. This conclusion can be as a result that, regardless of residence (urban or rural) children reported the presence of a water body they use for swimming. This factor puts children, urban or rural at risk of Bilharzia infection as the water bodies could be

infested with Bilharzia. Furthermore both urban and rural children also portrayed a behaviour of not using a latrine when urinating.

Children who knew signs and symptoms of Schistosomiasis were less likely to be infected compared to those that didn't know. Champo (2013) states that, low literacy levels, poverty, sub-standard hygiene practices, and inadequate public health infrastructure are some of the factors that have greatly contributed to high prevalence of Bilharzia especially in rural communities coupled with lack of scientific information on the disease among the high risk groups particularly school aged children.This shows that knowledge is important in prevention of bilharzia among school going children.

All the children had a good source of water at both school and home and yet the bilharzia prevalence was still high, showing that despite having a protected water source, children were still exposed to Bilharzia infection especially if they were in contact with water from a stream in their communities.

In terms of Sanitation, 85.4% children infected with Bilharzia had latrines at their homes compared to the children who didn't have toilets (13.6%). All the children had latrines in their schools. This shows that despite having latrines at home and at school children are still prone to infection especially when they lack knowledge about bilharzia and are in frequent contact with infected water. In terms of frequency of water contact, children with no contact with water on transit or during play had a higher prevalence which is different from the study conducted by Kapito et al (2009) which showed that increased frequency of water contact was a factor to Bilharzia prevalence. This could be attributed to children not wanting to disclose that they played in water since the behaviour is usually discouraged by parents and even teachers. It can also be as a result of recall bias where children could not remember how many times they were in contact with water.

5.4.2 Factors associated with Schistosomiasi*s* Prevalence

5.4.2.1. Social Economic factors

After controlling for confounding effects of play-sites, and being attended to by health worker at school, children that indicated they had painful urination as a symptom of Bilharzia

infection reflected a reduction in the risk of Bilharzia infection compared to baseline for knowledge of clinical signs i.e. those who were ignorant of the diseases' symptoms. The Odds ratios for children that indicated bloody urine was not significantly different from baseline for knowledge of clinical signs. This could have been because when children have knowledge about the symptoms, they will be quick to seek medical attention and hence will be cured.

Knowledge about signs and symptoms of Bilharzia is a very important social economic factor for Bilharzia prevalence. Children without knowledge are at risk of infection because even when they see their friends passing blood in urine during their play time in the streams, they will not be cautioned that they could also catch the infection. This is very true because the study also found that health education given to the school going concerning Bilharzia was inadequate since most children reported having never seen health workers giving school health services in the past year. These findings are similar to that found by Uneke et al, (2007) and Kapito et al, 2009) who attributed lack of knowledge to being a risk factor to *S. haematobium* infection.

5.4.2. Environmental Factors

After adjustment for confounding variables knowledge of Bilharzia symptoms and being attended to by health worker at school, children that played in streams were more likely to be infected compared to children that did not play in water bodies. The Odds ratios for playing in dams, canals and *pavwas* were not significantly different from those of children who did not play in water bodies.

The finding in this study are very significant as streams are known to carry all sorts of organisms including *Schistosoma haematobium*. Streams will usually have a lot of microorganisms including vegetation which favour a lot of aquatic life especially due to their abundance in food. The presence of streams in the community is a strong indicator that Bilharzia could be prevalent especially that children make streams as their social amenity. Mungomba et al, (1995) study also found that presence and proximity of risk water body contributed to the overall prevalence of Schistosomiasis.

5.4.2.3. Service Delivery Factors

After adjustment for confounding of play-site and knowledge of Bilharzia symptoms, children who reported seeing their teachers and health worker giving medication at their school once, twice, and three time were 5, 4, and 8 times, respectively, more likely to be infected compared to children that were never attended to by health worker.

Normally it is expected that the children who werenever attended to by healthworkers in their school would be more likely to have Bilharzia which is different from the findings in this study. The researcher can state that during the study period, there was an HPV vaccination program going on in the schools (a pilot study on Human papilloma Virus in Lusaka Province). Most of the children mistook the HPV pilot study to the regular school health services. It is however evident that School health services (which constitutes among other things, health workers giving drugs for worms and bilharzia) have since been neglected in most schools. The results from this question could have been affected due to recall bias on part of the pupils regarding seeing health workers together with teachers giving drugs to pupils in the school. Instead of asking if the pupil had seen a health worker and their teachers giving medication, the question should have been rephrased as to whether the pupil had received any medication during the past year.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

Based on the findings of this study it is concluded that Schistosomiasis still remains a public health problem in Kafue District. WHO (1995) states that any prevalence that is above 10% is a cause for concern.There is therefore a cause for concern in Kafue District as the prevalence could even be as high as 25% in some schools especially that some schools even had 86% prevalence.

In terms of socioeconomic factors, this study concluded that knowledge gap about bilharzia symptoms puts children at risk of getting bilharzia infection. Knowledgeable children about

Bilharzia had a reduced chance of getting the infection. It is therefore concluded that increased knowledge could reduce the chances of children being infected with Bilharzia.

Among the Environmental factors under study the study showedthat playing in a water body like a stream had increased risk of children getting infection,especially among schools situated in communities that are in close proximity to the stream. This shows that reducing water contact especially from the stream could reduce the prevalence.

Service delivery factors included frequency of being attended to by health worker at school, having health lessons at school and type of diseases learnt at school. The study concluded that the frequency of being attended to by a health worker at school variable either once, twice or thrice determined the prevalence of bilharzia infection among school going children.

6.2. Future Research and Policy implications

(a) Research– The high prevalence found among school going children in this study calls for further research targeting households especially that school going children do not live in isolation from their communities. It would be important to assess the prevalence of Bilharzia at community level and among different age groups including babies that are usually bathed in water collected from streams which is usually the case in many unplanned settlements.
(b) Policy –The results of this study provide a strong argument of the need for strengthening mass drug administration to control *S. haematobium* among school going children. The study demonstrated that the school health and Nutrition (SHN) services, which is part of the Zambian Policy in the fight against Neglected Tropical Diseases has been neglected in a lot of schools. It is likely that this could be a country wide problem. There is need to strengthen SHN activities especially screening of children at school entry and intensifying with health education on Bilharzia.

6.3. Study Limitations

It is worth noting that the current level of infection could be an underestimation of the actual prevalence as several studies have indicated that multiple stool and urine sample or slides are needed to improve the sensitivity of the Kato-Katz and 10 ml urine filtration methods

respectively (Ebrahim et al, 1997 and Konsinski et al, 2011). We could however not collect multiple samples or prepare multiple slides from the single samples collected mainly due to logistical reasons. In spite of this, our findings provide valuable evidence required for evidence-based decision making. The other limitation was that, the study was mainly limited to cover onlythree zones out of the four zones of the district due to financial constraints.

6.4. Recommendations

- There is need to strengthen health education and promotion in regard to Schistosomiasis in all schools in the district through Ministry of Community Development Mother and Child Health (MCDMCH) and Ministry of Education
- To ensure eradication, it will be important for government to implement all available preventive measures against Schistosomiasis i.e. morliciding, environmental management and mass drug administration campaigns where appropriate epidemiologically
- It will be important for government to come up with a policy of screening all children for Schistosomiasis at school entry for prompt detection and treatment of the infection
- The MCDMCH should encourage Community partnerships especially in environmental management to ensure streams are cleared and curb disease transmission among school going children
- Revamping and intensifying school health and Nutrition services in schools is very important in reducing the morbidity of Schistosomiasis

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APPENDICES

ANNEX 1: DATA COLLECTION TOOL

QUESTIONAIRE FOR SCHOOL GOING CHILDREN AGED 6 – 15 YEARS

Serial no.....

NAME OF SCHOOL: .....

NAME OF ZONE: .....

DATE OF INTERVIEW: .....

NAME OF INTERVIEWER: .....

INSTRUCTIONS TO THE INTERVIEWER

1. Introduce yourself to the respondent
2. Explain the purpose of your visit
3. Tell the respondent how he/she was selected and obtain verbal assent to interview him/she
4. Assure respondent of confidentiality and anonymity
5. Do not write respondents name on the questionnaire
6. Tick in the brackets corresponding to the correct answer or write responses in spaces provided

SECTIOPN A: DEMOGRAPHIC DATA

1. Sex/Gender
   (1) Girl [ ]
   (2) Boy [ ]

2. How old are you? [ ]

3. What grade are you? [ ]

4. Whom do you stay with
   (1) Mother and father [ ]
   (2) Mother [ ]
   (3) Father [ ]
   (4) Other Specify: .....

5. Where do you stay?

Name: .....

6. What is your religion?
   Name: .....

SECTION B: SOCIAL ECONOMIC FACTORS

7. What job does your parents/guardian do?
   (1) Formal Employment [ ]
   (2) Self-employed [ ]
   (3) Unemployed [ ]

8. How many are you in your family? [ ]

KNOWLEDGE ABOUT SCHISTOSOMIASIS

9. How can someone know he/she has bilharzia
   (1) Sweating [ ]
   (2) Body hotness [ ]
   (3) Blood in urine [ ]
   (4) Pain when urinating [ ]
   (5) Don't know

10. How can one get bilharzia infection?
    (1) Drinking dirty water [ ]
    (2) Swimming in infected water [ ]
    (3) Shaking hands with infected person [ ]
    (4) Walking in contaminated water [ ]
    (6) Don't know [ ]
11. How do you prevent bilharzia?
    (1) Washing hands after using toilet [ ]
    (2) Not urinating in water [ ]
    (3) Stop playing in contaminated water [ ]
    6) Don't know [ ]

SECTION C: ENVIRONMENTAL FACTORS

12. When you want to urinate or defecate, where do you go?
    (1) In the bush [ ]
    (2) In the water [ ]
    (3) Bath shelter [ ]
    (4) Toilet [ ]

13. Do you have a latrine at your school?
    (1) Yes [ ]
    (2) No [ ]

14. Do you have latrine in your household?
    (1) Yes [ ]
    (2) No [ ]

15. If you do not have latrine, in your household where do you go when you need to?
    (1) Neighbour latrine [
    (2) In the bush [ ]
    (3) In the water [ ]
    (4) Other places (specify) _____ [ ]
    (5) Not applicable [ ]

16. Where do you get water for drinking at home from?
    (1) Tap [ ]
    (2) River [ ]
    (3) Stream [ ]
    (4) Well [ ]
    (5) Borehole [ ]

17. Where do you get water for drinking at school from?

    (1) Tap [ ]
    (2) River [ ]
    (3) Stream [ ]
    (4) Well [ ]
    (5) Borehole [ ]

18. Do you pass through water on your way to school?
    (1) Yes, all the time [ ]
    (2) Yes, sometimes [ ]
    (3) No [ ]

19. Have you been playing in water this year?
    (1) Yes, all the time [ ]
    (2) Yes, sometimes [ ]
    (3) No [ ]

20. If yes to above, where do you play from?
    (1) Pavwa [ ]
    (2) Dam [ ]
    (3) Canal [ ]
    (4) Stream [ ]
    (7)Not applicable [ ]

SECTION D: SCHOOL HEALTH SERVICES FACTORS

21. How many times have you seen health workers together with your teachers giving medicine here at school this year?
    (1) Once per year [ ]
    (2) Twice per year [ ]

(3) Three times per year [ ]
(4) Never [ ]

22. Did you have any lessons on any disease at school this year?
(1) Yes [ ]
(2) No [ ]

23. What diseases have you learnt about from school this year?
(1) Malaria [ ]
(2) Diarrhoea [ ]
(3) Bilharzia [ ]
(4) Cholera [ ]
(5) Other [ ]
(7) Not applicable [ ]

SECTION E: URINE SAMPLE TEST RESULTS

(25)Infection sample results
(1) Positive [ ]
(2) Negative [ ]

Thank for participating in this interview

Annex 2:Information Sheet for Participants

Study Topic:

Prevalence and Factors associated with Schistosoma haematobium (passing blood in urine) infection among school going children of Kafue District.

Part A: Information about the research

1. Who the researcher is

This research project is conducted by Miranda Hamatanga, a MPH in Environmental health student at University of Zambia.

2. What the research project is about

The research project will determine the prevalence of Schistosoma haematobium (passing urine with blood) infection among school going children of Kafue district and hence the disease burden for the district will be known. The study will also establish the factors associated with Schistosoma haematobium (passing urine with blood) infection among school going children by looking at the social economic characteristics, environmental characteristics and the school health service characteristics.

3. What the participants will have to do and how long it will take.

The school going children aged between 6 to 15 years will be interviewed concerning the social economic status, environmental and the school health services characteristics. The school going children will then be asked to submit urine samples which will then be tested for the presence of Schistosoma haematobium ova at Kafue district Hospital. The school health and Nutrition (SHN) focal person will also be interviewed to determine the school health services factors associated with Schistosoma haematobium infection. All these activities will be carried out within the period of two months during data collection. Each interview is expected to last between 25 to 30 minutes.

4. Potential risks and benefits of participating in the study.

There are no potential risks of participating in the study as the study is just about finding out the prevalence and factors associated with Schistosoma haematobium infection. You shall only be requested to give 10mls of your urine in a specimen bottle provided to you. The urine will be transported to Kafue district hospital where it will be checked for the presence of Schistosoma ova and hence help us calculate the disease burden in this school. A trained staff will examine the urine after which the results will be recorded and discarded after use like any other specimen in the laboratory.

The information that will be generated from this study will inform government in strengthening the school health services in eliminating Schistosomiasis and put up preventive measures that are tailored to the factors identified. The other potential benefit is that if at all your urine tests positive to *Schistosoma haematobium*, you shall receive appropriate and adequate medication to treat the disease.

5. The expected major outcomes from the research.

The major outcomes from this study will be publications in international journals. The results of the study will also be shared widely with various stakeholders in Zambia, i.e. the Ministry of Health and collaborating partners.

6. What will happen to the information collected?

The information collected will remain confidential and will not be used for any other purpose apart from publications and also its application in coming up with policy in prevention of *Schistosoma haematobium* infection among school going children.

7. Confidentiality and anonymity for this research.

Anonymity of the source of the information published will be maintained. The identity of participants will not be disclosed in any way and will remain confidential.

8. Compensation and incentives to participation

Participants will not receive any monetary compensation for participating in the study since the study is being carried out right up in the school.

Part B: Declaration to participate:

- Individuals will not be identified in any publication/dissemination of the research findings without their explicit consent.
- All information collected during conversations/meetings/interviews will only be viewed by the researcher and remain strictly confidential

If you take part in the study you have the right to among other things to:

- Participation in the study is voluntary and you are free to withdraw from the study at any time of the study without penalty
- Refuse to answer any particular question
- Ask any further questions about the study that occurs to you during your participation
- Be given access to the summery of the findings from the study, when it is concluded.

Researchers Name: MIRANDA HAMATANGA

Mobile Number: 0977 851675

Researches signature: _____

Date: _____

In case of any queries you can contact the Principle Investigator or ERES Convergeas follows;

Contact details:

Miranda Hamatanga
University of Zambia,
School of medicine
Department of Public health
P.O. Box 50110
LUSAKA
Phone No.: 0977 851675

The Chairperson
ERES CONVERGE RB
33 Joseph Mwila Road
Roads Park
LUSAKA
Tel: 0955 155633/4

Pepala yankani za otenga mbali mukafukufuku

Mutu wakafukufuku:

kuchuluka ndizina zake zimene zingalengeste matenda yotunda gazi pakati kaana opita kusikulu muboma la Kafue.

<u>Chiyambi: Chizibiso cha kafukufuku aka</u>

1. Ndani ochita kafukufuku aka?

Kafukufuku aka kadza chitidwa ndi Miranda Hamatanga amene ali pamapuzilo ya zaumoyo ya Masters in Public Health (MPH) pasikulu yapamwamba muno muziko la Zambia.

2. kodi aka kafukufuku ndikachani?

Aka kafukufuku kaza tandiza kuziwa ukulu wadvito lo tunda gazi pakati kaana opita kusikhulu muboma la Kafue. Lizatandizanso kudziwa zina zake zamene zilengetsa matenda yamene aya yotunda gazi pakati pakati kaana asikulu pakuyangana zachitukuko, mankhalidwe ndiponso zaumoyo zimene sukhulu yichitapo.

3. Chimene otenga mbali mukafukufuku aka afunika kuchita ndithawi izapitapo pofufuza

Ana opita kusukhulu apakhati pa musinkhu kumi ndizisanu azafusidwa mafunso pamatenda aya yotunda gazi. Aza mpempedwanso kutipasa mitundo yawo yamene izapimidwa kuona ngati kadoyo kamatenda yotunda gazi kangapezekemo kapena ayi. Kupima uku kuza chitikila kuchipatala chikulu cha Kafue. Tizafunsanso mafunso ku mupuzinsi umodzi oyanganira pazaumoyo musukhulu. Aka kafukufuku kazatenga tawu yamwezi iwiri mukutenga zofunikila. Mafunso aya kumuthu umodzi umodzi yaza tenga mpindi yokwanira makhumi awiri ndizisanu kufikila kumakumi atatu.

4.Chipsezo ndimwai unga pezeke mukutenga mbali mu kafukufuku aka

Kuribe chopsezo chimene mungapeze potenga mbali mu kafukufuku aka chifukwa ndikofuna chabe kuziwa ukulu ndizina zimene zilengetsa matenda yotunda gazi. Tiza kumpempani kutipasa mitundo zokwanira 10mls muka botolo kamene tizakupasani. Mitundo muzatipasa izapelekewa ku chipatala chikhulu cha Kafue kwamene akatswiri azapima ndikuona ngati kadoyo kolengetsa matenda yotunda gazi kalimo kapena ayi. Kudziwaizi chizantadiza kuziwa kuchuluka kwamatenda aya musukhulu lathu ndi muboma la kafue. Akaswiri kuchipatala azalemba zimene azaona nakutaya mitundozo mwamene amachitila kuzonse amapima masiku yonse.

Nkani zimene zizachokera mukafukufuku aka zizatandidza kuzibisa boma lathu la Zambia kuti alimbitse njira zochingiridza ndikusilidza matenda otunda gazi pakati kaana opita kusukhulu kulingana ndizolengetsa zimene zizapezeka. Mwayi wina ulipo paotenga mbali mu kafukufuku aka ndiwakuti, ngati mitundo yanu yapezeka ndikadoyo kamene kelengetsa kutunda gazi, muzapasiwa mankwala ndikuchilisidwa kumatenda yamene aya.

5.Zazikhulu zimene tiyembekedza kupedzamo mu kafukufuku aka

Zotsatira zikhulu kuchokela mu kafukufuku aka ndikuzibisa ena kupitila mukulemba nkani mumapepala yankani zamumaziko. Nkani zimene zizachokera muka fukufuku aka

zizazibisidwa kuonse otenga mbali kuvuto la matenda otunda gazi muziko lathu la Zambia pamodzi ndiunduna wankani zaumoyo.

6.Zimene zizachitika kunkani ziza tengedwa mukafukufuku

Nkani zontse tizatenga ndiza chisinsi. Zizasebenzetsewa chabe kuzibisa otenga mbali muvuto yamatenda yotunda gazi ndiku faka malamulo yamene yaza tandidza ku chingiridza matanda yamene aya pakati kaana asukhulu.

7.Zachisinsi ndikunkala wosazibika mukafukufuku aka

Sitizaziwitsa munthu wina alionse kwamene kuzachokela nkani ya kafukufuku aka kapena kulemba mazina aonse otenga mbali mukafukufuku aka koma azankhala achisinsi.

8. Chipepeso nampaso potenga mbali mukafukufuku aka

Sitizapasa chipepeso, ndalama kapena chinachake kulionse munthu otenga mbali mukafukufuku aka chifukwa kazachitikira mu sukhulu mwathu mwamene muno.

<u>Chachibili: Kuvomekeza kutenga mbali mukafukufuku aka.</u>

- Munthu onse otengambali sazalembewa zina lake papepala ili yonse kulibe chivomeletsedwe
- Zonse nkani zizatengewa pofunsa mafunso kapena pokambisana zizaonewa chabe ndimunthu ovomelesedwa kutenga nkani eka nakusungiwa muchisinsi

Ngati muzatengako mbali mukafukufuku aka muli ndi pamvu pa zinthu izi;

- Kutenga mbali mukafukufuku aka ndi kuzipasila ndipo ndino omasuka kuchokamo panthawi iliyonse kopanda kukakamizidwa kapena kulandira chilango chilichonse
- Kukana kuyanka funso inayake
- Kufunsa mafunso ena pakafukufuku aka pamene mutengako mbali.
- Muzauzidwa mwachidule zopezekekamo mukafukufuku aka pambali posilidza.

Dzina la ochita kafukufuku: Miranda Hamatanga

Lamya: 0977 851 675

Kusayina: _____

Siku: _____

Kapena muli namafunso ali yonse mungazibise wochita kafukufuku aka kapena ba ERES Converge oyanganira pankani zamalamulo yochita kafukufuku pama motero;

Kopezeka:

Miranda Hamatanga
University of Zambia,
School of medicine
Department of Public health
P.O. Box 50110
LUSAKA
Phone No.: 0977 851675

The Chairperson
ERES CONVERGE RB
33 Joseph Mwila Road
Roads Park
LUSAKA
Tel: 0955 155633/4

Annex 3: Consent Form

UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE
DEPARTMENT OF PUBLIC HEALTH

Informed Consent Form for Parents/ Guardians

Study Title: PREVALENCE AND FACTORS ASSOCIATED WITH SCHISTOSOMA HAEMATOBIUM INFECTION AMONG SCHOOL GOING CHILDREN IN KAFUE DISTRICT

Principal Researcher: MIRANDA HAMATANGA

THIS IS TO CERTIFY THAT I ..... (name of participant/guardian) HEREBY agree to have my child ..... (Childs name) participate in the above project.

I hereby agree that a urine sample from my child be taken and be examined for Schistosoma haematobium. I also agree that the child be interviewed in relation to the study needs. I understand that the information may be published but the names and identity will not be associated with the results.

I understand that I am free to deny permission to include my child in the study. I also understand that I am free to withdraw my consent and terminate the participation of my child at any time without penalty.

I have been given the opportunity to ask whatever questions i desire, and all such questions have been answered to my satisfaction.

_____	_____	_____
Signature of Parent/Guardian	Witness Signature	Researchers Signature

		_____
Thumb Print Thumb Print		Date

Contact details: Miranda Hamatanga
University of Zambia,
School of medicine
Department of Public health
P.O. Box 50110
LUSAKA
Phone No.: 0977 851675

The Chairperson
ERES CONVERGE RB
33 Joseph Mwila Road
Roads Park
LUSAKA
Tel: 0955 155633/4

PEPALA YACHIBVOMEKEZO KUMAKOLO

Mutu Wakafukufuku: KUCHULUKA NDIZINA ZAKE ZOLENGETSA MATENDA OTUNDA GAZI PAKATI KAANA OPITA KUSUKHULU MUBOMA LA KAFUE.

Ochita kafukufuku: MIRANDA HAMATANGA

Ichi nichiziwiso chakuti ine _____ (zinala otenga mbali kapena makolo) nivomeleza kuti mwana wanga _____ (zina la mwana) anga tengeko mbali mukafukufuku kazina lakambiwa pamwamba.

Ndavomeletsa kuti mwana wanga angapatse kapena kubweretsa mitundo yake kuti ikapimiwe nakuona ngati kadoyo kamene kalengetsa kutunda gazi kalimo kapena ayi.

Ndavomeletsanso kuti mwana wanga anga funsidwe mafunso kulingana ndikufunikila kwa kafukufuku aka. Namvesesa kuti nkani iyi ifunika kufalisidwa koma ma ina ndi zizindikiro siyaza ikidwapo pa zopedzeka.

Namvesesa kuti ine ndine omasuka kukana chilolezo kuikilapo kuloledza mwana mukafukufuku. Ndiponso ndimvesesa bwino bwino kuti ndine omasuka kuchoka mo mukutenga mbali kapena mwana wanga mukafukufuku aka panthau ina iliyonse kopanda kupasidwa chilango chilichonse. Napasidwa mwaii ofunsa mafunso ali yonse ningankale nayo, ndipo mafunso aya yayankidwa ndipo ndine okutira.

_____	_____	_____
Chizindikizo cha makolo	Chizindikizo cha oyanganila	Chisindikizo cha ofufudza
☐	☐	_____
Chizindikizo cha chala	Chizindikizo cha chala	Siku

Contact details: Miranda Hamatanga
University of Zambia,
School of medicine
Department of Public health
P.O. Box 50110
LUSAKA
Phone No.: 0977 851675

The Chairperson
ERES CONVERGE RB
33 Joseph Mwila Road
Roads Park
LUSAKA
Tel: 0955 155633/4

CONSENT FORM FOR TEACHERS

UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE
DEPARTMENT OF PUBLIC HEALTH

Informed Consent Form for Teachers

Study Title: PREVALENCE AND FACTORS ASSOCIATED WITH SCHISTOSOMA HAEMATOBIUM INFECTION AMONG SCHOOL GOING CHILDREN IN KAFUE DISTRICT

Principal Researcher: MIRANDA HAMATANGA

THIS IS TO CERTIFY THAT I ..... (name of participant) HEREBY agree to participate in the above project.

I hereby agree that I be interviewed and will provide information in relation to the study needs. I understand that the information may be published but the names and identity will not be associated with the results.

I understand that I am free to deny permission to participate in the study. I also understand that I am free to withdraw my consent and terminate my participation at any time without penalty.

I have been given the opportunity to ask whatever questions I desire, and all such questions have been answered to my satisfaction.

_____	_____	_____
Signature of Parent/Guardian	Witness Signature	Researchers Signature
☐	☐	_____
Thumb Print	Thumb Print	Date

Contact details:

Miranda Hamatanga
University of Zambia,
School of medicine
Department of Public health
P.O. Box 50110
LUSAKA
Phone No.: 0977 851675

The Chairperson
ERES CONVERGE RB
33 Joseph Mwila Road
Roads Park
LUSAKA
Tel: 0955 155633/4

Annex 4:Assent Form

UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE
DEPARTMENT OF PUBLIC HEALTH

Study Title:

Prevalence and Factors associated with Schistosoma haematobium (passing blood in urine) infection among school going children of Kafue district.

My name is **Miranda Hamatanga**. I am trying to find out the prevalence and factors associated with Schistosoma haematobium (passing out urine with blood) infection among school going children because the school going children are mostly at risk of the infection. If you would like, you can be in my study.

If you decide you want to be in my study, you will be asked to give us your urine so that we check if you have the bilharzia ova. Your participation in the study will not injure you in any

way, but will be good for you because you will be treated for bilharzia if you have the disease.

Other people will not know if you are in my study. I will put things I learn about you together with things I learn about other children so no one will tell what things came from you. When I tell other people about my study, I will not use your name, so no one can tell who I am talking about.

Your parents/guardian has to say it is OK for you to be in my study. After they decide, you will get to choose if want to do it too. If you don't want to be in the study, no one will be mad at you. If you want to be in the study now and change your mind later, that is OK. You can stop at any time without penalty.

My address is **University of Zambia, School of Medicine, Department of Public health, P.O. Box 50110, Lusaka.** My cell number is **0977 851 675**. You can call me if you have any questions about the study or if you decide you don't want to be in the study any more.

If you have any complaints or questions about me during the study period, you can contact the chairperson at **ERES Converge IRB, 33 Joseph Mwila Road, Roads Park, Lusaka on cell No. 0955 155 633.**

Agreement

I have decided to be in the study even though I know I don't have to do it. Miranda Hamatanga has answered all my questions.

_____		_____
Signature of study participant		Date
	Thumb Print	
_____		_____
Signature of Researcher		Date

Pepala yachivomekezo cha ana otenga mbali mukafukufuku

Mutu Wakafukufuku:
KUCHULUKA NDIZINA ZAKE ZOLENGETSA MATENDA OTUNDA GAZI PAKATI KAANA OPITA KUSUKHULU MUBOMA LA KAFUE.

Zdina langa ndine **Miranda Hamatanga**. Ndiyetsa kuziwa kuchuluka ndina zake zimene zilengetsa matenda otunda gazi pakati ka ana opita kusukhulu chifukwa ndiye amene amapezeka navuto kambiri kambiri. Ngati ufuna, unga tenge mbali mukafukufuku aka.

Ngati uzavomekedza kutenga mbali mukafukufuku aka, tiza kupempa kuti utipatseko mitundo zako kuti tikapime nakuona ngati kadoyo kamene kalengetsa kutunda gazi kanga pezekemo kapena ayi. Kutenga mbali mukafukufuku sikunga bweletse vuto lili lonse koma

chizankala chabwino chifukwa muza ziwa ngati muli nako kadoyo kamene kalengetsa kutunda gazi ndi ku pasidwa mankwala okuchilisani.

Anthu ena sadza ziwa ngati muli mukafukufuku aka yayi. Ndizaika zinthu zoonse ndizapeza pamodzi ndiza ana oonse otenga mbali, kulibe wina aza ziwa zimene ziza choka kwainu. Poudza anthu ena pa nkani yakafukufuku aka, sindiza sebensensa zina lanu chifukwa chake sazasiba kuti ndani ndikambapo yayi.

Makolo anu azafunika kuvomekedza inu kutenga mbali mukafukufuku aka. Akavomekedza, naiwe udza pasiwa mupata osanka kutenga mbali kapena ayi. Ngati suufuna kutenga mbali mukafukufuku aka, kulibe azakukalipila yayi. Ngati wavomekezda kutenga mbali mukafukufuku ndipo wasintha maganizo yako pambuyo pake, zilichabe bwino. Ungaleke pa nthawu iliyonse chabe kulibe kupasidwa mulandu uli onse.

Addressi yanga ni **University of Zambia, School of Medicine, Department of Public Health, P.O Box 50110, Lusaka**. Nambala ya lamya yanga ni **0977 851675**. Munga nitumile lamya ngati muli namafunso yali yonse pa kafukufuku aka, kapena mwaona kuti simufunanso kutenga mbali mukafukufuku.

Ngati muli na ndandaulo kapena mafunso pali ine panthau yo chita kafukufuku aka, munga funsenso ba kulu banchito ku **ERES Converge IRB, bapezeka ku 33 Joseph Mwila Road, Roads Park, ku Lusaka pa lamya nambala 0955 155 633.**

Chivomekedzo

Navomela kutenga mbali mukafukufuku aka ngankale kuti ndiziwa kuti ninga sanke kusa tengako mbali. Miranda Hamatanga andi yanka mafunso yanga yonse.

_____		_____
Kusayina kwa otenga mbali		Siku
_____	chizindikizo cha chala	_____
Kusayina kwa ofufuzda		Siku

ANNEX 5: Gant Chart

Gant chart															
No.	Resp. person	Task	2013								2014					
			May	June	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1.	PR	Research Proposal defence in graduate forum														
2.	PR	Working on Proposal for submission to ERES														
3.	PR	Research Proposal Approval by ERES														
4.	PR	DHMT/DEBS briefing														
5.	PR & RA	Training of Data collectors and pilot testing of Questionnaire														
6.	PR & RA	Data collection from study sites														
7.	PR	Data Processing														
8.	PR	Data analysis														
9.	PR	Report writing														
10.	PR	Defending Thesis														
11.	PR	Finalising Report														
12.	PR	Report submission														

ANNEX 6: Budget

Description	Quantity	No. of Days	Unit Cost	Total Cost
1.TRAINING				
Stationary	1	1	500	500
Photocopying	1	1	100	100
Specimen bottles	600	1	1	600
Snacks	8	2	10	160
Lunch	8	2	50	800
Sub Total				**2,160**
2. DATA COLLECTION				
Fuel	40l	10	10	4,000
Researcher Lunch	1	20	50	1,000
Research Assistants Lunch	4	20	50	4,000
Driver	1	0	50	500
Paper	10	1	30	300
Sub Total				**9,800**
3.DATA ENTRY AND ANALYSIS				
Tonner	2	1	600	1,200
Paper	2	1	30	60
Report Binding	4	1	100	400
Data analyst lunch	2	30	50	3,000
Sub Total				**4,660**
Grand Total (ZKr)				**16,620**

ANNEX 7: Permission letter to conduct research from ERES Converge ethics committee

33 Joseph Mwilwa Road
Rhodes Park, Lusaka
Tel: +260 955 155 633
+260 955 155 634
Cell: +260 966 765 503
Email: eresconverge@yahoo.co.uk

I.R.B. No. 00005948
F.W.A. No. 00011697

23rd October, 2013

Ref. No. 2013-Aug-006

The Principal Investigator
Ms. Miranda Hamatanga
School of Medicine
Dept. of Public Health
P.O. Box 50110,
LUSAKA.

Dear Ms. Hamatanga,

RE: Prevalence and factors associated with Schistosoma Haematobium infection among school going children of Kafue District.

Reference is made to your corrections dated 1st October, 2013. Noting that you addressed all concerns raised the IRB members resolved to approve this study and your participation as Principal Investigator for a period of one year.

Review Type	Ordinary	Approval No. **2013-Aug-006**
Approval and Expiry Date	Approval Date: 23rd October, 2013	Expiry Date: 22nd October, 2014
Protocol Version and Date	Version-Nil	22nd October, 2014
Information Sheet, Consent Forms and Dates	• English, Chinyanja.	22nd October, 2014
Consent form ID and Date	Version-Nil	22nd October, 2014
Recruitment Materials	Nil	22nd October, 2014
Other Study Documents	Teachers, Pupils Questionnaires.	22nd October, 2014
Number of participants approved for study	480	22nd October, 2014

Specific conditions will apply to this approval. As Principal Investigator it is your responsibility to ensure that the contents of this letter are adhered to. If these are not adhered to, the approval may be suspended. Should the study be suspended, study sponsors and other regulatory authorities will be informed.

Conditions of Approval

- No participant may be involved in any study procedure prior to the study approval or after the expiration date.
- All unanticipated or Serious Adverse Events (SAEs) must be reported to the IRB within 5 days.
- All protocol modifications must be IRB approved prior to implementation unless they are intended to reduce risk (but must still be reported for approval). Modifications will include any change of investigator/s or site address.
- All protocol deviations must be reported to the IRB within 5 working days.
- All recruitment materials must be approved by the IRB prior to being used.
- Principal investigators are responsible for initiating Continuing Review proceedings. Documents must be received by the IRB at least 30 days before the expiry date. This is for the purpose of facilitating the review process. Any documents received less than 30 days before expiry will be labelled "late submissions" and will incur a penalty.
- Every 6 (six) months a progress report form supplied by ERES IRB must be filled in and submitted to us.
- ERES Converge IRB does not "stamp" approval letters, consent forms or study documents unless requested for in writing. This is because the approval letter clearly indicates the documents approved by the IRB as well as other elements and conditions of approval.

Should you have any questions regarding anything indicated in this letter, please do not hesitate to get in touch with us at the above indicated address.

On behalf of ERES Converge IRB, we would like to wish you all the success as you carry out your study.

Yours faithfully,
ERES CONVERGE IRB

Mrs. M.M Mbewe
RNM, DNE, BSc., M.Ed.
ACTING CHAIRPERSON

ANNEX 8: Application letters to MCDMCH and Ministry of Education

Approved
Ag/DMO
18/11/13

THE UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE
DEPARTMENT OF PUBLIC HEALTH

Telephone: 252641,
Fax: + 260-1-250753,
Email: commed@unza.zm

P.O. BOX 50110,
Lusaka, Zambia.

==========

11th November 2013.

The Permanent Secretary,
Ministry of Community Development,
Mother and Child Health,
LUSAKA

Dear Madam,

Re: **REQUEST FOR PERMISSION FOR MASTER OF PUBLIC HEALTH STUDENT TO CONDUCT RESEARCH- MS MIRANDA HAMATANGA**

The Department of Public Health is kindly requesting for permission for Ms Hamatanga who is currently studying for Public Health specializing in Environmental Health to conduct research in Kafue District. This will help on her Research study on:

"Prevalence and Factors associated with Schistosoma Heamotobium Infection among School going Children of Kafue District"

Attached is her permission approval letter from ERES Ethics Committee and Abstract of the Research Proposal.

We appreciate your support to our MPH programme and the student.

Yours Faithfully

Dr H Halwiindi,
POSTGRADUATE COORDINATOR.

cc: The District Medical Officer, Kafue District

THE UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE
DEPARTMENT OF PUBLIC HEALTH

Telephone: 252641,
Fax: + 260-1-250753,
Email: commed@unza.zm

P.O. BOX 50110,
Lusaka, Zambia.

11th November 2013.

The Permanent Secretary,
Ministry of Education
LUSAKA

Dear Sir/Madam,

Re **REQUEST FOR PERMISSION FOR MASTER OF PUBLIC HEALTH STUDENT TO CONDUCT RESEARCH- MS MIRANDA HAMATANGA**

The Department of Public Health is kindly requesting for permission for Ms Hamatanga who is currently studying for Public Health specializing in Environmental Health to conduct research in Kafue District. This will help on her Research study on:

"Prevalence and Factors associated with Schistosoma Heamotobium Infection among School going Children of Kafue District"

Attached is her permission approval letter from ERES Ethics Committee and Abstract of the Research Proposal.

We appreciate your support to our MPH programme and the student.

Yours Faithfully

Dr F. Halwiindi,
POSTGRADUATE COORDINATOR.

cc: The District Director, Kafue District Education Board

ANNEX 9: Permission letters to conduct research in schools form Kafue DCMO and DEBS office

In reply please quote
No. .....

All Communication should be
Addressed to the DEBS

Telephone/Fax 311386
E-Mail address: debskafue@yahoo.com

REPUBLIC OF ZAMBIA

MINISTRY OF EDUCATION, SCIENCE, VOCATIONAL TRAINING AND EARLY EDUCATION

Kafue District Education Board Office
P.O. Box 350019
CHILANGA

DEBS/K/101/4/9

18th November, 2013

Ms Miranda Hamatanga
School of Medicine
Dept of Public Health
P. O. 50110
LUSAKA

RE : AUTHORITY TO CONDUCT RESEARCH: YOURSELF

The subject above refers.

I wish to inform you that authority has been granted for you to conduct research on the "Prevalence and Factors Associated with Schistosoma Heamotobium infection among school going children of Kafue District.

I wish you all the best.

V. Zgambo
DISTRICT EDUCATION BOARD SECRETARY
KAFUE DISTRICT

Copy : III