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# Risk factors for schistosomiasis transmission among school children in Gwanda district, Zimbabwe

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ABSTRACT

*Introduction:* A nationwide cross sectional schistosomiasis survey conducted in 2011 in 280 primary schools found a prevalence rate of 22.7%. This warranted an intervention with Mass Drug Administration at all schools in line with WHO guidelines. This study aimed to identify risk factors for schistosomiasis transmission among Grade 3 children at two primary schools in Gwanda district.

*Methods:* A descriptive cross sectional survey which was part of a larger study on Malaria and Bilharzia in Southern Africa (MABISA) was conducted. Grade 3 children ($n$ = 120) attending two purposively selected rural primary schools in Dombo and Ntalale in Gwanda were respondents. Data on socio-demographic characteristics and risk factors which included knowledge and practices were collected using a pretested interviewer administered questionnaire.

*Results:* Of the 120 children, 98 (81.7%) of the children indicated that they did not consistently use the toilet. The other risk factors for schistosomiasis were bathing and swimming in rivers and dams 80 (66.7%), watering the vegetable gardens using unprotected water sources 77 (64.7%) and crossing rivers on their way to school barefooted 31.7%. History of schistosomiasis cases based on self-reporting indicated that of the 9 children 7 were girls. There was poor knowledge of schistosomiasis among the children with 54% of the children indicating that they had never heard about the disease. Misconceptions on the causes of schistosomiasis which included drinking dirty water, mosquitoes and flies as the causes of schistosomiasis were reported by the children. Parents were cited as the least disseminators of information on schistosomiasis with only 4 out of the 120 children having received information from their parents.

*Conclusion:* Frequent contact with unprotected water sources, non-use of the toilet, and lack of information on schistosomiasis could predispose the children to infection. There is need to raise awareness about schistosomiasis in schools and the community to reduce the risk of contracting schistosomiasis due to risky behaviour.

## 1. Introduction

Schistosomiasis is a parasitic disease caused by the blood flukes from the genus schistosoma. The main disease causing Schistosome species are *Schistosoma haematobium*, *S. mansoni*, *S. japonicum* and *S. intercalatum* (Gryseels et al., 2006). The disease which ranks second to malaria kills an estimated 280 000 people each year in the Sub Saharan region alone (Egbendewe-Mondzozo et al., 2011). Globally 800 million people are at risk of contracting schistosomiasis and 76 countries are endemic (Yang et al., 2006). Active transmission is reported in 67 countries and of these 46 are in Africa (Aagaard-Hansen et al., 2009). Like one of the neglected tropical disease (NTDs) schistosomiasis largely occurs in resource poor settings where it poses a serious public health burden (Njenga et al., 2014; World Health Organisation, 2015).

The disease causes severe morbidity in large parts of Africa, particularly sub Saharan Africa where 224 million are affected (World Health Organisation, 2015). About 120 million people infected with schistosomiasis are estimated to be asymptomatic where as 20 million are said to have developed severe disease because of not being treated at the early stages of the disease (World Health Organisation, 2015). Schistosomiasis is prevalent in most parts of Africa where there are large water bodies (World Health Organisation, 2015). In Zimbabwe, schistosomiasis is ranked the 9th mostly reported out-patient illness (Zimbabwe National Health Profile, 2011). Transmission is particularly high among persons residing in rural and agricultural areas where there are dams and irrigation schemes; and communities are generally poor, ignorant, have poor housing, have poor hygienic practices and have poor or no sanitary facilities (Njenga et al., 2014).

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The most common schistosome species found in Zimbabwe are *S. mansoni* and *S. haematobium* (Zimbabwe National Health Profile, 2011).

Control of schistosomiasis has been neglected for many decades mainly because it rarely kills and its signs and symptoms are only taken seriously when permanent impairment occurs. The disease has however received reasonable attention in recent times with much effort and resources being invested in the efforts to understand and control it (Chimbari, 2012; Hotez et al., 2007a,b; Utzinger and de Savigny, 2006; World Health Organisation, 2008).

Despite having been controlled in many countries the disease still poses a serious burden in Africa particularly in sub-Saharan Africa (Kabuyaya et al., 2017). Zimbabwe is one of the countries that has recently been hardest hit by the disease and this calls for understanding the risk factors associated with its transmission. A study by Midzi and colleagues indicated limited knowledge on the disease. (Midzi et al., 2011). The tendency has been to use 8–10-year-old children as proxy indicators of community infection and knowledge status to guide treatment strategies in endemic areas (Midzi et al., 2011). Children spend most of their time travelling to and from school and often have contact with water infested with intermediate host snails for schistosomiasis (Midzi et al., 2011).

Assessment of people's knowledge about a disease helps in understanding the disease transmission. A study on knowledge of Schistosomiasis conducted among school children in Zimbabwe showed that 32% of the respondents had good knowledge of the disease and 50.6% were not aware of the disease risk factors, causes or symptoms (Midzi et al., 2011). Children in that study had misconceptions about the causes of schistosomiasis which included eating green mangoes, eating too much salt, witchcraft and jumping over fire. The authors explained that these misconceptions could be wrong information passed on to children by their parents.

Children in Grade 3 have not yet been introduced to lessons on schistosomiasis in school, hence their knowledge could reflect their parental knowledge or based on whether they have suffered from the disease or not (Midzi et al., 2011). A study in Zimbabwe reported low levels of knowledge among community members (Chimberengwa et al., 2014). Similarly in Kano State, it was observed that there is a high level of ignorance regarding the causative agent, mode of transmission of the disease, its debilitating effect and curability. Some wrongly thought they contracted the disease from taking too much salt (Duwa et al., 2009).

Understanding the risk factors for schistosomiasis transmission in communities is an important determinant for successful control and prevention programmes. It is on this basis that we conducted this study on the risk factors for schistosomiasis transmission among 8–10 year old children in the two schools.

## 2. Methods

### 2.1. Study area and population

The study was conducted in Gwanda district in Matabeleland South Province of Zimbabwe in a semi-arid community. Gwanda lies in region five which is characterised by poor rainfall and high levels of poverty. This study is part of a larger study which aims to investigate the impacts of Malaria and Bilharzia in the context of climate change in three Southern African countries (Botswana, South Africa and Zimbabwe). Two wards were purposively selected, namely Ntalale ward which has five primary schools and Selonga ward which has three primary schools. In Ntalale ward, we selected Ntalale Primary school and in Selonga ward, Dombo primary school was selected. Ntalale primary school relies on water from three rivers and three dams for irrigation and domestic purposes. Dombo primary school is serviced by three dams which are mainly used for irrigation purposes.

### 2.2. Materials and methods

A descriptive cross sectional survey of Grade 3 children (7–12 year olds) was conducted at the two primary schools in Gwanda district ($n$ = 120) in March 2015. Out of the eight primary schools in the two wards (5 from Ntalale and 3 from Selonga) one school from each ward with the highest numbers of Grade 3 children was selected. The school registers at the 2 schools were used as the sampling frame. According to the registers at the two schools, 125 children met the criteria (Grade 3) although the researchers only managed to interview 120 (96%). The five children who were not interviewed did not bring back signed consent letters from their parents. The questionnaire administered to the children included questions on demographics, children's knowledge of causes of schistosomiasis, signs and symptoms of schistosomiasis, their water contact behaviours and their history of Schistosomiasis infection. The children stated what they knew without being given options. A knowledge score was generated based on correct responses given by the children. We considered correct causes and risk factors for schistosomiasis transmission as swimming, bathing, crossing rivers barefooted, fishing, collection of water for domestic purposes, playing, urinating or defecating in rivers or dams. Out of a possible score of 10, we categorised knowledge as follows: 0–3 as poor; 4–6 as average, and more than 7 as good. The determination of having suffered from schistosomiasis was through the children's self-reporting of having had a history of Schistosomiasis. Structured questionnaires translated into Ndebele and Suthu languages were used. Study tools were pretested at one of the non-participating primary schools in the study area.

### 2.3. Sample size determination

All the Grade 3 children in the two selected schools were included in this sub component ($n$ = 120). The Grade 3s were considered as a proxy for their parents' knowledge and practices since at this level they would not have been taught about Schistosomiasis at school. The children had recently undergone Mass Drug Administration which was conducted at all schools irrespective of infection levels hence the omission of conducting a parasitological survey.

### 2.4. Ethical approval

The study protocol was reviewed and approved by the University of Zimbabwe institutional review board (JREC 200/14) and the UKZN Biomedical Research Ethics Committee (BREC REF 409/14). The purpose of the study was explained to the participants, confidentiality was assured and written informed consent and assent were obtained from the study participants after they had received full information about the study. To maintain anonymity, children's names were not recorded.

### 2.5. Data analysis

Data were analysed using EPI INFO version 11. Characteristics of the respondents were described and univariate analysis of all potential risk factors was conducted. The strength of association among variables was reported using the 95% confidence intervals.

## 3. Results

All interviewed students (120) responded to all the questions hence there was a 100% response rate. The distribution of Grade 3 students by school was Ntalale, 67 (55.8%) and Dombo 53 (44.2%). Overall there were more girls 62 (52%). The children's ages ranged from 7 to 12, with an overall mean age of 8.9 years. Seven point five percent (7.5%; 9/120) of the had a history of urinary schistosomiasis. Table 1 summarises the demographics of the children.