



FACULTY OF HUMANITIES, DEVELOPMENT AND SOCIAL SCIENCES

**The relationship between parental or caregiver monitoring and risky behaviours
that are associated with the prevalence of schistosomiasis amongst adolescent girls
living in endemic KwaZulu-Natal**

By

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Abstract

The high prevalence of schistosomiasis found in adolescents living in KwaZulu-Natal, where the co-infection of multiple diseases is rife, is concerning. Adolescence is a pivotal stage of development that is characterised by transformation and transition. During this period, children are faced with many changes that impact on their health and wellbeing and this thrusts these adolescents into new roles and experiences that can lead to them engaging in behaviours that increase their risk of negative health outcomes. However, the social context within which they exist is considered to be important in this process, especially the parent-adolescent relationship. In particular, parental/caregiver monitoring is considered to serve as a buffer against risky adolescent behaviour.

This study aimed to understand whether risky behaviours are prevalent amongst adolescents in KwaZulu-Natal and whether these risky behaviours are associated with schistosomiasis. This study also sought to establish whether a relationship exists between parental or caregiver monitoring, the prevalence of schistosomiasis infection amongst adolescents, and risky behaviours that increase the chances of infection.

The sample consisted of 970 adolescent girls living in the Ugu district, KwaZulu-Natal. Interviews were administered and urine samples were collected. Crosstabulation analysis and binary logistic regression were utilised to analyse the data. The results indicate that there are significant associations between the prevalence of schistosomiasis and risky adolescent behaviour. Parental/caregiver monitoring was not associated with schistosomiasis infection and did not reduce the odds of schistosomiasis infection when engaging in risky water contact behaviour.

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Glossary

Adolescence: This term refers to the period that occurs between the ages of 10 to 19 years and is regarded as the transition from late childhood to the beginning of early adulthood and is usually characterised as a tempestuous period due to the multiple changes that transpire (Choudhury, Blakemore, & Charman, 2006)

Schistosomiasis: Schistosomiasis which is also known as bilharzia refers to a complex, chronic, debilitating parasitic infection that is caused by trematodes (flat, leaf shaped intestinal parasitic organisms) of the *Schistosoma* genus (Leshem, Meltzer, Marva, & Schwartz, 2009; Senghor et al., 2014). Infection occurs when human skin comes into contact with bodies of fresh water that are infested with schistosomes (Bruun & Aagaard-Hansen, 2008).

Schistosomes: the larval form (cercariae) of parasitic flatworms known as flukes (Bruun & Aagaard-Hansen, 2008).

Schistosoma: A major type of parasite of the *Schistosoma* genus that is found in Africa, Middle East, China and South America which causes schistosomiasis in humans (King, 2007, 2010) .

Urogenital Schistosomiasis: This term refers to the infection with *S. haematobium* which resides in the walls of the bladder and the blood vessels surrounding the urinary and genital tract (Wichmann et al., 2009). The eggs of this parasite then invade the mucosa or the mucous membrane of the urinary and genital tract, causing lesions in the genital tract and hematuria (blood in the urine) (Kjetland, Leutscher, & Ndhlovu, 2012; Wichmann et al., 2009).

Schistosomiasis positive: The presence of at least one egg or ovum of a schistosoma species in any of the specimen samples.

Risky behaviour: This concept refers to any behaviour that is engaged in that may irretrievably compromise health, development and quality of life (Jessor, 1991). For the purpose of the current study, risky behaviour has been categorized into two groups.

General risky behaviour: This refers to risky behaviour that is characteristic of the developmental period of adolescence, like experimentation with alcohol or substance use, for example.

Schistosomiasis specific risky behaviour: This refers to specific behaviour that increases the risk of infection as a result of direct contact with schistosomiasis infested bodies of water.

Parental or caregiver monitoring: Due to the high rates of children or adolescents who live with a family member or a caregiver and not necessarily their biological parents, the current study makes reference to parents or caregivers when discussing factors associated with the family, in particular, parental or caregiver monitoring (Reiter, Hjörleifsson, Breidablik, & Meland, 2013). Monitoring can be defined as the parents' knowledge of their adolescent children's whereabouts, the type of activities they are engaging in and a knowledge of with whom adolescents spend their time (Alboukordi, Nazari, Nouri, & Sangdeh, 2012)

Schistosomiasis specific risky behaviour: This refers to specific behaviour that increases the risk of infection as a result of direct contact with schistosomiasis infested bodies of water.

Parental or caregiver monitoring: Due to the high rates of children or adolescents who live with a family member or a caregiver and not necessarily their biological parents, the current study makes reference to parents or caregivers when discussing factors associated with the family, in particular, parental or caregiver monitoring (Reiter et al., 2013). Monitoring can be defined as the parents' knowledge of their adolescent children's whereabouts, the type of activities they are engaging in and a knowledge of with whom adolescents spend their time (Alboukordi et al., 2012).

Abbreviations (Statistical Analysis)

n: Total sample population

M: Mean

X^2 : Crosstabulation statistic

p : Significance level

z : Standardised z -score (0;1)

$Exp\beta$: Odds ratio

CHAPTER ONE

Introduction

The current study explored factors associated with the prevalence of neglected tropical diseases (NTDs), paying specific attention to a parasitic disease called schistosomiasis which is commonly referred to as bilharzia. In particular, this study sought to examine the psychosocial aspects relating to the parent-adolescent relationship that may serve as a protective factor against disease acquisition during the crucial developmental stage of adolescence. Of particular interest in this study was whether parental monitoring was associated with risky adolescent behaviour, which places adolescents at an increased risk of becoming infected with parasitic diseases such as schistosomiasis or other diseases associated with risky behaviour, like the *Human Immunodeficiency Virus* (HIV) and other sexually transmitted infections. This is particularly important to explore due to the high prevalence of co-endemic diseases that currently exist in South Africa.

1.1. Rationale for the study

The initiation of the eight millennium declaration goals by the United Nations in 2000 has increased efforts to eradicate extreme poverty, hunger and disease amongst the world's poorest (Hotez et al., 2007; Romer et al., 1999). However, neglected tropical diseases remain amongst the most common chronic infections which affect an estimated 2.7 billion people worldwide (Hotez et al., 2007). The high prevalence of schistosomiasis has been attributed to the "interplay between humans, snails and parasites", as well as "complex demographic, environmental, biological, technological, political, socioeconomic and cultural processes" (Bruun & Aagaard-Hansen, 2008, p. 01). Schistosomiasis is one of the seven most prevalent neglected tropical diseases worldwide, with an estimated 779 million people at risk of becoming infected and a further 207 million people who are infected with the schistosome worm (Hotez et al., 2007; Utzinger et al., 2009). Furthermore, 201.5 million infections are estimated to occur in Africa, with 112 million of those persons infected being concentrated in Sub-Saharan Africa (Utzinger et al., 2009). Moreover, 25.7 million of the South African population are at risk of becoming infected, whilst 4.5 million of South Africans are already infected. In terms of a public health impact, this places schistosomiasis in the top two of the most common parasitic infections in South Africa (Berge et al., 2011; Hotez et al., 2007; Kjetland et al., 2006; Utzinger et al., 2009).

A distinct characteristic of these parasitic trematodes is that they are most prevalent in low socioeconomic settings, where conditions for infection, transmission and re-infection are rife, resulting in a climate of poly-parasitism and co-endemic diseases, like HIV, which affects and infects an estimated 5.7 million South Africans (Gazzinelli, Correa-Oliveira, Yang, Boatin, & Kloos, 2012; Hotez et al., 2007). There has been increasing evidence that suggests that schistosomiasis may cause women to become susceptible to HIV (Kjetland et al., 2008). In 2009, WHO declared that "it is plausible that Female Genital Schistosomiasis (FGS) poses a risk for secondary HIV acquisition" (Berge et al., 2011, p. 23), therefore acknowledging the risk posed by the presence of schistosomiasis.

It is noteworthy that 45% of all new HIV infections occurs within the 15-24 age group worldwide, and 57% of the HIV infected population is comprised of women (Berge et al., 2011; Kjetland et al., 2006). Moreover, some of the highest infections and diseases, such as HIV, are

found in KwaZulu-Natal (Shisana & Onoya, 2014). This places school aged children, especially adolescent girls, at an increased risk of co-infection due to the high prevalence of co-endemic diseases and increased frequency of risky behaviours that are commonly engaged in during this stage of development. These behaviours increase their chances of acquiring a disease or multiple diseases (Berge et al., 2011; Kjetland et al., 2006). Research conducted by Kjetland et al. (2006) found that there was an association between HIV and schistosomiasis that is found in the urogenital tract of women. The findings from this research suggested that the presence of the parasite caused lesions or abrasions on the surface of the urinary tract, which made women more susceptible to HIV infection (Kjetland et al., 2006).

The study of schistosomiasis has predominantly been framed within a biomedical model of understanding disease; however, the importance of socio-cultural factors cannot be ignored. This includes, most especially, the influence of the family on adolescent development, which directly affects adolescents by impacting on their attitude, beliefs and behaviour, with regard to health and disease acquisition as well as many other various aspects of their lives (Dunnington & Liprie, 1995). Given that the nuclear family is the primary context for development, negative behavioural outcomes may be associated with aspects of the parent-adolescent relationship. As a result, it has been hypothesized that the parent-adolescent relationship has the greatest influence on the developing child, especially in the face of risky behaviours, that may have health implications and far reaching repercussions that affect adolescents well into their adult lives (Dunnington & Liprie, 1995; Griffin, Botvin, Scheier, Diaz, & Miller, 2000). Therefore, it is important to take into consideration the effects of the parent-adolescent relationship, which allows for a broader understanding of schistosomiasis beyond bio-medical models. By framing this neglected tropical disease within a socio-cultural context, it is possible to identify the salient risks that influence risky adolescent behaviours. Furthermore, this perspective allows for special attention to be paid to the influence of the family context on adolescent risky behaviours, especially parent or caregiver monitoring of adolescents' whereabouts, activities and their company which increase the risk of risky behaviours and adverse outcomes. This may help to reduce yet another "generation of adults, disadvantaged by irreversible repercussions of this infection, with significant deleterious consequences for public health and the economy" (Berge et al., 2011, p. 22), by serving as a buffer against risky behaviour and a protective factor against disease acquisition.

Adolescence is characterised as a time of great change as children embark on the road to adulthood (Dunnington & Liprie, 1995). This places them at an increased risk of a number of negative outcomes which may have adverse implications for their future and the future of their families. Negative outcomes of engaging in risky behaviour during the period of adolescence include ill health and disease acquisition. However it has been suggested that the family context, especially the parent-adolescent relationship, may serve as a buffer against risky adolescent behaviours as a result of consistent parental monitoring. Furthermore, consistent parental monitoring creates opportunities for communication and social modelling, since the family remains the main context within which children learn, especially with regard to health related beliefs and practices, which will influence them well into their adult years (Dunnington & Liprie, 1995; Modena & Schall, 2006).

The researcher was motivated to pursue this study in view of the paradigm shifts in medical research and therefore focused on the social aspects contributing to disease prevalence amongst this vulnerable group. Research conducted by Thomassen Morgas, Kvalsvig, Gundersen, Taylor, and Kjetland (2010), found that the family context may have influenced the prevalence of schistosomiasis infections which was common amongst this population (Thomassen Morgas

et al., 2010). Moreover the authors report findings that suggest that “girls who lived with their parents had significantly less urogenital schistosomiasis, probably indicating that parents exercise control, provide alternative activities, and/or have more economic resources” (Thomassen Morgas et al., 2010, p. 32). In a society where many find themselves living in low socioeconomic conditions, there is need for investigation into the prevalence of co-endemic diseases, especially amongst young South African adolescents. This will allow for a better understanding of the reasons why adolescents are at an increased risk of becoming infected with diseases. This study aimed to determine whether a relationship exists between parental monitoring, risky adolescent behaviour and the prevalence of schistosomiasis in 9-13 year old girls living in KwaZulu-Natal.

1.2. Aims and objectives of the study

1. The first aim of this study was to determine whether adolescent girls living in the Ugu District, KwaZulu-Natal engage in risky behaviour that placed them at risk for negative health outcomes.
2. The second aim was to identify the types of risky behaviours that were commonly engaged in by this sample population.
 - a. The first objective was to illustrate the types of behaviours commonly engaged in by South African adolescents living in schistosomiasis endemic regions of KwaZulu-Natal and therefore enhance current understanding of adolescent risk behaviour.
3. An additional aim of this study was to determine if a relationship existed between parental or caregiver monitoring and the prevalence of schistosomiasis and the frequency of adolescent risky behaviour.
 - a. The objective was to highlight the importance of the family and draw attention to the role played by the family in the healthy development of adolescents.
4. The final aim of the study was to ascertain whether parental or caregiver monitoring reduced the prevalence of schistosomiasis infection and adolescent risky behaviours.
 - a. The objective was to make recommendations for further research in the field of adolescent development and adolescent health in South Africa, by identifying the current context of risk.
 - b. In addition to making recommendations, the final objective of this study was to create public awareness of the influence of social factors, like the family context, on the prevalence of diseases, especially parasitic diseases, like schistosomiasis.

1.3. Research questions

- 1) Is risky behaviour common amongst 9-13 year old adolescent girls living in KwaZulu-Natal?
 - a) Which general risky behaviours were common amongst this sample population?
 - b) Which schistosomiasis specific risky behaviours prevailed amongst this sample population?
 - c) Which risky behaviours engaged in by this sample population were associated with the prevalence of schistosomiasis?
- 2) Does an association exist between parental or caregiver monitoring and the prevalence of schistosomiasis infections amongst adolescent girls?
- 3) Is there a relationship between parental or caregiver monitoring and adolescent risky behaviour?
- 4) Does parental or caregiver monitoring of adolescent behaviour decrease the odds of schistosomiasis infection amongst adolescent girls?

1.4. Methodological approach

The current study was nested within a larger longitudinal cohort study, which was informed by a positivist research approach. A quantitative approach was adopted for the purpose of this study as the researcher was interested in identifying the frequency of risky behaviours engaged in by adolescents and to determine possible associations between variables of interest. The study utilized a questionnaire which evaluated a number of aspects relating to adolescence. The sample population was drawn from 18 randomly sampled government schools in the Ugu district of KwaZulu-Natal. All girls who met the inclusion criteria were enrolled into the study. Statistical analyses were conducted to explore frequencies (frequency tables), associations between variables of interest (crosstabulation tables) and the odds of infection (logistic regression). A detailed description of the methodological procedures utilized in this study is provided in Chapter 3.

1.5. Conclusion

It is important to consider schistosomiasis in light of the social factors contributing to the high prevalence rates, especially within South Africa. It is therefore important to understand adolescent risky behaviours which contribute to schistosomiasis infection, as well as parental or caregiver monitoring, which might serve as a buffer against disease. This chapter has highlighted the rationale and the fundamental aims and objectives of the study. The subsequent chapter will present a review of literature in the current field of research which is related to the research questions, aims and objectives that are outlined in chapter one and also discusses the theoretical framework of this study.

CHAPTER TWO

Literature review and theoretical framework

Introduction

The period of adolescence is a particularly crucial developmental stage in the lives of children as they experience a number of physical, emotional and cognitive changes (Omotoso, 2007). Although the parent adolescent relationship serves as a buffer against threats that may affect developing children, role transitions, from child to young adult, that occur during this stage or changes in the parent adolescent relationship that allow for greater adolescent autonomy, create opportunities for changes in adolescent behaviours (Omotoso, 2007). These behaviours are sometimes risky and expose adolescents to a number of dangers, especially with regard to contracting disease. Adolescents living in developing countries, like South Africa, are especially vulnerable, as they exist within a climate of extreme poverty and poor living conditions, which increase their chances of becoming infected with co-endemic diseases, like sexually transmitted diseases/infections (STD's/STI's) or neglected tropical diseases, placing them at greater risk of early morbidity and mortality.

This literature review will explore the current context of disease in order to gain a contextualised understanding of disease within Africa and South Africa. Special attention will be paid to the HIV epidemic within Sub-Saharan Africa. Subsequently, attention will be given to neglected tropical diseases, in particular schistosomiasis. This literature review will explore HIV and the link between HIV and schistosomiasis, which both create detrimental effects for healthy development during adolescence. The period of adolescence will be reviewed in order to understand why adolescents find themselves at an increased risk for disease and early morbidity and mortality. The usual changes that children at this stage of development experience as well as the behavioural changes that occur will be explored. Special attention will be paid to risky behaviours that adolescents engage in which place them at an increased risk for co-endemic diseases and early mortality. Furthermore, the parent or caregiver adolescent relationship will be examined, specifically parental or caregiver monitoring, in order to understand the nature of adolescent risky behaviour. This will be conceptualised within a theoretical framework, developed by Albert Bandura, known as the social learning theory, which will be used to explore underlying influential factors of adolescent behaviour. In particular the family context will be explored as it serves as a source for learning and a context for social representations of disease to be communicated. This is especially important within a South African context, where the prevalence rates of HIV and other co-endemic diseases are high. Despite the increased prevalence of schistosomiasis and/or HIV infection due to risky behaviours, it has been suggested that the parent adolescent relationships, especially parental monitoring, serves as a buffer against this threat. Therefore, parental monitoring will be explored as an influential factor, with regard to schistosomiasis specific risky behaviours and other risky behaviour related to disease.

2.1 History of Human Immunodeficiency Virus (HIV)

HIV was first recognised as a new deadly disease in 1981 (Sharp & Hahn, 2011). In brief, HIV is, primarily, a sexually transmitted virus that weakens and impairs the immune system causing infected individuals to become susceptible to opportunistic diseases and infections (Sharp & Hahn, 2011). According to the World Health Organisation (WHO), since the beginning of the epidemic, an estimated 75 million people became infected with the disease

and approximately 36 million have died of HIV and AIDS related illnesses (WHO, 2014). At the end of 2012, there were an estimated 35.3 million people living with HIV. The World Health Organisation goes on to state that amongst the global population who have been severely affected, Sub-Saharan Africa remains the worst hit region by HIV and accounts for an estimated 71% of all people living with HIV, worldwide (WHO, 2014) (See Figure 5, Appendix 1).

2.2 Current context of disease in Africa

2.2.1 HIV in South Africa

Low income settings commonly exist within Sub-Saharan Africa which contribute to the increase in disease transmission are particularly rife, resulting in a “disproportionate share of the burden of HIV, as 35% of HIV infections” are found in this region (Shisana, 2009, p. 01). According to WHO (2014), South Africa is home to approximately 6.1 million people who are living with HIV. In addition, research revealed that KwaZulu-Natal has the highest HIV prevalence rates in South Africa, with 16.9% of the population living with HIV (Shisana, 2009; Shisana & Onoya, 2014). This high prevalence has been persistently recorded since 1990 (Shisana, 2009; Shisana & Onoya, 2014). Kwazulu-Natal reported the highest HIV national prevalence rate of 38.7%, amongst women in the 15-49 age groups in 2008 and a prevalence of 24.7% in the population on 2011 (Shisana, 2009).

Furthermore, the Ugu district was one of three districts in KwaZulu-Natal to report HIV prevalence rates in women above 40% in 2011 (Shisana & Onoya, 2014). Further research conducted in the district indicated elevated prevalence rates in women living in Emalengeni (70.8%), Umgababa (65%) Amahlongwa (56%) and Dududu (48%). This suggests that disease is disproportionately distributed especially amongst women and girls living in the province of KwaZulu-Natal and the Ugu District.

Despite the high death toll that resulted from HIV and AIDS related diseases, the introduction of antiretroviral therapy has reduced the effects of the disease, but the high prevalence remains a concern. There are a number of explanations for this, however, for the purpose of the current research the focus will fall on the association between HIV and schistosomiasis.

2.2.2 Association between HIV and schistosomiasis

There have been a number of studies that have been conducted that have reported an association between schistosomiasis and the prevalence of HIV (Kjetland et al., 2006). Several studies that have been conducted regarding HIV prevention have stressed the “unexplained gender quotient disfavours rural woman”, who come into contact with schistosomiasis infected water that results in infection (Kjetland et al., 2006, p. 594). It is believed that the presence of schistosomiasis in the genital tract of women causes lesions that render them susceptible to the HI virus (this is outlined in section 2.3.4 below) (Kjetland et al. (2006). Epidemiological studies suggest that the prevalence of HIV in rural women peaks at a younger age, which places many adolescent girls in danger of contracting life threatening diseases, like STI's, which have also been associated with the increased risk of HIV (Kjetland et al., 2006). One of the reasons might be related to schistosomiasis, which has been associated with the prevalence of HIV (Mkhize-Kwitshana, Taylor, Jooste, Mabaso, & Walzl, 2011). Women and girls living in these rural settings are at an increased risk of being infected by multiple diseases, like STI's, due to the pathologies in the cervix, vulva and vagina caused

by schistosomiasis, therefore increasing their chances of becoming infected with HIV (Kjetland et al., 2006).

2.2.3 What is schistosomiasis?

Schistosomiasis falls into the class of human parasites, which can be classified as one of two classes, Nematodes, commonly known as round worms, which includes soil transmitted helminths and filarial worms and Platyhelminths, commonly known as flatworms, which include tapeworms and trematodes (including schistosomes) (Rujeni et al., 2012). Trematodes are flat, leaf shaped intestinal parasitic organisms with a rather complex life-cycle (Rujeni et al., 2012). They require a primary or definitive host which is most often a vertebrate, like humans or other mammals like dogs, in which they reproduce (Rujeni et al., 2012). In order to complete their life-cycle, they also require an intermediate host, usually an aquatic organism, most often a snail, which serves as a vehicle for dispersal of infectious larvae (Rujeni et al., 2012).

Research on this genus of trematode, began around 1851, when the *Schistosoma* worm was first identified by and named after Theodor Maximilian Bilharz (Bruun & Aagaard-Hansen, 2008). However little attention was paid to the parasitic trematode until the Second World War which saw approximately 3000 American soldiers sent home after becoming infected with schistosomiasis, which caused the soldiers to experience severely debilitating symptoms (Sandbach, 1976). This drew an international spotlight to this otherwise neglected tropical disease (Sandbach, 1976).

Schistosomiasis, which is a parasitic disease, caused by infection with the schistosoma worm, is recognised by the World Health Organisation as a neglected tropical disease (NTD) and is the second most prevalent NTD, following Hookworm (Bruun & Aagaard-Hansen, 2008). NTDs are geographically distributed across an estimated 75 countries around the world, with 85% of cases being found in Africa (Bruun & Aagaard-Hansen, 2008). Schistosomiasis infections affect approximately 200 million people annually (Kjetland et al., 2006). The greatest effects of NTDs occur amongst children (Bruun & Aagaard-Hansen, 2008). In terms of schistosomiasis, this is of concern as children carry the heaviest burden of infection (Bruun & Aagaard-Hansen, 2008; Kjetland et al., 2008; Rujeni et al., 2012) (see Figure 6 and Figure 7, Appendix 1). According to WHO (2012), schistosomiasis infection can be classified into three prevalence groups, that is high ($\geq 50\%$ infected), moderate ($\geq 10\% < 50\%$ infected) and low ($< 10\%$ infected).

There are a number of species of blood-dwelling trematodes, however there are five main species of human schistosomiasis namely *Schistosoma haematobium*, *Schistosoma mansoni*, *Schistosoma japonicum*, *Schistosoma intercalatum* and *Schistosoma mekongi*, with *S. haematobium* being the most prevalent on the south coast of KwaZulu-Natal (King, 2009). Schistosomiasis is typically prevalent in rural areas, where natural, fresh water bodies that harbour the infected intermediate hosts are also used for domestic or occupational uses and are the main water source for many living in rural areas (Rujeni et al., 2012). Thus, the risk of becoming infected is escalated in the context of rural living, which suggests that a large proportion of young girls living in South Africa and other African countries are at an increased risk of infection.

Figure 8 (Appendix 1) illustrates the life cycle of schistosoma parasite. The adult schistosoma worm spends the majority of its lifespan in the blood vessels around either the intestine or

bladder of the host and together, the male and female produce hundreds of eggs which are then passed out through urine or faeces during the larval stage and are referred to as miracidia (Bruun & Aagaard-Hansen, 2008). If the miracidia reach fresh water, they then live in the intermediate host, the snail. After a period of multiplication in the snail, they emerge as cercariae, which are infectious, fork-tailed larvae that emerge from the snail and enter back into the water, penetrating the skin of humans on contact (Bruun & Aagaard-Hansen, 2008). The cercariae or larvae transform into schistosomula, which are immature schistosoma worms that enter the blood vessels of the host and then undergo a process of maturation in the human body. Once they reach a stage of maturation, the mature male and female begin producing eggs (Bruun & Aagaard-Hansen, 2008). This process of reproduction can continue for a period of 2-5 years, producing thousands of eggs (Bruun & Aagaard-Hansen, 2008). Moreover, it has been noted that these worms are able to survive in the human body for up to 30 years, which lead to a number of adverse effects, however symptoms range from no apparent symptoms to severe pathologies (Bruun & Aagaard-Hansen, 2008). It becomes clear that a young child engaging in everyday activities such as crossing a river or simply rinsing his feet is placed at risk of being penetrated by the infectious larvae (cercariae), which will then spend a period of time in the body, until the larvae mature and begin to reproduce for approximately two to five years. A child may suffer the effects of parasitic infection from early childhood, well into adulthood due to the lengthy life span of the mature adult worm, which have extremely detrimental effects consequences.

2.2.4 Effects of schistosomiasis

Within South Africa, the effects of this disease are especially severe given the high population densities and poor living conditions that so many South Africans find they must endure (Mkhize-Kwitshana et al., 2011). It is, therefore, important to explore the implications of schistosomiasis infection in young adolescent girls. When infected with schistosomiasis, the human immune system is exposed to antigens, which cause the body to produce antibodies (Rujeni et al., 2012). The reactions to the presence of foreign organisms like the eggs, larvae and adult worms in the body result in pathological effects that are detrimental to the healthy development of children and adolescents ultimately creating complications in adulthood (Kjetland et al., 2006). The consequences of infection are further amplified as a large percentage of those infected with schistosomiasis find themselves living in a context of extreme poverty and co-endemic disease, with schistosomiasis being considered a pervasive neglected tropical diseases.

Occasionally the presence of schistosoma can be asymptomatic, which means that the infection does not cause any visible adverse effects (Bruun & Aagaard-Hansen, 2008). However, it has been found that infection with a schistosoma parasite can cause dysuria and haematuria, bladder stones, bladder carcinoma, hydronephrosis and renal failure and has also been known to affect the nervous system, as well as reduce fertility in both men and women who are infected with schistosomiasis (Bruun & Aagaard-Hansen, 2008). In regions that are considered to be schistosomiasis endemic areas, with infection intensities that rise in the child and adolescent phases, anaemia, attention deficit disorder and learning disabilities are not uncommon amongst this age group living in endemic areas. Other symptoms related to schistosomiasis infections include fatigue, frequent urination and bloody urine, which sometimes cause school absenteeism and high school dropout rates, as the children find it difficult to pay attention in classes due to fatigue (Berge et al., 2011; Connolly & Kvalsvig, 1993). Further, they often find themselves falling behind in class due to frequent urination causing them to be physically vulnerable and intellectually compromised (Berge et al., 2011; Connolly & Kvalsvig, 1993).

This is of increased importance amongst this population in particular, as they are of school going age and this forms the foundation of their future education. Their ability to grasp concepts and to understand the context of the material presented to them in class, during this time, will serve as building blocks for the rest of their school career.

Schistosoma haematobium is known to affect the urinary tract causing lesions in the uterine cervix, in the vagina, as well as the vulva and is especially pervasive during the adolescent years (Kjetland et al., 2006). Pathology caused by schistosomiasis in these regions often mimics sexually transmitted infections (STI's) in the body and often causes bleeding disturbances, painful sexual intercourse, uterine fibroids and abdominal pain (Kjetland et al., 2006).

It has been suggested that the pathologies caused by schistosomiasis may impair the protective epithelium in the urogenital tract, thus placing women at an increased danger of contracting or spreading STI's, which have been closely associated with the increased risk of HIV acquisition or transmission (Kjetland et al., 2006; WHO, 2012). The lesions caused by schistosomiasis infections provide entry points in the vaginal regions, increasing the transmission of STI's (Mkhize-Kwitshana et al., 2011). More specifically, Feldmeier et al. (1994), as cited in Kjetland et al. (2006), hypothesize that the HI virus found in semen may attain access through the eroded epithelium or through broken blood vessels, which creates direct entry point of contact for the HIV virus and the receptive cells of women, creating an environment that fosters a climate of co-endemic disease (Kjetland et al., 2006).

It has been hypothesized that “in *S. haematobium* endemic areas HIV may have spread with genital schistosomiasis, rather than STDs, as an essential risk factor for heterosexual transmission” (Kjetland et al., 2006, p. 598), especially amongst adolescent women. This is most concerning for adolescent girls, who are at an increased risk coming into contact with infected water and engaging in risky sexual behaviours which may place them at risk of infection (Kjetland et al., 2006). It has been mentioned that the highest rate of new HIV incidence occurs in young women therefore young adolescent girls find themselves at the epicentre of the epidemic (Shisana & Onoya, 2014). It is evident that the combination of such prevailing contextual conditions, coupled with the presence of parasitic infections, is said to promote the prevalence of one of the most common and deadly diseases in Sub-Saharan Africa, HIV. This is of great public health importance as the period of adolescence is regarded as one of the most crucial developmental stages. Any threat to healthy development during this phase may have implications that last well into adulthood.

2.2.5 Social science research on schistosomiasis

Through the years, research has tended to focus on the biology of schistosomiasis until 1888, where some of the first social aspects of the disease surfaced in the form of behavioural analysis through the writing of Allen, who stated that “...nearly all youth bathing in the Unzindusi and Dorp sprid are infected, while the girls, who do not bathe, remain free from the disease” (Sandbach, 1976, p. 269). Existing literature addresses the biological outcomes of water contact with schistosomiasis infested water resulting in irreversible damage, as well as the relationship between schistosomiasis and co-endemic diseases (Bruun & Aagaard-Hansen, 2008). The main research into schistosomiasis has been from a biomedical perspective, with research only recently emerging on the socio-cultural aspects of the disease, like engaging in risky water contact behaviour.

Much of the early research focused on water contact patterns and water contact related behaviours in relation to schistosomiasis (Pimentel et al., 1961, as cited in Bruun and Aagaard-Hansen (2008). Farooq et al., (1966), as cited in Bruun and Aagaard-Hansen (2008), conducted some of the first detailed studies of schistosomiasis that incorporated sociological factors and aspects of transmission in Egypt by observing water contact behaviours, which paved the way for recent works and further emphasised the importance of investigating the social and cultural processes of disease (Bruun & Aagaard-Hansen, 2008). Additional studies conducted explored water contact behaviours and revealed a *social* dimension to schistosomiasis, by establishing that a significant relationship did exist between water contact behaviour patterns and the prevalence of schistosomiasis (Bruun & Aagaard-Hansen, 2008). These studies further illustrate that water contact behaviours occurred as a means to varying social ends, like domestic or income generating purposes, depending on the social role that was being fulfilled (Bruun & Aagaard-Hansen, 2008). These studies were conducted in schistosomiasis endemic villages that had a high prevalence of schistosomiasis and found that water contact occurred frequently during household activities, like washing clothes, hygiene and leisure activities (Dunn, 1979).

Research conducted in South Africa revealed that collecting water from the river is the dominant domestic activity, especially amongst rural communities (Hemson, 2007). The author goes on to suggest that children spent close to two thirds of their time collecting water and engaging in other household chores (Hemson, 2007). Furthermore, Hemson (2007), found that 81% of children reported that had engaged in water contact behaviours in the past seven days and that girls in these communities spent longer hours per week doing household chores compared to boys. Hemson (2007) states that water contact activities are especially detrimental to the healthy development of children, however, within these communities children regard such activities as a socially necessary practice. Water contact activities relating to household chores, such as collecting water from the river, are viewed within this culture, as a manner of contributing to the essential needs of their family (Hemson, 2007; Strebel et al., 2006). Through these activities children become socialised and adopt socially defined roles that they must fulfil (Hemson, 2007). Research conducted by Strebel et al. (2006) amongst two target communities in the Western Cape province, found that there was a distinct recognition of traditional gender roles in the community that involved women staying home and tending to all family related needs. It becomes increasingly evident that social scripts regarding gender norms are communicated through socially accepted water contact behaviours which place adolescent girls at an increased risk of adverse outcomes.

As the interest in the social context of schistosomiasis increased, authors began to demonstrate an understanding of the rising necessity to incorporate explanatory dimensions, like social and cultural processes that might determine different health risks, when describing patterns of health and disease that go beyond the conceptual models that traditionally explained health or disease from biomedical perspectives, which were no longer sufficient (Modena & Schall, 2006). Studies based in Africa and China that were reviewed by Huang and Manderson (1992) and Yi-Xin and Manderson (2005), contextualise schistosomiasis within the wider social processes with an “extraordinary variety of social factors” involved in water contact, whilst placing emphasis on the household as the primary unit of analysis (Bruun & Aagaard-Hansen, 2008; Modena & Schall, 2006, p. 50).

Drawing on this fundamental notion, Modena and Schall (2006), explored the social context of disease, specifically focussing on the intergenerational process of disease or health representations that described the meanings attributed to schistosomiasis within the family

context (Modena & Schall, 2006). According to this study, the socio-historic context within which disease operates is mediated by the meanings and representations conveyed from one generation to the next, emphasising the magnitude of influence that parents or caregivers potentially possess to shape the nature of children's behaviour, especially with regard to health and disease. Modena and Schall (2006) regard the family as the social space within which "man acquires his behaviour, values, norms and attitudes of the family, is fundamental in the construction of meaning" (p. 105). These authors found that the knowledge of the disease changed over the generations within the family context (Modena & Schall, 2006). They therefore argue that the family context is especially influential with regard to how disease is perceived and interpreted (Modena & Schall, 2006).

However research suggests that risky behaviours can be reduced by the presence of buffer agents, like the relationship that exists between parents or caregivers and adolescents during this period. Research suggests that there is a significant relationship between the levels of parental/caregiver monitoring and adolescent involvement in risk-taking behaviour, especially pertaining to their health, as the social representations adopted within the family context have been considered to impact the perceptions of disease that are held by adolescents as a result of the parent adolescent relationship that exists (Howell, 2001).

2.2.6 Perceptions of schistosomiasis

In terms of schistosomiasis, research conducted in Jaboticatubas, which is an area found in Brazil, revealed that there was no similarity between the perceptions of schistosomiasis held by school pupils and the reality of schistosomiasis in the area (Modena & Schall, 2006). The authors went on to suggest that the representations of schistosomiasis that were dominant amongst the school pupils were anchored on the information that was provided to them primarily by their parents and secondarily, by their teachers (Modena & Schall, 2006).

Research conducted in the Ugu district in 2012, which sought to explore the perceptions of pupils, teachers and community members found that schistosomiasis was generally perceived as a disease that possessed a low grade of severity (Lothe, 2012). Some of the findings suggest that the perception of schistosomiasis that was prominent within this community was that the disease was a minor problem with few or no serious consequences. This is emphasised by the fact that some adults reported that schistosomiasis was a problem 20 years ago and that it was no longer a problem in the Ugu district, with some even reporting that the problem of schistosomiasis in the area had been eradicated (Lothe, 2012). This perception of low susceptibility can be considered to be an underlying factor in the engagement in risky water contact behaviours. Research revealed that some of the interviewees knew that the river was a source of contracting schistosomiasis, some parents forbade swimming or playing in the river, whilst some parents encouraged their children to play in the river (Lothe, 2012). Thus the perceptions of the disease that are emphasised by parents may be adopted by children and have direct impact on their behaviour, especially during the pivotal period of adolescence.

2.3 What makes adolescence so important?

It is important to take a few steps back and consider why adolescent girls are at an increased risk of early mortality and morbidity. As the world of medicine, disease and health has evolved, so did the focus of inquiries, whereby researchers became interested in exploring different groups of people. Research that was conducted in the early 1980's and 1990's centred on the different periods of the human lifespan, with special attention being paid to the dramatic

developmental changes that took place within a particular context (Steinberg & Morris, 2001). Thus, scientists were inevitably drawn to the period of adolescence, which captured the attention of academics and sparked interest amongst many early researchers in the field (Steinberg & Morris, 2001). The field of adolescent development, according to (Steinberg & Morris, 2001), can be described as the scientific study of adolescents that is interested in describing, explaining and predicting problematic behaviour during this phase of development. Evidence suggests that it is a period during which adolescents must navigate through a context of risk and change and develop the tools to endure challenges without encountering significant social, emotional or behavioural difficulties (Steinberg & Morris, 2001).

The period of adolescence can be characterised as a period of transition that occurs between the ages of 10 to 19 years and is regarded as the transition from late childhood into the beginning of early adulthood (Choudhury et al., 2006). Adolescence is generally deemed as a stormy period, due to the multiple changes that take place. The most commonly recognised indicator of this developmental stage is distinguished by the onset of puberty, during which the adolescent experiences growth spurts and physical changes in size, shape and function (Choudhury et al., 2006). Adolescence is also characterised by the development of hormones that mark the beginning of the reproductive life span in humans as the body prepares for the transition from a child to a sexually mature individual, who is capable of reproduction (Choudhury et al., 2006).

During this stage, the adolescent also experiences increasingly complex social changes. These changes often result in behavioural changes which typically engender different adult roles that adolescents begin to mimic (McHale, Crouter, & Whiteman, 2003). It becomes evident that the nature of the relationship that exists between parents or caregiver and their adolescent children, is most influential during this stage of development as adolescents seek models for role acquisition. These behavioural changes may however, also cause adolescents to engage in more experimental behaviour than previously expected during their early childhood phases. This may create tensions during this stage that affect their interactions with peers, family and society at large and thus can be considered to be a stage of social transformation and transition (Choudhury et al., 2006).

During this period, adolescents strive to achieve autonomy, whereby each gains a “sense of oneself as a separate, self-governing individual” (Berk, 2001, pp. 573-574) and begin to rely less on their parents for support and guidance as they start to make decisions independently. It has been suggested by Choudhury et al. (2006), that adolescents find themselves expressing increased assertion and control over their decisions, emotions and actions and begin to progressively detach themselves from parental control and embark on life independently as the development of abstract thinking allows them to solve problems and to be able to foresee the consequences of their actions (Berk, 2001). This distance, according to Berk (2001), can be attributed to the effects of puberty that the adolescent might be experiencing.

Parents or caregivers might also give their adolescent children more independence and increased responsibilities; as a result, adolescents find themselves transitioning into a number of completely new or unusual roles that may be different to the roles that they fulfilled as children (Berk, 2001). The added responsibilities and less stringent supervision allow them to gradually become more autonomous and independent. However, the acquisition of new roles and increased autonomy pose a number of threats to the adolescent, placing them at risk of a number of negative outcomes, threatening their cognitive, behavioural and emotional functioning (Barbarin, 1999; Fergus & Zimmerman, 2005).

2.3.1 Contextual factors affecting adolescent development

It has been established that the period of adolescence is characterised by transition and many developmental milestones that take place during this stage, through which a child must transition into. However it is essential to consider the context within which these developmental changes occur, as adolescent development, like disease, does not exist in a vacuum, but rather, exists in a dynamic state with the environment, and therefore must be considered the result of a myriad of contributing factors. The current research is only able to identify, understand and discuss a few of these factors. This highlights the importance of research amongst this age group.

Some of the most evident factors that significantly influence the healthy development of adolescents are found in the immediate environment. Whilst there are a number of possible factors that might contribute to the development of adolescents, factors that are associated with socioeconomic status or the structure of the family have been regarded as having the most effect on the well-being of adolescents (McHale et al., 2003). These factors impact on the developmental changes that occur during this phase which may influence negative cognitive, behavioural, emotional and social outcomes (McHale et al., 2003). According to Barbarin (1999), research suggests that poverty, gender, race and family structures that affect children from a young age may expose them to more pervasive and detrimental outcomes. These factors have “broad empirical support as risk factors for behavioural and emotional difficulties” (Barbarin, 1999, p. 1356).

2.3.1.1 Poverty

Research conducted by Barbarin (1999), highlights the context of poverty as a major contributing factor toward the healthy development of young children. Aber, Bennett, Conley, and Li (1997) state that although “income directly influences the availability of food, health care and shelter, it also hinders child development through distinct mechanisms” (p. 475). It has been found that children who come from poor socio-economic households with low household incomes, often experience adverse health and developmental outcomes (Aber et al., 1997; Brooks-Gunn & Duncan, 1997). Moreover, Barbarin (1999) stresses the fact that children who are exposed to excessively low socio-economic conditions have an increased chance of being negatively affected, than children who come from financially advantaged backgrounds.

There has been substantial research conducted surrounding the effects of poverty on the well-being of children living in America (Aber et al., 1997; Brooks-Gunn & Duncan, 1997; Harris & Marmer, 1996). These findings support the notion that poverty negatively affects the development of children and further propose that there are a number of physical, cognitive, emotional and behavioural outcomes rooted within the context of poverty. Brooks-Gunn and Duncan (1997) suggest that children who face conditions of extreme poverty are likely to suffer low birth weight, which is associated with physical, cognitive and emotional problems that persist through childhood and adolescence, as well as grade repetition and learning disabilities. These authors go on to suggest that poverty may cause children to suffer effects such as growth stunting which is associated with malnutrition and also display behavioural problems (Brooks-Gunn & Duncan, 1997). These behavioural problems can be considered to manifest in two

distinct groups, externalising behaviour (aggression, fighting or acting out) and internalising behaviour (depression, social withdrawal and anxiety) (Brooks-Gunn & Duncan, 1997).

2.3.1.2 Race

Within South Africa, the effects of poverty and the implications they have on adolescent health are firmly entrenched within the salient backdrop of Apartheid, during which non-white South Africans were actively dispossessed and oppressed (Carter & May, 2001). Even though South Africa has celebrated twenty years of democratic freedom, the transition from apartheid to a democratic government has not been instant. Many still find themselves in the same socio-economic position, with limited access to health care, education and housing, which has had major implications on the health and well-being of the nation (Carter & May, 2001). Beside the socio-economic disparities that exist, there are a number of social factors that have been found to be associated with healthy adolescent development that stem from the unrest during the apartheid era (Barbarin, 1999). Research in the South African context suggests that “during the liberation struggle against apartheid, defiance of authority became an accepted norm, particularly amongst youth”, children and adolescents were more prone to engaging in “bullying, breaking rules, destroying property, not being liked by others and demanding attention” (Barbarin, 1999, p. 1356). Moreover, Barbarin (1999) suggests that it is not clear whether these kinds of behaviour are still prevalent amongst adolescents in the post-apartheid period. This literature as a whole suggests that adolescents are likely to engage in risky behaviours during this period of development and it becomes increasingly important to fully understand the vast changes experienced during this phase of development. The need to fully explore the context within which the individual exists on a daily basis that shapes their thoughts, desires, beliefs and actions is emphasised further by these historic grievances.

2.3.1.3 Gender

Although the citizens of South Africa were divided according to their racial groups during apartheid, this was not the only form of bias that existed during this time. Gender biases also played a major role in the lives of non-white South Africans. It is hypothesised that gender may be a risk factor for psychological problems in children and adolescents and within South Africa (Barbarin, 1999). Women and girls living in South Africa pre-democracy were faced with further discrimination, based on their gender, compared to their male counterparts, which created greater implications for their health, education and socioeconomic status. This has affected many generations that have followed, including those living in post-apartheid South Africa. It is evident that these adverse outcomes are further exacerbated due to a context of risk that is firmly entrenched within a history of discrimination, which may increase the chances of adolescents engaging in risky behaviours that jeopardise their health and well-being (Barbarin, 1999).

2.3.1.4 Family structure

Finally, (Barbarin, 1999) suggests that the family context serves as a crucial factor in the healthy development and well-being of adolescents. This is also evident through early research which focused primarily on understanding and describing adolescent development within the family context (Steinberg & Morris, 2001). By focussing on the family, researchers were able to identify problem behaviours that arose during this phase of development, whilst taking into consideration the factors that might have brought about the behaviour in the first place

(Steinberg & Morris, 2001). Research that has been conducted in this field has concentrated on the key functions within the family. It has been hypothesised that healthy adolescent development is highly dependent on the structure of the family, which may account for “the significant differences related to levels of behavioural and emotional adjustment” (Barbarin, 1999, p. 1351), which has a direct impact on the frequency of risky behaviour that is engaged in by adolescents.

This emphasises the role that is played by parents or caregivers in adolescents’ healthy emotional, psychological and behavioural development. These factors have direct impact on an adolescent’s risk of acquiring diseases such as schistosomiasis, by engaging in risky behaviours. According to Bronfenbrenner and Crouter (1983), as cited by McHale et al. (2003), “the role of the family in children and adolescents’ development holds that knowledge of the larger environment in which families are embedded is central to understanding the ways in which families work to socialise their children” (p. 126). Thus the complex relationship that exists between parents/caregivers and their developing adolescents requires further exploration to fully understand the current context of development, that results in risky behaviours that are common during this phase.

2.4 Outcomes of adverse contextual factors

2.4.1 Adolescent Risky Behaviour

The period of adolescence has been an area of interest for many researchers over the past years, with the focus falling on the ever-changing behaviour of adolescents. Whilst there are individual internal factors that contribute to adolescent risky behaviours (Berk, 2001), there are also a myriad of contextual factors, such as social and environmental factors, that act on adolescents, influencing their behaviour (Jessor, 1991). It is undeniable that “large segments of our young people are growing up in circumstances of limited resources and pervasive adversity” (Jessor, 1991, p. 597). For many of them, “their health, development and indeed their lives, as a whole, are certain to be severely and perhaps irretrievably compromised” (Jessor, 1991, p. 597). The overwhelming presence of historically entrenched and socially organised risks that exist in the everyday context of many adolescents is considered to serve as a catalyst in the behavioural trends amongst adolescents, by producing and maintaining a population of at-risk adolescents (Jessor, 1991). This is especially true for many adolescents in South Africa. According to Jessor (1991), risky behaviours can “jeopardise the accomplishment of normal developmental tasks, the fulfilment of expected social roles, the acquisition of essential skills, the achievement of a sense of adequacy and competence, and the appropriate preparation for the transition to the next stage” (Jessor, 1991, p. 599).

Risky behaviours, that result in adverse health outcomes, have traditionally been considered from a biomedical perspective, reflecting a concern for undesirable conditions related to morbidity and mortality which are unmistakably “associated with an increased probability of outcomes that will compromise health, quality of life or life itself” (Jessor, 1991, p. 597). The evolution of perspectives has allowed for the field of epidemiology to be able to identify risk factors and has increasingly taken into consideration the patterns of human behaviour as a major influential risk factor for adolescents and youth (Jessor, 1991). As this understanding has progressed, discourse on the topic of adolescent risky behaviour, like theories of disease acquisition, gravitated away from the notion of being solely associated with mortality and morbidity and began to focus on psychosocial outcomes and consequences of adolescent behaviour. Risky behaviours have thus been considered to be those behaviours that can

compromise successful development of psychosocial aspects, like healthy cognitive, behavioural and emotional development during adolescence (Jessor, 1991). What this view suggests is that adolescents who are faced with particular negative factors, for instance physical, environmental, social or psychological factors, are more likely to engage in risky behaviours that result in adverse health outcomes (Steinberg, 2004).

Research that has been conducted surrounding the topic of adolescent risky behaviours has shown that “adolescent risk behaviours are functional, purposive, instrumental and goal-directed and that these goals are often central to normal adolescent behaviours” (Jessor, 1991, p. 598), like gaining peer acceptance and respect, coping with anxiety, disappointment or failure, therefore engaging in activities that will achieve these goals. This suggests that adolescents will engage in behaviours that they perceive to be a means to a particular desired end, for example alcohol consumption during periods of stress or anxiety. Within a South African setting, stressful situations and anxiety inducing contexts would not be uncommon due to the increase in gender based violence and the high rates of rape and sexual coercion which are rife in Sub-Saharan Africa (Wood & Jewkes, 1997). Thus, contextual factors acting on adolescents, inadvertently shape their behaviour which increase the chances of them engaging in activities that have negative effects on their development.

This view highlights that adolescents engage in risky behaviours progressively during this period of development. Studies conducted by Barbarin (1999), Griffin et al. (2000) as well as Lansford, Criss, Pettit, Dodge, and Bates (2003) suggest that adolescents engage in increasingly violent and aggressive behaviours during this phase of development. These studies suggest that adolescents who are associated with peers who engage in delinquent and violent behaviours are likely to also engage in such behaviours (Lansford et al., 2003). Adolescents living in homes where parents or caregivers explicitly expose their children to aggressive conditions, with frequent expressions of irritability or arguments amongst parents or other family members or even direct exposure to violence and abuse at home, are often associated “with an increased risk for a wide variety of emotional and behavioural problems in children including aggression, conduct disorder, delinquency, antisocial behaviour, anxiety, depression and suicide” (Repetti, Taylor, & Seeman, 2002, p. 331). What this highlights for the current study is the fact that, generally, adolescents engage in increasingly risky behaviours during this period and as a result, adverse outcomes, that negatively affect their health are more likely to occur. For the purpose of this study behaviours that are characteristic of the period of adolescence, that occur across all cultures and settings, are referred to as general risky behaviour.

Other studies (Darling & Cumsille, 2003; Prinstein, Boergers, & Spirito, 2001; Rhodes, 1997) examine adolescent smoking and substance use, which increase the chances of future health risks, like pulmonary disease (Jessor, 1991). Many studies suggest that adolescents engage in such behaviours as a result of peer influences, as an attempt to fit in and to be accepted by their peers and in many cases, as a means of reducing anxiety or negative feelings that they experience as a result of a variety of social factors like an unstable home environment. This further emphasises the major role of the environmental context (Jessor, 1991). Moreover, by engaging in substance use adolescents are placed at an increased risk for legal problems, as well as detrimental health problems that have implications well into adulthood (Jessor, 1991).

Large bodies of research suggest that there are a number of behaviours that adolescents may engage in, that may place them at risk of experiencing mental, emotional, social and behavioural problems (Repetti et al., 2002). Studies conducted by Poulin, Kiesner, and Dishion

(2009) amongst Canadian and Italian adolescents, suggest that “although a developing awareness of sexuality and participation in some forms of sexual behaviour are normative during adolescence, some engage in risky sexual behaviour (RSB), such as having intercourse with multiple partners and misusing or under-using condoms” (Poulin et al., 2009, p. 265). As a result of such behaviour, adolescents find themselves at risk for sexually transmitted infections (STI’s) like HIV/AIDS (Poulin et al., 2009).

Much effort has resultantly gone into understanding adolescent development, with specific attention being paid to risky behaviours related to sexual practices. Research conducted between 2001 and 2002, amongst adolescent living in Durban, South Africa, found that “risky sexual behaviour such as inconsistent condom use and sexual intercourse with multiple partners are relatively common among adolescents and youth in South Africa” (Brook et al., 2006). The results from this study found that boys were more likely to engage in risky sexual behaviours than girls, who maintained stronger bonds with their mothers (Brooks-Gunn & Duncan, 1997). The findings from the 2006 study expound the fact that research seldom examines the social aspects of adolescent risk behaviour, like the parent-child relationship, which is crucial in promoting healthy development and positive behaviours (Brook, Morojele, Zhang, et al., 2006).

The battle against the spread of STI’s amongst adolescent and young adult populations has been at the forefront of many health interventions in South Africa, in an effort to be able to reduce the number of new infections in the country, as well as to improve the quality of life for those who are infected. Moving away from a purely biomedical and individualistic understanding of disease toward acknowledging the social nature of humans, numerous studies have been conducted, multiple interventions implemented and a number of strategies developed that address several aspects of an adolescent’s life, in order to inform preventative measures to curb transmission rates amongst adolescents. Special attention has been given to educating and highlighting the effects of engaging in risky behaviours that may increase the chances of contracting an STI, like multiple sexual partners or unprotected sex. However, adolescents still find themselves engaging in risky behaviours that jeopardize their health and this requires further investigation. A study conducted by Brook, Morojele, Zhang, et al. (2006), suggests that this might be attributed to the low socio economic circumstances that adolescents find themselves living in, which make them “more vulnerable to risky sexual behaviour owing to their relative lack of knowledge, about risky sexual behaviour, lack of access to condoms and lack of empowerment with respect to the negotiation of safer sexual behaviour” (p. 261). The authors go on to express that there is a need for further research that can enable a better understanding of adolescent risky behaviour, especially risky sexual behaviour, in order to be able to curtail the current epidemic (Brook, Morojele, Zhang, et al., 2006).

Although these behaviours occur during adolescence, they are general risky behaviours that have negative developmental outcomes, but do not necessarily impact on disease acquisition (Brook, Morojele, Pahl, & Brook, 2006; Brook, Morojele, Zhang, et al., 2006; Griffin et al., 2000; Repetti et al., 2002). The research discussed highlights the fact that the period of adolescence is a stormy period and adolescents are at an increased risk of engaging in risky behaviours. Within a schistosomiasis endemic region, risky behaviour can be regarded as any behaviour that is engaged in that causes an adolescent to come into contact with infected water (Hemson, 2007). This can be as a result of playing in the river, collecting water or carrying out domestic activities that are common in rural areas of South Africa (Hemson, 2007; Strebel et al., 2006). Research on the role of the caregiver is further highlighted by a review conducted by de Graaf, Vanwesenbeeck, Woertman, and Meeus (2011), which suggests that the frequency

of adolescent risky behaviours is influenced by the interactions that occur between parents and adolescent children.

2.5 Parent- adolescent relationship

The relationship that exists between parents or caregivers and their adolescent children is complex and is influenced by a number of factors that exist intrinsically and extrinsically. In spite of the complexity of such a relationship, the role of a parent or caregiver in the lives of adolescents and the subsequent influences of these interactions has been identified as a major contributor to the healthy cognitive, behavioural and social development of children and adolescents (Berk, 2009). There is extensive literature that focusses on the parent as a highly influential element in the healthy adolescent development (Brooks-Gunn & Duncan, 1997; Golombok, Tasker, & Murray, 1997; Harris & Marmer, 1996; McHale et al., 2003; Romer et al., 1999). Moreover, there is a large body of literature (Dunifon & Kowaleski-Jones, 2002; Steinberg & Morris, 2001; Thomassen Morgas et al., 2010) addressing the relationship that exists between parents and adolescents, placing much emphasis on the family, more specifically the relationship between a parent or caregiver and their adolescent children. Furthermore, this dynamic relationship is considered to play an important role in the healthy development of adolescents and also influences the behaviour that they engage in (Davis & Friel, 2001). This has major implications for their health as adults (Davis & Friel, 2001). This has been attributed to structure and guidance that is provided by the family during this crucial stage in adolescent development (Davis & Friel, 2001).

Through the years, there have been a number of studies that have been conducted to further explore the relationship between parents and their children and to try to determine the effects of this relationship on the behavioural outcomes that are exhibited during the phase of adolescence. A review exploring studies conducted amongst adolescent populations in the United States, who were between the ages of 13-18, noted that the perceptions that were held by adolescents regarding the “parental care, parental closeness, affection and satisfaction of the parent-child relationship, were related to the delay in their first sexual experiences” (de Graaf et al., 2011, p. 22). This is further emphasised by Romer et al. (1999) who reported that emerging theories highlight the “important role that parents can play by encouraging less favourable attitudes in their children toward risky behaviour” (p. 1055), which suggests that the influence of parents and caregivers on adolescents can serve as a crucial buffering agent against risky adolescent behaviours.

Results from a study conducted by Borawski, Ievers-Landis, Lovegreen, and Trapl (2003), amongst adolescents in grades 9 to grade 10, suggest that “adolescents who perceive high levels of trust with their parents are less likely to engage in high risk behaviours”. Other research that was conducted examined how parenting factors were associated with the problem behaviours of high risk sixth grade adolescents living in the United States, like alcohol consumption, smoking, aggressive or delinquent behaviours (Griffin et al., 2000). Results from this study revealed that parental factors were associated with less delinquent behaviour and aggression in boys from single parent families (Griffin et al., 2000).

2.5.1 Parental monitoring

Monitoring can be defined as “parents knowledge of the whereabouts of their teenager when they are not with them and knowing who they are spending time with” (Alboukordi et al., 2012). Dishian and McMahon (1998, cited in Kerr and Stattin (2000), suggest that monitoring

can be conceptualised as “a set of correlated parenting behaviour involving attention to and tracking of the child’s whereabouts, activities and adaptation” (p. 61). Extensive studies have been conducted in an effort to understand the relationship between parent behaviour and adolescent risk taking (Cottrell et al., 2003). The findings suggest that consistent parental/caregiver monitoring is associated with fewer adolescent risky behaviours that are commonly engaged in during this period of development (Cottrell et al., 2003). A review of the literature reveals that the majority of the studies concerning parental monitoring have been predominantly focused on adolescent norm-breaking behaviours and the findings from these studies suggest that parental/caregiver monitoring has been associated with less delinquent behaviours and therefore serves as a protective factor against influential environmental factors that lead to high risk behaviours (Alboukordi et al., 2012). Moreover, Laird, Pettit, Bates, and Dodge (2003) state that “it is expected of parents to know their child’s whereabouts, activities and playmates” (p. 752). This, once again, emphasises the role of parents in the lives of their children. According to Howell (2001), the “family structure, the number of parent figures and number of parents who are at home during significant hours, all contribute to parental monitoring” (p. 15).

Cottrell et al. (2003), note that there have been multiple studies conducted that show an association between poor parental/caregiver monitoring and cigarette smoking, alcohol consumption, substance use, sexual risk taking behaviour, violence and aggressive adolescent behaviours. This notion was supported by Fergus and Zimmerman (2005), who demonstrated that parental or caregiver monitoring can be considered as a resource against risky adolescent behaviour and may compensate for the effects of risk taking behaviour, especially violent behaviour. This is further emphasised by Dodge (1991) who suggests that a lack of parental discipline, monitoring and control, results in adolescent violent behaviour being endorsed by parents or caregivers and this endorsement results in adolescents using violent behaviour as a means of goal achievement (cited in Brendgen, Vitaro, Tremblay, & Lavoie, 2001). Research conducted by Brendgen et al. (2001), reiterates the idea that high levels of parental or caregiver monitoring should reduce the risk of violent behaviour and delinquency related aggression.

There have been several aspects of parenting such as poor parent-child relationships, low parental involvement and poor parental monitoring, that have been associated with adolescent smoking. In an investigation of adolescent smoking conducted in Finland, Dick et al. (2007) found that increased parental monitoring deterred adolescent substance use. In this study, parental monitoring was a highly significant main effect in adolescent smoking (Dick et al., 2007). The authors go on to make reference to a large body of literature which suggests that “increased parental monitoring is associated with reduced risk of smoking and alcohol use, as well as other deviant and risky behaviours amongst adolescents (Dick et al., 2007, p. 02).

Moreover, Pederson et al., (2003) found a positive correlation between the median age of first sexual intercourse and parent’s knowledge of their 12-14 years olds’ whereabouts and activities (cited in de Graaf et al., 2011). Additionally, Kerr and Stattin (2000) suggest that those who are poorly monitored are more likely to do badly in school and also engage in risky sexual behaviours.

According to Kerr and Stattin (2000), youth who have been poorly monitored by their parents or caregivers are at a higher risk of using illegal drugs and associating with delinquent peers, whilst cross sectional studies show that poorly monitored adolescents tend to be antisocial, delinquent and criminal. Researchers identified that the lack of parental monitoring was an indirect, but salient influencing factor on adolescent behaviour, which permitted the

adolescents to become affiliated with delinquent peers who were engaging in deviant behaviour (Alboukordi et al., 2012; Howell, 2001).

The importance of the parent-adolescent relationship also needs to be considered in the context of other relationships that the adolescent may have. Subsequently, Steinberg and Morris (2001), suggest that as children develop and make the transition into adolescence, they begin to spend more time with their peers and focus on developing these relationships, as opposed to building on the relationship with their parents (Steinberg & Morris, 2001). What this suggests is that as “children grow older their activities, interests and playmates change and expand, as they begin to spend more time outside of direct adult supervision” (Laird et al., 2003, p. 752), which unequivocally impacts on their behaviour. In addition, Prinstein et al. (2001) found, in a study conducted amongst Grade 9-12 pupils, that adolescents’ “substance use, violence and suicidal behaviour” (p. 287), were related to their friends substance use, deviance and suicidal behaviours respectively.

According to Cottrell et al. (2003), other studies also show that that perceptions of consistent monitoring efforts also predicted less violent behaviours as well as “adolescent smoking, drinking, marijuana use and sexual involvement” (p. 191). In addition, it has been suggested by Romer et al. (1999) and Statin and Kerr (2000, as cited by Cottrell et al. (2003), that the “perceived surveillance and communication involved in parent monitoring efforts function as preventive measures protecting youth from becoming involved in various risky behaviours” (p. 191). This emphasises the important role that is played by a parent or caregiver in the lives of adolescents, that extends further than their physical presence, but deep into the internalised world, which has direct impact on the manner in which they behave in their external environment.

2.6 Theoretical framework

Adolescent risky behaviour that results in infection has been broadly outlined. It is evident that the nature of the relationships that exists between these phenomena is complex and intricately associated. However, when considered from a social cognitive perspective, it becomes clear that there is a distinct role that is played by the social environment that influences adolescent behaviour that results in particular behaviours and outcomes. The theory of social learning, which was proposed by Bandura and McClelland (1977) allows for a greater contextualised understanding of social relationships that influence adolescent behaviour. This is especially true when trying to understand the nature of the relationship that exists between adolescent girls, risky behaviour and the prevalence of schistosomiasis.

2.6.1 Social learning theory

Social learning theory incorporates environmental and cognitive factors that interact to influence human behaviour. According to the social learning theory “man is neither driven by inner forces, nor buffeted helplessly by environmental influences. Rather, psychological functioning is best understood in terms of continuous, reciprocal interaction between behaviour and its controlling conditions” (Bandura & McClelland, 1977, p. 02). The parent-adolescent relationship can consequently be understood within this framework, as parents or caregivers and their adolescents, interacting within a common social environment and influence each other in a reflexive way. Moreover, social learning theory emphasises the importance of observing and modelling the attitudes and emotional responses of others in the social context in acquiring

behaviour (Bandura & McClelland, 1977). Social learning theory thus provides a framework for understanding the influence of social factors such as caregiver monitoring on adolescent risky behaviour. The key components of social learning theory that provide a framework for the current study are as follows.

2.6.1.1 Key components of social learning system

2.6.1.1.1 Observation and modelling

Social learning theory has been utilised as a conceptual framework to understand the development and acquisition of behaviour amongst children (Bandura & McClelland, 1977). The current study focuses mainly on the influence of the social environment and the nature of the relationship that exist between parents or caregivers and children, especially with regard to behavioural practices that are assimilated by developing children. Bandura and McClelland (1977) argued that “virtually all learning phenomena resulting from direct experiences can occur on a vicarious basis through observation of other people’s behaviour and its consequences for them” (p. 02). Bandura and McClelland (1977) state that it is possible to adopt behavioural practices by witnessing the affective reactions of others and also go on to suggest that this idea would hold true for a variety of behavioural outcomes, for example, emotional responses to situations or events. Thus people are able to learn how to behave, by directly observing the behaviours exhibited by others in their environment and the outcomes or consequences of their behaviours. Thus, when considered within the context of risky behaviour, it can be understood that adolescents will be able to assess which behaviours to engage in, which behaviours to avoid and also to determine the outcomes of engaging in such behaviours, based on the behaviours that are displayed by others in the social environment. Bandura used the example of fear or defensive behaviour, in which the fear or the risk of being hurt, is reduced in the observer, as a result of observing others engage in feared activities without succumbing to adverse consequences (Bandura & McClelland, 1977).

Bandura proposed a further component to learning behaviour within the social context, referred to as modelling. According to Bandura and McClelland (1977) behaviour in children is easily acquired when it is modelled by significant others in the immediate social environment, such as parents and caregivers. Modelling has been championed as a key component in the process of mastering complex behaviours, as it allows for the process of learning to be shortened, making it less laborious and easier to acquire (Bandura & McClelland, 1977). According to Miller and Dollard (1941), cited in Bandura and McClelland (1977), the process of learning a behaviour is complex as it results from an individual’s motivation to act, “they must be provided with an example of the desired behaviour, they must perform responses that match the example, and their imitative behaviour must be positively reinforced” (p. 06). Research conducted by Modena and Schall (2006), suggests that behaviours that are modelled by observers in the social environment are influenced by the perceptions of disease that are communicated by means of social representations that are observed in the environment. This suggests that a type of shared knowledge exists amongst individuals who operate in the same context and that this particular type of knowledge arises from social learning and communication (Camargo & Bousfield, 2009). This results in the convergence of several understandings or perceptions so that social knowledge becomes internalised by individuals, which influences their thoughts and actions, influencing the chances of adolescents facing health related risks. Thus according to this notion, children are more likely to adopt and display behaviours that are displayed by social references, such as the parent or caregiver or peers, in

the social environments. This highlights the complexity of behaviour and also emphasises the major role played by the social environment and social communication that takes place, but also demonstrates that internal individual factors play a crucial role in the emergence of behavioural practices.

2.6.1.1.2 Cognitive Factors

Although cognitive factors have not been directly explored by the current study due to the complex nature of these aspects of social learning theory, it is important to note that Bandura and McClelland (1977) also suggested that there were other factors that were associated with outcome behaviour. These factors concentrate on the cognitive abilities of humans (Bandura & McClelland, 1977). This notion is emphasised by Akers, Krohn, Lanza-Kaduce, and Radosevich (1979), who postulate that “the primary mechanism of social behaviour is operant (instrumental) conditioning in which behaviour is shaped by stimuli which follow or are consequences of the behaviour” (p. 637). Although there are a number of factors associated with behaviour, Bandura and McClelland (1977) suggest that reinforcement is one of the major factors that result in particular behaviours. Reinforcement however, is rooted in cognitive processes relating to the personal characteristics of individuals, such as knowledge, attitude, beliefs and motivation. Furthermore, reinforcement is considered to be informative through the observation of differential consequences of the actions of others which result in reward or punishment that shapes the actions of humans, whilst the motivational function of reinforcement influences human beings to engage in actions that will help them to achieve the outcomes that they value (Bandura & McClelland, 1977).

It is clear that the reinforcement of behaviour by others in the social environment, as well as through the internal processes of the individual, have implications on behaviour that is adopted by adolescents. According to social learning theory, reinforcement and the resultant behaviour is rooted in the inner motivational factors relating to personal desire for outcomes within the social context. It is not uncommon for parents/caregivers to be actively involved in enforcing and reinforcing the positive behaviours of their children, as well as punishing behaviours that are considered to be unacceptable and therefore this theoretical framework allows for further understanding.

The second important cognitive characteristic that is highlighted by Bandura and McClelland (1977) addresses the unique cognitive abilities of humans that not only determine how they are affected by their experiences, but also shape the direction of future behaviours. According to Bandura and McClelland (1977), “people can represent external influences symbolically and later use such representations to guide their actions; they can solve problems symbolically without having to enact the various alternatives; and they can foresee the probable consequences of different actions and alter their behaviour accordingly” (p. 03), which permits both insightful and intuitive behaviour.

2.6.1.1.3 Self-regulating influences

Finally, Bandura and McClelland (1977), referred to a human beings’ ability to create self-regulating influences by “managing the stimulus determinant of given activities and producing consequences of their own actions” (p. 03), which they believed suggested that people, to a certain extent, are able to control their own behaviour.

Bandura and McClelland (1977), explicate key components of learning which shape human behaviour, by discussing the interplay of these factors that result in particular patterns of behaviour and by demonstrating how these behaviours are continuously transformed as a result of the dynamic context within which they are expressed (Bandura & McClelland, 1977). The focus of this study will rest on the influence of the external environment through observation and modelling of behaviours.

2.6.1.2 Social learning theory applied to risky behaviour

Social learning theory has been utilised to explain adolescent deviant behaviour and has yielded great power as an explanatory theory, especially to predict whether adolescents would abstain from alcohol consumption or drug use (Akers et al., 1979). When applied to research conducted surrounding adolescents' risky behaviour like smoking, alcohol consumption and drug use, Akers et al. (1979), found that amongst adolescents who were in grade 7 to 12 the probability of substance use relied heavily on the model that was present. Akers et al. (1979), also state that it is expected that "the probability of abstinence decreases and the frequency of use increases when there is a greater exposure to using rather than to abstinent models" (Akers et al., 1979, p. 639). This can be directly linked to the social communication that occurs amongst adults who engage in substance use and the adolescents who model their behaviour, with regard to the message about diseases that is conveyed. When applied to risky adolescent behaviour the underlying causes of engaging in behaviours that jeopardize their health, can be attributed to the individual's perceptions of the disease, which are shaped by society. According to Modena and Schall (2006), this is determined by cultural patterns, which are "social creations that are formed by definitions and interpretations, constructed inter-subjectively" within a social space (p. 104). Research conducted by Akers and Lee (1996), suggests that these behaviours are in fact socially influenced and are acquired and sustained through the learning process because conforming or deviant behaviours are influenced by the behaviour of others in their immediate environment.

2.6.1.3 Social learning theory applied to parental monitoring

There is a gap in the literature regarding the use of social learning to understand the influence of parental monitoring on risky adolescent behaviour. McHale et al. (2003) suggest that the family environment serves as a context for children to make social references and inferences about behaviour because it is within this context that "children acquire information about gender roles and norms via their exposure to dyadic relationships in the family" (p. 126). Furthermore, McHale et al. (2003), go on to explain that "children may observe sex-typed behaviours in their mothers' and fathers' interactions with one another or be exposed to sex-typed division of labour in the marriage relationship" (p. 126). This highlights the importance of social learning and communication that occurs between the parent or caregiver and their adolescent children. Parents who provide models of abstinence and maintain a good parent-adolescent relationship are likely to communicate these values to their adolescent children and in turn to shape the nature of their behaviour. As a result, these children might be less likely to look to their deviant peers or delinquent individuals as referent models for behaviour.

As suggested by Bandura and McClelland (1977) social learning and social representations influence adolescent behaviour. These behavioural patterns that are acquired during this crucial stage of development are determined by contextual factors. Through direct observation, modelling and reinforcement of other people in the immediate environment. These interactions

influence adolescent choices with regard to engaging in particular behaviours. Research that has been conducted in this field, has found that observation and modelling of adult behaviour is hypothesised to be a powerful influential factor in adolescent behaviour.

2.7 Conclusion

This chapter therefore sought to present an argument for the importance of understanding adolescent risky behaviour, in particular, behaviours that increase the risk of becoming infected with schistosomiasis amongst adolescent girls in the context of the HIV/AIDS pandemic. The phase of adolescence and its attendant difficulties were discussed together with the importance of family context, in particular the vital role of parental monitoring as a buffer against risky behaviour and disease acquisition. Social learning theory, in particular the components of learning through observation and modelling, provided a framework for understanding the interactions that take place within the parent-adolescent relationship and the resultant risky behaviours within this social context. The following chapter will describe the methodological aspects of the study, like the sample population, design and procedures, as well as the statistical techniques utilized for analysis.

CHAPTER THREE

Research Methodology

3.1 Introduction

This chapter begins by describing the research paradigm and the design that was implemented. This chapter outlines the procedures and techniques that were utilised during the research process. Furthermore, the chapter outlines the selection of the sample of study participants and the sampling techniques used, whilst also describing the data collection processes that were adhered to. The current project is located within the context of a broader research study. In order to explore the research questions posed by the broader study, an appropriate instrument was developed and administered to the sample population under stringent ethical guidelines. The chapter goes on to outline which variables were selected for analysis, for the purposes of addressing the current research questions, highlighting the data collection and analysis processes. The chapter concludes by briefly describing ethical considerations, which served as a fundamental factor in shaping the current research methodology.

3.2 Research design

3.2.1 Positivist' approach

The design of a research study can be considered as a map that shapes the path that the research will follow. According to Bryman (2012), research design is a fundamental factor, as it serves as a guide and has implications on the researcher's ability to attribute meaning to the findings.

Social research seeks to identify "patterns of regularity in social life" (Babbie, 2012, p. 09). This suggests that social science research seeks to understand the system of variables that causes, for example, a particular behaviour, attitude or view to be "strong in one instance and weak in another" (Babbie, 2012, p. 12). According to Babbie (2012), in order to make such inferences careful thought must be given to the underlying paradigm, research design and data collection processes. The author refers to theory, data collection and data analysis as the three fundamental aspects of social science research that must be given careful consideration (Babbie, 2012).

3.2.2 Broader research study

The current research study was nested within a larger longitudinal cohort study that began in 2008 and adopts a quantitative research design. The study focuses on schistosomiasis in young women and girls of KwaZulu-Natal, the effect of treatment and the association of schistosomiasis with HIV. A longitudinal design refers to a study that "involves the observations of units over a period of time" (Terre Blanche, Durrheim, & Painter, 2006, p. 43).

3.2.3 Current research design

In order to be able to answer the research questions in the current research study, a quantitative approach was adopted, which allowed for the objective analysis of risky behaviour amongst adolescent girls, the prevalence of schistosomiasis and patterns that exist in caregiver monitoring practices.

Quantitative research can be defined as “explaining phenomena by collecting numerical data that are analysed using mathematically based methods” (statistics in particular) (Muijs, 2010, p. 01). According to Babbie (2012) “quantification often makes observations more explicit” and as a result makes it easier to compare, aggregate and summarize the data (p. 25). This was most appropriate for the current study, as quantification allowed for variables of interest, for example, or the frequency of adolescents engaging in risky behaviours, to be further explored. This also introduced the possibility of statistical analysis of these behaviours like water contact with rivers amongst adolescent girls, “ranging from simple averages to complex formulas and mathematical models” (Babbie, 2012, p. 25) Moreover, the quantitative design allowed for the current research to be implemented amongst a larger sample, which would increase the chances of the findings being generalised, “beyond the confines of the particular context in which the research was conducted” (Bryman, 2012, p. 76).

3.3 Methodology

3.3.1 Sample

3.3.1.1 Settings and participants

This study focused on data collected from schools that were visited between September 2009 and November 2010 in a predominantly rural district (Ugu), covering 5866 km² on the south coast of KwaZulu-Natal, South Africa. This area is considered to be an area in which schistosomiasis is highly prevalent. The population in this district is an estimated 700 000, almost exclusively *isiZulu* speaking people, with 84% of the population residing in rural areas (Hegertun et al., 2013). A further 51% are below the age of 20 years and 55% of the general population are female (Hegertun et al., 2013).

3.3.1.2 Sampling and sampling method

The broader study focused on schools within the Ugu district on the south coast of KwaZulu-Natal. Sampling was conducted in a manner that ensured that the sample population was representative of the population of interest as a whole. This is important, according to (Terre Blanche et al., 2006), as “effective sampling ensures that the elements selected for a sample resemble the parameters of the population they were selected from” (p. 134), allowing the development of stronger and more valid descriptions and inferences about the population. Random selection was utilised as a sampling method to ensure that each primary school in the sampling frame had an equal and independent chance of being selected to participate in the study (Terre Blanche et al., 2006). The current sample was drawn from the list of schools that was compiled by the Department of Education in 2008-2009. The list comprised of 309 local primary schools.

A random sample of eighteen primary schools was selected to participate in the study (Hegertun et al., 2013). Based on the large amounts of literature suggesting that women are at an increased risk of pathologies found in the urinary tract, including lesions caused by the presence of schistosomiasis, which increase their chances of becoming infected with diseases like STI's, girls were approached to participate in the study (Kjetland et al., 2008). In order to ensure that justice was maintained, this cohort of participants was chosen as they were, theoretically, most affected by the disease and in need of corrective measures, according to previous research conducted in Zimbabwe (Kjetland et al., 2006).

The criteria for selection were carefully adhered to, ensuring that only schools within 10 km from the coast, near a river and not more than 300m above sea level, which are conditions that are suitable for the presence of schistosomiasis, were invited to participate in the study. All girls in this area who were between the ages of 9-13 in the 18 primary schools were invited to participate in the study but only those who agreed were selected. Following written informed consent from parents/caregivers, those who felt that they had received adequate information about the study and understood the information regarding participation, offered assent and participated by providing urine samples and answering a questionnaire. Participants who were not available on the days that the invitations for participation in the study were made, due to absenteeism, serious illness or if their caregivers had not consented, were excluded from the sampling process (Hegertun et al., 2013). As a result, the initial study sample was n=1057, but only participants who completed the questionnaire (n=1043) and submitted urine samples (n=970) were considered for the current study sample to reduce bias in behavioural conclusions drawn and to also increase the precision of the conclusions drawn about infection amongst this sample population. The current study sample consisted of n=970 participating girls (Figure 1).

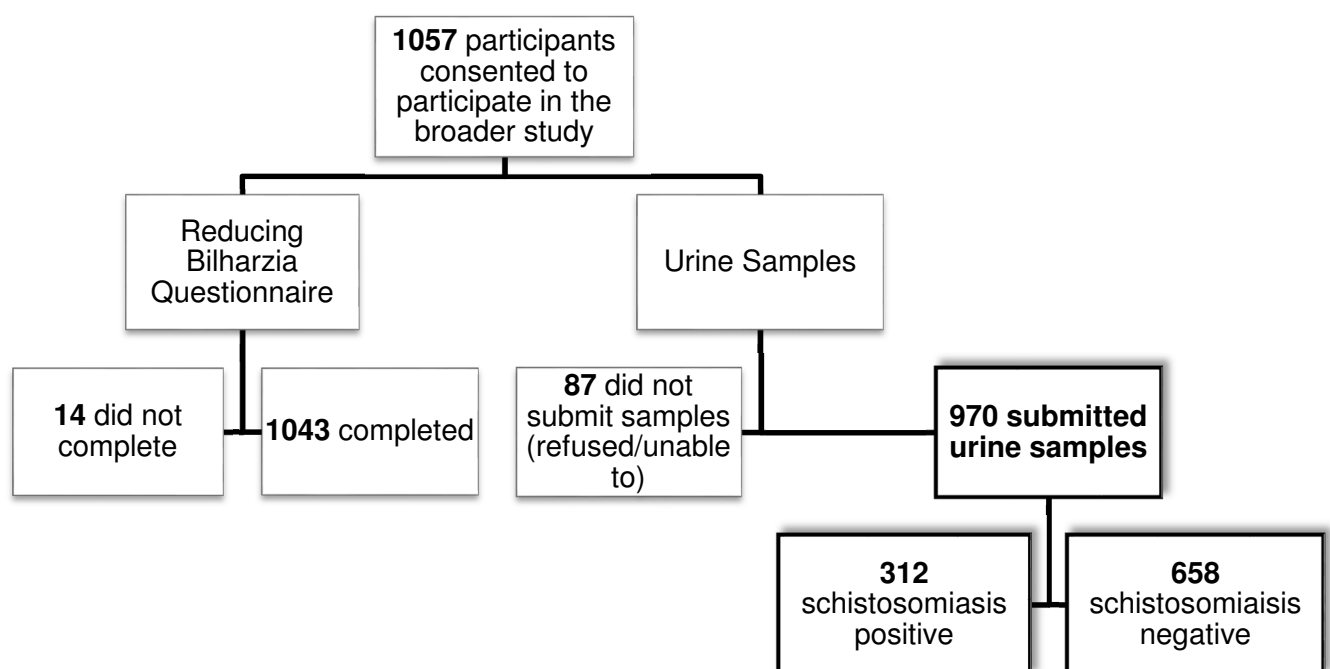


Figure 1 Flow chart showing the participant inclusion process

3.3.2 Data collection

Urine samples were collected, which allowed for the identification of the presence of schistosomiasis and a questionnaire that explored a wide range of topics relating to the broader study was conducted with each eligible participant. Before any data collection procedures took place, factual information surrounding the study, participation, methods and procedures were clearly explained in the preferred language of the participant, either English or *isiZulu*, by a trained female research assistant. Only girls who provided assent and also returned a consent

form that was signed by their parent or guardian were subjected to two measures, which are described in detail below.

3.3.2.1 Questionnaire description

The current study involved behavioural and social dimensions nested within a biomedical perspective, which is a relatively unique area of research and consequently, there were limited appropriate social and behavioural instruments at hand. As a result, the *Reducing Bilharzia Project Questionnaire* (Appendix 4) was designed which investigated a number of topics. For the purposes of the current study only the social and behavioural factors covered by the questionnaire were explored, so as to establish a pattern of behaviour, and to investigate whether a relationship between risky adolescent behaviour, care giver monitoring and the prevalence of disease did exist.

The areas of interest covered by the questionnaire included biographical questions, which captured information relating to the participants' age, education as well as their home life, family structure and living arrangements. Questions 14e (Does your father live with you at home?), 15a (Does your mother live with you at home?) and 16a (Who is your main caregiver?) from Section A were used for descriptive analysis, such as frequency analysis. The questionnaire also covered behavioural aspects relating to risky water contact, which was defined as contact with fresh water in a schistosomiasis endemic region. Risky water contact behaviour was referred to as schistosomiasis specific risky behaviour and was addressed in Section C of the questionnaire. In this section, questions 1 (Where do you get your drinking water from?) and question 5 (Now I will ask you what water activity you do) were used for frequency analysis and crosstabulation. This concentrated on issues relating to the source of the drinking water and the different behavioural activities that are commonly practised amongst this particular age group, like playing or swimming in the river, bathing or doing laundry. Questions 5 in this section addressed, for example, water contact by asking how often adolescents came into contact with the water. Alcohol consumption (Section H, question 2 which states "Have you ever drunk alcohol?") and drug use (Section I, question 2 which states "Do you use drugs"), which were referred to as general risky behaviours, were covered in the questionnaire. The importance of social influences was also explored in the questionnaire. Section D of the questionnaire addressed the issue of parent-adolescent relationships. Questions 2-4, in particular addressed parental/caregiver monitoring by asking questions about the presence of, and when, and whether the caregiver was interested in the adolescent's whereabouts, company and activities.

3.3.2.1.1 Instrument development

Due to the relatively uncharted nature of the broader schistosomiasis research study, no existing instrument could be utilised to accurately explore and inform the objectives of the study. As a result, an intensive literature search was conducted to guide the development of the instrument used in this study. The instrument was referred to as the *Reducing Bilharzia Project Questionnaire*. This survey instrument allows for collection of data from individuals about themselves, or about a social unit like the family structure, in line with a positivist approach (Matsueda & Heimer, 1987).

The structure of the instrument that was utilised for the purposes of this study was guided by pretested psychometric tools, as well as other questions which explored risky water contact

behaviours related to schistosomiasis, that were developed and standardised in previous studies conducted by Thomassen Morgas et al. (2010). The questionnaire was translated from English into *isiZulu* by a team of first language *isiZulu* speakers including people from the area. The questionnaire was then back translated from *isiZulu* into English by a different group and the two versions were compared and corrected where necessary, increasing the reliability of the instrument.

3.3.2.1.2 Validity, reliability and rigour of the Reducing Bilharzia Project Questionnaire

The questionnaire was piloted at one of the schools and the learners appeared to understand and to answer all the questions. Due to the contemporary nature of the study, it was difficult to access a pre-tested psychometric tool that had been valid and reliable and could be utilised for the purpose of this study. Therefore, the *Reducing Bilharzia Project Questionnaire* was “designed, translated, pretested and adapted to local decorum” (Thomassen Morgas et al., 2010). It was through this process that the reliability and validity was documented.

All relevant statistical procedures were conducted by the instrument development team under the broader research study. The questionnaire was developed based on the properties of a Likert scale, as the responses from all the scales that were included for the factor analysis were on a Likert-type scale, ranging from 0 (*never*) to 4 (*daily*). Factor analysis was conducted and allowed for the identification of a smaller number of factors that would adequately represent the relationship (Hair & Black, 2010). These factors were then included in the instrument. Some questions were reverse scored. Research assistants collecting the data were trained over a two week period and great emphasis was placed on confidentiality, in an effort to encourage truthful answers from participants, to try and add to the reliability and validity of the instrument.

3.3.2.1.3 Validity, reliability and rigour of guiding instruments

For the purpose of the broader study, questions were adapted from the *Bonding Family Social Capital Scale* and *The Bonding Peer Social Capital Scale*, seven items adapted from the 10-item *Likert Rosenberg's Self-esteem Scale (RSE)* and seven questions from *Bandura's Self-Efficacy Scale* were selected, as these aspects were of interest to the investigators. The *Bonding Family Social Capital Scale* and the *Bonding Peer Social Capital Scale*, were originally used as one scale and were tested on N=7988 adults in England as part of the Health Survey in 2000 (Moodley, 2008). The reliability of the scale yielded a .87 Cronbach's reliability coefficient, indicating that it possessed high reliability, with high internal consistency of .90 (Moodley, 2008).

The original purpose of the *RSE* was to measure the self-esteem of high school students and this scale demonstrated internal consistency with a Guttman scale coefficient of reproducibility of .92 (Ciarrochi & Bilich, 2007). The scale demonstrated excellent stability, using the test retest method over a two week period, as it yielded correlations of .85 and .88 and was therefore used as a basis for the *Reducing Bilharzia Project Questionnaire* (Ciarrochi & Bilich, 2007). The *RSE* also “demonstrated concurrent, predictive and constructive validity” (Ciarrochi & Bilich, 2007, p. 61), whilst also significantly correlating with other self-esteem measures, including the *Coopersmith Self Esteem Inventory*. These instruments served as a guide in developing variables that were specifically selected for inclusion for the purpose of the larger research study.

Finally, *Bandura's Self Efficacy Scale* was used, which was primarily concerned with the ability of participants to estimate their ability to produce desired outcomes. Bandura proposed that individuals who perceived themselves as “capable, tend to attempt and successfully execute tasks or activities” (Williams & Coombs, 1996, p. 04). The reliability of this measure “produced an overall Cronbach's alpha reliability coefficient of .92” (Williams & Coombs, 1996, p. 06), which indicated strong internal consistency.

3.3.2.2 Questionnaire administration

The questionnaire was administered by a trained research assistant in the preferred language of the participant, which was in most cases *IsiZulu* and sometimes in English. Once assent and informed consent were provided the interview was conducted one on one, away from the hearing range of others (the procedures followed with regard to consent and assent are discussed further in the ethical considerations section 3.3.5). The interview was carefully explained and participants had freedom to answer the questions, only disclosing information that they were comfortable with.

3.3.2.3 Urine sample collection

After the interview, each girl was given a “honey jar” and requested to go to the toilet and provide a urine specimen in a numbered bottle. There were female research assistants stationed at the toilet block to collect the samples and provide assistance and hand washing facilities. Girls were asked to submit urine samples over three days between 10:00 and 14:00 (Thomassen Morgas et al., 2010).

3.3.3 Data treatment

3.3.3.1 Data coding and editing processes

The questionnaire was structured to ensure that the coding of data and data entry processes remained uniform amongst all data enterers. A standard template of the questionnaire was generated allowing for data to be entered by trained research assistants. A program called EpiData was used to enter and validate data in a simple and efficient way. All data enterers followed a code book which served as a guide to ensure that uniformity was maintained. All missing data were recorded by substituting a dummy value of ‘99’. To ensure that all data were entered accurately all questionnaires were subjected to a process of double entry, which meant that all answered questionnaires were entered into the program on a second occasion by a different research assistant. This ensured correction of all errors that may have occurred.

Data collection was conducted in a standardized manner to ensure the validity of the data obtained. Data collection was also done in an ethical manner to make certain that the interruptions caused by the data collection process at schools were minimal. This ensured the well-being of the participants who consented to be part of the research study.

3.3.4 Data analysis

3.3.4.1 Statistical analysis

For the purpose of this study, adolescent risky behaviours, in terms of general risky behaviour and water contact were explored, in order to establish the frequency of such behaviours, in relation to the prevalence of schistosomiasis. Caregiver or parental monitoring was also explored in order to determine whether the presence of a caregiver or parent influenced the prevalence of risky behaviours and schistosomiasis infection amongst adolescent girls.

The data were first examined using descriptive statistics in order to determine the characteristics of the sample population (Hair & Black, 2010), suggest that it is important to examine the data by graphically exploring the dataset in a simple and visual manner, by utilising techniques like graphs. In order to determine the age and grade of the participants, frequency tables and bar graphs were generated which allowed visual inspection of the sample population. In order to make comparisons, frequency tables were generated to compare the frequency of the participants' risky behaviours and the prevalence of schistosomiasis that is, participants who were positive or negative for schistosomiasis. Frequency tables were also used to explore factors related to main caregiver and caregiver monitoring, like whether a care giver asked the participant about school.

According to (Howell, 2007), research questions seek to identify how a change in one variable is related to the differences in another variable which allows for the prediction of a person's score on one variable from the knowledge of that person's score on another variable. This requires that associations between variables must be explored. Crosstabulation tables were utilised to examine the relationship between two variables by applying the chi square statistic. Binary logistic regression was then conducted on all variables found to be significant in order to determine the risk of infection.

3.3.4.1.1 Crosstabulation analysis

The data obtained from the questionnaire were classified as nominal data. Nominal data are a specific form of categorical data, as they consist of variables which have a measurement scale consisting of a set of categories, but are not categorised in a particular order (Agresti, 2010).

Essentially, data collection seeks to identify the number of counts in a particular category, for example, the number of schistosomiasis positive adolescent girls who swim in the river (Marsh & Elliott, 2008). Of further interest, might be to compare the number of adolescent girls who do or not swim in the river against the number of schistosomiasis positive or negative cases in the sample population. In order to achieve this, crosstabulation tables were utilised, as they identify observed cell counts for particular categories and also explore the associations that may exist between categorical variables by utilising the chi square statistic (Agresti, 2010).

Crosstabulation tables are tables that compare two variables (referred to as two-way crosstabulation tables) and are made up of rows and columns ($r \times c$), that consist of cells that count the observed counts (frequencies) for each combination, which helped to show the nature of the dependence between the variables. Dependence was determined by computing the chi square statistic (χ^2) (Agresti, 2010; Marsh & Elliott, 2008). More specifically, chi square

analysis is a statistical method of comparing “the observed counts with those that would be expected if there were no association between the variables” (Marsh & Elliott, 2008, p. 114). Crosstabulation analysis is based on two fundamental assumptions which suggest that the validity of the chi square statistic is determined by the size of the sample and the cells and the number of cells in the crosstabulation table (Marsh & Elliott, 2008). According to Cochran (1954), as cited in Marsh and Elliott (2008), the approximation of the chi square statistic is satisfactory and adequate when no expected cell frequencies are less than one and no more than twenty per cent are less than five (Marsh & Elliott, 2008). Therefore the cut-off values for frequency analysis conducted for all variables was ≥ 5 , in order to ensure that the chi square statistic could be accurately utilised.

According to Bernston (2002), “when we examine the relationship from sample data presented in a two way table, we want to know if the two variables are independent (no significant relationship) or related in the population (p. 01). We refer to these statements as the null hypothesis (which suggests that the variables are independent) and the alternate hypothesis (suggests that there is a significant relationship between the variables) (Bernston, 2002). If the null hypothesis is true, then the chi square value will be small and the observed cell counts will be closer to the expected cell counts. If the alternate hypothesis is true, then the chi square value will be larger and the observed cell counts will differ from the expected cell counts (Field, 2013).

One of the limitations of the chi square statistic in crosstabulation analysis is that it is merely an indication of association, but does not however, supply information on the nature or strength of the association (Agresti, 2010). Statisticians advise against sole reliance on chi square analysis and suggest that associations be explored using other factors, like standardized residual values. Based on this advice, residual values were explored in order to study the pattern of association between the variables of interest. If the variables are independent, then the residual values have approximately a standard normal distribution $N(0; 1)$, however large residual values provide evidence against independence in that cell (Agresti, 2010).

Crosstabulation tests were performed, using *Statistical Package for Social Sciences* (SPSS version 21), to test the association between adolescents who were schistosomiasis positive or negative and parental monitoring and to also establish whether parental monitoring was associated with adolescent risky behaviours, with the focus resting on risky water contact behaviours. The null hypothesis would thus state that no association existed between these variables. A relationship was considered significantly associated and not attributed to chance when the value for chi square was large and the p-value was less than alpha, where alpha was $p < .001$ (Howell, 2007). For the purpose of this study, a conservative alpha was applied to reduce the chance of family wise error, which suggests that an increased number of tests may yield a greater number of significant relationships amongst the sample; therefore a lower alpha would ensure that the most probable significant associations were considered. The alpha level was derived using a Bonferoni calculation, in which the critical p-value (alpha of .05) was divided by the number of comparisons being made ($\frac{.05}{42} = 0.001$). Cell frequencies of the observed and expected categories were also examined and residual values explored in order to identify the pattern of association. Residuals that were greater than or equal to positive or negative 1.96 were considered to be significant contributors to the relationship and to provide evidence against independence (Field, 2013).

3.3.4.1.2 Binary logistic regression analysis

Once these significant relations were identified, logistic regression was used. The two main uses of logistic regression are to predict category membership and to provide information about the relationships and strengths among variables (Pampel, 2000). Logistic regression is usually used when there are two categories of the dependent variables, for example infected or not infected (Pampel, 2000). Logistic regression is based on binomial probability theory, in which Pampel (2000) posits that “there are only two values to predict that probability (p) is 1 rather than 0, that is the event or person belongs to one group rather than the other. According to (Pampel, 2000), the use of logistic regression allows researchers to “determine the impact of multiple independent variables presented simultaneously to predict membership of one or the other group of the two dependent variable categories” (p. 569).

Logistic regression is based on assumptions that are similar to normal regression which assumes that the outcome is a linear relationship, but differs slightly for logistic regression in that “the assumption of linearity in logistic regression, therefore, is that there is a linear relationship between any continuous predictors and the logit of the outcome variable” (Field, 2013, p. 273). The second assumption is the independence of errors which suggests that the data cases should not be related (Field, 2013). The final assumption of logistic regression is that is the predictors should not be too highly correlated, this is referred to as multicollinearity (Field, 2013).

Logistic regression includes procedures for dummy variables, therefore variables of interest were recoded to embody 1's and 0's, where 1 represented the success of an event occurring and 0 represented the failure of an event occurring. This can be conceptualised as follows, the value 1 represents those who reported that they did swim in the river and 0 represents those who reported that they did not swim in the river. Variables that were significant in the crosstabulation analysis were selected and entered into the binary logistic regression model using the forced entry method.

For the purpose of the logistic regression model, predictor variables were considered significant predictors of disease infection when the Wald statistic was significant at an alpha level of .05. The Wald statistic can be defined as “a test statistic with a known probability distribution (a chi-square distribution) that is used to test whether the b coefficient for a predictor in a logistic regression model is significantly different from zero” (Field, 2013, p. 796). The Nagelkerke's R^2 value, which refers to the “partial correlation between the outcome variable and each predictor variable” (Field, 2013, p. 268), was used to determine how well the model fits. These values were converted to and interpreted in percentages, for example, a Nagelkerke's R^2 of 0.90 would indicate that only 90% of possible values influencing the variable were included in the logistic regression model. This value can range between negative one and positive one and the higher the percentage, the better the fit of the model (Field, 2013). Finally the odds ratio ($\text{Exp}\beta$) was interpreted to determine the change in odds resulting from one unit change in prediction. The odds of infection were considered to increase when the exponential value was greater than one or decrease when the exponential value was less than one (Field, 2013, p. 270). A confidence interval (CI) of 95% was used.

3.4 Ethical considerations

In order to conduct research amongst human participants a number of ethical considerations had to be taken into account to ensure that the interests and well-being of all involved in the research process were maintained.

3.4.1 Permissions

The broader study was approved by the “Biomedical Medical Research Ethics Administration, UKZN2009, Ref BF029/07; by the Department of Health, Pietermaritzburg, 2009, Ref HRKM010–08; by the Norwegian ethics committee, Ref 469–07066a1.2007.535, 2007, and the Departments of Health (2008) and Education (2009) in Ugu District. The Helsinki Declaration was followed” (Hegertun et al., 2013, p. 02) (Appendix 2).

In order to implement the research study, the gate keepers, such as community and traditional leaders in the district were approached. Presentations were conducted for traditional leaders in the different areas and to the Ugu District Traditional Leaders’ Forum, to ensure that all cultural aspects were respected, before, during and after participation. Once access to the community was gained, principals at all schools were approached and permission was granted by principles and governing bodies.

The current study was approved by the Humanities and Social Sciences Research Ethics Committee (SSHREC) as a sub-study of the above mentioned study (BF029/07), as well as the Department of Psychology, University of KwaZulu-Natal (Appendix 2).

The study is further premised on the fundamental ethical principles as outlined by the National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research, which highlights a number of ethical principles that must be adhered to as defined by the Belmont Report (1979) (Koski & Nightingale, 2001). According to the Belmont Report (1979), all research must ensure that respect for persons; beneficence and justice are given careful consideration when implementing research with human subjects (WMA, 2000).

3.4.2 Informed consent

Further permission was obtained from the parents/caregivers and the participants in the form of a written informed consent (former) and assent (latter), which is required when participants cannot autonomously consent. The consent form (Appendix 3) explained the objectives of the study and the methods and procedures that would be implemented. Risks and benefits of participation were also outlined, allowing participants to make a decision based on factual information. All relevant contact details were made available to parents and participants for further questions. The information sheet and consent form were explained to the participants on a one-on-one basis, allowing them to ask necessary questions. Furthermore, participants were informed of the confidentiality of their participation and that they would be able to withdraw from the study at any time. Once the questionnaire was completed, each participant was assigned a unique identity number and was referred to by this particular number for the duration of the research study. This confidentiality ensured the reduction of harm that may befall the participants as a result of the study.

3.4.3 Anonymity and confidentiality

Once the unique identity number was assigned, the name of the participant, their corresponding identity numbers and their answered questionnaires were stored in separate locations, in two different towns, to maintain confidentiality. Access to the information was reserved for relevant personnel only. Moreover, identity numbers were assigned to participating schools and the area was not mentioned to reduce stigmatization. Parents were also consulted about the future use of the sample data for future research purposes that may arise in this field, as the research data would be stored. Digitalized data was kept in locked locations, with identity numbers and corresponding names stored in separate locations to maintain on-going respect and anonymity. Access to data was limited, only accessible for further investigations and future studies. Once the data are no longer needed and/or can no longer be used, all forms of the stored data will be erased and/or incinerated.

3.4.4 Respect for persons

Individuals participating in research were treated as agents of autonomy. This suggests that research participants enter into research voluntarily after receiving adequate information regarding the research being conducted (WMA, 2000). Based on this ethical consideration, all information pertaining to participation in the research study was disclosed to parents and participants, especially with regard to specimen sampling. This was carefully explained by the trained research assistant in order to make the girls feel at ease and comfortable with the procedure.

3.4.5 Beneficence

All research conducted on human subjects must try to secure their well-being and also seek to ensure that all participants are protected from harm (WMA, 2000). There are two general rules that ensure beneficence of research participants, firstly do not harm and secondly, maximise the possible benefits whilst minimising the possible harm that might occur from the research investigation (WMA, 2000). Research participants may have been faced with social harm as a result of participation that may be rooted in misconceptions about the disease or stigma attached to schistosomiasis. For this reason adequate information was supplied to the community and to the schools in the area. Other harm that may befall study participants pertain to unforeseen medical reactions to treatment; however such cases were referred for further medical treatment to ensure the safety of the participant. However, the benefits of treatment far outweighed the risks of participation.

In order to reduce stigma attached to participation, general terms such as urinary schistosomiasis were used. A private psychologist was also hired by the project to take care of referred cases as necessary; psychologically, practically and legally in order to maximise beneficence and maintain on-going respect for participants and to secure the well-being of the participants. When other medical help was required, the participants were referred to a government clinical facility, or offered private care if government services were unavailable. For ethical and community liaison purposes the project staff were not involved in any physical or psychological examinations after referral (Hegertun et al., 2013). The results of the study will be made freely available to the community. Results will also be disseminated at local health awareness days for the community in the form of flyers or posters, as well as through publications in open access online journals for other researchers to further research in the field.

3.4.6 Coercion

The research study did not engage in any form of coercion. All principals, parents and learners were informed that participation was completely voluntary and that non-participation in the study would not lead to any prejudice.

3.4.7 Deception

All information regarding participation was disclosed to all involved and further contact details of principal investigators and clinicians were provided for further questions, ensuring that no form of deception was employed during the research process. The research study ensured that careful attention was paid to ethical considerations which were enforced throughout the research process.

3.5 Conclusion

This chapter highlighted the research process followed and the manner in which this study was conducted. Quantitative methodology was utilised and a structured questionnaire and urine sampling were conducted. The sample comprised of N=1059 participants from 18 randomly selected schools in a district in southern KwaZulu-Natal. Only girls who completed the questionnaire and submitted a urine sample were included in the current study (N= 970). Crosstabulation analysis and binary logistic regression were used to analyse the data. The following chapter will report the findings and results.

CHAPTER FOUR

Results

4.1 Introduction

The current research study sought to explore the relationship between the prevalence of schistosomiasis amongst adolescent girls who engaged in risky behaviours and to also determine whether the prevalence of schistosomiasis and/ or adolescent risky behaviours were influenced by parental or caregiver monitoring.

Risky behaviours were defined as behaviours or activities that placed adolescents at risk of infection or disease, that were general or schistosomiasis specific. In order to establish the regularity of the sample population engaging in risky behaviours which place them at risk for co-endemic diseases, general risky behaviours, like alcohol consumption or drug use, were explored. Behaviours, like frequent water contact through playing or engaging in activities such as doing the laundry in the river were classified as schistosomiasis specific risky behaviours as they increase the chances of becoming infected with this particular disease.

The current study also explored the association between schistosomiasis, risky behaviours and parental monitoring. The chapter begins with the description of the sample population by age and grade using bar graphs and frequency tables to examine behavioural patterns amongst schistosomiasis positive and schistosomiasis negative participants and thereafter the frequency of parental monitoring amongst schistosomiasis positive and schistosomiasis negative participants.

The chapter then outlines the results of the crosstabulation analysis that was conducted in order to establish whether or not a significant relationship existed between the prevalence of schistosomiasis and risky behaviours, schistosomiasis prevalence and caregiver monitoring as well as caregiver monitoring and risky behaviours. The chapter goes on to highlight the results of the binary logistic regression that was conducted to determine the odds of infection. The chapter ends with a summary, highlighting all significant results obtained during data analysis.

4.2 Characteristics of the Study Group

4.2.1 Age and Grade

The total of 1057 adolescent girls consented to participate in the study. A total of 1043 adolescent girls answered the *Reducing Bilharzia Project* questionnaire, however 14 participants who did provide urine samples, chose not to complete the questionnaire. In total 970 girls submitted urine samples (91.8%, of the total consenting participants) and 87 samples were omitted from analysis, which may be due to participants refusing to submit a sample or perhaps due to them failing to produce the three required urine samples. Therefore the sample size used for statistical procedures was n=970. Figure 2 and Figure 3 illustrate the age and grade distributions of the sample population.

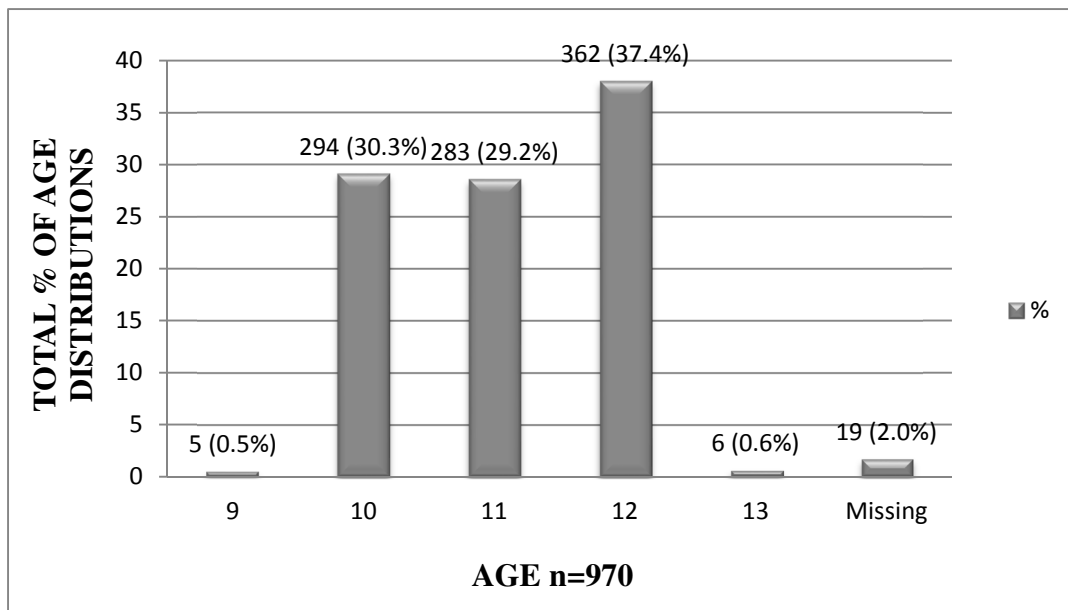


Figure 2 Age distribution of study participants

The participants' ages ranged from 9 years to 13 years. The mode of the sample is 12 years old and the mean sample age is 11 years old.

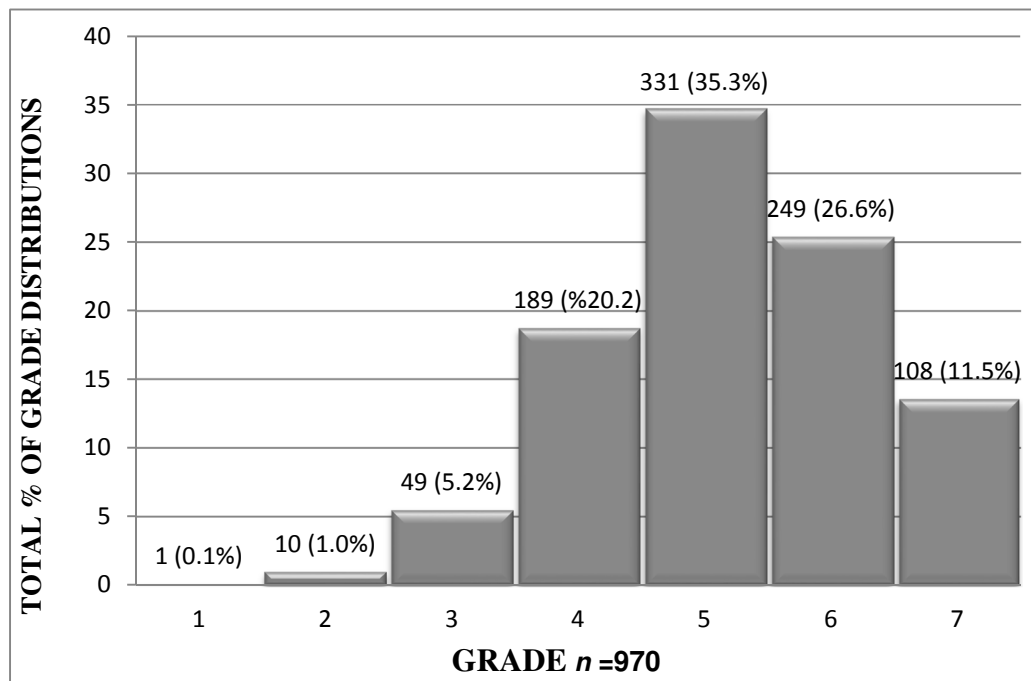


Figure 3 Grade distribution of sample population

It is evident that 35.3% of the sample population were in grade 5. A total of 3.4 % of the sample did not report their grade.

Frequencies of the variables of interest such as the prevalence of schistosomiasis, main water source reported, general risky behaviour, schistosomiasis specific risky behaviour, main caregiver, caregiver monitoring and schistosomiasis infection, as well as caregiver monitoring and risky behaviour are described in the tables that follow.

4.2.2 Prevalence of schistosomiasis

The prevalence of schistosomiasis infection amongst this sample population was 32.2%.

Table 1 Prevalence of Schistosomiasis (bilharzia) among 9-13 year school girls in KwaZulu-Natal

Schistosomiasis	Total
Infected	32.2% (312/970)
Uninfected	67.8% (658/970)
Total	100% (970)

4.2.3 Main water source

Table 2 highlights the main water sources reported by adolescent girls in the sample. The most common water source amongst this sample was the stand pipe or communal tap (71.2%).

Table 2 Main water source reported by adolescent girls in KwaZulu-Natal

Main Water Source	Schistosomiasis Positive (n=312)	Schistosomiasis Negative (n=658)	Total Sample (n=970)
Stand pipe/communal tap	76.9% (240/312)	68.6% (451/658)	71.2% (691/970)
Indoor tap	16.0% (50/312)	25.1% (165/658)	22.1% (215/970)
River	1.0% (3/312)	1.8% (12/658)	1.5% (15/970)

4.3 Frequency of risky behaviours reported by 9-13 year school girls

An insignificant proportion of the sample indicated that they were sexually active (0.7%), therefore only drug use and alcohol consumption were explored in order to establish the prevalence of general risky behaviours amongst the sample population. Furthermore, careful attention was paid to schistosomiasis related risky behaviours. The current analysis explored water contact behaviour in detail, as it is considered a schistosomiasis risky behaviour. Whilst there is a known association between schistosomiasis infection and water contact, it is important to be able to identify which water contact behaviours are commonly engaged in by adolescents, especially adolescent girls.

Overall, a lower proportion of the sample reported that they had engaged in general risky behaviours and schistosomiasis specific risky behaviours across both schistosomiasis positive and schistosomiasis negative groups.

4.3.1 Frequency of general risky behaviours

The frequencies of general risky behaviours, such as alcohol and drug use, are reported in Table 3. A total of 171 adolescent girls between the ages of 9-13 years reported that they had consumed alcohol. Almost a quarter of the girls who were infected with schistosomiasis also reported alcohol use (23.4%). The frequency tables suggest that the proportion of girls who consumed alcohol was greater for girls who were schistosomiasis positive than those who were schistosomiasis negative. The frequency of drug use reported amongst schistosomiasis positive and negative sample was very low and ranged between 0.9-1.0 percent. Drug use was excluded from further analysis due to the low reporting frequency.

Table 3 Frequency of general risky behaviours amongst adolescent girls in KwaZulu-Natal

General Risky Behaviour	Yes/No	Schistosomiasis Positive (n=312)	Schistosomiasis Negative (n=658)	Total Sample (n=970)
Alcohol	Yes	23.4 % (73/312)	14.9% (98/658)	17.6% (171/970)
Drugs	Yes	1.0 % (3/312)	0.9% (6/658)	1.5% (15/970)

4.3.2 Frequency of water contact behaviours

Participants were asked to report the frequency of their water contact behaviours based on eight possible categories of water contact behaviour (swim, play, bath, do the laundry, collect water, wash blankets and cross the river). Fishing was excluded from further analysis due to the low overall reported frequency (1.3%).

A total of 31.4% of the schistosomiasis positive population reported that they did swim in the river and 43.0% reported that they played in the river (Table 4). Frequency analysis revealed that 38.5% of those who were schistosomiasis positive indicated that they bathed in the river, 48.7% reported doing their laundry in the river and 34.0% reported that they washed their blankets in the river.

In sum, 67.8% of the sample population were not infected with schistosomiasis. Frequency analysis suggests that 19.5% of the participants who were schistosomiasis negative indicated that they did swim in the river. In addition, 26.1% of the schistosomiasis negative participants indicated that played in the river and 29.9% bathed in the river. Moreover, 34.7% of the schistosomiasis negative group reported that they did their laundry in the river, 22.5% collected water from the river and 22.5% reported that they crossed the river.

Table 4 Frequency of schistosomiasis specific risky behaviours amongst adolescent girls in KwaZulu-Natal

Water Contact Behaviour	Yes/No	Schistosomiasis Positive (n=312)	Schistosomiasis Negative (n=658)	Total Sample (n=970)
Swim	Yes	31.4 % (98/312)	19.5 % (128/658)	23.3% (226/970)
Play	Yes	43.0% (134/312)	26.1% (172/658)	31.6.% (306/970)
Bath	Yes	38.5% (120/312)	29.9% (197/658)	32.7% (317/970)
Laundry	Yes	48.7% (152/312)	34.7% (228/658)	39.2% (380/970)
Collect water	Yes	32.7% (102/312)	22.5% (148/658)	25.8% (250/970)
Wash Blankets	Yes	34.0% (106/312)	21.7% (143/658)	25.7% (249/970)
Fish	Yes	1.9% (6/312)	1.1% (7/658)	1.3% (13/970)
Cross the river	Yes	32.7% (102/312)	22.5% (148/658)	25.8% (250/970)

4.4 Characteristics of main caregivers

It was reported by 63.9% adolescent girls that their primary caregiver was their mother, with smaller proportions indicating that their grandmothers (13.0 %) or aunts (11.2%) provided primary care (Table 5). Only 22.6% reported that their fathers were present, with 58.0% reporting that their mothers were present. It is evident that the primary caregiving role for children and adolescents is provided by females.

Table 5 Main caregiver of adolescent girls in KwaZulu-Natal

Family	Level	Schistosomiasis Positive (n=312)	Schistosomiasis Negative (n=658)	Total Sample (n=970)
Mother	Yes	67.9% (212/312)	62.0% (408/658)	63.9% (620/970)
Grandmother	Yes	10.3% (32/312)	14.4 % (95/658)	13.1% (127/970)
Aunt	Yes	11.2% (35/312)	11.2% (74/658)	11.2% (109/970)
Mother Present	Yes	57.4%(179/312)	58.2%(383/658)	58.0% (562/970)
Father Present	Yes	21.2% (66/312)	23.3% (153/658)	22.6% (219/970)

4.4.1 Frequency of caregiver monitoring

Caregiver monitoring was explored by assessing the presence of a caregiver on weekends, during the day and at night. Monitoring was also evaluated based on whether or not the caregiver asked the participant in their care about school, where the participant was going and with whom the participant would be going. The general pattern across the sample population indicates that majority of the participants are monitored '*everyday*'. A total of 38.0% of the sample indicated that they were monitored '*everyday*' during the day, 81.5% '*everyday*' at night and 48.7% '*everyday*' during weekends. The results indicate that the frequency of girls reporting monitoring on a daily basis were higher at night, the participants also reported higher daily rates of caregivers asking about school (75.5%), where the girls were going (70.7%) and with whom they were going with (73.9%). Most of the participants' time was spent in school on weekdays, therefore further statistical analysis explored caregiver monitoring at weekends in detail. Participants would have more free time on weekends and would therefore require monitoring over longer periods of time by their parents or caregivers.

Table 6 Frequency of caregiver monitoring of adolescent girls in KwaZulu-Natal

Caregiver Monitoring	Level	Schistosomiasis Positive (n=312)	Schistosomiasis Negative (n=658)	Total Sample (n=970)
Day	Everyday	34.9% (109/312)	39.5% (260/658)	38.0% (369/970)
Night	Everyday	81.4% (254/312)	81.6% (537/658)	81.5% (791/970)
Weekends	Everyday	47.8% (149/312)	49.1% (323/658)	48.7% (472/970)
Asks about school	Everyday	75.0% (234/312)	75.7% (498/658)	75.5% (732/970)
Asks where you are going	Everyday	70.8% (221/312)	70.7% (465/658)	70.7% (686/970)
Asks who you are going with	Everyday	75.0% (234/312)	73.4% (483/658)	73.9% (717/970)

4.5 Crosstabulation analysis

To discover which factors contribute to the prevalence of schistosomiasis infection amongst adolescent girls, crosstabulation analysis compared a) the prevalence of schistosomiasis and risky behaviour b) caregiver monitoring and risky behaviour and c) the prevalence of schistosomiasis and caregiver monitoring, amongst the sample population. A number of possible relationships were investigated. The following summary table (Table 7) displays risky adolescent behaviour crosstabulated against the presence or absence of caregiver monitoring, along with the associated degrees of freedom and the significance level of selected categorical variables. The significance level for the current analysis is conservative to reduce family wise error ($p < .001$).

Residual values in each of the crosstabulation tables were also examined. By examining observed and expected frequencies for each comparison, further exploration of the significant associations was possible. Large residuals ($-1.96 \leq z \leq 1.96$) provided evidence against the null hypothesis, which was conceptualised as independence between the two variables being compared (Agresti, 2010).

Residual values in the crosstabulation tables reveal a pattern across reported (observed) water contact behaviours and the expected number of cases, (if the null hypothesis were true), for those who were schistosomiasis negative and positive. When compared to the frequency of the observed counts, residual values reflected a lower expected cell count for those who were schistosomiasis negative and a higher expected cell count for those who were schistosomiasis positive across significantly associated risky behaviours. This overall residual pattern suggests that the observed count for those who engaged in risky behaviour and were schistosomiasis positive was more than the expected count. This is of importance as it highlights that those who engage in water contact behaviours are more likely to be infected with schistosomiasis, emphasising that the relationship is not attributed to chance. Conversely the overall residual patterns for those who engaged in risky behaviour and were

schistosomiasis negative were less than expected. The null hypothesis would suggest that risky water contact behaviour would not account for the frequency of infection.

Table 7 Crosstabulation of risky behaviour and schistosomiasis infection amongst adolescent girls in KwaZulu-Natal

	Chi Square				Residual Values	
Risky Behaviour	Schistosomiasis infection			Level	Schistosomiasis positive	Schistosomiasis negative
	value	df.	sig.			
Swimming ^a	17.224	1	0.0001	Yes	3.0 ^b	-2.1 ^b
				No	-1.7	1.2
Play ^a	23.337	1	0.0001	Yes	3.5 ^b	-2.4 ^b
				No	-2.4 ^b	1.7
Wash ^a Blankets	16.475	1	0.0001	Yes	2.9 ^b	-2.0 ^b
				No	-1.7	1.2
Laundry ^a	17.599	1	0.0001	Yes	2.7 ^b	-1.8
				No	-2.2 ^b	1.5
Collect ^a Water	11.464	1	.001	Yes	2.4 ^b	-1.6
				No	-1.4	1.0
Cross river	9.684	1	.002	Yes	2.1 ^b	-1.5
				No	-1.4	1.0
Bath	6.674	1	0.01	Yes	1.7	-1.2
				No	-1.2	0.8
Alcohol	9.865	1	.002	Yes	2.3	-1.6
				No	-01.1	0.8

Note. df = degrees of freedom sig. = significance level

^a Significant associations (p = 0.001)

^b Significant residual values (\geq/\leq 1.96)

4.5.1 Association between adolescent risky behaviour and prevalence of schistosomiasis infection

Crosstabulation suggests that collecting water, doing laundry, playing, washing blankets and swimming were significantly associated with the prevalence of schistosomiasis. It is evident that swimming in the river was significantly associated with being schistosomiasis positive, ($\chi^2(1) = 17.224$, $p = 0.0001$). The number of those who indicated that they did swim in the river and were infected, was significantly higher than expected ($z = 3.0$). This is very strong evidence against independence and therefore suggests that the relationship between the prevalence of schistosomiasis and risky water contact behaviour is not attributed to chance.

The observed frequency of participants who reported that they did swim in the river, but were not infected with schistosomiasis was significantly less than expected ($z = -2.1$). This suggests that if the null hypothesis of no association between swimming in the river and schistosomiasis infection were true, the expected count of uninfected adolescent girls would be significantly greater for girls who did swim in the river, but because it is evident that an association does exist, the number of uninfected girls who indicated that they did swim in the river is significantly less than expected for those who swim in endemic regions.

Schistosomiasis infection was also associated with girls who played in the river ($\chi^2(1) = 23.337$, $p = 0.0001$). Moreover, the relationships between washing blankets in the river, ($\chi^2(1) = 16.475$, $p = 0.0001$), as well as doing laundry in the river, ($\chi^2(1) = 17.599$, $p = 0.0001$), were also significantly associated with being schistosomiasis positive or negative.

Residual patterns reveal a similar pattern for participants who were schistosomiasis positive and schistosomiasis negative. The absence of schistosomiasis infection was less than expected when participants swam in the river ($z = -2.1$), played in the river ($z = -2.4$) or washed their blankets in the river ($z = -2.0$); and schistosomiasis infection was more likely to occur when participants reported that they played in the river ($z = 3.5$), washed their blankets in the river ($z = 2.9$), did laundry in the river ($z = 2.7$) and collected water from the river ($z = 2.4$). These patterns emphasise the association between water contact behaviours and schistosomiasis infection.

There was however, no significant association between the prevalence of schistosomiasis and crossing the river, $X^2(1) = 9.684$, $p < 0.002$, bathing in the river, $X^2(1) = 6.674$, $p < 0.01$ and alcohol consumption $X^2(1) = 9.865$, $p < 0.002$.

4.5.2 Association between caregiver monitoring and the prevalence of schistosomiasis infection

The relationship between the prevalence of schistosomiasis and the frequency of caregiver monitoring on weekends was not found to be statistically significant, $X^2(3) = 7.364$ $p < 0.06$ (Table 8). This suggests that there are grounds to accept the null hypothesis, which suggests that there is no significant relationship between caregiver monitoring and the prevalence of schistosomiasis.

Table 8 Crosstabulation of caregiver monitoring and schistosomiasis infection amongst adolescent girls in KwaZulu-Natal

Caregiver monitoring	Schistosomiasis Infection			Residuals	
	Value	df	sig.	Schistosomiasis Positive	Schistosomiasis Negative
Sometimes				-1.1	0.8
Most Days	7.364	3	0.06	1.5	-1.0
Everyday				-0.3	0.2

Note. df = degrees of freedom sig. = significance level

4.5.3 Risky behaviour and caregiver monitoring

The crosstabulation analysis suggests that only crossing the river, $X^2(2) = 16.627$, $p = 0.0001$ was significantly associated with caregiver monitoring.

Table 9 Crosstabulation of caregiver monitoring and risky behaviour amongst girls in KwaZulu-Natal

Chi Square					Residual Values	
	Caregiver Monitoring			Level	Risky Behaviour	
	Value	df.	sig.		Yes (engaged in activity)	No (did not engage in activity)
Swimming	12.420	2	0.002	Sometimes	-1.0	0.6
				Most Days	-2.0	1.1
				Everyday	2.1	-1.2
Play	9.901	2	0.007	Sometimes	1.5	-1.0
				Most Days	-2.1	1.4
				Everyday	0.3	-0.2
Wash Blankets	3.4922	2	0.174	Sometimes	1.4	-0.8
				Most Days	-0.3	0.2
				Everyday	-0.8	0.5
Laundry	1.586	2	0.453	Sometimes	0.8	-0.7
				Most Days	-0.1	0.1
				Everyday	-0.5	0.4
Collect Water	9.147	2	1.10	Sometimes	2.0	-1.2
				Most Days	-1.6	1.0
				Everyday	-0.3	0.2
Cross river ^a	16.627	2	0.0001	Sometimes	2.4 ^b	-1.6
				Most Days	-2.4 ^b	1.6
				Everyday	-0.1	0.0
Bath	4.546	2	0.103	Sometimes	0.5	-0.4
				Most Days	-1.5	1.1
				Everyday	0.7	0.2
Alcohol	6.526	2	0.038	Sometimes	1.2	-0.6
				Most Days	1.1	-0.5
				Everyday	-1.6	0.8

Note. df = degrees of freedom sig. = significance level

^a Significant associations ($p < 0.001$)

^b Significant residual values ($\geq/\leq 1.96$)

4.5.4 Residual values

Residual values reveal that those who were '*sometimes*' monitored by their caregivers on weekends crossed the river more than expected ($z = 2.4$) and those who were monitored on '*most days*' crossed the river less than expected ($z = -2.4$), therefore emphasising that the relationship cannot be attributed to chance.

The negative residual values imply that crossing the river would be less frequent if the null hypothesis were true, suggesting that fewer adolescents cross the river when being frequently monitored, emphasising the significant role played by caregiver monitoring in terms of adolescents frequently crossing the river.

It is evident from the chi square analysis that two-way relationships exist between the prevalence of schistosomiasis and risky behaviours, some risky behaviours and caregiver monitoring. Residual values emphasise that the associations are not attributed to chance.

4.6 Binary logistic regression

Although the crosstabulation analyses shed light on the significant associations that exist amongst the variables of interest, they do not provide sufficient information on the direction of the relationships that exist. In order to build on the relationships established by the chi square analysis, logistic regression analysis was conducted to predict the probability of schistosomiasis infection amongst adolescents who reported engaging in risky behaviour. The model was adjusted for covariate factors, such as age, water source, presence of a parent and the presence of a caregiver. These factors were controlled for in the logistic regression model, to be able to account for the multiple factors that may influence the prevalence of schistosomiasis infection. The unadjusted model, which allowed for risky behaviours to predict the odds of infection, was compared to the adjusted model, which also allowed for risky behaviours to predict the odds of infection whilst incorporating into the model covariate factors of interest that might influence the odds of infection. This is presented in Table 10.

4.6.1 Odds of schistosomiasis infection

Logistic regression was utilised in order to be able to investigate significant associations identified in crosstabulation analysis. Schistosomiasis ('*negative*' / '*positive*') was the dependent variable, with '*yes*' to general risky behaviour and schistosomiasis specific risky behaviour and schistosomiasis positive as the reference groups. This allowed for the prediction of schistosomiasis infection, when engaging in general risky behaviour and risky water contact behaviours.

4.6.1.1 Unadjusted model

Significant predictors of schistosomiasis infection are presented in Table 10. The overall prediction success for the logistic regression models was 68%. This suggests that there are other factors not included in the model that influence infection. The alpha level for this analysis was not conservative ($p < 0.05$). Evidently, bathing in the river ($X^2(1) = 6.643, p < .01$), crossing the river ($X^2(1) = 9.614, p < .002$), collecting water from the river ($X^2(1) = 11.350, p < .001$), doing laundry in the river ($X^2(1) = 17.423, p = .0001$), washing blankets in the river ($X^2(1) = 16.244, p = .0001$), swimming ($X^2(1) = 16.942, p = .0001$) and playing in

the river ($X^2(1) = 28.850, p = .0001$) are all significant predictors of schistosomiasis infection at a significance of level $p < .05$). Drug use, alcohol consumption and fishing in the river were excluded from the analysis as these variables were not significantly associated with the probability of being infected with schistosomiasis.

Unadjusted odds of infection are illustrated in the line graph in Figure 4 (grey). The odds of infection increased when bathing in the river ($\text{Exp}\beta = 1.453$) and thereafter gradually increased when crossing the river ($\text{Exp}\beta = 1.582$) and collecting water from the river ($\text{Exp}\beta = 1.676$). The probability of becoming infected, when engaging in water contact behaviour increased with behaviours relating to washing items in the river, with increased odds of 1.801 for those who did their laundry in the river and 1.853 for those who washed their blankets in the river. The highest odds of infection resulted from swimming in the river ($\text{Exp}\beta = 1.914$) and adolescent girls who played in the river ($\text{Exp}\beta = 2.126$). Therefore, it is clear that the odds of becoming infected with schistosomiasis are increased when engaging in risky water contact behaviour.

4.6.1.2 Adjusted model

The logistic regression model was then adjusted to control for covariate variables that may influence the association between risky behaviours engaged in by adolescent girls and schistosomiasis infection. Covariate variables of interest were as follows, age, water source, mother or father present and caregiver monitoring on weekends. The adjusted model yielded a number of significant results, with an overall decrease in the odds of being infected across a number of risky water contact behaviour, however, it must be noted that this was a marginal change. Bathing in the river ($X^2(1) = 5.442, p < .020$), crossing the river ($X^2(1) = 7.782, p < 0.007$), collecting water from the river ($X^2(1) = 11.277, p = 0.001$), doing laundry in the river ($X^2(1) = 14.939, p = 0.0001$), washing blankets in the river ($X^2(1) = 14.813, p = 0.0001$), swimming ($X^2(1) = 15.593, p = 0.0001$) and playing in the river ($X^2(1) = 23.290, p = 0.0001$) were all significant predictors of schistosomiasis infection, when controlling for covariate factors.

Table 10 Predictors of schistosomiasis infection

Risky Behaviour	Unadjusted Model				Adjusted Model ^a			
	Wald	df	Sig.	Exp β (CI:LL;UL)	Wald	df	Sig.	Exp β (CI: LL; UL)
Bath	6.643	1	.010	1.453 (1.094;1.93)	5.442	1	.020	1.441 (1.057; 1.884)
Cross	9.614	1	.002	1.582 (1.184; 2.115)	7.782	1	.007	1.504 (1.118; 2.022)
Collect	11.350	1	.001	1.676 (1.214; 2.263)	11.277	1	.001	1.683 (1.242; 2.281)
Laundry	17.423	1	.0001	1.801 (1.366; 2.374)	14.939	1	.0001	1.738 (1.313; 2.299)
Blankets	16.244	1	.0001	1.853 (1.373; 2.501)	14.813	1	.0001	1.815 (1.340; 2.459)
Swimming	16.942	1	.0001	1.914 (1.405; 2.607)	15.953	1	.0001	1.875 (1.373; 2.562)
Playing	26.850	1	.0001	2.126 (1.598; 2.827)	23.290	1	.0001	2.042 (1.528; 2.730)

Note. ^a Covariate variables included age, source of drinking water, mother present, father present and caregiver monitoring on weekends

df = degrees of freedom

sig. = significance level

Exp β = Exponential coefficient

CI: Confidence interval (95%)

LL: Lower limit

UL: Upper Limit

It is evident from the line graph (Figure 4) that the odds of infection for the adjusted model follow a similar pattern to the unadjusted model. However there was a slight decrease in the odds of being infected when engaging in water contact behaviour when adjusting for covariate variables, parent or caregiver present, age and main water source (yellow line). The small decrease suggests that whilst these factors may influence the odds of infection, the nature of infection and disease prevalence is complex and therefore there are a number of

possible variables that may influence infection that cannot be accounted for. The odds of being infected with schistosomiasis when engaging in risky behaviour decreased slightly when adjusting for the presence of a parent or caregiver, age and main water source, suggesting that reduced risky behaviours that cause infection are insignificantly influenced by these covariate factors. The Nagelkerke's R^2 values were less than 0.50, suggesting a scanty model fit. Moreover the small decrease between the unadjusted and adjusted models suggest that there are a number of other factors, not included in this particular model, that account for the odds of infection. This is not uncommon in the field of biomedical research as the cause of disease can be attributed to multiple factors, which can never fully be captured by and accounted for, in a single logistic regression model.

The odds of infection for water contact behaviours like collecting water from the river increased by 0.07. This was not a noteworthy change and this might be attributed to the fact that 71.0% of the sample reported stand pipes or communal taps as their main source of water. The washing of blankets and bathing in the river decrease the chances of infection when adjusted for covariate variables, like the presence of a parent or caregiver by 0.03. The odds of being infected with schistosomiasis decreased marginally, by 0.07, for those crossing the river, 0.06 for doing their laundry in the river, 0.04 for swimming in the river and 0.17 for playing in the river, when adjusted for confounding variables, suggesting that the presence of a caregiver, age of the adolescents and water source reduce the odds of being infected with schistosomiasis for specific water contact behaviours.

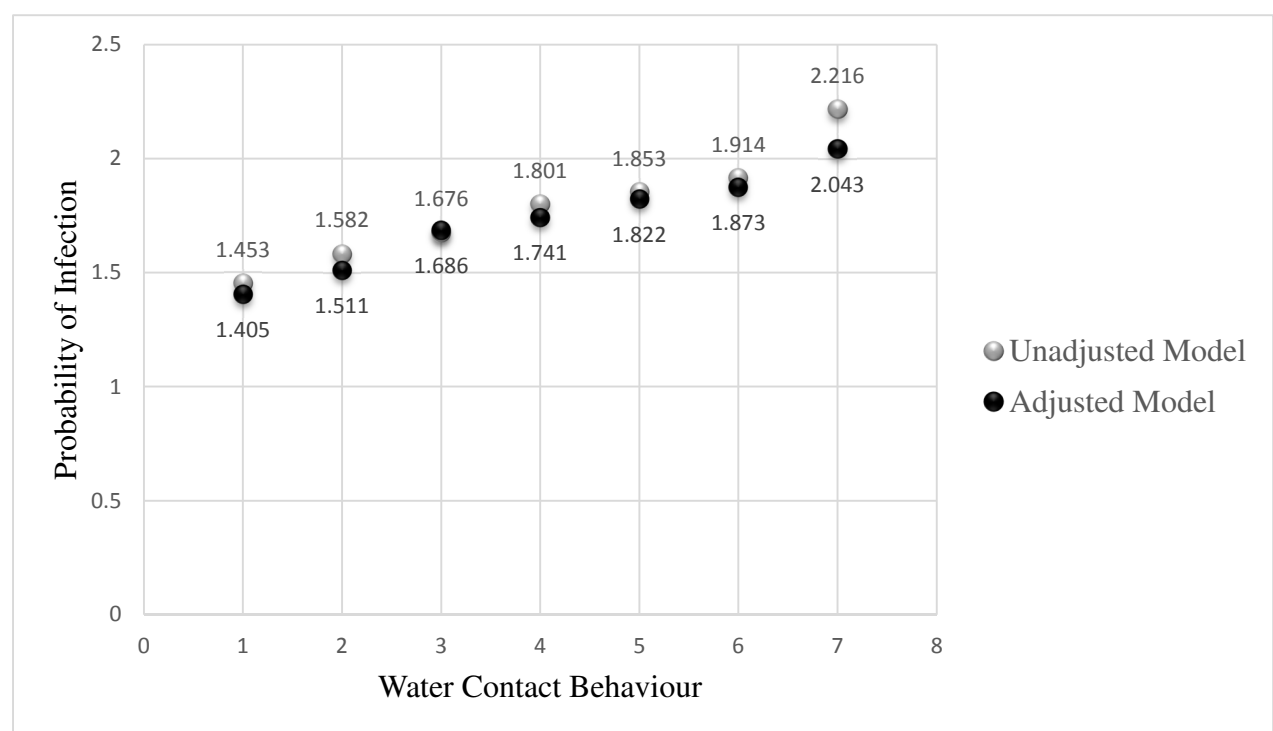


Figure 4 The odds of schistosomiasis infection when engaging in water contact behaviours

¹ Figure 8 The odds of infection when engaging in water contact behaviours: (1) Bath, (2) Cross the river, (3) Collect water, (4) Laundry, (5) Blankets, (6) Swim, (7) Play

The point graph illustrates the least risky behaviour to the most risky behaviours engaged in by the sample population. There was a slight decrease when adjusting for covariate factors, like age, water source, mother or father present and caregiver monitoring (black).

It is clear from the unadjusted model that the risk of infection increases when engaging in risky water contact behaviour which emphasises the relationship between risky water contact behaviours and schistosomiasis infection. This model can be broadly conceptualised as two groups of behavioural predictors of infection, domestic (bath, cross the river, collect water, do laundry and wash blankets) and social (swim and play). It is evident from the binary logistic regression results that the presence of a parent or caregiver does not significantly reduce the odds of adolescent girls engaging in risky behaviours that increase the chances of adolescent girls becoming infected with schistosomiasis.

4.7 Reprise

The analysis revealed a number of interesting patterns with regard to risky behaviours that were engaged in by the sample population, trends in caregiver monitoring and the prevalence of schistosomiasis. Descriptive analysis revealed that risky behaviours, that were general or schistosomiasis specific, were not commonly reported amongst this sample population. Crosstabulation tables highlighted that general risky behaviour (drug use and alcohol consumption) were not significantly associated whilst schistosomiasis specific risky behaviour (swim, play, wash blankets, laundry and cross the river) were significantly associated with schistosomiasis infection. Parental or caregiver monitoring was not significantly associated with schistosomiasis infection. There was a significant association between parental or caregiver monitoring and one schistosomiasis specific risky behaviour (crossing the river) and general risky behaviour (drug use/alcohol consumption). Binary logistic regression suggested that parental or caregiver monitoring reduced the odds of infection by means of engaging in risky behaviour marginally and therefore was considered insignificant. There was no noteworthy change in the unadjusted and adjusted models when adjusting for covariate factors, therefore caregiver monitoring was not considered to be a predictor of schistosomiasis infection when engaging in risky water contact behaviours.

4.8 Conclusion

This chapter described the sample population using frequency tables and bar graphs and also utilized crosstabulation analysis to explore significant associations and relationships that exist amongst the variables of interest. This chapter also evaluated the odds of infection when engaging in risky behaviour, using binary logistic regression. The following chapter will discuss the findings in relation to the theoretical framework and previous research conducted in this field.

CHAPTER FIVE

Discussion

5.1 Introduction

Sub-Saharan Africa is home to a number of co-endemic diseases that are particularly detrimental to the well-being of those living in this region. The high prevalence of diseases such as HIV/AIDS, malaria and tropical diseases, such as schistosomiasis, in this region has been well documented (Hotez et al., 2007; Shisana & Onoya, 2014). This context, characterised by high prevalence rates of co-endemic disease, warrants further exploration to identify factors contributing to the high rates of such serious diseases that continue to persistently scourge the global population, especially those living in low socioeconomic conditions. Within such regions, infections amongst women are especially common highlighting the increased risk of adverse outcomes for women and adolescent girls (Kjetland et al., 2006).

It is believed that parasitic diseases, like schistosomiasis, increase the chances of becoming infected with HIV due to the effects of the presence of the parasite in the body (Kjetland et al., 2006). Such parasitic infections are acquired as a result of contact with infected water (Bruun & Aagaard-Hansen, 2008). Therefore within this context water contact can be regarded as an extremely risky behaviour. This is especially true for women and young girls living in rural areas, where socially defined practices are passed on through generations and are inherently adhered to (Modena & Schall, 2006). Moreover, adolescent girls are considered to be at an increased risk of adverse outcomes due the nature of the period of adolescence. Literature exploring aspects related to this period, suggest that risky behaviours are commonly engaged in during this phase (Steinberg & Morris, 2001). The current study is fundamentally premised on the multifaceted nature of disease and acknowledges the influence of socio-cultural and developmental factors on the prevalence of disease. Thus, the pairing of underlying socio-cultural influences and developmental risks is considered to be a mechanism that influences the detrimental developmental and health outcomes experienced by this young population group.

This study sought to answer the fundamental question of whether adolescent risky behaviours were associated with the high prevalence of this pervasive parasitic disease amongst adolescent girls living in this endemic region of Kwazulu-Natal. In particular, whether general risky behaviours and schistosomiasis specific risky behaviours were associated with infection and to also determine whether parental/caregiver monitoring influenced or reduced the risk of engaging in behaviours that are associated with infection.

5.2 Key Findings

5.2.1 Schistosomiasis infection amongst 9-13 year old adolescent girls

This study identified a moderate schistosomiasis infection level (32.2%), amongst 9-13 year girls living in a region where schistosomiasis is endemic, in KwaZulu-Natal (WHO, 2012). Within a context of co-endemic disease, the risk of being schistosomiasis positive, especially within a region that is affected by the HIV pandemic, is of great concern, as research suggests that a possible relationship between schistosomiasis infection and HIV may exist

(Kjetland et al., 2006). It has been hypothesised that the presence of schistosomiasis in the urogenital tract might increase the chances of becoming infected with HIV when engaging in risky sexual activities (Kjetland et al., 2006). What these findings suggest is that almost a third of the adolescent girls in this sample population might be at an increased risk of becoming infected with HIV and thus highlights the need to understand risky behaviours amongst adolescent girls which may result in infection or disease, in order to be able to reduce adverse health outcomes.

5.2.2 Behaviour amongst 9-13 adolescent girls

General risky behaviours, such as alcohol consumption or drug use, were not reported by a large proportion of the sample. However, a quarter of those who were schistosomiasis positive indicated that they had consumed alcohol. Almost half of the adolescent girls in this study reported that they played in the river, more than a quarter bathed or did their laundry in the river and a quarter indicated that they swam, collected water, washed blankets or crossed the river. On average, 26% of the sample engaged in risky water contact behaviour that placed them at risk for schistosomiasis infection which accounts for the moderate infection found amongst this sample. Furthermore, there was a significant relationship between schistosomiasis infection and schistosomiasis specific risky behaviours such as swimming and playing in the river, collecting water, doing laundry and washing blankets in the river.

5.2.3 Caregiver monitoring amongst 9-13 adolescent girls

The primary caregivers of adolescent girls living in this endemic region were exclusively female. Although caregiver monitoring was not associated with schistosomiasis infection, parental/caregiver monitoring was found to be significantly associated with crossing the river. Parental/caregiver monitoring was significantly associated with alcohol consumption. Furthermore, the odds of engaging in risky behaviours that result in schistosomiasis infection were not significantly reduced by parents/caregiver monitoring, suggesting that the frequency of caregiver monitoring did not reduce risky behaviours that resulted schistosomiasis infection amongst this sample.

5.3 Contextual factors influencing disease prevalence

Historical ramifications that have shaped the current context in South Africa play a key role in understanding the high prevalence of this disease, which is disproportionately distributed amongst previously marginalised groups. The issue of poverty and gender in particular, have been considered to directly influence the very nature of adolescent development (Barbarin, 1999), and must therefore be further evaluated in order to gain a deeper understanding of the adverse outcomes that occur amongst this population. The effects of poverty on the healthy development of adolescents has been well documented (Aber et al., 1997; Barbarin, 1999; Brooks-Gunn & Duncan, 1997). These authors suggest that children who come from poor homes often experience adverse health and developmental outcomes, and are faced with an increased risk of becoming infected with diseases. This is especially true for schistosomiasis infection which has been associated with low socio economic conditions, where access to clean water is limited (WHO, 2014). As a result, many generations of South African women have relied on access to rivers in which the schistosomiasis parasite exists. What this highlights for the current study is that adolescents, who come from poor homes, find themselves living in

schistosomiasis endemic regions as a result of historical discrimination and are inherently at increased risk for adverse outcomes (Carter & May, 2001).

National statistics have suggested that adolescents are one of the highest at-risk population groups for HIV infection in South Africa (Shisana & Onoya, 2014). This has been attributed to a number of causes, but most often risky sexual behaviours, low socio economic circumstances, older sexual partners or gender based violence account for infection amongst young girls. However, Kjetland et al. (2006) suggest that one of the reasons for unimpeded HIV infection might be due to the presence of schistosomiasis. This has major implications for the current understanding of HIV and AIDS, especially for women living in rural KwaZulu-Natal, where schistosomiasis is endemic. These findings further highlight the gender specific risk related to schistosomiasis infection and possibly the high HIV prevalence amongst adolescent girls. This paints a background of risk that is entrenched in socio-cultural practices and beliefs that underpin and shape behaviours that are adopted by adolescent girls as a result of socially communicated ideologies. These latent factors are entrenched in the socio-cultural context and increase susceptibility to co-infection. Therefore adolescent girls can be considered to be one of the most at risk populations and it is thus crucial to understand adolescent behaviours that increase the risk of parasitic infections and other life threatening diseases.

5.4 Adolescent girls and general risky behaviour

The current study conceptualised general risky behaviour as risky behaviours that commonly occur during this period of development across all cultures and societies. It is important to note that most research studies that have explored risky behaviour patterns amongst adolescents, have predominantly focused on adolescents in their late teens living in western societies, like America, with the assumption being that adolescents are more likely to engage in risky behaviours progressively as they get older and closer to young adulthood (Aber et al., 1997; Brooks-Gunn & Duncan, 1997). It is during this transitioning stage that risky behaviours peak and adolescents might become exposed to increased threat to their well-being. Although this view of adolescent behaviour has been championed by many researchers, results from the current research differ. The current research suggests that adolescent girls living in rural KwaZulu-Natal are at an increased risk of engaging in risky behaviours that have major implications on their health and well-being from a younger age than previously suggested.

As discussed in the literature review, adolescence is often regarded as a stormy developmental phase that is characterised by drastic changes that take place, as children transition into new roles that they must naturally embody (Steinberg & Morris, 2001). It has been hypothesised that the transitions experienced during adolescence are normally completely new and often create an intrinsic disequilibrium, resulting in behaviour that would not necessarily be common during their childhood stages (Berk, 2001). There have been a number of studies conducted that have found that adolescents commonly engage in activities and behaviours relating to substance use (Darling & Cumsille, 2003; Prinstein et al., 2001; Rhodes, 1997), risky sexual behaviour (Brook, Morojele, Zhang, et al., 2006), and violence (Barbarin, 1999; Lansford et al., 2003), which jeopardise their health.

Although drug use was not commonly reported amongst this sample, the findings from this study highlight an alarming number of young girls who had reported that they had consumed alcohol, despite being under the legal age of 18 years, and therefore concurs with previous research that suggests that adolescents are likely to engage in activities relating to substance

use (de Graaf et al., 2011). A study conducted in Durban, South Africa, by Brook et al., (2006), found that risky behaviours were common amongst older adolescent groups. The findings from the current study indicate a decrease in the debuting age for general risky behaviours, amongst children and young adolescents living in developing communities.

5.4.1 Alcohol consumption and schistosomiasis infection

The current findings are of interest, as almost a quarter of all those who were infected with schistosomiasis had engaged in alcohol consumption, suggesting that those who were infected with schistosomiasis as a result of engaging in risky water contact behaviour were also more likely to also engage in general risky behaviours. This is of concern as many developmental theories suggest that the behaviour of children at a young age has major implications for their behaviour throughout adulthood. This therefore suggests that adolescents who engage in risky behaviour in their early adolescence stages will be at an increased risk of engaging in other risky behaviour as they grow, which may have major implications on their health and well-being. The likelihood of these individuals engaging in risky behaviour increases and the probability of becoming infected with diseases, like sexually transmitted diseases, coupled with the presence of the schistosoma parasite might increase their chances of becoming infected with HIV in their teens or young adulthood, which is alarming. It is important to note that for the purposes of the current research, a very stringent alpha level was utilised in order to decrease family wise error. Although there was a lack of a significant association between schistosomiasis infection and alcohol consumption in this study ($p < .002$), ordinarily, this relationship would be considered significant, as the significance value found for this association was less than .05, therefore suggesting that alcohol consumption amongst this population group can be regarded as a major health concern.

Although adolescents were frequently monitored by caregivers, this study found that adolescents who were infected with schistosomiasis were also able to access and consume alcohol, despite being well under the legal age. One of the channels of accessing alcohol might be through older partners, which has become an increasingly common occurrence amongst adolescents in South Africa (Brook, Morojele, Zhang, et al., 2006). It has been suggested that substance use increases the chances of engaging in other risky behaviour, such as risky sexual behaviour, which increase the risk of teenage pregnancy or becoming infected with sexually transmitted diseases (Brook, Morojele, Zhang, et al., 2006). There have been a number of studies that have associated alcohol consumption with HIV infection therefore emphasising the incredible risk amongst this sample population for disease acquisition (Parry, 2005). For adolescents who are between the ages of 9-13, these outcomes can be considered extremely detrimental for their future.

Many studies have suggested that the presence of positive, supportive and involved caregivers, parents and community members serves as a buffer against risky adolescent behaviour (Borawski et al., 2003; Dunifon & Kowaleski-Jones, 2002; McHale et al., 2003; Parry, 2005; Romer et al., 1999). The current findings of this study support this idea, as those who were monitored everyday were also less likely to consume alcohol. The findings emphasise the need for consistent monitoring so that the dangers of engaging in general risky behaviours, such as alcohol consumption, can be socially communicated and, thereby prohibited. However, adolescents in this study were still able to engage in substance use, suggesting that those who were not consistently monitored, were at an increased risk of engaging in risky behaviours. This emphasises the extreme risk of detrimental outcomes and adverse effects for adolescent girls who are not consistently monitored by parents or caregivers.

A reason for the number of adolescents who reported that they had consumed alcohol might be attributed to the social relationships that exist with peers. These relationships often entail peer pressure to engage in risky behaviours (de Graaf et al., 2011). A meta review conducted by de Graaf et al. (2011) and research conducted by Prinstein et al. (2001) found that adolescents who, despite parental/caregiver involvement, associated with delinquent peers were more likely to engage in substance use and delinquent behaviours. The current findings concur with these studies. These findings stress the need for parents/caregivers to pay careful attention to the social groups that adolescents associate and align themselves with. Alcohol consumption amongst young adolescents warrants further investigation, especially amongst adolescent girls living in rural KwaZulu-Natal. It is crucial to understand how, when and where children under the age of twelve years obtain alcohol.

5.5 Adolescent girls and schistosomiasis specific risky behaviour

One of the reasons for the moderate schistosomiasis prevalence amongst this at risk population, as hypothesized by the current research, can be attributed to the tendency of adolescents to engage in risky behaviours, in particular, schistosomiasis specific risky behaviour, which was conceptualized as risky water contact behaviour. From a public health perspective, water contact behaviour in these endemic regions is considered to be a major risk factor and therefore, those engaging in water contact are considered to be at a greater risk for adverse outcomes (Bruun & Aagaard-Hansen, 2008). Conclusions drawn from previous studies conducted in the field of schistosomiasis and water contact, state that water contact behaviour is associated with the prevalence of infection (Bruun & Aagaard-Hansen, 2008; Thomassen Morgas et al., 2010). However, these studies do not identify which behaviours are most commonly engaged in during the period of adolescence, especially amongst young girls living in rural KwaZulu-Natal.

According to the findings of the current study, risky water contact behaviours were frequently reported by one third of adolescent girls and there was a moderate schistosomiasis infection amongst this sample population. The most common water contact behaviours that were engaged in by female adolescents in this region of KwaZulu-Natal were swimming in the river, playing in the river, doing the laundry in the river, crossing the river and also washing blankets in the river. These behaviours might account for the moderate infection rates amongst this sample population. Whilst there is limited information pertaining to the activities of young adolescents living in Southern Africa, the current research highlights that adolescent girls were more likely to engage in risky water contact behaviours that belong to two broad categories. These are discussed as social and domestic water contact behaviour.

5.5.1 Social water contact

Although there has been little research conducted regarding the activities associated with the prevalence of schistosomiasis in an endemic area of KwaZulu-Natal, studies conducted by Connolly and Kvalsvig (1993), suggest that children who were more active were more likely to be infected with schistosomiasis. Swimming and playing in the river can be considered activities that have social connotations, as they most often occur in groups. Adolescents who are more active are more likely to swim or play in the river with friends or siblings as opposed to engaging in these behaviours alone. This is in line with the research conducted by Hemson (2007) which has suggested that girls are expected to help with domestic chores that require them to go to the river. Furthermore, these kinds of activities have been engaged in by many

generations of rural communities, thus water contact is regarded as a social norm (Hemson, 2007; Strebel et al., 2006). The sense of security that comes from engaging in socially normative behaviour might reduce the perception of risk relating to water contact behaviours. As a result, an individual's ability to recognize the risk of engaging in such behaviours is obscured, as opposed to the increased risk that is experienced when engaging in these behaviours alone. The frequency of adolescent girls swimming and playing in the river is of extreme concern, as half of those who were schistosomiasis positive reported that they played in the river and a quarter reported that they frequently swam in the river. Whilst brief contact with schistosomiasis infected water does not necessarily result in infection, increased exposure to infected water through submersion and increased duration, increase the chances of adolescent girls becoming infected. This makes swimming or playing in the river an extremely risky behaviour.

The predicament of such a scenario is rooted in the social representations of disease and risks that are communicated by important figures in the social environment, like mothers or grandmothers as suggested by Modena and Schall (2006). Behaviour that is of a social nature, might not be associated with extreme risk, as swimming or playing in most cases is associated with play and fun. These behaviours that are commonly expected during these developmental phases, as opposed to activities related to gang membership or substance abuse. Furthermore these behaviours are regarded as a social norm amongst these communities, as caregivers themselves also engaged in such behaviours when they were children (Strebel et al., 2006). Thus monitoring of such behaviour may not necessarily result in these behaviours being prohibited. The threat of infection as a result of engaging in these behaviours in particular, is mitigated by the association with innocent fun that is attributed to behaviour related to socialising. As a result, frequent monitoring does not reduce water contact. This implies that, instead of being a deterrent to risky water contact behaviours, a caregiver may actually serve as a catalyst for schistosomiasis infection, by modelling or encouraging these behaviours.

5.5.2 Domestic water contact

The second category of water contact behaviours encompasses behaviours that are associated with domestic activities, like doing the laundry in the river and washing blankets in the river. The findings of this study coincide with the research conducted by Dunn (1979), by highlighting that ordinary, everyday activities such as household chores, are considered risky behaviours, when considered within a schistosomiasis endemic region (Hemson, 2007). This suggests that adolescent girls are at an increased risk of parasitic infection when engaging in activities that might not be deemed dangerous in any other setting, which highlights the concealed risk which adolescent girls face (Hemson, 2007). Increased risk of infection, when engaging in these behaviours in particular, might be attributed to the extended duration of time that is required when washing blankets, which are relatively large and difficult to wash quickly. Many also do their laundry in the river, as large amounts of laundry require large volumes of water, which might be difficult to obtain and are probably too expensive to access on a daily basis. It is thus possible that those who live in low income settings where water is not easily accessed, despite having access to stand pipes or communal taps, still gravitate to the river to do their laundry or to wash big items, like blankets, due to the large amounts of water required to adequately complete the task. Therefore these activities increase the time that adolescent girls are exposed to infected water which will directly increase their chances of becoming infected with schistosomiasis. Engaging in activities relating to domestic chores was found to be a socially accepted norm behaviour within rural communities and the results from the current study further highlight this idea (Hemson, 2007). These findings suggest that activities that are

related to socially defined and culturally reinforced activities that are gender specific may in fact be a major risk factor for schistosomiasis infection and other adverse health outcomes for adolescent girls as they are regarded as positive activities that benefit the family (Strebel et al., 2006).

5.6 Parental/caregiver monitoring, risky behaviour and schistosomiasis infection

Research has suggested that parents/caregivers influence the way that adolescents view and understand the social environment around them, especially with regard to disease (Modena & Schall, 2006). The current study identified that adolescent girls living in this endemic district of KwaZulu-Natal, came from homes that were predominantly headed by females. The findings of this study correspond with the research conducted by Modena and Schall (2006), that focused on the family context as an influential factor in schistosomiasis infection. The social representations of disease and disease acquisition that are adopted by adolescent girls might be rooted in notions that are socially communicated from one generation of women to the next (Modena & Schall, 2006). This creates opportunities for gender specific social communication to take place between mothers or grandmothers and their adolescent daughters, whereby perceptions of disease are socially communicated and behaviours are modelled and imitated (Bandura & McClelland, 1977). The findings from this study are in line with Bandura's social learning theory and substantiate the idea that the nature of the family structure of girls living in a schistosomiasis endemic district increases the possibility of adolescent girls mimicking the behaviours of those in their immediate environment and may also increase the likelihood that the perceptions become intrinsically adopted. This is further emphasised and supported by the research conducted by Strebel et al. (2006) which highlights the influence of socially communicated messages regarding gender specific domestic activities as well as the research conducted by Hemson (2007) which suggests that domestic chores are viewed as a way in which, children living in rural areas of South Africa, are socialized to contribute to the needs of their family.

As previously mentioned, literature in the field of caregiver monitoring suggests that frequent caregiver monitoring would result in less risky behaviours (Alboukordi et al., 2012). Previous research has suggested that the presence of a parent or caregiver who consistently monitors the whereabouts, company and activities of adolescent children, might prevent them from engaging in risky behaviour like substance use or risky sexual behaviours (Alboukordi et al., 2012; Brendgen et al., 2001; Fergus & Zimmerman, 2005; Harris & Marmer, 1996). Whilst this might be true for activities that are socially accepted as dangerous, the findings from this study dispute this notion based on the current conceptualisation of risk when considered within a schistosomiasis endemic region.

Most research findings suggest that consistent parental or caregiver monitoring serves as a buffer against adolescent risky behaviour (Dick et al., 2007; Harris & Marmer, 1996). In the case of schistosomiasis specific risky behaviour, the high prevalence of infection might be assumed to be due to adolescents disobediently engaging in risky water contact behaviour, against the instructions of parents or caregivers and may possibly be attributed to the lack of consistent monitoring (Cottrell et al., 2003). However, the current findings suggest that within such contexts, the presence of parent or caregiver might in fact be a catalyst for adolescent girls to engage in risky water contact behaviours that place them at an increased risk of schistosomiasis infection. In fact, the frequency of adolescent girls engaging in risky water contact behaviour is possibly the result of consistent parental or caregiver monitoring of tasks

related to household chores, such as washing blankets or doing the laundry. This suggests that parents or caregivers are strongly involved in the activities by supervising or monitoring these behaviours. A research review conducted by Huang and Manderson (1992) and Yi-Xin and Manderson (2005), place emphasis on the social factors associated with water contact behaviours and schistosomiasis infection, especially household activities. Research conducted by Hemson (2007) highlights the influence of caregivers in the socialisation of young adolescents with regard to performing household chores and domestic activities within a South African context, which provide support for the current study. Hemson (2007) states that domestic chores, such as collecting water from the river, are regarded as socially necessary tasks that benefit the family. This highlights the role of the caregiver as a catalyst for schistosomiasis specific risky behaviours. This highlights the importance of the social context and its impact on the behaviours adopted by adolescent girls which may increase their chances of infection.

5.7 Social Modelling

According to Ordóñez and Marconi (2012), “humans are both individual and cultural beings” (p. 2) and therefore understanding the behaviour of humans is a complex and variable process. It becomes apparent that behaviour is influenced by the social environment and any attempts to understand human behaviour must essentially be framed within this social perspective. This understanding emphasises the dynamic relationship between an individual and her environment, especially regarding the influence of others in the immediate environment, in shaping behaviour and perceptions. The current research supports the idea that individuals are influenced by their social environments and actively engage in a cognitive process of social learning.

Social representations are communicated to adolescents by those in their social environment. These social representations influence perceptions of risk and inform behaviours and as a result determine which behaviours adolescents consider risky. This dynamic relationship that exists between adolescents and their parents/caregivers perhaps creates a number of obscure implications on the understanding of disease and the perceptions of risk that are adopted by adolescents. What this research highlights is that the majority of adolescent girls living in this schistosomiasis endemic region are raised in a family environment that is dominated by the social representations of women. These social representations are essentially entrenched in culture and in turn, inform the actions that are frequently engaged in by adolescents. Thus activities relating to domestic chores and activities that foster social interactions with other women are not prohibited and as a result, not regarded as a risk factor for disease. This implies that adolescent girls are influenced by the messages that are communicated to them regarding socially desirable behaviours, that are defined by socially and culturally defined gender roles. Therefore these findings build on the findings of Modena and Schall (2006), that emphasise the role on intergenerational representations and communications regarding schistosomiasis. In order to further understand these socially defined messages that are communicated to adolescents, additional research must be conducted in the field of social communication and social learning, especially with regard to disease.

According to social learning theory, behavioural patterns can be ascertained through direct experience or by modelling or imitating the behaviours of those in the immediate environment (Bandura & McClelland, 1977). In terms of schistosomiasis risky behaviour and parental or caregiver monitoring, parents might be directly involved in adolescent risky behaviour as they

model behaviours that are socially desirable for adolescent girls to engage in within the given cultural context. It is important to note that the social context is equally important in terms of shaping the behaviour of adolescents in both positive and negative ways (Carlson, 2012). This is emphasised by Carlson (2012) who states that “from birth a parent will mould and shape behaviours suitable to the norms of society” (p. 44). What this suggests is that, parental monitoring might encourage adolescent girls to assist with household chores, due to the context of single parent homes and large families, with the intent of raising girls who are able to carry out duties that are culturally expected. Behaviours pertaining to domestic chores might be gleaned from the mothers or grandmothers who automatically serve as a social reference for developing adolescent girls. Therefore, adolescent girls innately engage in behaviours that increase their risk of becoming infected, as a result of social learning, which reduces the perception of risk relating to water contact behaviours.

These behaviours might be consistently monitored by parents or caregivers, which accounts for the water contact behaviour reported, despite consistent monitoring. Increased monitoring creates opportunities for social communication to take place between parents or caregivers and their adolescent children, which allows for perceptions, values, beliefs and even myths regarding disease to be passed on and reinforced. Such highly monitored behaviours cause the perception of risk to decrease, therefore parental or caregiver monitoring can be considered to directly increase the risk of becoming infected with schistosomiasis. Research conducted by Lothe (2012), found that members of the Ugu community regarded schistosomiasis as a minor problem with no serious consequences and this may account for the increased risky water contact amongst these adolescent girls. The idea of rewarding or punishing particular behaviours, as suggested by social learning theory, might also provide reasons for the frequency of adolescent girls engaging in particular behaviours and should be further explored within this setting (Bandura & McClelland, 1977). The notion of parent or caregivers rewarding domestic behaviours or punishment for not completing the chores might further encourage girls to engage in water contact behaviours, in an effort to avoid punishment and gain rewards, which in fact create the idea that water contact in this instance is a socially desirable behaviour (Bandura & McClelland, 1977). Therefore, although parental monitoring is regarded as a protective factor against adverse outcomes relating to general risky behaviour; in the case of schistosomiasis infection, parental or caregiver monitoring might in fact be a latent risk factor that enforces risky behaviour which results in disease acquisition.

5.8 Conclusion

The consistent prevalence of schistosomiasis infection amongst adolescent girls living in rural KwaZulu-Natal, despite medical advancements, is a complex and convoluted matter to understand and is the subject of multifactor causation which is situated within a social context. The fortuitous role of the socio-cultural environment provides a framework for understanding the moderate prevalence of infection amongst this population. Behaviours that are socially defined and culturally reinforced are not regarded as socially wayward, like domestic chores or activities that promote social interactions amongst women and therefore occur more frequently. These behaviours are perceived to be innocuous or socially acceptable when compared to general risky behaviours such as alcohol consumption. Consequently, adolescent girls find themselves at an increased risk of becoming infected with schistosomiasis and may subsequently increase their chances of becoming infected with other sexually transmitted diseases or adverse effects associated with urogenital schistosomiasis.

This chapter has highlighted the main findings of this study and has reviewed these findings in relation to previous research that has been conducted. The current study acknowledges the complex social nature of the current research and therefore provided an understanding of the findings from a social learning perspective. The discussion included findings that support other research studies that have been conducted, relating to common adolescent general risky behaviour, in particular alcohol consumption and also discussed findings that were emergent of the current study, regarding common water contact behaviours. This chapter also highlighted the contradictions revealed by the current study compared to previous research conducted with regard to the role of caregiver monitoring in the frequency of adolescents engaging in risky behaviours. The current study also focussed on the role of the caregiver as a catalyst and the role of social learning as a vehicle for adolescent engagement in risky behaviour. The following chapter will provide a summary of the findings, limitations of the study and also recommendations for future research.

CHAPTER SIX

Summary, Limitations, Recommendations and Conclusions

Whilst the current research has uncovered a number of significant results, it is not without limitations. The following chapter summarises the findings, discusses the limitations of the study and makes recommendations for future research. This chapter also offers concluding thoughts on the study.

6.1. Summary

Overall the findings of this study suggest that there is a need to adopt an approach that combines biological and social factors, in order to understanding the prevalence of schistosomiasis amongst the adolescent population. It is evident that adolescents living in South Africa frequently engage in risky behaviours which increase their chances of becoming infected with schistosomiasis and other diseases. The findings show that schistosomiasis infection was associated with schistosomiasis specific risky behaviours like playing and swimming in the river, crossing the river, doing the laundry and washing blankets in the river, as well as general risky behaviours like alcohol consumption. The findings also highlight that adolescent girls are consistently monitored by their parents or caregivers and this served as a buffer against general risky behaviours. Caregiver monitoring was associated with the prevalence of schistosomiasis and adolescent risky behaviour. Whilst it is believed that parental or caregiver monitoring serves as a protective factor against general risky adolescent behaviour, when considered using the social learning theory, within this context, the findings suggest that parental or caregiver monitoring in fact, increases the odds of engaging in risky behaviours that are associated with schistosomiasis infection amongst this adolescent population.

6.2 Limitations

One of the main limitations of this study centres on the inclusion criteria of the broader longitudinal study, which required a parent or caregiver to provide a signed informed consent form allowing their adolescent child to participate in the study. However, those who were excluded because they did not provide a signed consent form might in fact be the population who are at an increased risk of negative outcomes. This might possibly be attributed to parents or caregivers not asking about school, which suggests that they are not completely involved in their adolescent's life.

A further limitation of this study can be attributed to a phenomenon referred to as recall bias. Recall bias is conceptualised as the inaccurate or incomplete recollection of events and often occurs when participants report on past events (Bhopal, 2002). In the case of the current study, participants who were schistosomiasis positive but reported reduced water contact might not recall engaging in water contact behaviours that caused them to become infected with schistosomiasis. This is especially pertinent in the case of schistosomiasis as it has been established that the parasite can be asymptotically present in the body for a number of years (Bruun & Aagaard-Hansen, 2008). Therefore, infection might have occurred at a younger age that participants no longer recall and therefore did not report engaging in risky water contact behaviours. This is of concern as children may be exposed to infection at a younger age and may not necessarily be aware of it when they are older. This suggests that the risk of infection might begin in earlier stages of development. Early infection coupled with the debut of risky

behaviours that are both general and schistosomiasis specific might mean a double threat amongst this population.

Thirdly, due to the contemporary nature of the study that combined both biomedical and psychosocial aspects, an existing instrument that incorporated all these fields could not be obtained for use in this study. Therefore the team developed an instrument that included the necessary topics and although validity testing was done to ensure that the instrument was valid, the instrument was not rigorously tested on multiple populations to determine the generalizability and validity of the test measure. Further studies will be conducted in order to improve the quality of the *Reducing Bilharzia Project Questionnaire*.

Finally, an added limitation to this study focuses on the self-report method adopted for the data collection process as the answers provided are dependent on the adolescents' perceptions of caregiver monitoring. This is highlighted by the fact that 63.9% of the sample reported that their mother fulfilled the role of their primary caregiver, but only 58% reported their mother was present. There may have also been participants who did not provide accurate answers to the questions regarding risky behaviour or parental or caregiver monitoring due to their desire to provide socially accepted accounts to the interviewer, that would allow them and their parents or caregivers to be held in high esteem. This could have been remedied by conducting interview with the caregivers themselves, but this would have been difficult and costly to complete as caregivers do not regularly visit the schools.

6.3 Recommendations

Future research can expand the current understanding of adolescent risky behaviour and the role of family with regard to disease acquisition, by further exploring social behavioural factors associated with adolescence. Research that explores early behavioural patterns concerning water contact might be a key in understanding the time of infection and may also assist in identifying behaviours that commonly contribute to the high prevalence of schistosomiasis in endemic regions.

There needs to be more public awareness surrounding the risk of becoming infected with schistosomiasis, the channels of infection and the extreme adverse effects of schistosomiasis on the health and development of children and adolescents. Research that explores the perceptions of parents or caregivers surrounding schistosomiasis, disease acquisition and the risks of infection will allow for a better understanding of the current context of perception regarding schistosomiasis and will help to better inform health initiatives and intervention strategies.

There is a need for social and behavioural instruments that assess the role of parents in the lives of adolescents and also to explore the perceptions of disease and disease acquisition that are adopted by both parents or caregivers and their children. These instruments need to be developed and also contextualised for South African populations. These contextualised instruments are necessary in order to obtain accurate information and gain a deeper understanding about the current state of disease in South Africa, in order to initiate effective prevention strategies to eradicate co-endemic diseases in South Africa.

6.4 Conclusion

The prevalence of schistosomiasis infection amongst adolescent girls living in KwaZulu-Natal remains a major public health concern. This is mainly due to the adverse developmental outcomes associated with schistosomiasis infection. Of further concern is the notion that the presence of schistosomiasis in the urogenital tract may increase susceptibility to HIV infection. Risky behaviour is regarded as the vehicle for disease acquisition especially during the period of adolescence when general risky behaviours peak. Within a schistosomiasis endemic region however, imperceptible behaviours such as water contact behaviours, are deemed risky due to the salient threat posed by schistosomiasis infection. Furthermore, parental or caregiver monitoring, in developing communities, is considered to be a catalyst for risky behaviour and infection.

Despite health interventions and awareness campaigns, adolescents in developing communities continue to engage in risky behaviours that result in infection. These behaviours have serious implications for healthy development that persists even in the adult years. The main aim of the study was to identify the types of risky adolescent behaviours that place them at risk for negative health outcomes as well as to determine whether parental/caregiver monitoring influenced the risk of infection. Therefore this study explored the associations between these phenomena. In doing so, the researcher identified important factors that could impact on the prevalence of infection amongst this at-risk population.

The researcher made use of a quantitative research design. A behavioural questionnaire was conducted to explore a number of topics, in particular general risky behaviours, water contact and parental monitoring. Urine samples were collected for microscopy to determine schistosomiasis infection. The sample in the study consisted of 970 girls living in the Ugu district who were between the ages of 9-13 years.

The results of the study are valuable as they shed light on risky behaviours that are commonly engaged in by adolescent girls living in a schistosomiasis endemic region of KwaZulu-Natal and has also identified the role of parental or caregiver monitoring in the frequency of adolescent girls engaging in these behaviours. It is therefore, crucial to increase awareness of the detrimental effects of schistosomiasis infection and to also highlight risk factors associated with this disease amongst children, parents and communities. An important implication of this study is the need to combat the perception of minimal risk, especially amongst parents and caregivers, by highlighting the seriousness of schistosomiasis infection and the implications of engaging in both general and schistosomiasis specific risky behaviours.

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Appendix 1: Figures

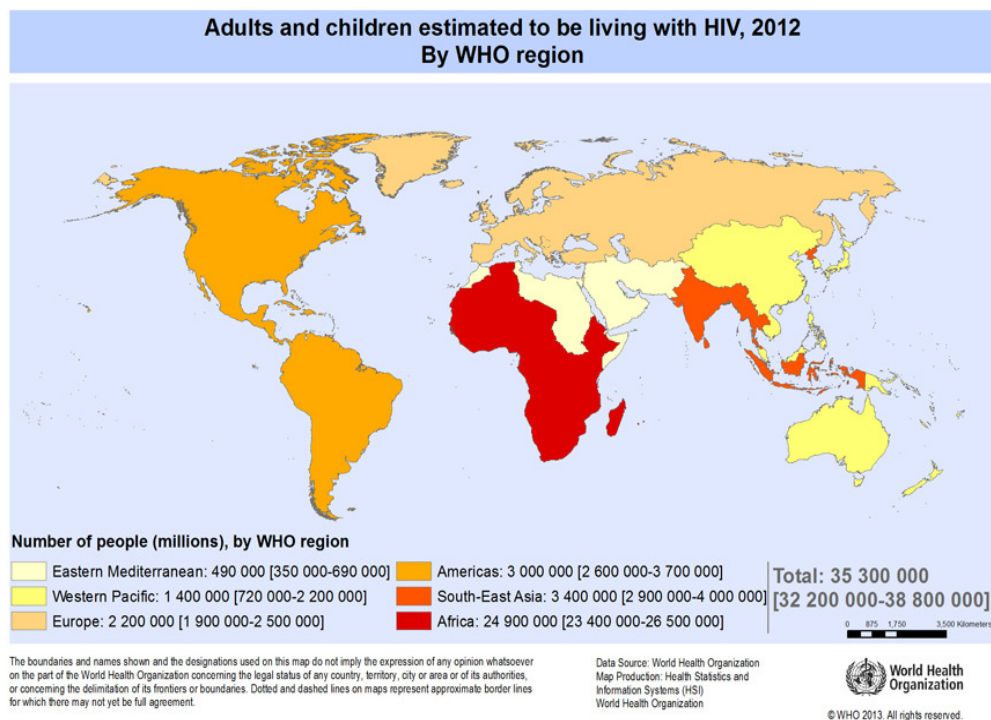


Figure 5 Global distribution of adults and children living with HIV (WHO, 2014)

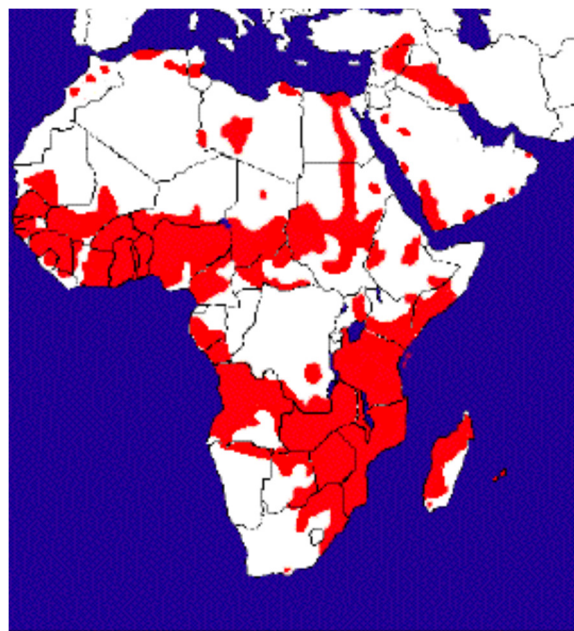


Figure 6 Distribution of schistosomiasis in Africa (GHO, 2010)

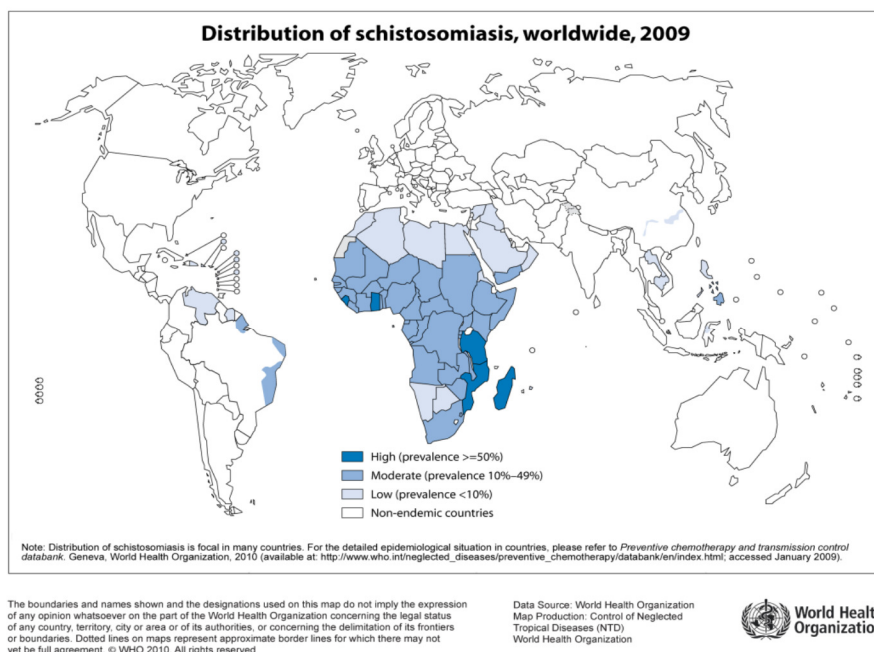


Figure 7 Global Distribution of schistosomiasis infection (GHO, 2010)

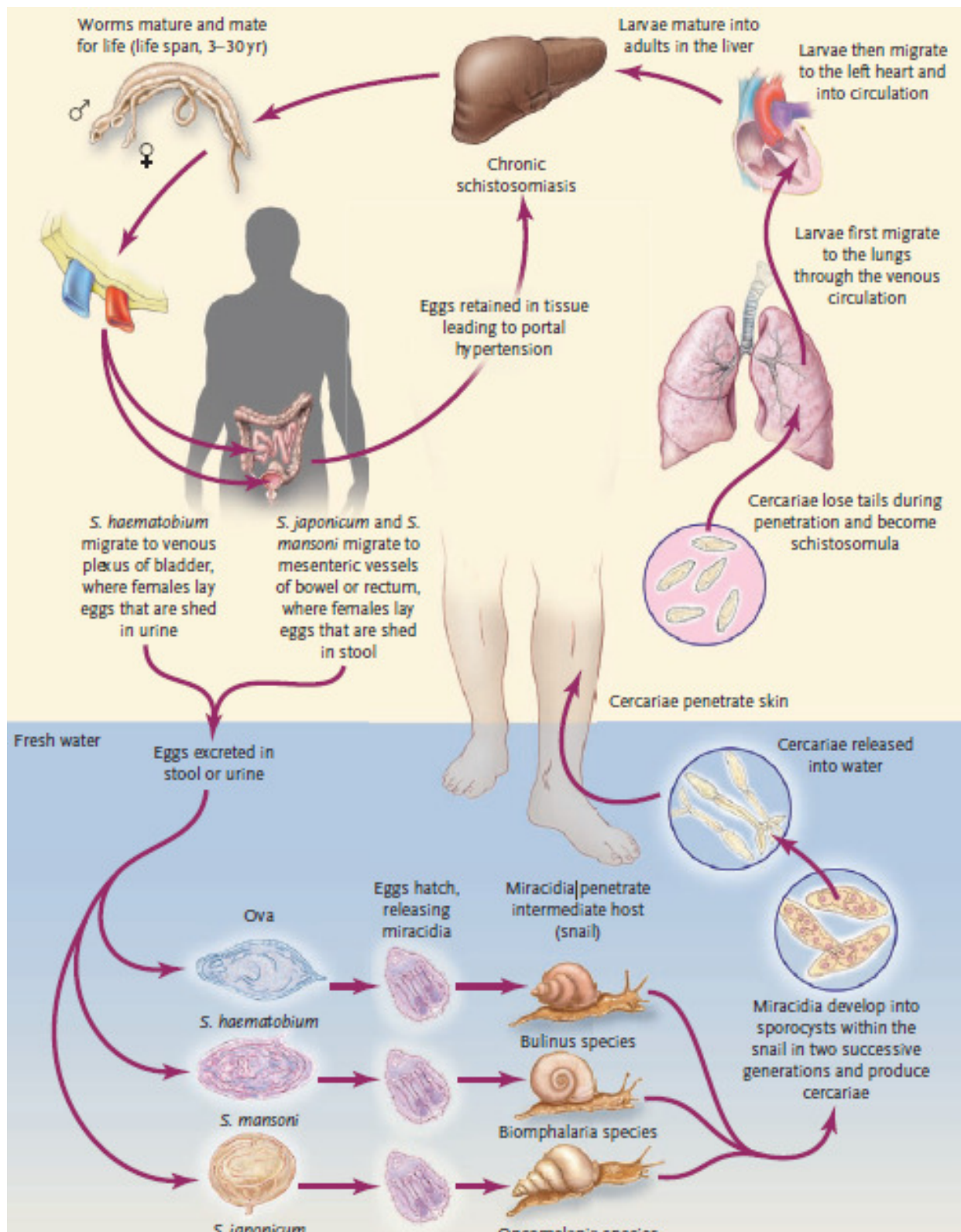



Figure 8 Life cycle of schistosomiasis (King, 2009)

Appendix 2: Approval Letters (Broader Research Study)

Biomedical Research Ethics Committee



UNIVERSITY OF
KWAZULU-NATAL
INYUVESI
YAKWAZULU-NATALI

RESEARCH OFFICE
Biomedical Research Ethics Administration
Westville Campus, Govan Mbeki Building
Private Bag X 54001
Durban
4000
KwaZulu-Natal, SOUTH AFRICA
Tel: 27 31 2604769 - Fax: 27 31 2604609
Email: BREC@ukzn.ac.za
Website: <http://research.ukzn.ac.za/ResearchEthics/BiomedicalResearchEthics.aspx>

01 March 2011

Prof. M. Taylor
Department of Public Health Medicine
Nelson R Mandela School of Medicine
University of KwaZulu-Natal

PROTOCOL: Schistosomiasis in young women and girls of KwaZulu-Natal, manifestations, effect of treatment, association with HIV. Professor Myra Taylor. Department of Public Health Medicine. Ref: BF029/07.


RECERTIFICATION APPLICATION APPROVAL NOTICE

Approved: 20 February 2011
Expiration of Ethical Approval: 19 February 2012

I wish to advise you that your application for Recertification dated 01 December 2010 for the above protocol has been noted and approved by a sub-committee of the Biomedical Research Ethics Committee (BREC) for another approval period. The start and end dates of this period are indicated above.

If any modifications or adverse events occur in the project before your next scheduled review, you must submit them to BREC for review. Except in emergency situations, no change to the protocol may be implemented until you have received written BREC approval for the change.

The approval will be ratified by a full sitting of the Committee at a meeting to be held on 12 April 2011.

Yours sincerely

Mrs A. Marimuthu
Senior Administrator: Biomedical Research Ethics

Department of Health



HEALTH
KwaZulu-Natal

Health Research & Knowledge Management sub-component
10 – 102 Natalia Building, 330 Langalibalele Street
Private Bag x9051
Pietermaritzburg
3200
Tel.: 033 – 395 2805
Fax.: 033 – 394 3762
Email.: hkrkm@kznhealth.gov.za
www.kznhealth.gov.za

Reference: HRKM010-08
Enquiries: Mr X. Xaba
Telephone: 033-395 2805

03 February 2009

Dear Prof Taylor

Subject: Approval of Research

1. The research proposal titled "Schistosomiasis in young women and girls, manifestations, effect of treatment, association with HIV" was reviewed by the KwaZulu-Natal Department of Health. The proposal is hereby approved for research to be undertaken at Ugu District facilities PENDING full ethics clearance.
2. You are requested to undertake the following:
 - a. Make the necessary arrangement with identified facility before commencing with your research project.
 - b. Provide an interim progress reports and final report (electronic and hard copies) when your research is complete.
3. Your final report must be posted to **HEALTH RESEARCH AND KNOWLEDGE MANAGEMENT, 10-102, PRIVATE BAG X9051, PIETERMARITZBURG, 3200** and e-mail an electronic copy to hkrkm@kznhealth.gov.za.

For any additional information please contact Mr X. Xaba on 033-395 2805.


Yours Sincerely

Dr. Y. Mbele
Acting HOD: KwaZulu-Natal Department of Health

uMnyango Wezempilo . Departement van Gesondheid

Fighting Disease, Fighting Poverty, Giving Hope

Department of Education



kzn education
Department:
Education
KWAZULU-NATAL

Enquiries: Sibusiso Alwar Tel: 033 341 8610 Ref.: 2/4/8/66

Ms. Myra Taylor
Room 219, George Campbell Building
Department of Public Health Medicine
Science Drive, Howard College Campus
University of KwaZulu-Natal
Durban

Dear Ms. Taylor

PERMISSION TO CONDUCT RESEARCH IN THE KZNDoE INSTITUTIONS

Your application to conduct research entitled: **Schistosomiasis (Bilharzia) in young women and girls, manifestations, effect of treatment and association with HIV**, in the KwaZulu Natal Department of Education Institutions has been approved. The conditions of the approval are as follows:

1. The researcher will make all the arrangements concerning the research and interviews.
2. The researcher must ensure that Educator and learning programmes are not interrupted.
3. Interviews are not conducted during the time of writing examinations in schools.
4. Learners, educators, schools and institutions are not identifiable in any way from the results of the research.
5. A copy of this letter is submitted to District Managers, Principals and Head of Institutions where the intended research and interviews are to be conducted.
6. The period of investigation is limited to the period: From 01 July 2011 to 31 July 2012.
7. Your research and interviews will be limited to the schools you have proposed and approved by the Superintendent General. Please note that Principals, Educators, Departmental Officials and Learners are **under no obligation to participate or assist you in your investigation**.
8. Should you wish to extend the period of your survey at the school(s), contact Mr Alwar at the contact numbers below.

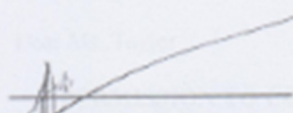
...dedicated to service and performance
beyond the call of duty.

KWAZULU-NATAL DEPARTMENT OF EDUCATION

POSTAL:	Private Bag X9137, Pietermaritzburg, 3200, KwaZulu-Natal, Republic of South Africa
PHYSICAL:	Office G 25, 185 Pietermaritzburg Street, Metropolitan Building, Pietermaritzburg, 3201
TEL:	Tel: +27 33 341 8610/11 Fax: +27 33 341 8612 email: sibusiso.alwar@kzndoe.gov.za

9. Upon completion of the research, a brief summary of the findings, recommendations or a full report/dissertation/thesis must be submitted to the research office of the Department. Address to: The Director: Resource Planning; Private Bag X9137; Pietermaritzburg, 3200

The Department of Education in KwaZulu Natal fully supports your commitment toward research and wishes you well in your endeavours. It is hoped that you will find the above in order.


Nkosingathi SP Sishi, PhD
Head of Department: Education


Date

1. The researcher will submit all the research results concerning the research to the Department.
2. The researcher must ensure that all research data and findings are properly stored.
3. The researcher must ensure that all research data and findings are properly stored.
4. The researcher must ensure that all research data and findings are properly stored.
5. A copy of the report to be submitted to the Director: Resource Planning and Head of Department.
6. The report of the research is to be submitted to the Director: Resource Planning and Head of Department.
7. The researcher must ensure that all research data and findings are properly stored.
8. The researcher must ensure that all research data and findings are properly stored.
9. The researcher must ensure that all research data and findings are properly stored.
10. The researcher must ensure that all research data and findings are properly stored.

...dedicated to service and performance
beyond the call of duty.

KWAZULU-NATAL DEPARTMENT OF EDUCATION

POSTAL: Private Bag X9137, Pietermaritzburg, 3200, KwaZulu-Natal, Republic of South Africa
PHYSICAL: Office G 25, 168 Pietermaritzburg Street, Metropolitan Building, Pietermaritzburg, 3201
TEL: Tel: +27 33 341 0010/11 | Fax: +27 33 341 0012 | email: sitshino.aher@kzndoe.gov.za



UNIVERSITY OF
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INYUVESI
YAKWAZULU-NATALI

COLLEGE OF HUMANITIES

MASTERS/PHD RESEARCH PROPOSAL AND ETHICAL CLEARANCE APPLICATION
(HUMAN AND SOCIAL SCIENCES)

14 March 2013

To: Research Ethics Committee

RE: Masters Proposal and Ethical Clearance

Protocol: The relationship between parental or caregiver monitoring and risky behaviours that are associated with the prevalence of schistosomiasis amongst adolescent girls living in endemic KwaZulu-Natal

The above mentioned study is nested within and will be using data collected by a larger study referred to below.

Schistosomiasis in young women and girls of KwaZulu-Natal, manifestations effect of treatment, association with HIV. Professor Myra Taylor. Department of Public Health Medicine.

This study has already obtained ethical clearance from the Biomedical Research Ethics Council (Reference: BF029/07).

Therefore, the current study that has been proposed will not engage in data collection, as all data was collected in 2008-2009, which will now be used for the purpose of degree completion.

Yours sincerely

Ms. Adele Delysia Munsami (208 501 553)

Approval Letter: Humanities and Social Sciences Research Ethics Committee (Sub-study)



20 September 2013

Ms AD Munsamy 208501553
School of Applied Human Sciences
Pmb
3201

Dear Ms Munsamy,

PROTOCOL: Schistosomiasis in young women and girls of KwaZulu-Natal, manifestations, effect of treatment, association with HIV. Professor Myra Taylor. Dept. of Public Health Medicine. Ref: BF029/07.

Your application to SSHREC for ethics approval refers.

In agreement with the SSHREC chair, your proposed Masters study is hereby approved as a substudy of the already BREC approved study by Prof Myra Taylor BF 029/07.

We note that your study proposes secondary analysis of already approved data and involves no human participant contact.

Yours sincerely,

Professor D Wassenaar
Chair: Biomedical Research Ethics Committee

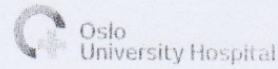
Professor D Wassenaar (Chair)
Biomedical Research Ethics Committee
Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban, 4000, South Africa
Telephone: +27 (0)31 260 2384 Facsimile: +27 (0)31 260 4609 Email: brec@ukzn.ac.za
Website: <http://research.ukzn.ac.za/Research-Ethics/Biomedical-Research-Ethics.aspx>
Working Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

INSPIRING GREATNESS



Appendix 3: Informed Consent- isiZulu

M-cohort 1 Consent, Version 20.01.12_MT



SCHOOL OF NURSING AND PUBLIC HEALTH MEDICINE
DEPARTMENT OF PUBLIC HEALTH MEDICINE
2nd Floor, George Campbell Building, Science Drive, Durban

Telephone: (+27) 031 260 4499/4287/4383

UKUNCIPHISA ISICHENENE – UHLELO LWABESIFAZANE LWESICHENENE

Ulwazi nesicelo sokuba ubambe iqhaza ocwaningweni – mzali/mbheki

Bazali nababheki

Siyabonga kakhulu ukumbambisana nawe sisebenza nengane yakho ngokwedlule.

Singathanda ukumlandelela futhi.

Isikhungo sezemfundo esiphakeme saseUniversity yakwaZulu Natal ne-University yase Norway i-Oslo benza ucwaningo ngesichenene

- ukuthola ukuthi isichenene siwaphatha kanjani amantombazane
- ukuphenya ukuthi ukwelashwa kusebenza kangcono kwabancane
- ukuphenya ukuthi ukwelashwa kwesichenene kungabavikela yini kwezinye izifo

Kungani intombazane yakho icelwa ukuba ibambe iqhaza

Ukwelashwa kuzanyiwe kwabesifazane abadala kodwa akusebenzanga kahle. Siyazi ukuthi ukwelashwa kubulala abamuncigazi/mahlaleceleni besichenene. Siyazi ukuthi kusebenza kahle kakhulu ezifeni zomchamo kwabasebancane. Manje sifisa ukukuhlola kubantwana.

Sicela intombazane yakho

- ngoba kungase kube ithintene namanzi anesichenene
- ngoba isencane
- ngoba sinethemba lokuyivikela esifeni

Cishe amantombazane angu 4000 kanye nabesifazane abasebancane bayamenywa

Amalungelo akhe

Uma uvuma ukubamba iqhaza unalo ilungelo lokuba ubone lonke ulwazi esilubhalile ngendodakazi yakho. Angalungisa noma yiluphi ulwazi oluyiphutha ngaye. Angahoxa noma yingasiphi isikhathi futhi angacela lonke ulwazi lushatshalaliswe

Okulandelayo ngendodakazi yakho

Ukubamba iqhaza kulolucwaningo kusho ukuthi

- uzosinika umchamo, indle kanye ahlolwe negazi bese eba nengxoxombuzo
- uzothola ukwelashwa okungcono kakhulu
- uzomenywa njalo ngonyaka, mhlawumbe iminyaka ewu 10
- Uma sithola izinkinga ezibanzi, uzokwelashwa noma adluliselwe ngokwesidingo

Izinzuzo:

Siphakamisa kakhulu ukuthi wonke amantombazane athinta amanzi alashwe minyaka yonke yize umchamo wawo ukhanya/cacile. Kungenxa yokuthi umonakalo ungangabonakali noma wenzeke emva kwesikhathi. Ababambe iqhaza bazobhekwa balashiwe minyaka yonke njengesiphakamiso senhlangano i-World Health Organisation. Isichenene sakhe sizofa futhi uzozizwa ephila kangcono. Uzothola ukwelashwa kwezinye izifo ezingase zitholakale.

Ingcuphe:

Angase azizwe egula kodwa okungatheni, aphilaze abenokuqubuka ahanjiswe yisisu uma ephuza amaphilisi esichenene. Lokhu kungaba okwezinsukwana. Uma ethola izikelemu eziningi ezifile angazizwa egula kakhulu.

Ulwazi esiluqoqayo kulolucwaningo luzonika ulwazi olusha ngesichenene emantombazaneni futhi sizocobelelana ngalo nodokotela nabahlengikazi abaludingayo. Noma kunjalo akekho oyoke azi ngemininingwane yesiqu sendodakazi yakho. Ukuhlolwa nenxoxombuzo izocwaningisiswa bese iyagcinwa ngaphandle kwegama lendodakazi yakho kuyo. Noma yini enye enegama lendodakazi yakho izogcinwa kwenye indawo. Amasampula endodakazi yakho azocwaningwa ezikhungweni eziphambili zocwaningo emhlabeni ngaphandle kwegama lendodakazi yakho kuwo. Uma uvuma ukuthi indodakazi yakho ibambe iqhaza kulolucwaningo, unikeza imvume yalokhu futhi. Ulwazi luzosetshenziswa kuphela ukufunda ngesichenene nezifo

zamantombazana kanye nabantu besifazane kanjalo nencuphe yokusuleleka kuze kube iminyaka engaba ngamashumi amabili. Angeke lusetshenziselwe ezinye izinto. Abacwaningi abaphezulu yibo ababhekela ngokusemthethweni ukuthi lonke ulwazi lugcinwe ngokuphepha. .

Ngubani onikeze igunya lokwenza ucwaningo Ucwaningo luthole imvume emnyangweni wezempilo kanye nowezemfundo esifundazweni saKwaZulu – Natali kanye nasezigungwini ezibhekelele ukusebenza ngendlela ehloniphekile zalapha eNingizimu Afrika kanye naseNorway

Umnotho

Ucwaningo luxhaswe ngezezimali zocwaningo zaphesheya naseNingizimu Afrika. Azikho izinhlelo zokusebenzisana nezimboni noma zokwenza inzuzo. Abacwanini abakulolucwaningo abazuzi mnotho kulolucwaningo.

Nguwe onqumayo

Ukubamba iqhaza kungukuzinkela okupheleleyo. Ungabuza noma imuphi umbuzo, sizozama ukukuphndula. Awungeke wanika sizathu uma ungafisi intombazane yakho ukuthi ibambe iqhaza. Ukwelashwa kwakhe manje nasesikhathini esizayo angeke kuthikamezwe yisinqumo sakho. Uma ethanda angakunqamula/misa ukubamba iqhaza kwakhe.

Ulwazi olungaphezulu

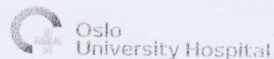
Siza uzizwe ukhululekile ukuthinta umphathi wocwaningo u Dr M Taylor kulenombolo 031 2604499 noma 2661592. Omunye ongamthinta: Ms Pumla Mkhiva: 0765508220 Dr JD Kvalsvig kulenombolo 031 2093735, The Department of Community Health at the University of Kwa-Zulu Natal. Dr Eyrun Kjetland, Department of Infectious diseases, University of Oslo, Norway. The Biomedical Research Ethics Committee: phone 031 2604679, fax: 031 2604609; email: BREC@ukzn.ac.za

Abazithobayo,

Myra Taylor PhD and Dr E. Kjetland



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UKUNCIPHISA ISICHENENE – UHLELO LWABESIFAZANE LWESICHENENE

Isicelo sokuba ubambe iqhaza ocwaningweni – mzali/mbheki

Ukubamba iqhaza ocwaningweni kungukuzinikela okungenampoqo nokunika imvume. Ukhlulekile ukuba ucele olunye ulwazi olungezelelekile. Uma emva kokuthola lololwazi ucabanga ukuthi kunesidingo ukuba indodakazi yakho ibambe iqhaza ocwaningweni ungasayina lelifomu lemvume

Mina, _____
(igama lomzali/mbheki ngosonhlamvukazi)

Ngiyavuma ☐ Angivumi ☐

umbheki/mzali ka: _____

Uma uvuma sicela usiphe

Usuku lokuzalwa lwengane yakho: _____

Inombolo kamazisi wakhe: _____ (uma ikhona)

Inombolo yocingo: _____

Isikole: _____ Grade _____ Section: _____

Umzali ka: _____
(igama lendodakazi ngosonhlamvukazi)

Ngiqinisekisa ukuthi ngilutholile ulwazi olubhalwe phansi ngocwaningo ngaba nethuba lokubuza ngolwazi olungezelelekile futhi ngizoyivumela indodakazi yami ukuba ibambe iqhaza.

Ukusayina _____ Usuku _____
(Signed by guardian/parent) (Dated by guardian/parent)

Uma kwenzeka nisuka endaweni sicela igama nenombolo yocingo yalowo eniyokumazisa ukuze sazi. _____

Abayingxenywe yocwaningo: Prof. M. Taylor, Dr J. Kvalsvig (031) 260 4499, Department of Public Health Medicine at the University of KwaZulu-Natal. Dr. Eyrun Kjetland, Department of Infectious Diseases, University of Oslo, Norway. Dr Elisabeth Kleppa, tel: 0791942652.

Amalungelo akho

Uma uvuma ukuba ingxenywe yocwaningo, unelungelo lokubona yonke imininingwane yakho esiyibhalisile. Unelungelo lokulungisa nanoma imiphi imininingwane engesilo iqiniso. Ungashiya ucwaningo nganoma isiphi isikhathi ngaphandle kokunika isizathu. Lokho angeke kulimaze ukuthola kwakho ukanakekelwa kwezempilo nokulashwa okujwayelekile. Uma ukhetha ukushiya ungacela ukuthi imininingwane kanye namasampula akho kungasetshenziswa kushiswe.

Incwadi yokubayinxenywe kuncwaningo

Unikezwe ulwazi ngocwaningo ngu_____

Ukuba yingxenywe yocwaningo uzikhethela wena. Uvumelekile ukubuza ukuze uthole nanoma yiluphi ulwazi oludingayo. Uma usuthole lonke ulwazi oludingayo, ufisa ukuba yingxenywe yocwaningo kumele usayine leliphepha lesivumelwano

Mina_____ (igama ngofeleba), ngiyavuma ukuthi ngilutholile ulwazi olubhaliwe phansi ngocwaningo futhi ngibenalo ithuba lokuthola lokubuza ukuze ngithole ulwazi olwengeziwe, futhi ngizoba yingxenywe yocwaningo.

Ukusayina_____ Usuku_____ (ozoba ingxenywe yocwaningo) (ozoba yingxenywe yocwaningo)

Uyingxenywe kolunye ucwaningo, luphi lona, kwenziwani lapho?_____ Unyaka:_____

Uma ungathanda ukuthola ulwazi ngocwaningo, ungafisa sikuthinte kanjani?

Uma sikumema ukuba uze lapha ngempelasonto noma ngamaholide ungavunyelwa ukuba uze?_____

Inomholo esinaakuthinta kuvo:_____

Appendix 4: Reducing Bilharzia Project Questionnaire

(Only relevant sections have been included: Section A, B, C, D, H, I, J)

Id. no: _____

Questionnaire

Reducing Bilharzia Project



REDUCING BILHARZIA PROJECT

NB: Please use a tick where there are pre-coded responses

Name of Interviewer: _____ Date: _____
day month year

A. Personal data page

1. Isibongo / Surname(s) _____

Amagama / First name(s) _____

Nickname/praise names/other names _____

2. Uneminyaka emingaki? / How old are you? Age (years) _____

3. Wazalwa nini? / When were you born? _____
day month year

4. Wazalelwaphi? / Where were you born? _____

School: _____ Area: _____

Grade: _____ Section: _____

5. Ubani igama likathisha wakho kulonyaka? / What is the name of your class teacher this year? _____

6. Uhlala kuphi isikhathi esiningi? (Ikheli lala uhlala khona) / Where do you live most of the time? (Physical address) _____

7. Ujwayele ukulala kangakanani lapha? sonke isikhathi ☐ ingxenywe yesikhathi ☐ /
 How often do you sleep here? (All the time / Most of the time)

8. Ikheli leposi / Postal address _____

a. Inombolo kamakhalekhukhwini / Cell phone number _____

b. Inombolo yocingo lwasekhaya / Landline number _____

9. Kungani ubelapha isikhathi esiningi? / Why are you here most of the time? _____

a. Ubani okunakekelayo lapha? (igama) / Who is looking after you here? (name) _____

b. Igama lombheki / Name of a guardian _____ sex M/F ☐ ☐

c. Ubuhlobo umama ☐ /umalume /umngani ☐ omunye (chaza). / Relation (mother ☐ ☐
 /uncle /friend /other (specify) _____

d. Ngubani oyinhloko yekhaya? / Who is the head of the household? _____

e. Ngubani ongumninimuzi? / Who owns the house? _____

10. Ingabe ikhona enye indawo ohlala kuyo ngezimpelasonto, amaholide noma ezinye izinsuku? yebo ☐ cha ☐ Uma kungu CHA → 11/ /Is there another place where you stay on weekends, holidays or other days? (Yes, no) (IF NO → 11)

a. Ujwayele ukulala kangakanani lapho? ngezinye zezinsuku zesikole ☐ ngezimpelasonto ☐ amaholide ☐ okunye (chaza) //How often do you sleep there?(some school days, weekends, holidays, other—explain)) _____

Id. no: _____

Questionnaire

Reducing Bilharzia Project

b. Ikheli lapho uhlala khona / Physical address _____

c. Ikhelileposi / Postal address _____

d. Inombolo kamakhalekhukhwini / Cell phone number _____

e. Inombolo yocingo lwasekhaya / Landline number _____

f. Kungani uhlala lapha ngesinye isikhathi? / Why do you stay here sometimes? _____

g. Ubani okunakekelayo lapha? (igama) / Who is looking after you here? (name) _____ sex F/M ☐

h. Ubuhlobo umama ☐ /umalume ☐ /umngani ☐ etc. / Relation (mother /uncle /friend etc.other (specify) _____

i. Ngubani oyinhloko yekhaya?(ubuhlobo) / Who is the head of the household?(Relationship) _____

j. Ngubani ongumninimuzi? / Who owns the house? _____

11. Unaso esinye isihlobo esisondele kuwe esihlala kwenye indlu? yebo ☐ cha ☐
uma kung CHA → 12 / Do you have any other close relative living in another household? (Yes, no) (If no go to 12)

a. Ubani igama? / What is the name _____

b. Ubuhlobo umama ☐ /umalume ☐ etc / Relation (mother/uncle etc) _____

c. Ingabe uhlala endaweni efanayo njengeyakho yebo ☐ cha ☐ / Does he/she live in the same area as you? (Yes, no)

d. Ikheli lapho uhlala khona / Physical address _____

e. Ikhelileposi / Postal address _____

f. Inombolo kamakhalekhukhwini / Cell phone number _____

g. Inombolo yocingo lwasekhaya / Landline number _____

12. Uma ungase ube nohambo noma usuke kulendawo, ubani ongaba neminingwane yakho yokukuthinta (ngaphandle kwalena engenhla)? / If you were to travel or move away, who would have your contact details (other than the above)?

a. Igama / Name _____

b. Ubuhlobo umama ☐ /umalume ☐ etc / Relation mother/uncle etc _____

c. Ikheli lapho ahlala khona / Physical address _____

d. Ikhelileposi / Postal address _____

e. Inombolo kamakhalekhukhwini / Cell phone number _____

f. Inombolo yocingo lwasekhaya / Landline number _____

Id. no: _____

Questionnaire

Reducing Bilharzia Project

13a. Ubani osayine ifomu lakho lemvume? (ubuhlobo, igama) / Who signed your consent form? (relation, name) _____

b. Kungani kunguyena? / Why this person? _____

14. Awukakamusho/yiphathi u/ekamama wakho noma ubaba wakho okuzalayo.

/You haven't yet mentioned your biological mother and/or biological father.

a. Ingabe umama wakho usaphila? Yebo ☐ cha ☐ angazi ☐ /Is your mother still alive? (Yes, no, DK)

b. Ingabe ubaba wakho usaphila? Yebo ☐ cha ☐ angazi ☐ /Is your father still alive? (Yes, no, DK)

Uma kungu CHA: Ngiyadabuka ukuzwa ukuthi umama noma ubaba wakho usashona. Ngizokubuza ngomzali osaphilayo. / I'm sorry to hear that your mother or father has passed away. I am going to ask you about the parent who is alive.

c. Uma kungu CHA kubo bobabili abazali yiya ku15. / If No for both parents go to 15.

14d.	Igama likamama okuzalayo / Biological mother	Igama likababa okuzalayo / Biological father
i) Unako ukuthintana nomama/ubaba wakho? Do you have contact with your mother/father?	yebo <input type="checkbox"/> cha <input type="checkbox"/> akwenzeki <input type="checkbox"/> yes no NA	yebo <input type="checkbox"/> cha <input type="checkbox"/> akwenzeki <input type="checkbox"/> yes no NA
ii) Ingabe umama/ubaba wakho uhlala eduze kwala uhlala khona? Does your mother/father live near you?	yebo <input type="checkbox"/> cha <input type="checkbox"/> akwenzeki <input type="checkbox"/> yes no NA	yebo <input type="checkbox"/> cha <input type="checkbox"/> akwenzeki <input type="checkbox"/> yes no NA
iii) Ingabe yiliphi izinga lemfundo eliphezulu likamama/baba wakho? What is your mother/father's top education?	Ayikho imfundo esemthethweni <input type="checkbox"/> No formal education Imfundo ephansi <input type="checkbox"/> Primary school Imfundo ephezulu <input type="checkbox"/> High school Imfundo ephakeme <input type="checkbox"/> Tertiary Angazi <input type="checkbox"/> Don't know	Ayikho imfundo esemthethweni <input type="checkbox"/> No formal education Imfundo ephansi <input type="checkbox"/> Primary school Imfundo ephezulu <input type="checkbox"/> High school Imfundo ephakeme <input type="checkbox"/> Tertiary Angazi <input type="checkbox"/> Don't know
iv) Ubani igama likamama/baba wakho? What is your mother/father's name?		
v) Lithini ikheli likamama/baba wakho? What is your mother/father's address?		

e. Ingabe ubaba wakho uhlala nawe ekhaya? Yebo ☐ cha ☐ Uma kungu CHA → 15a) / Does your father live with you at home? (Yes, no) (If no → 15a)

f. Ingabe ubaba wakho uyakusiza ngomsebenzi wakho wesikole uma udinga usizo? Yebo ☐ cha ☐ / Does your father help you with schoolwork if you need help? (Yes, no)

g. Ingabe ubaba wakho uke akujezise ngokwenza okungalungile? Yebo ☐ cha ☐ / Does your father ever punish you for doing wrong? (Yes, no)

h. Ingabe lokho kuyakuvimba/gwema ukuthi ungakwenzi futhi? Yebo ☐ cha ☐ / Does that stop you from doing it again? (Yes, no)

i. Ungasho uthi ubaba wakho unomthetho oqinile? Yebo ☐ cha ☐

Id. no:

Questionnaire

Reducing Bilharzia Project

*Would you say that your father is too strict? (Yes, no)***j. Ingabe unomthetho oqinile kunobaba womngane wakho? Yebo ☐ cha ☐ angazi ☐***/Is he stricter than your friends' fathers? (Yes, no, D/K)***15a. Ingabe umama wakho uhlala nawe ekhaya? Yebo ☐ cha ☐ Uma kungu CHA →***/Does your mother live with you at home? (Yes, no) (If no → 16a)***b. Ingabe umama wakho uyakusiza ngomsebenzi wakho wesikole uma udinga usizo? Yebo ☐ cha ☐***/Does your mother help you with schoolwork if you need help? (Yes, no)***c. Ingabe umama wakho uke akujezise ngokwenza okungalungile? Yebo ☐ cha ☐***/Does your mother ever punish you for doing wrong? (Yes, no)***d. Ingabe lokho kuyakuvimba/gwema ukuthi ungakwenzi futhi? Yebo ☐ cha ☐***/Does that stop you from doing it again? (Yes, no)***e. Ungasho uthi umama wakho unomthetho oqinile? Yebo ☐ cha ☐***/Would you say that your mother is too strict? (Yes, no)***f. Ingabe unomthetho oqinile kunomama womngane wakho? Yebo ☐ cha ☐ angazi ☐***/Is she stricter than your friends' mothers? (Yes, no, D/K)***16a. Ngubani omandla ekukunakekeleni?***Who is your main caregiver?*

M = mother	F = father	B = brother	S = sister
Gm = grandmother	Gf = grandfather	U = uncle	A = aunt
C = cousin	Sf = step-father	Sm = step-mother	Sb = step-brother
Ss = step-sister	N = none	O = other (please list)	

16b. Ingabe uyakusiza ngomsebenzi wakho wesikole uma udinga usizo? Yebo ☐ cha ☐*/Does she/he help you with schoolwork if you need help? (Yes, no)***16c. Ingabe uke akujezise ngokwenza okungalungile? Yebo ☐ cha ☐***/Does she/he ever punish you for doing wrong? (Yes, no)***16d. Ingabe lokho kuyakuvimba/gwema ukuthi ungakwenzi futhi? Yebo ☐ cha ☐***/Does that stop you from doing it again? (Yes, no)***16e. Ungasho ukuthi unomthetho oqinile? Yebo ☐ cha ☐***/Would you say she/he is too strict? (Yes, no)***16f. Ingabe unomthetho oqinile kunombheki womngane wakho? Yebo ☐ cha ☐ angazi ☐***/Is he stricter than your friends' caregivers? (Yes, no, D/K)***B. Family and living****1. Usuhlale isikhathi esingakanani lapha? /How long have you lived here? (years)****2. Wake wahlala edolobheni? Yebo ☐ cha ☐ angazi ☐***(Yes, no, D/K)***Uma kungu CHA yiya ku Q5: If no :go to Q5****Uma kungu YEBO: If yes:****3. Wawuneminyaka emingaki ngesikhathi uhlala edolobheni? / How old were you when you lived in the city? (D/K) / angazi ☐****4. Wahlala isikhathi esingakanani lapho? Isikhathi esingaphansi konyaka ☐ 1-5****iminyaka ☐ ngaphezulu kuka 5 weminyaka ☐***/For how long did you live there? (Less than 1 year, 1-5 years, more than 5 years)*

Reducing Bilharzia Project

[illegible]

M = mother
F= father
B = brother
S = sister
Gm = grandmother
Gf = grandfather
U = uncle
A = aunt
C = cousin
Sf = Step-father
Sm = Step-mother
Ss = Step-sister
Sb =Step-brother
O = other (friend,
housekeeper etc)
OC = Our Child
Ne = nephew
Ni = niece

1/Who is the main provider in the household? (name and relation)

Now I will ask you some questions about water contact.







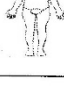
- How? What do you use some questions about water contact.
1. Uwatholaphi amanzi okuphuza? emfuleni ☐ empompini/womphakathi ☐
 esiphethwini esivikelekile ☐ esiphethwini esingavikelekile ☐ kuxubene ☐
 empompini ongaphakathi ☐ *Where do you get drinking water? (river, stand pipe/communal stand pipe, protected spring, unprotected spring, mixed, indoor tap)*
 2. Ingabe amantombazane ekilasini lakho ayabhukuda emfuleni noma edamini ezinsukwini ezishisayo? yebo ☐ cha ☐ angazi ☐ *I Do girls in your class swim in the river or dam on hot days?(Yes, no, D/K)*
 3. Ingabe umngane wakho omkhulu uyakwenza lokho? yebo ☐ cha ☐ angazi ☐
I Does your best friend do this?(Yes, no, D/K)
 4. Uyakwenza wena? yebo ☐ cha ☐ *I Do you do this? (Yes, no)*

Id. no:

Questionnaire

Reducing Bilharzia Project

5. Manje ngizokubuza ngezinhlobo zezinto ozenzayo ngamanzi, nizenza kangakanani, isikhathi eside kangakanani osihlala emanzini nokuthi uthintana kangakanani umzimba wakho namanzi? /Now I will ask you what kind of water activity you do, how often you do them, for how long you stay in the water and how much of your body that is in contact with the water.

Umfula/river Amadamu/dam Amanzi amile/standing water Amanzi avela kulezisuka/water from these sources	Kangaki/ How often? Daily (4)/Daily (4) Kujwayele (3)/Often(3) Kwesinye isikhathi (2) /Sometimes (2) Kuthukela/qabukela (1) / Rarely (1) Ngeke (0) / Never (0)	Uhlala kangakanani emanzini? / For how long do you stay in the water? Ngaphezulu kuka 5 h (4) More than 5 h (4) 3-5 Amahora (3)/ 3-5 hours (3) Ngaphansi kwamahora amathathu (2) Less than 3 hours (2) Kuze kube yimizuzu ewu-60 (1) Up to 60 minutes (1)	Umzimba uwathinta kangakanani amanzi ngesikhathi wenza lezizinto /How much of your body is in contact with water during this activity?
Uyadlala / Uyabhukuda?/Do you play / swim?			
Uyawasha / uyageza Do you wash / bathe?			
Uyazihlanza izingubo?/Do you do laundry?			
Uyazihlanza izingubo zokulala? /Do you wash blankets?			
Uyawakha amanzi? /Do you collect water?			
Uyadoba?/Do you fish?			
Uke uwele emanzini?/Do you ever cross the water?			

Id. no:

Questionnaire

Reducing Bilharzia Project

D. Wena nomndenini wakho / You and your family**1. Imibuzo elandelayo ingobudlelwane nomndenini wakho kanye nontanga bakho.**

Ngizokufundela isitatimende kumele ucabange ngesitatimende ungitshele uma kungekona, ingxenye ingekona, ingxenye iyiqiniso noma iqiniso! *The next questions are about your relationships with your family and peers. I will read out a statement, and you must think about the statement and tell me if it's false, partly false, partly true or true.*

1.	Isitatimende / Statement	Akukona/ False	Ingxenye Ayikona/ Partly false	Ingxenye yiqiniso/ Partly True	Iqiniso/ True
1a.	Kukhona abantu obaziyo emndenini wakho abenza zinto ukukujabulisa/ <i>There are people you know amongst your family who do things to make you happy</i>				
1b.	Kukhona abantu obaziyo emndenini wakho abakwenza uzizwe uthandeka/ <i>There are people you know amongst your family who make you feel loved</i>				
1c.	Kukhona abantu obaziyo emndenini wakho ongathembela kubona noma kwenzekani/ <i>There are people you know amongst your family who can be relied on no matter what happens</i>				
1d.	Kukhona abantu obaziyo emndenini wakho abangabona ukuthi uyanakekelwa uma udinga lokho / <i>There are people you know amongst your family who would see that you are taken care of if you needed to be</i>				
1e.	Kukhona abantu obaziyo emndenini wakho abakumukela njengoba unjalo <i>There are people you know amongst your family who accept you just as you are</i>				
1f.	Kukhona abantu obaziyo emndenini wakho abakwenza uzizwe uyingxenye ebalulekile emindenini yabo. <i>There are people you know amongst your family who make you feel an important part of their lives</i>				
1g.	Kukhona abantu obaziyo emndenini wakho abakuxhasayo nabakuqguqguzelayo. <i>There are people you know amongst your family who give you support and encouragement</i>				

Id. no: [][][][][]

Questionnaire

Reducing Bilharzia Project

NB: Siza ufunde isitatimende 2 kuzozonke izitatimende ezingezansi. /NB: Please read this for all statements below:

2. Uma umbheki/mzali wakho ekucela ukuba uhlale ekhaya uwashe ngesikhathi engekho

bese: If your caregiver asked you to stay at home and do the washing while she/he was out, and then:

	Isitatimende / Statement	Yebo / Yes	Cha / No
2a.	Abangani bakho bakucele ukuthi uphumele emnyango uyodlala nabo ungahamba?/Your friends asked you to come out and play with them, would you go?		
2b.	Abangani bakho bakucele niyobhukuda emfuleni nabo ungahamba?/Your friends asked you to go swimming in the river with them, would you go?		
2c.	Umhambi akucele ukuthi uye naye esitolo niyothola amaswidi ungahamba?/ A stranger asked you to go to the shop with him to get sweets, would you go?		

NB: Siza ufunde isitatimende 3 kuyoyonke imibuzo yesitatimende ngasinye. /NB: Please read statement 3 for questions below each statement

3	Ingabe umbheki/mzali wakho usuke esekhaya uma usekhaya /Is your caregiver at home when you are home:	Ngeke Never	Ngesinye isikhathi Sometimes	Izinsuku eziningi Most days	Nsukuzonke Every day
3a.	Emini / In the daytime?				
3b.	Ebusuku / At night?				
3c.	Ngempelasonto /On the weekend?				

NB: Siza ufunde isitatimende 4 kuyoyonke imibuzo yesitatimende ngasinye. /NB: Please read statement 4 for questions below each statement

4	Ingabe umbheki/mzali wakho uyathanda ukwazi / Does your caregiver want to know	Ngeke Never	Ngesinye isikhathi Sometimes	Izinsuku eziningi Most days	Nsukuzonke Every day
4a.	Ukuthi kuqhubeka kanjani esikoleni?/How you are getting on at school?				
4b.	Ukuthi uyaphi uma nizikhipha nabangani bakho?/Where you are going when you go out with friends?				
4c.	Ukuthi ubani ozikhipha naye?/Who you go out with?				

Id. no: [][][][][]

Questionnaire

Reducing Bilharzia Project

E. Ezempilo / Health

Imibuzo elandelayo ingezempilo yakho. /The next questions are about your health.

1. Ingabe uyazi siyini isichenene? yebo ☐ cha ☐ anginasiqiniseko ☐ /Do you know what Bilharzia is? (Yes, no, unsure)

Isichenene yisifo ongasithola ngokuthinta amanzi angcolile. /Bilharzia is an infection you can get through contact with infected water.

2. Ingabe kukhona emndenini onaso noma owake wabanesisichenene yebo ☐ cha ☐ Angazi ☐ /Has anyone in your family ever had Bilharzia?

3. Wake waba naso isichenene? yebo ☐ cha ☐ angazi ☐ /Have you ever had Bilharzia? (Yes, no, D/K)

Uma kunguyebo: /If yes:

4a. Wake walashelwa isichenene phambilini? yebo ☐ cha ☐ /Have you ever been treated for Bilharzia before? (Yes, no)

Uma kungu CHA yiya ku Q5 /If No go to Q5

Uma kungu YEBO yiya ku4b /If Yes go to 4b.

4.b Walashelwa nini isichenene (iminyaka) [][] 1st time [][] 2nd time [][] 3rd time /When were you treated for Bilharzia (age)

Ngaphambi kokuba uphendule imibuzo elandelayo sifuna ukukuqinisekisa ukuthi loluwazi luyimfihlo futhi angeke lwatshelwa noma ubani. /Before you answer the next questions, we want to assure you that the information you give will not be told to anybody.

5. Unako ukukhwehlela, inkinga yokuphefumula, isifo esiqhubekayo noma ukukhubazeka? Siza chaza /Do you have a cough, breathing problems, a chronic disease or a disability? Please describe.

6. Ingabe uyaye uye kohlolwa emtholampilo noma kudokotela? yebo ☐ cha ☐ akwenzeki ☐ /Do you regularly go to a clinic or a doctor? (Yes, no, NA)

Ingculazi yisifo esithathelana ngegazi noma ngokuhlangana ngokocansi nasobisini lwebele. /HIV is a disease that is transmitted through blood, sexual contact and breast milk.

7. Wake wezwa ngengculazi? yebo ☐ cha ☐ /Have you heard about HIV before? (Yes, no)

8. Usuke wahlolelwa ingculazi? yebo ☐ cha ☐ angazi ☐ /Have you ever been tested for HIV? (Yes, no, DK)

9. Ingabe uyazi ukuthi unayo ingculazi? yebo ☐ cha ☐ angazi ☐ /Do you know if you have HIV? (Yes, no, DK)

Uma kungu CHA yiya ku Section F /If No go to Section F

Uma kungu YEBO: Ngiyadabuka ukuzwa ukuthi unengculazi kodwa kukhona imishanguzo emihle yazo zonke lezizifo eziqhubekayo. /If yes: I am so sorry to hear that you have HIV, but nowadays there is good treatment for all of these chronic diseases.

10. Kukhona obheka izinga lakho leCD4-count emtholampilo? yebo ☐ cha ☐ angazi ☐ /Is there someone at the clinic monitoring your CD4-count? (Yes, no, DK)

F. Okuphathelene nezitho zokuzala nomchamo / Genitalia and urine

Mhlawumbe uyazi ukuthi abesifazane bayopha zinyanga zonke. Lokhu kubizwa ngokuthi ukuya esikhathini. Ungaya esikhathini kusukela eminyakeni eyisikhombisa (7) kuya kwengamashumi amabili (20) ubudala / Maybe you know that women bleed every month. This is called menstruation. You can start your menstruation from 7 up to 20 years of age.

Id. no:

Questionnaire

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1. Usuqalile ukuya esikhathini? Yebo ☐ cha ☐ /Have you started menstruating? (Yes/no)
Uma kungu YEBO yiya kuQ2/If No go to Q2 Uma kungu CHA yiya kuQ4/If No go to Q4
2. Waqala nini ukuya esikhathini (iminyaka)? When did you first get menstruation (age)
3. Uma kunguyebho, ingabe uya esikhathini njalo nje? Yebo ☐ cha ☐ /If yes, do you get your menstruation regularly? Yes, no
4. Ingabe amabele akho aseqalile ukumila? Yebo ☐ cha ☐ /Have your breasts started growing? Yes, no
5. Ingabe usuqalile ukuba neziboya emakhwapheni noma esithweni sakho sangasese? Yebo ☐ cha ☐ /Have you started getting hair in your armpits or around your private parts? Yes, no

SEBENZISA ICHART YEMIBALA BESE UFAKA INAMBA YOMBALA kuColour 2a No 2b
USE COLOUR CHART AND INSERT ONE COLOUR NUMBER FOR 2a AND ONE COLOUR NUMBER FOR 2b.

4	Wake waba nakho okuphumayo noma okusagazana ungekho esikhathini ungasiza ukhombhe ukuthi kumbala muni / Have you ever had discharge or trace of blood when it's not your menstruation and can you please point out the colour.	Njalo ngesonto Every week	Njalo ngenyanga Every month	Kanye Once	Akukaze Never (0)	Njalo (3) kwesinye isikhathi (2) akukaze (0) /Always (3) sometimes (2) never (0)
4a.	Okuphumayo / Discharge (Grade 1-8)					
4b.	Okusagazana / Trace of blood (Grade 1-6)					
4c.	Ingabe kunephunga (njalo, kwesinye isikhathi, akukaze) Does it smell (always, sometimes, never)					

Emantombazaneni isitho sangasese sinezimbobo/gudu ezintathu. Imibuzo elandelayo igxile ikakhulu embotsheni yesibili ebizwa ngokuthi yinkomo (Isitho sangasese sowesifazane) / In girls the private parts consist of three openings. The next questions focus mostly on the second opening, called the vagina.



5	Wake wezwa ukungaphatheki kahle esithweni sakho sangasese njengo: /Have you ever felt any discomfort in your private parts like:	Esontweni eledlule This last week	Kudala phambilini Sometime before	Akwenzeki /Never
5a	Ukulunywa / Itch			
5b	Ukushisa/Ukushoshozela / Burn/Sting			
5c	Uzozo/isilonda / Sore (ulcer)			
5d	Isimila/isigaxa / Lump (tumour)			
6	Wake waba nayo inkinga noma yiphi ngokuchama njenge: /Have you ever had any problems with urination like:	Esontweni eledlule This last week	Kudala phambilini Sometime before	Akwenzeki /Never
6a	Zinhlungu uchama / Pain when you urinate			

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6b	Ukuzwa sengathi ufuna ukuchama esithubeni /Sudden urge to urinate			
6c	Iconsi lomchamo uma ugxuma, ukhohlela noma uhleka / Drop of urine if you jump, cough or laugh			
6d	Umchamo obomvu / Red urine			

G. Wena nabangani bakho - Ubuhlobo / You and your friends – Relations

Manje ngizokubuzisa imibuzo ngabangane bakho nokuhlobana kwenu. Lezi yizitatimende, ngizokufundela izitatimende kufuneka ungitshele ukuthi akukona, ingxenye ayikona, ingxenye iyiqiniso, iqiniso. /Now I will ask you some questions about your friends and relationship. These are statements, and I will read the statement for you, and you must tell me if it is false, partly false, partly true or true.

1	Isitatimende /Statement	Akukona False	Ingxenye Ayikona Partly false	Ingxenye yiqiniso Partly True	Iqiniso True
1a.	Kukhona abantu obaziyo kubangane bakho abenza izinto ukukujabulisa/There are people you know amongst your friends who do things to make you happy				
1b.	Kukhona abantu obaziyo kubangani bakho abakwenza uzizwe uthandeka. /There are people you know amongst your friends who make you feel liked.				
1c.	Kukhona abantu obaziyo kubangani bakho abangathenjwa noma kwenzakalani. /There are people you know amongst your friends who can be relied on no matter what happens.				
1d.	Kukhona abantu obaziyo kubangane bakho abangabona ukuthi unakekelekile uma udinga lokho/There are people you know amongst your friends who would see that you are taken care of if you needed to be				
1e.	Kukhona abantu obaziyo kubangane bakho abakwenza uzizwe uyingxenye ebalulekile ezimpilweni zabo /There are people you know amongst your friends who make you feel that you are an important part of their lives				
1f.	Kukhona abantu obaziyo kubangani bakho abakumukela njengoba unjalo. / There are people you know amongst your friends who accept you just as you are.				
1g.	Kukhona abantu obaziyo kubangani bakho abakuxhasayo nabakugququzelayo. /There are people you know amongst your friends who give you support and encouragement.				

H. Okudakayo / Alcohol

Imibuzo elandelayo ingophuzo oludakayo. Izimpendulo onginika zona angeke zatshelwa yinoma ubani. /The following questions are about alcohol. The answers you give will not be told to anybody.

Id. no:

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1. Umbono kabani owazisa kakhulu mayelana nezophuza (ukusebenzisa utshwala) (abazali noma ogogo ☐ /ababheki ☐ abafowenu ☐ /odadewenu ☐ abangani ☐ abanye abadala ☐ /Whose opinion do you value most about the use of alcohol? (parents, grandparent, guardian, brother, sister, friend, other person, who (relation).

2. Wake wabuphuza utshwala? Yebo ☐ cha ☐ akukhompndulo ☐ /Have you ever drunk alcohol? Yes, no, NR

Uma kungu YEBO yiya ku Q3/If Yes go to Q3

Uma kungu CHA → izitatimende ngotshwala emva kukaQ5/If NO → statements about alcohol after Q5

3. Yisiphi isikhathi sokuqala uzwa utshwala? (iminyaka) /When was the first time you tasted alcohol? (age) .

4. Ubuphuza utshwala ezinyangeni ezintathu ezedlule? yebo ☐ cha ☐ akwenzeki ☐ /Have you been drinking alcohol the past 3 months? (Yes, no, NA)

Manje ngizokufundela izitatimende ngotshwala, kumele ungitshele uma isitatimende singekona, ingxenye ingekona, ingxenye iyiqiniso noma iqiniso /

Now I will read you some statements about alcohol, and you have to tell me if the statement is false, partly false, partly true or true.

5	Isitatimende /Statement	Akukona False	Ingxenye Ayikona Partly false	Ingxenye yiqiniso Partly True	Iqiniso True
5a.	Uma udakwa utshele abangani bakho bangacasuka baphoxeke. / If you got drunk and you told your friends, they would be angry and disappointed.				
5b.	Abangani bakho bakhuluma kakhulu ngokungabinesidingo sokuphuza utshwala. / Your friends talk a lot about the need to not drink alcohol.				
5c.	Wena nabangani bakho niyagqugquzelana ukuthi ningaphuzi (utshwala). / Your friends and you encourage each other not to drink.				
5d.	Ucabanga ukuthi akulungile ukudakwa. / You think it's bad to get drunk.				
5e.	Uma udakwa abangani bakho bangakukhathalela baqiniseke ukuthi uphephile. / If you got drunk, your friends would care and make sure you were safe.				
5f.	Wake wadakwa /You were once drunk.				
5g.	Ungathanda ukuthi uke udakwe /You would like to get drunk.				

I. Izidakamizwa / Drugs

1. Ingabe abangani bakho bayazisebenzisa izidakamizwa? yebo ☐ cha ☐ angazi ☐ / Do your friends use drugs? (Yes, no, DK)

2. Uyazisebenzisa izidakamizwa? yebo ☐ cha ☐ / Do you use drugs?(Yes, no)

3.Wake wasebenzisa okunye noma okungaphezulu kwalokhu	Insangu dagga	Yiglu glue	Yibensin bensin	umgwinyo ecstasy	Okunye 1 Other 1 (specify)	Okunye 2 Other 2 (specify)
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Id. no:

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okulandelayo? / Have you ever used one or more of the following						
	Yebo <input type="checkbox"/> Cha <input type="checkbox"/>	Yebo <input type="checkbox"/> Cha <input type="checkbox"/>	Yebo <input type="checkbox"/> Cha <input type="checkbox"/>	Yebo <input type="checkbox"/> Cha <input type="checkbox"/>		

J. Ukuziphatha ngokocansi / Sexual behaviour

Imibuzo elandelayo ingokuziphatha ngokocansi nokucabangayo wena nabangani bakho ngocansi. / Ngiyazi eminye yalemibuzo inzima ukuyiphendula kodwa ngicela usize wenze okusemandleni akho. / The next questions are about sexual behaviour and what you and your friends think about sex. I know some of these questions are hard to answer, but please do your best.

1. Umbono kabani owazisa kakhulu mayelana nokuziphatha kwezocansi? abazali ☐
umkhulu nogogo ☐ umbheki ☐ umfowenu ☐ udadewenu ☐ umngani ☐
omunye umuntu ☐ (ubuhlobo nengane) / Whose opinion do you value most with regards to your sexual behaviours? (parent, grandparent, guardian, brother, sister, friend, other person, (relationship with the child) _____

2. Hloboluni locansi owake walwenza? / What kind of sex have you had?

2a	Ukuphathaphatha isitho sangasese kuphela / Petting	Yebo	Cha
2b	Ukusoma / Thigh sex	Yebo	Cha
2c	Olokukhatha isitho sangasese / Oral	Yebo	Cha
2d	Olwasesithweni sowesifazane / Vaginal	Yebo	Cha
2e	Olwasembotsheni yokuzikhulula / Anal	Yebo	Cha
2f	Alukho / None	Yebo	Cha

Uma kungu YEBO yiya kuQ3/If Yes go to Q3

Uma kungu CHA kwelesitho sangasese sowesifazane noma olwesitho sokuzikhulula yeqela embuzweni 10 / If no vaginal or anal, jump to question 10.

3. Wawungakanani ngesikhathi wenza ucansi lwesitho sowesifazane okokuqala ngqa? (iminyaka) / How old were you when you had vaginal sexual intercourse for the first time? (age)

4. Empilweni yakho usuwenze ucansi nabantu besilisa abangaki? (inamba) / During your life, with how many males have you had sexual intercourse? (number)

5. Ezinyangeni ezintathu ezedlule usuwenze ucansi nabantu besilisa abangaki? (abesilisa) / During the past 3 months, with how many males did you have sexual intercourse? (males)

6. Uke waphuza uphuza oludakayo noma izidakamizwa ngaphambi kokuba wenze ucansi ngesikhathi ugcina? yebo ☐ cha ☐ NA ☐ / Did you drink alcohol or use drugs before you had sexual intercourse the last time? (Yes, no, NA)

7. Esikhathini sokugcina wenza ucansi ikhona indlela owayisebenzisayo ukuvikela ukukhulelwa? (khetha impendulo ibe yinye) / The last time you had sexual intercourse, did you use a method to prevent pregnancy?

7a	Ayikho indlela eyasetshenziswa	No method was used	Yebo	Cha
7b	Amaphilisi okuhlela	Birth control pills	Yebo	Cha