

Chapter 1

1.0 INTRODUCTION

Background

Schistosomiasis is a tropical disease caused by a parasitic worm of the genus *Schistosoma*. The transmission cycle requires contamination of surface water by excreta, specific freshwater snails as intermediate hosts, and human water contact.

The etiological agent of the disease is the schistosome blood-fluke, and three species account for most of the disease occurring in humans: *S. mansoni*, causing hepatic and intestinal schistosomiasis, is distributed in Africa, the Arabian peninsula and South America; *S. haematobium*, causing the Urinary form of the disease, is found in Africa and the Arabian peninsula; and *S. japonicum*, causing intestinal Schistosomiasis, is found in parts of China and Indonesia (Steinmann et al., 2006).

Natural streams, ponds and lakes are typical sources of infection, but over the past few decades, man-made reservoirs and irrigation systems have contributed to the transmission of schistosomiasis. The disease is a rural problem, but urban foci can be found in many endemic areas (Gryseels et al., 2006).

The burden of disease as a result of schistosomiasis infection has been traditionally tallied in terms of quantifiable, objective physical morbidities, such as hepatosplenomegaly, hepatic fibrosis, or, for urinary schistosomiasis, as bladder and kidney inflammation. However, the average person with schistosomiasis does not experience these advanced forms of the disease. Instead, he or she is prone to suffer from less obvious, but nonetheless significant disabilities such as growth stunting, anemia, abdominal pain, exercise intolerance, poor school performance and lowered work capacity (King et al., 2006). The average disability of uncomplicated schistosomiasis has been dismissed by some as unimportant, but in the setting of the developing world 'poverty trap', in which a family must invest its entire capital for survival each year, even a 2-3% disability associated with chronic schistosomiasis infection can become highly relevant to their annual success. Although an infected person might get by, he or she might never be able

to emerge from a subsistence level of productivity (King et al. 2006). This in itself implies that an infected person might not perform to the best of his or her abilities.

Methods for schistosomiasis control are chemotherapy, health education, provision of safe water supplies, installation of adequate sanitation facilities and use of molluscicides for focal intermediate host snail control. However, the current focus of control is morbidity control, and chemotherapy is the most widely used strategy to achieve this goal. Over the past 25 years, therapy and control of schistosomiasis has come to rely heavily on one drug, Praziquantel (PZQ). A more expensive alternative, Oxaminiquine, is also available, but its bioactivity is restricted to *S. Mansoni*, and the drug has largely been replaced in favour of the more cost-effective Praziquantel. Moreover, Praziquantel is active against all schistosome species, with a single oral dose of 40-60 mg/kg being sufficient to achieve cure rates of 60-90% (Caffrey, 2007). This makes it the drug of choice for disease treatment at the community or individual level – a recommendation underpinned by its low cost of between 10 and 19 Cents (USD) per 600mg tablet, depending on the supplier. It is however worth noting that this reliance on Praziquantel is of concern, should wide-spread treatment failure arise, particularly as measures are being undertaken to increase Praziquantel's availability (Caffrey, 2007).

Since the reassessment of parasitic disease burdens by the international community in the late 1980's and 1990's, the world-wide problem of Schistosomiasis seems to have lost priority in the global health agenda. Compared with treatment and prevention of more lethal diseases (such as Malaria, HIV and Tuberculosis) control of Schistosomiasis has not been considered such a high priority. This is extremely unfortunate because 200–300 million people suffer Schistosomiasis-related disability on a daily basis and will experience recurrent episodes of *Schistosoma* infection for as much as half of their lives (King et al., 2006).

The view of the social and medical importance of schistosomiasis is changing with the greater appreciation of its day-to-day impact on individual health and disability. The well known infection-associated advanced morbidities that occur late in infection, i.e. liver fibrosis, intestinal bleeding, urinary tract obstruction, super infection and cancer, seem to represent only a small fraction of schistosome infection-associated disease. It now seems likely that chronic complications; such as anemia, under nutrition (e.g. short stature, infertility), play a much more

substantial part in the daily and lifetime health burden of affected individuals and populations. Such outcomes are associated with both the presence and, to a lesser extent, the intensity of infection.

1.1 STATEMENT OF THE PROBLEM

Schistosomiasis is the second most devastating parasitic disease after malaria in tropical countries in terms of socio-economic and public health impact. According to WHO's weekly epidemiological report of 2006, about 200 million people in 74 countries are infected with the disease, of whom; ~85% live on the African continent. The burden of disease has recently been reassessed, suggesting that ~70 million individuals suffer from haematuria associated with *Schistosoma Haematobium* infection, 18 million suffer major bladder wall Pathology and 10 million have hydronephrosis (WHO, 2006). Fenwick et al., (2003), estimate that annual mortality due to *S. haematobium*-related, non-functioning kidneys could be as high as 150, 000. He further suggests that morbidity due to *Schistosoma Mansoni* includes hepatosplenomegaly, liver fibrosis and ascites, and as many as 130,000 per year die from haematemesis due to related portal hypertension. Evidence from Sudan and Uganda indicates that, in most cases, serious liver fibrosis takes > 15 years to develop (Dunne, 2003).

Children are especially vulnerable to acquiring schistosomiasis, and infected school-age children are often physically and intellectually compromised by concurrent anaemia, attention deficits, learning disabilities, school absenteeism and high drop-out rates. Unfortunately, few recognize or complain of their symptoms during their childhood years; therefore, failure to treat school-age children not only affects child development, but also to a generation of adults disadvantaged by the irreversible sequelae of infection.

In sub-Saharan Africa, schistosomiasis is widespread, with foci of high prevalence and high morbidity found adjacent to rivers, lakes and irrigation schemes. Garba, (2006) and others state that many governments aware of the problem have developed national plans and have carried out training and pilot control projects (e.g. Ghana, Kenya, Malawi, Senegal, United Republic of Tanzania, Uganda and Zambia). However, the on-going small-scale initiatives using PZQ currently cover ~ 4 million school-age children in Africa, corresponding to only 3% of the target

population for this continent. One of the major reasons cited for the low use of PZQ is that even if drugs were made available in the health services, the difficulty of diagnosis (stool and urine examination, and lack of specific symptoms) means that patients are often diagnosed incorrectly and not given PZQ.

Increased urbanization in sub-Saharan Africa and Zambia in particular over the past years has led to the concomitant development of peri-urban squatter compounds, and findings suggest that urbanization patterns and water facilities unique to the peri-urban environment may impact the transmission of common water-borne diseases such as Schistosomiasis. The peri-urban compounds outside of Lusaka, Zambia lack an established water supply infrastructure, and have just begun to be targeted by efforts to deliver piped water to community taps. However, the supply is in most cases erratic, inadequate and only available at restricted times of the day.

In Zambia, information on the distribution of schistosomiasis is scanty as there has been no systematic national survey on the prevalence of the disease. However, the Ministry of Health (MOH) reports that schistosomiasis is highly prevalent in rural districts especially those close to the Lakes and rivers. Further estimates by MOH indicate that close to 2 million people in Zambia are infected with the disease with prevalence reaching as high as 90% in some communities (Zambia Bilharzia Control Programme Prevalence Survey, 2005-2007). Of the two species of human schistosomes (*S. haematobium* and *S. mansoni*) affecting man, *S. haematobium* has a greater distribution than *S. mansoni* in Zambia (Siziya et al., 1993).

The School Health and Nutrition (SHN) Interventions under the auspices of the USAID conducted a study in Chipata district of Eastern province in 2003, where the prevalence of schistosomiasis was alarmingly reaching 70% in some schools (USAID, 2003).

Anecdotal evidence suggests that Ng'ombe Township is the hardest hit by schistosomiasis in Lusaka province of Zambia. With this view, a directive from the Ministry of Health Epidemic Preparedness Committee meeting was issued to the Zambia Bilharzia Control Programme to investigate and recommend actions on the complaints from the Public and Health staff concerning observed high prevalence of Urinary schistosomiasis in the Ng'ombe area of Lusaka bordering the Ngwerere stream, a stream associated with high infection rates in the area.

A prevalence survey was conducted in November 2007 by Zambia Bilharzia Control Programme which confirmed a prevalence of about 30% (Report on Bilharzia/deworming programme in Ng'ombe, March 2008-Unpublished). The prevalence of schistosomiasis in Ng'ombe Township is particularly high in children and due to their frequent contact with infested water and their underdeveloped resistance to re-infection. Based on the mentioned arguments, a recommendation was thus made to conduct Mass Drug Administration in School-age children in the Catchment area. These disturbing reports led to different organizations such as Angel of Mercy, the School Health and Nutrition programme and the Zambia Bilharzia Control Programme to conduct Mass treatment in children of school-going age with very little success, as indicated by Ng'ombe clinic records. Important investigations have been done concerning such issues as the distribution of the disease (Simoonga et al., 2008), reduction in prevalence, intensity of infection and on instances of morbidity due to Schistosomiasis infection despite treatment of infected persons with PZQ. Other surveys involving the identification of snails responsible for schistosomiasis transmission have equally been carried out (Mubila & Rollinson, 2002) but re-infection levels remain high. This ultimately poses a problem for future investigative studies as the community is not seeing lasting solutions to their public health problem. Without doubt, so much information on schistosomiasis has been gathered with no co-ordinated approach towards its control.

In order to further local/global awareness and community treatment and to ensure sustainability in the control of schistosomiasis in this township and for effective use of scarce resources, there is need to consider factors that affect the prevalence of the disease in designing interventions to reduce the prevalence of schistosomiasis.

This paper therefore reveals the findings of the study on the prevalence and factors associated with schistosomiasis in the five schools of Ng'ombe Township endemic of schistosomiasis.

1.2 RESEARCH QUESTION

What factors are associated with schistosomiasis in the five schools of Ng'ombe Township?

1.3 VARIABLES AND INDICATORS OF MEASUREMENT

Dependent Variable	Independent Variables	Cut-off point	Indicator
Schistosomiasis Infestation	Time of residence	=2 years	0 Score
		2-5 years	1 Score
		All my life	2 Score
	Gender	Male	0 Score
		Female	1 Score
	Age	<10 years	0 Score
		10-11 years	1 Score
		12= years	2 Score
	Water Source	Well	0 Score
		Communal Tap	1 Score
		Public Tap	2 Score
	Water contact	Never	0 Score
		Playing	1 Score
		Drawing	2 Score
		Crossing	3 Score
	Socio-economic status	Low	No Radio/TV at home
		Medium	Radio or TV alone at home
		High	Both Radio/TV at home

Chapter 2

2.0 OBJECTIVES

2.1 General Objective

- To determine the prevalence and factors associated with schistosomiasis infestation in the five schools of Ng'ombe Township.

2.2 Specific Objectives

- To determine the levels of schistosomiasis infestations in the school-going children.
- To evaluate the circumstances under which school-going children come into contact with water in the five schools of Lusaka district.
- To estimate the level of awareness and knowledge of the disease among pupils.
- To make recommendations for effective control of the disease.

Chapter 3

3.0 LITERATURE REVIEW

Schistosomiasis is a tropical parasitic disease caused by blood-dwelling fluke worm of the genus *Schistosoma*. In urinary schistosomiasis, the schistosomes live within the perivesical venous plexus. The females produce eggs which are excreted in the urine and on contact with water, the egg releases the miracidium. It searches for the intermediate host, fresh-water snails and after penetrating and passing some developmental cycles starts leaving the snail as cercariae. Cercaria penetrates the skin of human, migrates in the blood via the lungs to the liver and transform into young worms which eventually reside in associated destination (Massara et al., 2004).

One case in point for most sub-Saharan African countries where schistosomiasis is endemic is that control programmes based on oral drug delivery have been developed and partially implemented as a means to control morbidity within the affected populations. However, questions remain about the long-term impact of the programmes on parasite transmission. Treatment of the most heavily infected segment of the population, i.e., school age children, has been suggested as the best practical means of reducing contamination of local water by schistosoma eggs (Kapito-Tembo et al., 2009). Although treatment has been shown to significantly reduce *Schistosoma* egg output, by about 90% in the case of *S. haematobium* among the treated subjects over the short term (Kapito-Tembo et al., 2009), the actual impact of long-term, population based treatment programmes on year-to-year transmission of Schistosomiasis has not been fully explored.

The public health significance of schistosomiasis is often underestimated partly because like all helminthic infections, its distribution is usually wide-spread with few people having heavy infections and severe disease while the majority is asymptomatic with lighter infections. Schistosomiasis is a neglected tropical disease that can cause death although research shows that rather than mortality, the main outcome of infection is chronic disability (King et.al. 2005; King & Dangerfield-Cha, 2008). The degree of morbidity is usually related both to the intensity of infection and the total duration of the infection. Children of school age are usually the highly vulnerable group and represent the infection status in the population. According to the WHO

expert committee report on schistosomiasis, children should be the first target group for intervention because of the detrimental effects the disease has on their growth and development (WHO, 1993). Early diagnosis and treatment of children shortens the duration of heavy infections thereby reducing the risk of severe disease and childhood disability (King et.al. 2005).

The World Health Organization (WHO) classifies schistosomiasis as one of the Neglected Tropical Diseases (NTD's). It is believed that 1 billion people are affected with one or more neglected tropical diseases (WHO, 2002). Yet, these diseases remain neglected at all levels. They are called neglected because of the following reasons;

- These diseases persist exclusively in the poorest and the most marginalized communities, and have been eliminated and thus forgotten in wealthier places.
- They are not highly visible because they do not kill large numbers of people (approx. 500,000 deaths annually).
- They have to compete with more visible diseases like HIV, TB and Malaria with higher mortality rates and attract more attention nationally and internationally.
- They do not cause explosive outbreaks that attract public and media attention
- They cause enormous misery but do not kill large numbers of people
- They affect the poorest of the poor so there is no incentive for the development of new diagnostic tools, drugs and vaccines for diseases with a market they cannot pay
- Endemic countries have limited resources to invest in health and competition for funds is fierce.

Schistosomiasis is endemic in much of Africa, yet affected nations do not always treat it as a health priority. One reason for this is the perception that sequelae are mild, since infected people are often able to maintain an active lifestyle.

According to Awotunde (2002), surveillance for schistosomiasis is very important in establishing endemicity and in the planning of control operations. It is believed that many areas of the world

are yet un-sampled while some have been sampled without making definite data available on the factors that may have influence on prevalence in such localities.

3.1 Distribution

Schistosomiasis infections are generally widely distributed within populations at risk with few individuals harbouring the majority of worms. A study one by Seto (2007), found that infection levels are lower in adults than in children, which maybe as a result of partially protective, acquired immunity and/or changes in water contact behaviours with age. Numerous studies have assessed the relationship between age, water contact and infection.

Some studies suggest that changes in exposure with age do not completely explain the infection levels (Butterworth et.al 1992). A study by Scott et.al (2003) in Senegal found that water contact differed with age, sex and location, but was not related to infection intensity. In Brazil, Bethony (2001) found water contact to be weakly associated with infection, after adjusting for household risk factors. It is however, a fact that exposures are largely related with fishing, tending cattle, harvesting crops and swimming.

3.2 Environmental Issues

The aspect of snail control has been an issue of debate in the recent past. However, it is a well known fact that snail control is expensive, difficult to sustain and the use of molluscicides has negative effects on the environment. Given the complex life-cycle of the snail (intermediate host), mathematical modeling has been used to predict the outcome of control strategies (Williams et.al. 2002). In this article, Williams and were able to determine that infrastructural water-management projects had a huge impact on the habitat of snails and that mathematical modeling would help predict the effect of changes in water management on the frequency and transmission dynamics of infectious diseases. If through increased contacts any such negative effects are foreseen, control and preventive measures could be taken to avert the disease. Thus water-management projects may lead to less contacts and hence, less risk of the disease.

3.3 Transmission, Disease Pattern and Risk effects

Schistosomiasis represents a significant health burden for many developing countries. Accumulation of parasite eggs in host tissues and the consequent egg-induced inflammatory response lead to both acute and chronic injury of the ^{genitourinary} tract in the case of Urinary schistosomiasis. Haematuria, anaemia and under nutrition are clinical correlates of infection in childhood. Long-term manifestations of infection include scarring and ^{stenosis} of the ureters and bladder, chronic bacterial super-infection, and kidney failure. King et.al (2002) mention that, while Schistosomiasis infection is chronic by nature and is unlikely to be directly lethal, its toll of morbidity is high in the endemic areas, where health-care budgets are often limited.

Schistosomiasis thrives in places with unsafe water, poor sanitation, and limited access to basic health. It is in the category of diseases that blind, debilitate, deform and maim (Talaat et.al. 2006). With schistosomiasis, severe impairments occur after years of virtually silent infection.

According to Engels et.al (2002), School-aged children, particularly those between 10-15 years of age, are at risk of contracting Schistosomiasis. Understandably, this pattern is likely due to multiple risk factors, such as higher rates of water activities, anatomical developmental changes of the vasculature supplying genitourinary structures ^{that} harbor the parasite and its eggs (Bichler et.al. 2001). Because schistosomiasis rates peak in early adolescence, complications of infection can affect integral aspects of adolescent life, such as growth and cognitive development impairment thus reducing the child's ability to learn and benefit from attending ^{school}. In adults, it significantly reduces the economic productivity, thereby anchoring millions of people in poverty.

3.4 Factors associated with Schistosomiasis Infection

Observations have been made in endemic regions, in Africa, Asia, Latin America and the Caribbean, where socio-economic and behavioural factors, as well as water-supply patterns, have been shown to play major roles in the transmission of the parasites causing human schistosomiasis (Barreto, 1991; Cautinho et.al., 1997; Gazzinelli et.al., 2006; Kloos et.al., 2008; Rudge et.al., 2008). Some other studies have reported ^a likely role of parental education and environmental factors (Stothard et.al., 2006). Many other factors influence the epidemiology of

schistosomiasis. Edungbola (1980) reported the relationship between water utilization and schistosomiasis; while Okanla (1991) reported that parental occupation maybe a factor in contracting schistosomiasis. Socio-demographic variables and out-door activities associated with water contact have always been associated with schistosoma infection (Massara et.al., 2006). In Brazil, Costa (1983) reported that the water used for drinking, bathing and home use purposes showed to be factors closely associated with *S. Mansoni* infection in school children, while Coutinho et.al (1997) showed that water contact in household activities were associated with the infection in people aged less than 15 years. Cairncross et.al (1996) indicates that an important characteristic for schistosomiasis transmission is a set of household activities related with water use. In this study, frequency of water contact was evaluated, regarding the most common activities in their communities, such as washing clothes, fetching water, taking baths, swimming, fishing, crossing the river, watering vegetable cultivation and working in agricultural areas and sand extraction. Such activities maybe related with infection foci leading to the spread of risk factors for the family members. Socio-economic status and its correlation with schistosomiasis has also been extensively studied in several countries worldwide (Bethony et.al. 2004). However, knowledge on specific, local features of water contact that determine schistosomiasis infection, as well as the local populations have regarding the disease are essential to provide support to elaborate control strategies involving local communities. As Massara et.al (2004) point out, seeking such conditional characteristics has a social meaning as it allows investigators to realize local people behaviour enabling an association between the disease and activities that may result in increasing risk factors in order to propose specific prevention strategies.

Satayathum et.al (2006) conducted a study in Kenya on factors affecting infection or re-infection with *Schistosoma haematobium* in coastal Kenya. In this study, multivariable proportional hazards model indicated that village-sex interaction were independent predictors of infection risk in the face of the continuing, school-based age-targeted mass treatment campaign. Of these, village of residence was estimated to have the greatest effect on risk for infection, suggesting that local environmental factors should be considered for the optimum design of schistosomiasis control programs. It is believed that factors such as location of residence in the afflicted area, garbage disposal, gender and age could play a vital role in the transmission of schistosomiasis. In principle, schistosomiasis can be eliminated by behavioural changes, sanitation, and safe water

supply. Education programmes can improve knowledge about the disease and health-care seeking, but behaviour can be difficult to change without other options for water contact. In a study done by Agnew-Blais et.al (2009) in Ng'ombe Township, Clinical Officers detected schistosomiasis with a sensitivity of 24.7% and specificity of 98.2% after history and physical examination of pupils. These results reveal that peri-urban populations have a significant but under-recognised vulnerability to infection, and suggest that history and physical examination alone are inadequate for identifying a treatment population.

Chapter 4

4.0 METHODOLOGY

4.1 RESEARCH SETTING

The study was on a population of children living in Ng'ombe Township, a peri-urban compound of Lusaka, the capital of Zambia. Data from the Zambia Central Statistics Office (Census of Population and Housing, 2000) indicated that 58% of the population in the peri-urban compounds of the capital were considered poor by national standards, and 39% were considered extremely poor in 2000. Lusaka district had a 27% unemployment rate.

Ng'ombe Township was one of the 16 peri-urban settlements surrounding Lusaka and contained 27 993 inhabitants within 6044 households (Census of Population and Housing, 2000). There were 18 community and 10 Government schools within Ng'ombe which served the Township's school-age children. The study was done in 5 Government Schools located in Ng'ombe Township. The schools were selected on the basis that they all participated in the Zambia Bilharzia Control Program in 2007 in which the prevalence was found to be 30%.

4.2 STUDY POPULATION AND DESIGN

This study adopted an exploratory cross-sectional study design. It was limited to children attending grade three (3) to grade five (5). Previous studies which indicated that these grades represent the most affected 'school-grades' in a primary school relatively well. Kapito-Tembo, et al., (2009) and Siziya & Mushanga (1996) describe this population as the most intensely affected in endemic communities. All pupils, both boys and girls, were eligible for the study though random sampling of classes was used.

4.3 SAMPLE SIZE

The proportion of infected pupils was 30%

Using Epi info, and taking the following into consideration:

Population size	= 900 (An average of 60 Pupils per class for the 3-5 grades in five schools)
Expected Frequency	= 30%
Worst Acceptable	= 25%

At 95% Confidence level, the sample size became 238 which was increased by 10% to **264** to cater for non response and missing data. This is obtained by dividing 238 by 0.9

4.4 SAMPLING

Five schools, namely; Aisha, Chikumbuso, PTA Community, Zambia Open Community and Flying Angels schools were selected for this study. Out of fifteen classes, five classes attending school in the morning were sampled using a computer-aided simple random selection procedure. All boys and girls in selected classes were eligible for the study. The collection of all urine and stool specimens took place between 10:00hrs in the morning and 14:00hrs in the afternoon because the sensitivity for the detection of *shistosoma* eggs is optimal for samples collected during this period of the day. Each specimen was identified by a number that corresponded to the one on the questionnaire.

4.5 INCLUSION CRITERIA

All assenting children in randomly selected classes, providing urine and stool specimens were included in the study.

4.6 EXCLUSION CRITERIA

Children who refused to participate or whose parents/guardians opted out to participate, who were absent from school, and those who were unable to produce specimens were excluded from the study.

4.7 QUESTIONNAIRE SURVEY

Information relating to factors associated with Schistosomiasis in the five schools of Ng'ombe Township was collected from school going children. Structured interview schedule (Appendix 3) was used to collect quantitative data. The interview schedule captured demographic variables, knowledge on schistosomiasis and factors associated with the schistosomiasis infection. The schedule had close-ended questions. These close-ended questions helped capture specific and guided responses. The questionnaire was in most cases in the local language (Cinyanja) as the target group was not very conversant with the English language.

4.8 PILOT STUDY

The pilot study of this study was done at a school that is very close to Ng'ombe Township. This helped test the tool and also helped determine the duration for each interview. Ten percent of the sample size (26) was interviewed during the pilot study.

4.9 ETHICAL CONSIDERATIONS

This study was performed under a protocol that was reviewed and approved by the Biomedical Research Ethics Committee of The University of Zambia. Written permission was obtained from the Permanent Secretary in the Ministry of Health (Appendix 5) and the Permanent Secretary in the Ministry of Education (Appendix 5). Parents/guardians were informed that they were free to “opt-out” if they did not want their children to take part in the study.

The purpose of the study was explained to both Parents and study participants (Appendix 4). Those that declined to participate in the study were not forced, but were assured of their protected privileges. The respondents were interviewed in their classrooms and only stool and urine specimens were collected from them.

Privacy and confidentiality was maintained. The names of the respondents did not appear anywhere on the forms. The respondents were thus assured of utmost confidentiality.

All children found positive with Schistosomiasis were referred to Ng'ombe clinic for treatment.

4.10 LABORATORY ANALYSIS

Stool examination – Parasitological diagnosis was carried out using the Kato-Katz quantitative method (Katz et.al 1972). Two slides of each stool sample were examined. The quantitative examination was performed for *S. Mansoni*.

Urine examination – Urine samples were tested for micro-haematuria. Each specimen was thoroughly mixed, by drawing it in and out of the syringe ten (10) times, before a 10 ml volume was slowly forced through a 8µmole pore membrane filter. Each filter was moistened with a drop of physiological saline before being checked for eggs under a microscope at X40 magnification. All the eggs detected were counted.

The slides were read by two technicians from the Bacteriological Laboratory of the University Teaching Hospital. This was done in makeshift laboratories that were in all cases provided by the schools.

4.11 DATA ANALYSIS

Raw data from the field was edited for consistency and legibility on a daily basis. The closed ended responses were pre-coded before the interview to ensure easy entry and analysis of data using STATA/SE version 11.1 Computer Software.

Parasitological data was entered in the WHO Parasitological Survey form (Appendix 5) and exported to the STATA/SE computer package for analysis.

The Chi-Square test was used to compare proportions and Fischer's exact test was used when expected frequencies were less than five. A result yielding a P value of less than 5% was considered statistically significant and was included in a multivariate analysis. Logistic regression analysis was used to assess the independent associations between disease outcome and explanatory variables. Odds ratios and their 95% confidence intervals are reported.

Chapter 5

5.0 FINDINGS

A total of 260 pupils aged 8-14 years participated in the study out of which 160 (61.5%) were boys. The mean age for all the pupils was 10.3 with a standard deviation of 1.31 years.

5.1 Schistosomiasis Prevalence

No cases of *S. mansoni* were recorded in the five schools of Ng'ombe Township. However, the prevalence of *S. haematobium* infection was 13.1% (34/260) as shown in table 1.

Table 1 details the prevalence of *S. haematobium* infection, stratified by age and gender. The 10-11 years age group showed a high prevalence of Schistosomiasis as compared to the other age groups.

There was no difference in prevalence of Schistosomiasis as regards to gender in the study participants, 13.1% for males and 13.0% for females.

Table 1. Prevalence of Schistosomiasis infection among school children of the five schools of Ng'ombe Township in Lusaka district, categorized by age and gender.

Factor	No. examined	No. infected	Prevalence (%)	P-Value
Age-group (Years)				
<10	80	4	5.0	0.016
10-11	128	24	18.8	
≥12	52	6	11.5	
Gender				
Males	160	21	13.1	0.977
Females	100	13	13.0	

5.2 Socio-demographic factors and schistosomiasis-related knowledge

Table 2 shows the distribution of the socio-demographic factors of the respondents and their knowledge of the disease, mode of transmission and its treatment.

Overall, 200 (76.9%) of the pupils who were interviewed had heard about Schistosomiasis and were also able to give its correct symptoms, 188 (72.3%) of them gave the correct mode of transmission and 238 (91.5%) knew the correct treatment for the disease.

Socio-demographic Characteristics and schistosomiasis-related knowledge

Table 2. Social demographic characteristics and schistosomiasis-related knowledge of respondents

Factor	n	%
Age		
<10 years	80	30.8
10-11 years	128	49.2
12+ years	52	20.0
Gender		
Male	160	61.5
Female	100	38.5
Primary School		
Aisha	52	20.0
Chikumbuso	52	20.0
Flying angels	52	20.0
^a PTA Community	52	20.0
^b ZOCS	52	20.0
Grade		
Three	108	41.5
Four	66	25.4
Five	86	33.1
Heard of Bilharzia		
Yes	200	76.9
No	60	23.08
Know what Bilharzia is		
Yes	198	76.15
No	62	23.9

Able to give correct symptom of Bilharzia

Yes	200	76.9
No	60	23.1

Able to give correct mode of transmission

Yes	188	72.3
No	72	27.7

Able to give correct treatment of Bilharzia

Yes	238	91.5
No	22	8.5

^aPTA: Parents Teachers Community School; ^bZOCS: Zambia Open Community School

5.3 Sanitation characteristics

Table 3 shows the distribution of the general sanitation characteristics of the respondents by Schistosomiasis. Two hundred and fifty four (97.7%) confirmed the availability of toilets in schools, 158 (60.8%) children said that they came into contact with a stream/river/pond.

Table 3. Sanitation characteristics of respondents (N=260)

Factor	n	%
Are there toilets/latrines in your school		
Yes	254	97.7
No	6	2.3
If yes, any water to wash hands		
Yes	174	66.9
No	4	1.5
Sometimes	82	31.5
Is there open water source		
Yes	238	91.5
No	22	8.5
Do you ever come into contact with water?		
Yes	158	60.8
No	102	39.2
If yes, under what circumstances		
When playing/swimming	170	65.4
When crossing it	66	25.4
When drawing water for domestic/agricultural use	24	9.2

What is the source of drinking water at school?

A communal hand pump	22	8.5
A public water tap	238	91.5

What is the source of drinking water at home

A well	8	3.1
A communal hand pump	142	54.6
A public water tap	36	13.9
A private water tap	72	27.7
Other	2	0.8

Have you ever suffered from Bilharzia

Yes	32	12.3
No	212	81.5
I don't know	16	6.2

5.4 Socio-economic status

On the socio-economic status parameter, Table 4 shows the proportion of respondents that had television and radio sets or either of the two. The majority of the respondents, 255 (98.1%) mentioned that they had either television or radio sets at home.

Table 4. Socio-economic status of respondents (N=260)

Do you have a TV or Radio at home?	n	%
Yes	255	98.1
No	5	1.9

5.5 Demographic factors associated with schistosomiasis

Table 5 shows demographic variables associated with Schistosomiasis. Age (P=0.016) and Grade (P=0.033) were significantly associated with Schistosomiasis.

Table 5. Demographic variables associated with Schistosomiasis in bivariate analyses

Factor	Without Bilharzia		With Bilharzia		P-Value
	n	%	n	%	
Age (years)					
<10	76	33.6	4	11.8	0.016
10-11	104	46.0	24	70.6	
12+	46	20.4	6	17.7	
Gender					
Male	139	61.5	21	61.8	0.977
Female	87	38.5	13	38.2	
Primary School					
Aisha	44	19.5	9	26.5	0.459
Chikumbuso	44	19.5	8	23.5	
Flying angels	45	19.9	3	8.8	
PTA Community	42	18.6	8	23.5	
ZOCS	51	22.6	6	17.7	
Grade					
Three	92	40.7	16	47.1	0.033
Four	53	23.5	13	38.2	
Five	81	35.8	5	14.7	

5.6 Determinants of schistosomiasis in a multivariate analysis

Table 6 reports the results of multivariate regression analysis revealing independent risk factors for schistosomiasis. In an unadjusted model, pupils that did not come into contact with water were 64% (OR=0.36; 95% CI [0.15, 0.86]) less likely to get infected compared to those that came into contact with water. There was no difference adjusting, giving an AOR of 0.42 (95% CI 0.17-1.06).

Age was significantly associated with infection. Compared with participants of age less than 10 years, participants aged 10-11 years and those aged 12 years or older were 5.17 (95% CI [1.62, 16.49]) and 14.96 (95% CI [2.52, 88.65]) times more likely to get infected respectively. In univariate analysis, children in grade five were 65% (95% CI [0.02, 0.40]) less likely to have Schistosomiasis than those in grade three.

Pupils whose source of water at school was a public water tap were 73% (95% CI [0.09, 0.90]) less likely to have schistosomiasis than those that were using a communal hand pump at school.

Table 7. Multivariate regression results: likelihood of urinary schistosomiasis infestation among school-going children based on selected associated characteristics

Factor	OR	95% C.I	AOR	95% C.I
Come into contact with water				
Yes®	Ref		Ref	
No	0.36	0.15-0.86	0.42	0.17-1.06
Age				
<10 years®	Ref		Ref	
10-11 years	4.38	1.46-13.16	5.17	1.62-16.49
=12 years	2.48	0.66-9.25	14.96	2.52-88.65
Grade				
Three®	Ref		Ref	
Four	1.41	0.63-3.16	0.64	0.25-1.65
Five	0.35	0.12-1.01	0.09	0.02-0.40
Source of water at School				
A communal hand pump®	Ref		Ref	
A public water tap	0.27	0.10-0.73	0.30	0.09-0.90

OR: odds ratio; AOR: adjusted odds ratio; ®: Reference group

CHAPTER 6

6.0 DISCUSSION

6.1 PREVALENCE OF SCHISTOSOMIASIS

The overall prevalence of Schistosomiasis was 13.1% in children between the ages of 8 and 14 years. This finding accords that of Simoonga et al., (2008) who found a prevalence of 9.6%.

6.2 FACTORS ASSOCIATED WITH SCHISTOSOMIASIS

DEMOGRAPHIC VARIABLES

Age was significantly associated with the disease in the current study. Satayathum et al., (2006) also observed the same association between age and urinary schistosomiasis. Older age groups were more likely to be infected inspite of the wider confidence interval. Nevertheless, the result conforms to the findings by Firmo et al., (2006) who in their study found age to be predictive of infection. Studies by Siziya et al., (1993) and Boatın et al., (1984) reveal that the most heavily infected persons with *S. haematobium* were children in the age group 10 to 14 years. These are mainly found in Grades Three, Four or Five. This similar observation has been reported by Kapito-Tembo et al., (2009) who found an increasing trend in infection among children from 6 years to 13 years with a decline from 14 years. This is not surprising as this age group is most adventurous and the decline after age 14 could be attributed to the change in behaviour as children reach puberty.

There was no significant association between gender and infection which conforms with findings by Satayathum et.al (2006) and Opara et al., (2007). This, however, contrasts the finding by Agnew-Blais et al., (2009), Ogbeide et al., (1994), and Kapito-Tembo et al., (2009) who found that gender was associated with infection depending on sex-specific water use behaviour. Differences in the finding between the present study and that by Agnew-Blais et al., (2009) that was done in the same study population could be attributed to sampling error.

6.3 KNOWLEDGE, TRANSMISSION AND TREATMENT OF DISEASE

Study participants demonstrated a high level of knowledge (76.2%) on Schistosomiasis in terms of what the disease is. A total of 188 (72.3%) pupils gave the correct mode of transmission and a remarkable 238 (91.5%) gave the correct treatment for the disease. This is in line with Ndyomugenyi (2001) who in his paper paid tribute to t who made information about the disease available to the school-going children, particularly their teachers and the general academic syllabus. However, a significant proportion of children had no knowledge, 44 (23.1%) on the transmission and treatment of the disease. These were mostly children from lower grades which could explain the need to introduce such important information to pupils as they begin school. Nevertheless, no significant associations were observed between kn and infection.

6.4 WATER CONTACT ACTIVITIES

Schistosomiasis is essentially tied to local water-use behaviours. Some studies have revealed a strong association of human water contact and infection. King (2001), Ndyomugenyi (2001), Kapito-Tembo et al., (2009) and Satayathum et al., (2006) all mention this association. Edungbola (1980) also reported the relationship between water utilization and schistosomiasis. According to Cairncross et al., (1996) and Watts et al., (1998), an important characteristic for schistosomiasis transmission is a set of household activities related with water use. Watts et al., (1998) evaluated the frequency of water contact activities, regarding the most common activities in their communities, such as washing clothes, fetching water, taking baths, swimming, fishing, crossing the river, watering vegetable cultivation and working in agricultural areas and sand extraction. In contrast to these previous studies, water was not a significant predictor of infection in the current study. The difference in the findings observed in the current study and those reported elsewhere could be attributed to different roles boys and girls at household level in relation to water contact such as fetching water for domestic and agricultural use, crossing the stream when going or coming back from school and recreational activities such as bathing. The significant relationship between water contact and infection in bivariate analysis might have been compounded by water source such that in multivariate analysis, water source remained significantly associated with infection while water contact was no longer significant.

Use of a public water tap as regards the source of drinking water at school was a protective factor. The plausible explanation for this could be that public water is treated water from the local water authority.

6.5 STUDY LIMITATIONS

The findings of this study cannot be generalized as by gathering data among participants of an in-school health programme, children not in schools at the time of screening were excluded from the study.

The other limitation is that only one urine and stool specimen was collected and children were not encouraged to conduct exercises prior to specimen collection probably because of the debate on the type that achieves maximum yield of eggs. Studies by Doehring et al., (1983) and Warren et al., (1978) reveal that repeated examination of urine specimen over consecutive days and exercises prior to urine or stool collection improves egg detection. Hence, we might have underestimated the prevalence of urinary schistosomiasis in our population.

6.6 CONCLUSION

- 1.) In this study, the prevalence of urinary schistosomiasis in the five Schools was found to be 13.1%.
- 2.) None of the pupils was found with *S.mansoni*.
- 3.) Knowledge of the disease by study participants was encouragingly high.
- 4.) Water tap as a source of water at school was protective.

6.7 RECOMMENDATIONS

- 1.) The fact that the study revealed only one type of schistosomiasis implies that only one drug, Praziquantel, should be considered for treatment of infected children in Ng'ombe Township.
- 2.) Provision of communal water taps would minimize getting in contact with contaminated water.

- 3.) School-age children who are out of school should be invited to participate in future studies to produce a more reliable estimate for the prevalence of urinary schistosomiasis.
- 4.) Further studies to be conducted in Ng'ombe Township that should collect two urine and stool specimens and ask children to perform the right type of exercises prior to urine collection
- 5.) In terms of education, continuing health education programmes are clearly needed to maintain the observed levels of awareness of the disease in schools.

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APPENDICES

Appendix 1.

INFORMED CONSENT.

PREVELANCE AND FACTORS ASSOCIATED SCHISTOSOMIASIS IN FIVE SCHOOLS OF NG'OMBE TOWNSHIP IN LUSAKA DISTRICT.

INTRODUCTION.

I Ng'andwe Kalungwana, a student of Masters of Public Health at the University of Zambia is requesting for your child's participation in the research study mentioned above. The essence of the study is to assess the prevalence and factors associated with Schistosomiasis in the five schools of Ng'ombe Township. Before you decide whether or not your child should participate in the study, I would like to explain to you the purpose of the study, any risk or benefits and what is expected of you. Your child's participation in this study is entirely voluntary. Your child is under no obligation to participate. If you decide that your child does not participate, no privileges will be taken away from him or her. If you agree that your child participates, you will be asked to sign this consent in front of someone.

PURPOSE OF THE STUDY

The study will determine the prevalence and factors associated with Schistosomiasis in the five schools of Ng'ombe Township. The information obtained will help your child, the school and the Ministry of Health take measures in understanding and the importance of controlling this disease.

PROCEDURES

Your child will be required to provide urine and stool specimens in the containers that will be provided by the study team after which he or she will be asked some questions relating to Schistosomiasis. The responses will be recorded on the questionnaire and the interview is expected to last about 30 minutes.

RISKS AND DISCOMFORTS

No risks are anticipated in this particular study though your child might experience some minor embarrassment/discomfort in providing the urine and stool specimens that will be analysed by our laboratory staff.

BENEFITS

There are no immediate benefits to your child participating in this study. However, the information which will be obtained will help the policy makers in the Ministry of Health take measures in controlling this disease that has troubled the people of Ng'ombe Township for a long time now. No gift or money will be given in exchange for the information obtained.

CONFIDENTIALITY

Privacy and confidentiality will be maintained. The name of your child will not appear anywhere on the forms but will instead be identified by numbers. Your child will thus be assured that the information he or she will provide will not be used against him/her in any way. Personal information will not be released without your permission except when required by law.

The MOH, the UNZA Research Ethics Committee or the School of Medicine may review your records again but this will be done with confidentiality.

Appendix 2

ASSENT FORM

The purpose of this study has been explained to me and I understand the purpose, benefits, risks and discomforts, and confidentiality of the study.

I further understand that: if I agree that my child takes part in this study, he/she has the right to withdraw at any time without having to give an explanation and that taking part in this study is purely voluntary.

I _____ (names)

agree that my child takes part in this study.

Signed _____ Date _____ (participant)

Parent's signature or thumb print.

Signed: _____ Date _____ _____ (Witness)

Signed: _____ Date _____ _____ (Researcher)

PERSONS TO CONTACT FOR PROBLEMS OR QUERIES

1. Ng'andwe Kalungwana
UNZA, School of Medicine
P.O Box 50110
Lusaka
Cell: 0978751106

2. Professor Seter Siziya
Department of Community Medicine
School of Medicine
P.O Box 50110
Lusaka
Tel: 01256181

3. The Chairperson
UNZA Biomedical Research Ethics Committee
P.O Box 50110
Lusaka

Appendix 3

CHIBVOMELEKEZO PA MBUYO PA KU ZIWISIDWA KUCHULUKA KWA TENDA YA KUTHUNDA NGATI KU PAMBUKA GAZI (SCHISTOSOMIASIS) NDI ZOLENGA KAPENA ZO SATILA ZAKE NU MA SIKULU ASANU A MUKOMBONI Y NG'OMBE MU DELA YA LUSAKA.

CHIYAMBI

Ine Ng'andwe Kalungwana, ndine wamaphunziro ya zaumoyo pa sikulu ya ma phunziro ya pamwanza pa University of Zambia. Cholinga cha kafukufuku aka ndikufuna kusiwa kuchuluka ndi zolenga za matendaYa khuthunda ngati ku pambuka gazi (Schistosomiasis) mu ma sikulu asanu a mu Ng'ombe. Pomwe mukalibe kulola mwana manu kutengako mbali ku kafukufuku aka, ndiloleleni ndi ku fotokozeleni cholinga chake, ndi zoyopya, ndi zo phindulamu ndi zoyembekeleka kwa ino. Kutengako mbali kwa mwana manu mu kafukufuku aka ndi mozipeleka ndipo si mwachikakamizo mukasankha kuti mwana wanu asatengeko mbali, sazalandidwa kanthu kalikonse. Ngati mwa bvomekeza, muzafunsidwa kusaina chibvomelezo.

CHOLINGA CHA KAFUKUFUKU AKA

Kafukufuku aka ka za langiza kuchuluka ndizlegesa mwakuyangana ndi matenda ya kuthunda ngati ku pambuka gazi (Schistosomiasis) muma sikulu asanu a mu komboni ya Ng'ombe mu Lusaka. Zotulukamu mu kafukufuku aka ka zathandiza mwana wanu, sikulu, ndi chigawo cha zaumoyo za ziko yathu mukumvetsa ndi kuziwa kafunikila kwakw kwa kuteteza aya matenda.

KACHITIDWE

Mwana wanu azayenela ku peleka mitundo ndi tuvuvu muchotengelako chomwe azapasidwa ndi aevulu ya kafukufuku. Pambuyo paka azafunsidwa mafunso yolinga ka matenda ya Schistosomiasis. Mayankho yaza lembedwa pa pepala ya nso. Kukambilana kuzatenga nthawi pafupifupi dekha ya ola imozi.

ZOYOPYA

Kulibe choyopya chilichonse chomwe chiyembekezeleka kuchitika pa kafukufuku aka koma mwana wanu angamwe manyazi pakupeleka mkozo kena tuvi, zomwe zizafunika kuti tikapime muma labu athu.

ZOPHINDULAMU

Pakutegaku mbali mukafukufuku aka, mwana wanu saza pezamu phindu yapafupi, koma zotulukamo mukafukufuku aka ziza thandiza opanga malamulo kuti apenze njira yotetezelamo matenda aya yomwe yavutisa anthu a mu komboni ya Ng'ombe kwa kanthawi.

Mwana wanu sazapasidwa ndalama kapena mphaso zina zotele.

ZACHISINSI

Chisinsi chamwana wanu chisazungika ndipo zina lake siza oneka pa pepala iliyonse chifukwa chakuti mwana wanu azaziwika ndimanambala. Mwana wanu chisimbimi kuti zotulukamu mukafukufuku aka sizisasewenzesedwa munjira iliyonse yomuononga.

Kulibe kanthu komwe kazaloledwa kupasidwa kumunthu aliyense kopanda chilolezo chanu, pokapo malamulo aziko atelo. Chigawo cha zaumoyo, asikulu ya University of Zambia kapena asikulu ya zaumoyo angaone zolembedwa mu pa mwana wanu mukafukufuku aka, koma izi zizachitika mwachisinsi.

PEPALA YAKUSIYINAPO CHIBVOMELEZO

Cholinga cha kafukufuku aka chinaziwisidwa kwa ine ndipo ndinabvesesa zones zolinga ku zoyopya, zo phindulako, ndi za chisinsi. Ndiponso ndibvesesa kuti, ngati ndabvomekeza kuti mwana wanga atengeko mbali, ali ndi ufulu wakusiya kutengakombali pa nthawi yliyonse kopanda kupeleka chfukwa chilichonse popeza kutengako kwake ndi kwaufulu, kozipeleka chabe.

Ine..... (Dzina)

Ndifomeleza mwana wanga kutengako mbali mukafukufuku aka.

Kusayina..... Siku
(wotengako mbali)

Kusayina..... Siku
(Mboni)

Kusayina..... Siku
(Bwochita kafukufuku)

Appendix 4

PART I: Prevalence and factors associated with Schistosomiasis in five schools of Ng'ombe township of Lusaka district Interview Questionnaire
Grade 3-5 School-going children
Questionnaire Number

Code

Respondent's Identification

Residence: 1. (State place of residence).....

Province: 1. Lusaka []

Recruitment Centre:

Name of primary school.....

Age of Respondent

Grade of Respondent: 1. Grade 3 [] 2. Grade 4 []
3. Grade 5 []

Gender: 1. Male [] 2. Female []

Interviewer's Identification

Interviewer's Name.....

Study Site (Specify Name of school).....

Date of Interviews.....

Day Month Year

Section B

Knowledge Attitude and Practices:

1. Have you ever heard of Bilharzia?

a. Yes

b. No []

2. If your answer is yes, do you know what Bilharzia is?

a. Yes

b. No. []

c. If no, explain what Bilharzia is in the local language

3. What are the symptoms of Bilharzia?

a. Stomach ache

b. Malnutrition

c. Failure to grow

d. Learning difficulty at school

e. Diarrhea []

f. Vomiting

g. Presence of blood in Urine

h. Presence of blood in Stool

i. Pain when urinating

4. Do you know how a person can get Bilharzia?

- a. From mosquito bites
- b. From flies lying on your food
- c. By eating fruits and vegetables that have not been washed
- d. By swimming or playing in soiled or contaminated water
- e. By walking barefoot
- f. By eating without washing your hands first
- g. By wearing the same clothes
- h. By witchcraft
- i. I don't know []

5. How is a person suffering from Bilharzia be treated?

- a. By taking tablets for Bilharzia
- b. By receiving an injection
- c. By visiting a traditional healer
- d. I don't know []

Section C: Factors Associated with Bilharzia

6. Are there any toilets/latrines in your school

a. Yes

b. No []

7. If there are latrines/toilets in your school, is there any water to wash your hands after using them?

a. Yes

b. No

c. Sometimes []

8. If there are latrines/toilets in your school, do you know how many times there are cleaned?

a. Daily

b. Twice a week

c. Once a week

d. Once a month

e. Other (please specify :.....)

f. I don't know []

9. Do you have any latrines/toilets at home?

a. Yes

b. No []

10. If yes, is there always water to wash your hands after using them?

- a. Yes
- b. No
- c. Sometimes []

11. If there are latrines/toilets at home, do you know how many times there are cleaned?

- a. . Daily
- b. Twice a week
- c. Once a week
- d. Once a month
- e. Other (please specify :.....)
- f. I don't know []

12. If there is no water (near the toilet/latrine), do people usually go and wash their hands in the house or other nearby water point after using them?

- a. Always
- b. Sometimes
- c. Never []

13. Where do you urinate/defecate most of the times when you are at school?

- a. Outside
- b. In the street gutter
- c. In the stream/water body
- d. In an open latrine/toilet
- e. In the bush
- f. Other (please specify:.....) []

14. Where do you urinate/defecate most of the times when y are neither at home or at school?

- a. Outside
- b. In the street gutter
- c. In the stream/water body
- d. In an open latrine/toilet
- e. In the bush
- f. Other (please specify:.....) []

15. Do you often walk barefoot?

- a. Never
- b. Always
- c. Only at home/inside
- d. Only outside
- e. []

16. Is there an open water source (any water body including streams, dams, ponds and swamps) near your home/school?

a. Yes

b. No

c. If no, proceed to Q. 20 []

17. How far is an open water source from your home or school?

a. Far from home but closer to school

b. Far from school but closer to home

c. Far from both home and school

d. Nearer to both home and school []

18. Do you ever come into contact with any of the water sources mentioned above?

a. Yes

b. No

c. If no, skip to Q.20 []

19. If yes, under what circumstances do you come into contact with any of the above mentioned water bodies?

a. When playing/swimming

b. When drawing water for domestic use

c. When crossing it by either going to school or just going somewhere

d. When drawing water for agricultural/building purposes

- e. When disposing off household garbage
 - f. When urinating/defecating
 - g. Other (please specify)
- []

20. Is there a source of drinking water at your school?

- a. Yes
- b. No

21. If there is a source of drinking water at your school, what is it?

- a. A stream/river
 - b. A well
 - c. A communal hand pump
 - d. A public water tap
 - e. A private water tap
 - f. Other (please specify)
- []

22. What is the source of drinking water at your home?

- a. A stream/river
 - b. A well
 - c. A communal hand pump
 - d. A public water tap
 - e. A private water tap
 - f. Other (please specify :.....)
- []

23. Have you ever suffered from Bilharzia?

- a. Yes
- b. No
- c. I don't know

24. If yes, have you ever received treatment for Bilharzia?

- a. Yes
- b. No
- c. I don't remember

25. Do you live in Ng'ombe township?

- a. Yes
- b. No

26. If yes, for how long have you been living in this township?

- a. Since I was born
- b. Less than 2 years
- c. Between 3 and 5 years
- d. I don't know

Socio-economic factors

27. Do you have a television set and/or Radio at home?

- a. Both radio and television set
- b. Just radio
- c. Just television
- d. None

28. Any comments or questions you will like to say or ask about my interview with you today?

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

(Interviewer please **thank** respondent for the interviews and time).

Appendix 5 - WHO Parasitological Survey Form:

Appendix 6 – UNZAREC Ethical Clearance

Appendix 7 – Ministry of Education clearance

Appendix 8 – Provincial Medical Officer clearance

Appendix 7 – Ministry of Health clearance

WHO Parasitological Survey Form

File Calculate Statistics Tools

Child Form for Parasitological/Nutritional Data

I - Personal Data [Reset form](#) [Open previous survey](#) [New survey](#)

ID Number Sex: ☐ M ☐ F ☒ Not specified

Family Name First Name Age (years)

II - Nutritional Data

Weight kg Height cm Hb g/dl

Anemia (<11g/dl) ☐ Yes
Severe anemia (<7g/dl) ☐ Yes

III - Parasitological Data Conversion factor (eggs/slide to eggs/gram)

a) stool examination	eggs/slide	eggs/gram	Medium Intensity Infection?	Heavy Intensity Infection?
<i>Ascaris lumbricoides</i>		not tested	☐ Yes	☐ Yes
<i>Toxocara trichiura</i>		not tested	☐ Yes	☐ Yes
Hookworms		not tested	☐ Yes	☐ Yes
<i>Schistosoma mansoni</i> (or <i>S. japonicum</i> or <i>S. mekongi</i>)		not tested	☐ Yes	☐ Yes
Region-specific parasite:		not tested	Other comments:	

S. haematobium ☒ not tested

b) urine visual examination Visible haematuria ☐ Microhaematuria (reagent strip)? ☐ Yes ☐ No

c) urine examination by microscope eggs/10 ml of urine Heavy Intensity Infection? (50eggs/10ml) ☐ Yes



THE UNIVERSITY OF ZAMBIA

BIOMEDICAL RESEARCH ETHICS COMMITTEE

Telephone: 260-1-256067
Telegrams: UNZA, LUSAKA
Telex: UNZALU ZA 44370
Fax: + 260-1-250753
E-mail: unzarec@unza.zm

Ridgeway Campus
P.O. Box 50110
Lusaka, Zambia

**Assurance No. FWA00000338
IRB00001131 of IORG0000774**

29 June, 2010
Ref.: 029-06-10

Mr Ng'andwe Kalungwana
Department of Community Medicine
UNZA School of Medicine
LUSAKA

Dear Mr Kalungwa,

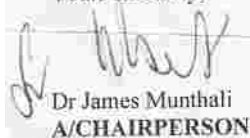
**RE: SUBMITTED RESEARCH PROPOSAL: "PREVALENCE AND FACTORS ASSOCIATED
WITH SCHISTOSOMIASIS IN FIVE SCHOOLS OF NG'OMBE TOWNSHIP, LUSAKA
DISTRICT"**

The above-mentioned research proposal was presented to the Biomedical Research Ethics Committee where changes/clarifications were recommended. We are in receipt of the revised research proposal with changes/clarifications. The proposal is now approved.

CONDITIONS:

- This approval is based strictly on your submitted proposal. Should there be need for you to modify or change the study design or methodology, you will need to seek clearance from the Research Ethics Committee.
- If you have need for further clarification please consult this office. Please note that it is mandatory that you submit a detailed progress report of your study to this Committee every six months and a final copy of your report at the end of the study.
- Any serious adverse events must be reported at once to this Committee.
- Please note that when your approval expires you may need to request for renewal. The request should be accompanied by a Progress Report (Progress Report Forms can be obtained from the Secretariat).
- **Ensure that a final copy of the results is submitted to this Committee.**

Yours sincerely,


Dr James Munthali
A/CHAIRPERSON

Date of approval: 29 June, 2010

Date of expiry: 28 June, 2011

All communications should be addressed to
quote the Permanent Secretary to the Ministry of Education
Not to any individual by name
No.

In reply please

Telephone: 250855/251315/251283
251293/211318/251291
251003/251319



REPUBLIC OF ZAMBIA

MINISTRY OF EDUCATION

MOE/10/38/2

P.O. BOX 60093
LUSAKA

19th August, 2010

Dr. C. Zyaambo
A/MPH Coordinator
Department of Community Medicine
University of Zambia
P. O. Box 50110
LUSAKA

Dear Dr. Zyaambo,

**RE: REQUEST FOR PERMISSION FOR MPH STUDENT TO CONDUCT
THE RESEARCH STUDY: MR. N'GANDWE KALUNGWANA**

I acknowledge receipt of your letter dated 10th August, 2010 regarding the above subject.

I wish to inform you that the Ministry of Education has raised no objection to your request.

Kindly inform Mr. Kalungwana accordingly.

Yours sincerely,

A handwritten signature in blue ink, appearing to be 'T. C. Mwewa'.

T. C. Mwewa
Director - HRA
For/Permanent Secretary - HRA
MINISTRY OF EDUCATION

c.c. The Permanent Secretary, Ministry of Health, LUSAKA

11th October, 2010

The District Director of Health
Lusaka DHMT
Lusaka

**REF: REQUEST FOR AUTHORITY TO CONDUCT RESEARCH
- MR N KALUNGWANA**

Kindly refer to the subject matter above.

2. Enclosed therefore is a self explanatory letter from the Permanent Secretary, Ministry of Health for your further action.
3. Kindly accord him all the necessary support that he may require.



**DR TACKSON K LAMBART
PROVINCIAL MEDICAL OFFICER**

CC The Director Public Health and Research
CC Mr N Kalungwana
Tropical Diseases Research Centre
P O Box 71769
Ndola

*All Correspondence should be addressed to the
Permanent Secretary*

Telephone: +260 211 253040/5

Fax: +260 211 253344



REPUBLIC OF ZAMBIA
MINISTRY OF HEALTH

In reply please quote

No.

MH/101/17/6

NDEKE HOU
P.O. BOX 302
LUSAKA

1st September 2010

Mr. N. Kalungwana
Tropical Diseases Research Centre
P.O Box 71769
NDOLA

Dear Mr Kalungwana,

Re: Request for Authority to Conduct Research

We are in receipt of a request for authority to conduct a study on **“Prevalence and factors associated with Schistosomiasis in five schools of Ng’ombe Township in Lusaka District”**. I wish to inform you that following submission of your research proposal to my Ministry, our review of the same, my Ministry has granted you authority to carry out the study on condition that:

1. The relevant Provincial and District Directors of Health where the study is being conducted are fully appraised;
2. Progress updates are provided to MoH quarterly from the date of commencement of the study;
3. The final study report is cleared by the MoH before any publication or dissemination within or outside the country.

This study is of policy relevance in non-communicable diseases.

Yours sincerely,

Dr. P. Mwaba
Permanent Secretary
MINISTRY OF HEALTH

c.c. Director Public Health and Research