FACTORS INFLUENCING PERSISTENCE OF UROGENITAL SCHISTOSOMIASIS AMONG SCHOOL CHILDREN IN CHAKE-CHAKE DISTRICT, ZANZIBAR - TANZANIA

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By

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A Dissertation Submitted in Partial Fulfillment of the Requirement for the Degree of Master of Science in Tropical Diseases Control of the Muhimbili University of Health and Allied Sciences

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CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation titled "***Factors Influencing Persistence of Urogenital Schistosomiasis among School Children in Chake-Chake District Zanzibar-Tanzania***," in (Partial) fulfillment for the requirements for the degree of Master of Science in Tropical Diseases Control of Muhimbili University of Health and Allied Sciences.

_____

Dr. Dinah Gasarasi

(Supervisor)

Date: _____

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I, Juma H. Khamis, declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature: _____ Date: _____

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LIST OF ABBREVIATION

AOR	-	Adjusted odd ratio
BCI	-	Behaviour Change intervention
CI	-	Confidence Interval
COR	-	Crude odd ratio
IRB	-	Institutional Review Board
MDA	-	Mass Drug Administration
MoH	-	Ministry of Health
MUHAS	-	Muhimbili University of Health and Allied Sciences
NTD	-	Neglected Tropical Disease
PC	-	Preventive Chemotherapy
PZQ	-	Praziquantel
SAC	-	School-Aged Children
SBT	-	School-Based Treatment
SC	-	School Children
SCI	-	Schistosomiasis Control Initiative
WHO	-	World Health Organization
ZEST	-	Zanzibar Elimination Schistosomiasis Transmission

DEFINITION OF TERMS

Hotspots: Areas with Schistosomiasis prevalence greater than ten per cent (10 %) in children at least once

Infection status of the snail: Presence of infectious *S. haematobium* cercariae shed in water (infected) and absent of cercariae (Not infected)

Prevalence: The proportion of participants with S. *haematobium* egg(s) in the urine sample (infected)

MDA uptake: Administration, receiving and swallowing any anti-helminthes drugs within the last treatment cycle

School children: All children between the ages of 6 to 14 years attending primary school**.**

Urogenital schistosomiasis: Is a neglected tropical disease caused by the parasite *Schistosoma haematobium*, which resides in the vasculature surrounding the urogenital system.

ABSTRACT

Background: Despite the implementation of eight rounds of mass drug administration (MDA) with praziquantel to all school-aged children and snail control measures since 2012, there are still hotspot areas with urogenital schistosomiasis prevalence of greater than 10% in Chake-Chake District, Zanzibar. Factors influencing the persistence of urogenital schistosomiasis transmission in these hotspots are not well characterized. Therefore, this study was designed to delineate specific factors influencing the persistence of urogenital schistosomiasis among school children in Chake-Chake District.

Materials and Methods: A cross-sectional study was conducted among school children at Ole, Vitongoji and Ngomeni schools in Chake-Chake District from August 2020. The schools were chosen using a probability proportional to size method. At each school, standard II to VI pupils were selected using simple random sampling. A single urine sample was obtained from all pupils and examined for *S.haematobium* eggs using sedimentation technique. Urine samples confirmed positive were later examined by filtration technique for quantification of eggs and establishment of infection intensity. Structured interview schedule and checklist were used for data collection on factors influencing the persistence of urogenital schistosomiasis infections such as water contact activities, sanitation facilities, knowledge and attitude. In addition, morphologically identified *Bulinus sp.* snails were examined for infection using the cercaria shedding method. Data were summarized by descriptive statistics, while proportions were compared by Pearson's chi-square and Fisher's Exact test. Logistic regression analyses were used to test the association between dependent and independent variables using odd ratios and 95% CI, the significance level was set at a p- value of $p < 0.05$.

Results:

Ngomeni and Vitongoji primary schools had more children with *S. haematobium* infection. Majority of pupils had average level of knowledge, good attitude about urogenital schistosomiasis, high MDA uptake and availability and good use of sanitation facilities among school children. When bivariate and multivariate logistic regression analysis were performed, swimming was associated with increased likelihood of acquiring *S. haematobium* AOR= 22.204, 95% CI: 7.487-65.074, p =0.001 and good attitude on urogenital schistosomiasis

AOR=0.004, (95% CI: 0.006 - 0.074, p<0.011) were associated with reduced risk of *S. haematobium* infection.

Conclusion: The study confirms that urogenital schistosomiasis is still prevalent among pupils in Chake-Chake district; nevertheless, the overall prevalence was 9.6% slightly lower than that reported in the previous years. Conceivably, persistent *S. haematobium* transmission is influenced by the prevailing risk factors for transmission (presence of infected pupils, water contact activities such as swimming). Presence of *Bulinus* snails' intermediate hosts in sampled water sources indicates potential/likelihood of transmission of schistosomiasis in the study area.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Schistosomiasis (also known as bilharzia) is an acute or chronic disease caused by parasitic worms known as Schistosomes, acquired through penetration of the intact skin with the parasite larva form (cercariae) when people come into contact with infested fresh water(WHO, 2019).

Worldwide urogenital schistosomiasis is caused by the species *Schistosoma haematobium* in Africa, the Middle East and Corsica (France)of which *Bulinus is* suitable snail intermediate hosts which exist and facilitates the parasite development and transmission(WHO, 2019)

In poor endemic communities with inadequate sanitation, contamination of water bodies with human excreta containing *Schistosoma* eggs may result in infection of freshwater snail vectors which facilitate the transmission of infection. School children are at greater risk of being infected with *Schistosoma* cercaria once contact the infested freshwater(Colley *et al.*, 2014; Sulieman *et al.*, 2017;WHO, 2019). Other risk factors that influence urogenital schistosomiasis transmission include human water contact behaviour, the infection status of *Bulinus* snail vectors, availability of sanitation facilities, MDA coverage and Knowledge and attitude (KAP).

Despite more effort made to contain Schistosomiasis transmission, more than 220 million people are infected worldwide of which 85% live in Sub-Saharan Africa(SSA)(WHO, 2019).The urogenital schistosomiasis is the second to malaria with significant public health importance in terms of social-economic impact (Ochodo *et al.*, 2015; Tebeje *et al.*, 2016; Mohammed *et al.*, 2018) and is highly endemic in SSA countries including Tanzania (Mazigo *et al.*, 2012).

In Tanzania, urogenital schistosomiasis widely distributed with the remarkable high transmission that occurs in the eastern and southeastern parts of Lake Victoria and Zanzibar Island. The disease is highly restricted to northwestern and central parts of Unguja, and western, southern, central, and northwest of the Island in Pemba(Mazigo*et al.*, 2012).

Urogenital schistosomiasis in both Unguja and Pemba is caused by infection of S. *haematobium* which is being transmitted by intermediate host snail species is *Bulinus globosus* (Knopp *et al.*, 2012).

The effort for control of schistosomiasis worldwide is mainly based on the strategy for controlling morbidity by Preventive chemotherapy (PC) with Praziquantel (PZQ) which normally distributed through mass drug administration (MDA). The schistosomiasis global control programs are either school-based programs that target school children aged 5 to 14 years or community-wide programs (WHO, 2017). Recently, the emphasis for integrated approaches has been advocated and includes the provision of hygiene education, potable water supply, adequate sanitation, and snail control strategies.

The Zanzibar Government through the Ministry of Health (MoH) is committed to the elimination efforts through the Zanzibar Elimination of Schistosomiasis Transmission Program (ZEST).
Zanzibar provides biannual MDA with praziquantel for prevention of urogenital schistosomiasis integrated as school-based Treatment (SBT) focusing school-aged children and a Community-Wide Treatment (CWT) as well as snail control.
The intervention reduced the prevalence to less than 3% in some of the districts (Knopp *et al.*, 2019), however, some wards, in particular, Ole, Vitongoji, and Ngomeni still have a higher prevalence of greater than 10%(Ming-zhen*et al.*, 2019).
Several epidemiological studies have been conducted on infection status and reported factors such existence intermediate snail host and shedding cercariae, freshwater contact behaviour, and lack of safe water supply and latrine in school and not a participation in MDA with Praziquantel (super spreaders), living in close to freshwater bodies and construction of agricultural water schemes influences urogenital schistosomiasis infection (Rollinson *et al.*, 2013; Sang *et al.*, 2014; Figueiredo *et al.*, 2015; Tchuenté *et al.*, 2017).The *Bulinus sp,* snails infection status, human-water contact behaviour, availability and use of sanitary facilities, level of MDA coverage, and Knowledge and altitude are factors which more likely to influence the persistence of urogenital schistosomiasis transmission in hotspots had not well characterized.
Therefore, this study is designed to assess the factors influencing the persistence of urogenital Schistosomiasis among school children in selected schools of Chake-Chake District.

1.2 Problem statement

In most areas of Zanzibar, the average prevalence of urogenital schistosomiasis had been reduced to less than 3% (Knopp *et al.*, 2019). However, in some areas of Chake-Chake district, particularly Ole, Vitongoji and Ngomeni there is a higher prevalence of greater than 10% despite the implementation of 8 rounds MDA since 2012 to all school-aged children and snail control measures (Ming-zhen *et al.*, 2019). Therefore, the presence of these areas with higher disease prevalence may act as potential sources for re-infection of treated individuals which may hinder the achievements made in the control and elimination efforts.

However, factors that may influence transmission and persistence of urogenital schistosomiasis in particular; infection status of *Bulinus* snails, human-water contact behavior, availability and use of sanitary facilities, level of MDA uptake, Knowledge and attitude in the identified hotspots are not well characterized.

Therefore, this study was designed to delineate specific factors influencing the persistence of urogenital Schistosomiasis transmission among school children in selected schools of Chake-Chake district.

1.3 Conceptual framework

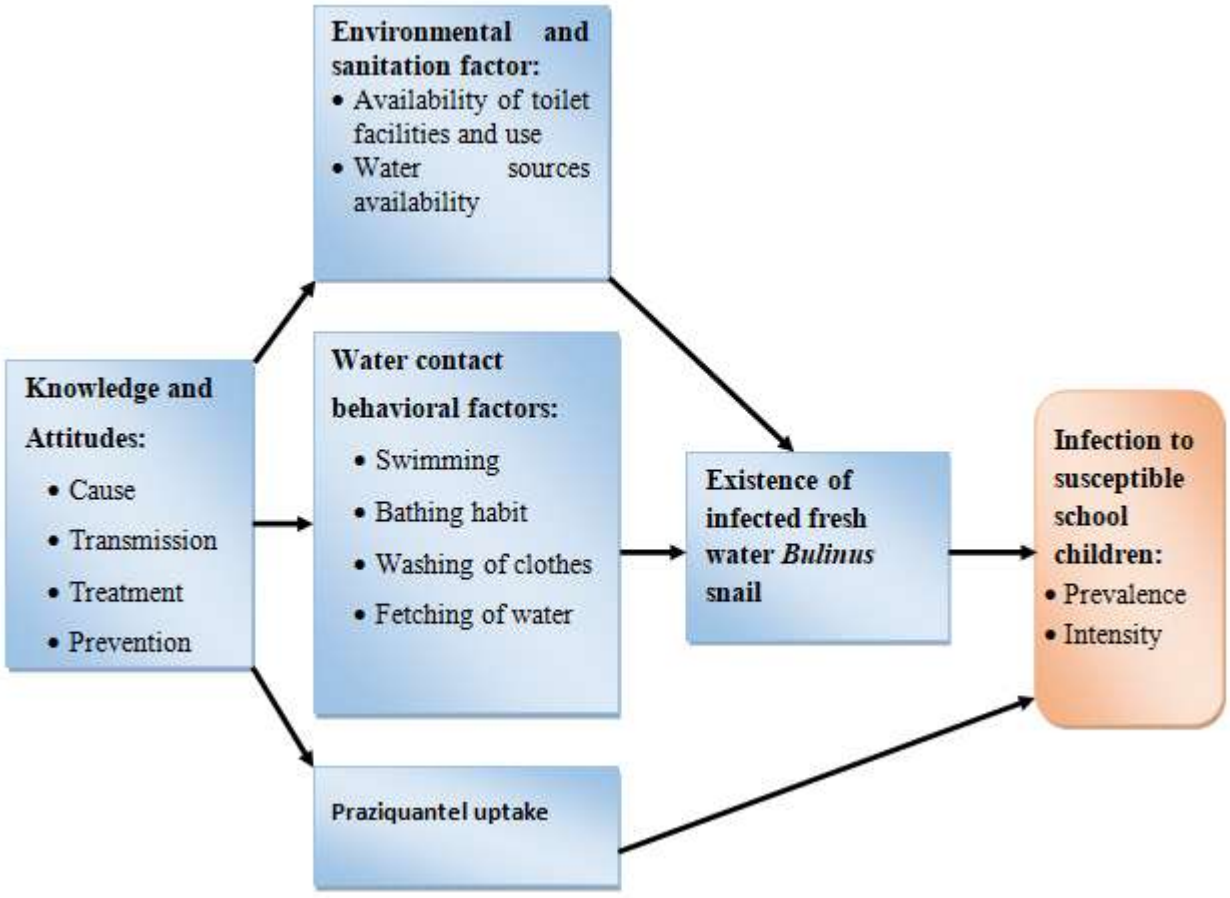


Figure 1: Conceptual framework on factors influencing the persistence of urogenital schistosomiasis

Explanation of the conceptual frame:

- MDA coverage with praziquantel in school base treatment (SBT) interrupts transmission by reduces the number of infected individuals.
- Water contact behavioural factors: such as swimming or bathing habit and urinating in the water source, washing of clothes in the water source may lead to Contamination of water bodies with parasite eggs and schistosomiasis transmission in those areas where water bodies contain *Bulinus sp.* snails' vectors that save as intermediate hosts.
- Environmental and sanitation factors**:** such as lack of toilet facilities availability and irregular use and safe water availability may lead to contamination of water and led transmission.

- Poor knowledge and attitude on disease transmission among children may lead to persistence of transmission of infection in the presence of water bodies and existence intermediate host snails

1.4 Rationale

The findings of this study will help to provide a general picture on magnitude and factors influencing persistence of urogenital Schistosomiasis among school children. Subsequently it will help policy and decision makers such as Government, program managers and coordinators in the NTD programs to strengthen or modify the strategies for the elimination program. Also, the findings of this study will be important for those involved in *S. haematobium* elimination program and might contribute to the resource of knowledge and efforts towards the diseases eradication.

1.5 Research question

1.5.1 General Question

What are the factors influencing persistence of urogenital Schistosomiasis among school children in Chake-Chake District?

1.5.2 Specific research question

1. What is the prevalence and intensity of urogenital schistosomiasis infection among school children in selected schools of the Chake-Chake District?
2. What is the proportion of children who participated in MDA uptake with praziquantel in the last treatment cycle?
3. What is the type of water contact patterns among the school children in selected schools of Chake-Chake District?
4. What is the level of infection of *Bulinus* snail from the water contact points that are frequented by school children?
5. What is the availability and use of toilet facilities in school and households in selected schools and associated communities of Chake-Chake District?
6. What is the level of knowledge on cause, transmission, treatment and prevention of Urinary Schistosomiasis among school children in selected schools of Chake-Chake District?

7. What is the attitude towards Urinary Schistosomiasis among school children in the selected school of Chake-Chake District?

1.6 Research objectives

1.6.1 Broad objectives

To assess the factors influencing persistence of urogenital schistosomiasis among school children in Chake-Chake District

1.6.2 Specific objectives

i. To determine the prevalence and intensity of urogenital schistosomiasis infection among school children in selected schools of Chake-Chake District.
ii. To determine the proportion of children who participated in MDA uptake with praziquantel in the last treatment cycle.
iii. To identify the type of water contact activities among the school children in selected schools of Chake-Chake District.
iv. To determine the level of infection of *Bulinus* snail from water contact points that is frequented by school children.
v. To determine availability and use of toilet facilities in schools and households among pupils from selected schools of Chake-Chake District
vi. To assess the level of knowledge on cause, transmission, treatment and prevention of Urinary Schistosomiasis among the school children in selected schools of Chake-Chake District.
vii. To assess attitude towards Urinary Schistosomiasis among school children in the selected schools of Chake-Chake District.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Prevalence and intensity of urogenital schistosomiasis infection among school children.

Poor and rural communities in tropical and subtropical areas are the most affected by schistosomiasis known as diseases of poverty. The prevalence of schistosomiasis infection in Tanzania varies from one area to another, and it is the second country in sub-Saharan Africa having the highest prevalence after Nigeria (Mazigo *et al.*, 2012). The prevalence and intensity of infection vary with socio-demographic factors and water contact behaviour(Person *et al.*, 2016).

Children aged 5 – 14 years are more susceptible to infection or re-infection than adult individuals and initial infection in a child often occurs by the age of 2 years, then the prevalence and intensity of infection becomes highest among children less than 15 years of age and reach a peak between ages of 10 to 19 years; after this age range, both intensity and prevalence of infection are generally decreased as the age increases(Mazigo*et al.*, 2012; Sulieman *et al.*, 2017).

Many studies documented in African countries show variation in the prevalence and intensity of urogenital schistosomiasis due to *S. haematobium*. Epidemiological situation analysis in Egypt primary schoolchildren in the year 2016 showed that the prevalence of *S. haematobium*was4.04% and this proved that *S. haematobium was* gradually decreasing in Middle and Upper Egypt where the magnitude ranged from 0 to 20.6% for more than a decade(Moftah*et al.*, 2000; Dahesh, 2017).

In Nigeria, a cross-sectional, descriptive study conducted by *Mohammed et al*,2018reported the prevalence of urinary schistosomiasis among school children to be 33.5% compared to studies carried out Ethiopia which indicated a prevalence of 24.54% in schoolchildren aged 11 to 14 years (Mohammed *et al.*, 2018).

A cross-sectional parasitological survey was done at Barrage Cameroon from March and May 2016 observed both prevalence and intensity of urogenital schistosomiasis to be 41.1% similar to that reported in school children in southwest region (Njunda *et al.*, 2017). Furthermore, a preceding study in Cameroon in 2015, indicated a high prevalence rate of urinary schistosomiasis of 51.3% among the age group of 11 to 20 years(Ntonifor*et al.*, 2015). In 2018, a cross-sectional study conducted in Côte d'Ivoire reported a prevalence rate of urogenital schistosomiasis to be

14.0% among schoolchildren which is low compared to the previously conducted study, which reported a prevalence of 18.4%(Angora *et al.*, 2019).

A cross-sectional study conducted in Sudan in 2018, the prevalence rate of urogenital schistosomiasis was 12.9% among schoolchildren (Hajissa *et al.*, 2018). However, it is lower compared to that reported in 2014 when the prevalence rate of *S. haematobium* increased to73% and 53% among the schoolchildren with high intensity(Ahmed *et al.*, 2014).

In East Africa, the prevalence and intensity of urogenital schistosomiasis differ from country to country. A recent Cross-sectional survey carried out at Nyanza Kenya in 2014, reported the overall prevalence rate *S. haematobium* to be 9.6%(Sang *et al.*, 2014) which is much lower than the previously reported prevalence of 14.8%(Mwandawiro *et al.*, 2013).

In Tanzania, a study conducted in Kilosa of Morogoro region in 2018 to assess the prevalence and intensity of urogenital schistosomiasis in schoolchildren indicated a reduction in these rates and the overall *S. haematobium* rate was 4.42%(Kavana, 2018). Similarly, a cross-sectional survey conducted in Zanzibar from 2013 to 2016 the findings indicated a reduction in prevalence in most sites to less than 3% but in some wards, it remains greater than10% with low intensity(Knopp*et al.*, 2018). However, a similar study conducted at Uwandani village Chake–Chake indicated a magnitude of 11% (Makame, 2017).

2.2 MDA uptake with praziquantel in the last treatment cycle.

Administration of Praziquantel termed as preventive chemotherapy (PC) is the drug of choice recommended by WHO for reducing morbidity due to schistosomiasis infection and is effective to all schistosome species. In endemic areas such as Sub - Sahara Africa, interventions are targeted towards mass treatment of school children by large-scale administration of praziquantel (PZQ) to interrupt transmission(WHO, 2019).

For some years now there have been significant steps taken to control schistosomiasis at a national level, for example, Efforts were taken by Sub-Saharan Africa to scale up PC by administering Praziquantel as a Mass Drug to millions of school children which aims to reduce morbidity and disease associated with schistosomiasis, justifies the fact that children are at high risk of transmission(WHO, 2013)

A study carried out in Nigeria on schoolchildren infected with *S. haematobium* reported the prevalence of 24.9% at pre-treatment and reduction from 74.4% to 86.4% of mean egg count after 6 to 12 months followed by post-treatment(Adewale *et al.*, 2018).

A cross-sectional study in Burkina Faso (2008) reported the magnitude of urogenital schistosomiasis infection in schoolchildren to below, follow up before treatment indicated a prevalence of 55.8% and after treatment, a 12.6% reduction was recorded from 77.4% at baseline (Touré *et al.*, 2008).

In East Africa, A repeat cross-sectional survey conducted in Kenya over five years (2012-2017), reported that MDA intervention reduced schistosomiasis infection among infected schoolchildren by 64.5%(Mwandawiro *et al.*, 2019)

The contemporary control measures established in Tanzania over the past decade rely on MDA for school-aged children as the primary strategy for morbidity and transmission control. Several studies have been conducted to assess the impact of MDA to control urinary schistosomiasis.

A recent cross-section study reported at Bahi district revealed that Praziquantel MDA uptake effectively reduces the prevalence of *S. haematobium*; thus the prevalence dropped by 50.0% from 30.0% before MDA to 15.0%(Chaula and Tarimo, 2014). Similarly, the current cross-sectional survey conducted at Uwandani village Chake -Chake indicated that the prevalence of urinary schistosomiasis was 11% which is lower when compared to 37.7% that was reported in the pilot studies done in 2016 after six rounds of ongoing Praziquantel MDA program(Makame, 2017).However, there is a paucity of information on MDA coverage among school children particularly in hotspot areas of transmission

2.3 Water Contact activities among the school children.

Schistosomiasis being water-based parasitic infection disease may affect people of all ages in endemic areas because in one way or another everyone comes in contact with water from environment water bodies which may contain viable larvae(Dalton and Pole, 2014).People become infected with schistosoma cercaria through contact with infected water during *domestic activities* (fetching water, bathing, washing of utensils or clothes), *recreational activities* (swimming, playing) or *occupational activities* (irrigation farming, fishing) in freshwater sources(WHO, 2019).

The risk of being infected with *Schistosoma* cercaria in freshwater mainly depends on the type of water, frequency, duration of time in the day of contact with infected water and often influenced by socio-demographic characteristics(Anto*et al.*, 2015)

Different studies indicate that types of water like a river, pond, stream, and lake are crucially for supporting snail life and to increase their population. The infected snails are higher in the inland sites (dams, rivers, and springs) compared to the lakeshore sites because of less human excreta contamination (Mazigo *et al.*, 2012; Dalton and Pole, 2014).

Recreational or leisure water contact particularly swimming and playing in water bodies during the washing of clothes and bathing that elicit types of water contact activities is significantly associated with school children aged 5-15 years old. Existence of more than one source of water indicates that there is a potential for contact with some of the water sources that may not be safe such as ponds, rivers, and dams for different activities that present a risk for urogenital transmission(Chaula and Tarimo, 2014). However, in the study area, there are very limited studies quantifying the Schoolchildren's type of water contact pattern in water sources potentially associated with the transmission of schistosomiasis.

2.4 Infection of *Bulinus* snail from water contact points.

Schistosomiasis is a snail-borne, water-based parasitic infection caused by blood-dwelling (hence called blood-fluke) trematode worms of the genus *Schistosoma*.

S. haematobium is one of the five species causing human schistosomiasis and is transmitted by the freshwater snails belonging to the genus *Bulinus.* The period from penetration of miracidia in the snail until the production of infectious cercariae is called the pre-patent period. In Zanzibar, *Bulinus globosus* is the only intermediate host species present(Knopp*et al.*, 2016), which prefers to live at the margin of the pond or stream.

B. globosus distribution and population density is influenced by the nature of the river, pond or stream often prefers to live on vegetation (live or dry vegetation)and they are highly susceptible to infection with *S. haematobium* miracidia(Mazigo *et al.*, 2012)

Several studies have demonstrated that the number of infected *Bulinus* snails is influenced by the concentration of *S.haematobium* eggs in water, wave action in the aquatic environment, the age structure of the snail population, and MDA coverage in the human population(Kulinkina *et al.*, 2019)

The number of infected snails increases with the increase in the age of the snails but decreases with snail densities. The highest infection rates occur when snail populations contain the largest number of adult snails(Ekwunife and Eneanya, 2008)

All sites with high levels of human-water contact activities, particularly swimming, bathing, and washing of clothes with the highest number of *Bulinus* snails shedding *S. haematobium* cercariae, become transmission sites (Angora *et al.*, 2019).

MDA intervention efforts in the nearby human populations interrupt transmission through its influence on the number of eggs shed by the infected humans in the environment, which directly affects the number of infected *Bulinus* snails shedding cercariae(Chaula and Tarimo, 2014; Knopp *et al.*, 2016). However, the infection status of *Bulinus* snails remains unclear in hotspot areas that may be potential source of transmission.

2.5 Availability and use of toilet facilities in school and households in selected schools and associated communities.

The mature adult females *S. haematobium* in the infected human produces fully embryonated eggs daily throughout their lives, they produce100 to 200 eggs per female worm per day, eggs are excreted into the urine characterized by hematuria as a classical sign (Ekwunife and Eneanya, 2008; Ahmed *et al.*, 2014). Thus, a single infected person defecating/urinating in a water body with the presence of the suitable intermediate host, may create a significantly sufficient risk of exposure to all community members who will come into contact with that water later(Hajissa*et al.*, 2018).

Open water

bodies may be particularly attractive sites for swimming or bathing to school children who sometimes use these sites for open defecation/urination due to the privacy offered by vegetation around the water body, which may be absent in other areas in addition to the availability of water for washing following defecation/urination(Hajissa*et al.*, 2018; Mohammed *et al.*, 2018)

Therefore, the availability of improved sanitary facilities in all schools and their households can contribute to the reduction of contamination of the water bodies and potential infection of the snail vectors facilitating the elimination of urogenital schistosomiasis (Mazigo *et al.*, 2012; Tchuenté *et al.*, 2017). However, there is limited information about the use and coverage of sanitary facilities in some of the hotspot areas.

2.6 Knowledge, attitude and perception

Health education may lead to behavioural changes like avoidance of contact with schistosome-infested waters and contamination of the environment with urine, however, humans are at high risk of infection due to poor sanitation, lack of knowledge, negative attitudes and practices about schistosomiasis (Sacolo, Chimbari and Kalinda, 2018). The correct and comprehensive knowledge influences promoting healthy attitudes and protective behaviour(Rollinson *et al.*, 2013), hence positive attitude towards urogenital schistosomiasis may be influenced by educational and knowledge level.

In contrast, lack of comprehensive knowledge, negative attitude relating to schistosomiasis infection on causes, transmission, prevention and control are the key factors for promoting the transmission of the disease(Sacolo, Chimbari and Kalinda, 2018).However, knowledge itself cannot be translated directly into behaviour change but promotes positive attitudes towards the behaviour in question. A study was done in Cameroon(Folefac *et al.*, 2018)reported that only the minority 35.4% (70/198) of respondents had knowledge, negative attitude on urinary schistosomiasis. Another study was done in Swaziland (Maseko *et al.*, 2016) reported that practices of some children are risky and have some misconceptions to urinary schistosomiasis infection of which knowledge was correlated to practice and both predictors of good and bad practices. Furthermore, the study conducted in the Mtera dam area of Mpwapwa district(Kitalile, 2012) revealed that the majority of the school children had a low level of knowledge, attitude and practice about urinary schistosomiasis.

Despite having more studies being coined on the quantified knowledge and attitude toward schistosomiasis among school children worldwide, there is a paucity of information about the knowledge and attitude about this disease among school children in the hotspot areas in Chake-Chake.

CHAPTER THREE

3.0 MATERIAL AND METHODS

3.1 Study area

Zanzibar is a part of the United Republic of Tanzania and consists of the two main islands, Unguja, and Pemba as well as a few smaller islands.Chake-Chake District is one among four districts in the Pemba Island Southern region of Pemba namely, Micheweni, Wete, Chake-Chake, and Mkoani.

Chake-Chake District is located in the central part of Southern Region, bordered to the north by Wete district, to the East and West by the Indian Ocean and to the South by the Mkoani district. The district is divided into twenty-nine (29) wards (called shehia) among those is Ole, Vitongoji, and Ngomeni and there is only one primary school in each Shehia with enrollment from standard one (I) to six (VI).Based on the 2012 population and Housing Census, the population of the Chake-Chake district is 97,249 of which 46,411 are males and 50,838 females. The district has an average household size of 5.5(NBS, 2012).

There are two annual rainy seasons: the Masika rains from the south lasting usually from March to June, and the Vuli rains from north-east occurring from October to November. The average annual temperature ranges between 23°C and 32°C. Rainfall supports the life of intermediate host (Bulinus) such that the presence of even a few snails may be a potential source of transmission.

The seawater fishing, business, and agriculture activity was major income-generating activities mainly done in Chake-Chake. However, agriculture activities in particular paddy production predispose people to infection.

The study were carried out in all three Shehia where Urinary schistosomiasis prevalent including; Ole, Vitongoji and Ngomeni in Chake-Chake District of South region. Therefore, the study area is purposively selected because it has three hotspots, with a high prevalence of greater than 10%(Ming-zhen*et al.*, 2019).

3.2 Study design

A Descriptive school-based cross-sectional study was carried out in selected primary schools in Chake-Chake District, the southern region of Pemba from August - September 2020.

3.3 Study population

The study population comprised of primary school pupils from Ole, Vitongoji, and Ngomeni schools in Chake-Chake district. The total number of standard II to VI pupils in Ole, Vitongoji and Ngomeni primary schools were 1141, 1171 and 142 pupils respectively.

3.4 Sample size estimation

The following formula was used to obtain the sample, the prevalence *S. haematobium* after the sixth round of MDA uptake was 11% (Makame 2017)

$$\text{Sample size (n)} = \frac{Z^2 P (100-P)}{\varepsilon^2}$$

Where;

n = Sample size required

Z = standard normal deviation corresponding to a 95% confidence interval which equals to 1.96

P = Expected prevalence of schistosomiasis in the study area is 11% based on school children the previous study conducted at Uwandani Chake-Chake (Makame, 2017)

ε = margin of errors estimated to be 3%

Substituting the value:

$$\text{Sample size (n)} = \frac{1.96^2 x 11(100-11)}{3^2}$$

= 418

Adjusting for non-response and drop out which is set at 10%,

10/100x418 = 460

Therefore, from that formula, the total number of 460 respondents was obtained and involved in this study.

3.5 Sampling procedure

Based on probability proportional to size of the school enrollment, 214, 219 and 27 pupils (standard II to VI) were enrolled from Ole, Vitongoji, and Ngomeni primary schools respectively. Then, in each class pupils were selected from class attendance list by simple random technique (blind draw method).

Probability proportional to size sampling method was used to get the number of students to be recruited from each of the selected schools. Total number of students in each school (X) was

obtained from the respective authorities, and summed up (X1+X2+X3) to get N (which is the summation of the total number of students in the study area). The number of students recruited from each school was calculated by the formula: school sample size (n)/N *X_n), whereby n/N gives sampling fraction. A simple random sampling was used to obtain a representative sample of students from each selected class.

3.6 Eligibility criteria

3.6.1 Inclusion criteria

- All primary school children in standard II-VI who were attended at school during the day of data collection.

3.6.2 Exclusion criteria:

- Children who were not being in school on the day of the study i.e. due to the interview were conducted in one day.
- Children who were did not consent to participate in the study.

3.7 Variables

3.7.1Independent variable

Independent variables are the exposure or predictor variables and in this study, the independent variables for objectives ware:

- **Intensity of infection:** amount of *S. haematobium* eggs per 10 milliliters of urine. It was categorized as light-intensity(<50 eggs/10 ml of urine) or heavy-intensity(≥50 eggs/10 ml of urine) (WHO, 2002).
- **MDA uptake status:** reported to swallow antischistosomal drugs in any round of MDA with praziquantel
- **Water contact activities:** any reported occupational, recreational, domestic or other social activity involve touching of water bodies.
- **Availability and use of toilet facilities:** reported availability of larine at school and usability at household for urination or defecation.
- **Snail infection status:** availability of Schistosoma cercaria in the water containing *Bulinus sp* snail during shedding process.

- **Level of knowledge:** measured by a series of five questions with total of 5 points and categorized as high (>3 points), average (2-3 points) or low knowledge (<2 points).
- **Attitude:** likert scale consisting of statements with five levels of respondents agreement to each statement and assigned a score ranging from 0 to 25 points and categorized as poor attitude (<14 points) or good attitude (>15 points).

3.7.2 Dependent variable

The dependent variable is the outcome or response variable and in this study the dependent variable is:

- **Prevalence:** presence of at least one *S. haematobium* eggs in the urine was referred as infected otherwise not infected.

3.8 Data collection tools

3.8.1 Structured interview schedule

Structured interview schedule were used to gather information on school children's MDA coverage, type of water contact activities, Knowledge and attitude as well as the availability of toilet facilities and use for the disposal of urine.

3.8.2 Specimen examination forms

Urine data collection forms were used to record data on individual infection status and intensity of infection. Also, Snail examination forms were used to collect information of snails and its infection status at collection sites.

3.8.3 Validity and reliability data collection tools

The interview schedules were tested at Wesha primary school using 10% of the respondents to check for the flow of words and understanding of the tool. The pre-testing was done twice at different time to the same individual using the Kiswahili version in order to ensure reliability of the tool and the data collection tool was improved.

3.9 Data Collection methods

Data collection was carried out by investigator and five trained research assistants. The techniques used to collect data were observation, interview and parasitological examination of urine specimens and snails.

3.9.1 Interview

Data collection was carried out by the researcher and five trained research assistants accompanied by the class teacher of the respective school. Research assistants were oriented by investigators on the tools before data collection.

Each individual pupil was interviewed on their social demographic information, MDA up take status, knowledge and attitude about urogenital schistosomiasis, water contact activities, availability of sanitation facility at household.

3.9.2 Observation

Two water bodies in the study area were visited to determine actual water contact activities carried out by pupils. Also, latrines for pupils in all selected schools were visited to confirm for their existence.

3.9.3 Urine sample collection and transportation

After the interview, participants were given instructions on how to collect urine samples and were provided with a sterile plastic container (with a wide mouth, 50mls screw cap labelled with their identification number) to bring about 20 mls of clean terminal catch urine (WHO, 1993).

One drop of 37% formalin was added to each sample for preservation and fix the eggs to prevent hatching and to destroy pathogens(WHO, 1991). All preserved samples were placed in a box and transported to the NTD Chake-Chake laboratory for examination.

3.9.4 Urine examination

Parasitological examinations of urine samples from individual participants were done in the NTD laboratory to determine the prevalence and intensity of infection by investigator and two research assistants.

3.9.5 Parasitological urine examination

Single urine specimen per respondent was processed by using the sedimentation technique firstly urine was assessed macroscopically for visible blood in the urine (BUN) and secondly microscopically by examination of urine sediments. Urine sediments were obtained by centrifugation whereby deposits were stained with Lugol's iodine and examined microscopically under 10x and 40x magnification. Findings were recorded as negative for the absence or positive for the presence of *S. haematobium* egg. For each positive case, the intensity of infection was

established by urine filtration technique, 10ml of a well-shaken terminal urine sample was passed through nucleopore filter and eggs trapped on the nucleopore. Thereafter, the specimen found to have *S.haematobium* eggs were recorded as infected and the number of eggs in each specimen was counted and the intensity of infection was determined by the number of eggs per 10ml of urine. The intensity of *S.haematobium* was categorized light infection for <50 eggs/10ml of urine, or heavy infection for ≥ 50 eggs/10ml of urine (WHO, 1991; Knopp *et al.*, 2019)**.** Samples found to have at least one egg were recorded as infected and the number of egg present in each specimen were counted and recorded in Urine data collection form.

3.9.6 Validity and reliability of urine test

Standard operating procedures (SOP) was followed during urine collection, transportation, processing, examination, result recording and analysis for maintaining a good quality study as described in the WHO benchmark aid for diagnosis and urine parasitic infections surveys(WHO, 1991). Positive and negative control samples were examined before examining collected samples. Reliability of the urine test was maintained through re-examining 10% of specimen by laboratory technician on daily basis without prior knowledge of the previous results.

3.9.7 Snail collection and examination

A total of 27 *Bulinus* snails were collected from Ole, Vitongoji and Ngomeni. About 9 snails were collected from Ole and 10 snails from Vitongoji pond where bathing and swimming were carried out, while 8 snails were collected from Ngomeni stream a clothes washing site. Snails were collected from submerged rocks and leaves in the fresh water body using a forceps and were identified to genus level based on shell morphology. The collected snails were placed in separate plastic containers filled with water from collection points and transported to the NTD laboratory at Chake-Chake for examination. Examination of snails was performed using the cercariae shedding method from morning to mid day (WHO, 2017). All snails which shed cercariae are recorded as infected in the snail examination form otherwise not infected (Luka, 2015).

3.10 Data management

At the end of each day of data collection, the structured interview schedule and checklists were checked for completeness and correctness. Discussion meetings were held every morning to rectify data collection problems encountered by the research assistants in the previous day, before

going to the field. Data was coded, entered into the Statistical Package for the Social Sciences (SPSS for Windows, version 21.0), and cleaned for entry error. A copy of the datasheet was stored in a separate drive to save as a backup. Then, data collection tool that had been recorded was filed and stored.

3.11 Data Analysis

Data was entered into a computer and analyzed using SPSS version 21.0. Descriptive analyses were performed to summarize socio-demographic characteristics data, infection status, sanitation practices, drug status and knowledge as well as attitude toward urogenital schistosomiasis into frequencies and proportions while the intensity of infection was determined for *S. haematobium* as egg per 10 milliliter of urine and categorized as light (<50 eggs/10mls of urine) and heavy intensity (≥50 eggs/10mls of urine)(WHO, 2002). Pearson's chi-square and Fisher Exact statistical tests were used to compare proportions between groups.

Logistic regression analyses were performed to determine the association between infection status as an outcome and other independent variables by calculating the strength of the association between *S. haematobium* infection and determinant factors using odds ratio (OR) and 95% confidence interval (CI). Crude odds ratio (COR) was estimated by bivariate logistic regression analysis to determine factors associated with *S. haematobium* infection. Then, the adjusted odds ratio (AOR) was computed using multivariable logistic regression analysis by taking all variables with P-value with ≤ 0.2 in bivariate analysis. The difference was considered as statistically significant if a P-value of less than 0.05 is determined.

3.12 Ethical consideration

Ethical clearance was obtained from MUHAS Ethical Review Board (ERB). Permission to conduct the study in Chake-Chake district was obtained from Zanzibar Research Authorities. Permission to conduct the study in the schools was obtained from the office of second vice president. The permission to interview the pupils was obtained from the head teacher of the respective school on behalf of their parents or guardians. The participation was voluntary and identification numbers were used instead of names so as to ensure privacy as well as confidentiality of the information from participants. The study posed no harm to the participants as only urine samples were collected and is a natural biological process no invasive procedures were employed in sample collection. Furthermore, participants directly benefited from their

participation as they were able to know their infection status and those who were found to be infected were referred to NTD programme for treatment using praziquantel.

CHAPTER FOUR

4.0 RESULTS

4.1 Social - demographic characteristics

A total of 460 eligible participants consented to participate in the study with response rate of (100%). The mean age of the study participants was 11.07years with standard deviation of ±1.9 years. More than one third of participants (58.5%) were aged greater than 11years while more than half of the participants were females (58%). Majority of school children were sampled from Ole and Vitongoji schools, only 5.9% of enrolled children came from Ngomeni primary school (Table 1).

Table 1: Social demographic characteristics of the study population (N = 460)

VARIABLES	CATEGORIES	FREQUENCY	PERCENTAGE (%)
Age group	≤ 10	191	41.5
	≥11	269	58.5
Gender	Male	193	42
	Female	267	58
Class level	Standard II - III	185	40.2
	Standard IV - VI	275	59.8
School	Ole	214	46.5
	Vitongoji	219	47.6
	Ngomeni	27	5.9

4.2 Prevalence of *S. haematobium* of infection

The overall prevalence of *S.haematobium* infection was 9.6%. There was a remarkable difference of *S. haematobium* infection between schools whereby school children from Ngomeni primary school were more likely to be infected with *S. haematobium* compared to school children from other schools (p<0.001). Although not statistically significant, socio-demographic characteristics, including; standard II-III and male pupils were more likely to have *S. haematobium* infection (Table 2).

Table 2: Prevalence of *S.haematobium* infection stratified by Social demographic characteristics (N=460)

VARIABLES	CATEGORIES	EXAMINED (N=460)	POSITIVE n (%)	P-VALUE*
Age group	≤ 10	191	18 (9.42)	0.93
	≥11	269	26 (9.67)	
Gender	Male	193	22(11.4)	0.256
	Female	267	22 (8.2)	
Class level	Standard II - III	185	20(10.8)	0.057
	Standard IV - VI	275	24(8.73)	
School	Ole	214	9(4.2)	0.001*
	Vitongoji	219	29(13.2)	
	Ngomeni	27	6(22.2)	

*P-value of Pearson Chi-square (χ^2) test.

4.2.1 Intensity of urogenital *schistosomiasis* infection among study participants

Majority (86.4%) of infected pupils involved in this study had light intensity. The overall geometric mean of egg per 10ml of urine was 9.15, with no variation by age group, gender, class level and school location (Table 3).

Table 3: Intensity of *S. haematobium* infection stratified by Social demographic characteristics

VARIABLES	CATEGORIES	POSITIVE (N=44)	INFECTION INTENSITY		P-VALUE*
			LIGHT (%)	HEAVY (%)	
Age group	≤ 10	18	15(83.3)	3(16.7)	0.67*
	≥11	26	23(88.5)	3(11.5)	
Gender	Male	22	18(81.8)	4(18.2)	0.380*
	Female	22	20(90.9)	2(9.1)	
Class level	Standard II - III	20	16(80)	4(20)	0.387**
	Standard IV- VI	24	22(91.7)	2(8.3)	
School	Ole	9	9(100)	0(00)	0.19**
	Vitongoji	29	25(86.2)	4(13.8)	
	Ngomeni	6	4(66.7)	2(33.3)	

*P-value of Pearson Chi-square (χ^2) and **Fisher Exact test

4.3 Knowledge on cause, transmission, treatment and prevention of urogenital schistosomiasis.

More than half (65.2%) of the school children who responded on the cause of urogenital schistosomiasis mentioned; snail to be the cause of schistosomiasis infection, while more than one third (31.1%) mentioned worm as a cause of the disease. More than three quarter of the respondents (79.8%) reported that contact with infested water may contribute to transmission of the disease, while (15.4%) of the respondents said walking with barefoot in freshwater contribute to transmission of urogenital Schistosomiasis. Fewer respondents (2.0%) did not know how urogenital schistosomiasis was transmitted

Less than half of the respondents (47.6%) mentioned blood in urine as the main sign/symptoms for urogenital Schistosomiasis and (44.1%) mentioned pain during urination.

Regarding preventive measures, over three quarter of school children (77.2%) mentioned avoiding contact with snail infested water while less than ten percent reported washing hand with

water and soap. With regard to the knowledge on treatment of infection, majority of respondents (85.7%) mentioned use of hospital medicine (Table 4).

Table 4: Knowledge of the school children about urogenital schistosomiasis (N =460)

VARIABLE	CATEGORY	FREQUENCY(n)	(%)
Cause	Worms	143	31.1
	Snail	300	65.2
	Do not know	17	3.7
	Drinking untreated water	10	2.2
Transmission	Contact with infected person	3	0.7
	Walking with barefoot in freshwater	71	15.4
	Contact with an infested water	367	79.8
	Do not know	9	2.0
Sign and symptoms	Blood in urine	219	47.6
	Blood in stool	1	0.2
	Painful urination	203	44.1
	Stomach pain	32	7.0
	Do not know	5	1.1
Preventive method	Avoid contact infested water	355	77.2
	Washing hand with water and soap	17	3.7
	Avoid drinking untreated water	45	9.8
	Do not know	43	9.3
Treatment	Tradition medicine	8	1.7
	Hospital medicine	394	85.7
	Do not know	58	12.6

4.3.1 Level of knowledge about urogenital Schistosomiasis

Based on summation of correct answers, the knowledge score ranged from 1 to 5 points with the mean score points of ± 3.21.More than half (57.8%) of respondent had average level of knowledge about urogenital schistosomiasis (Figure 2).

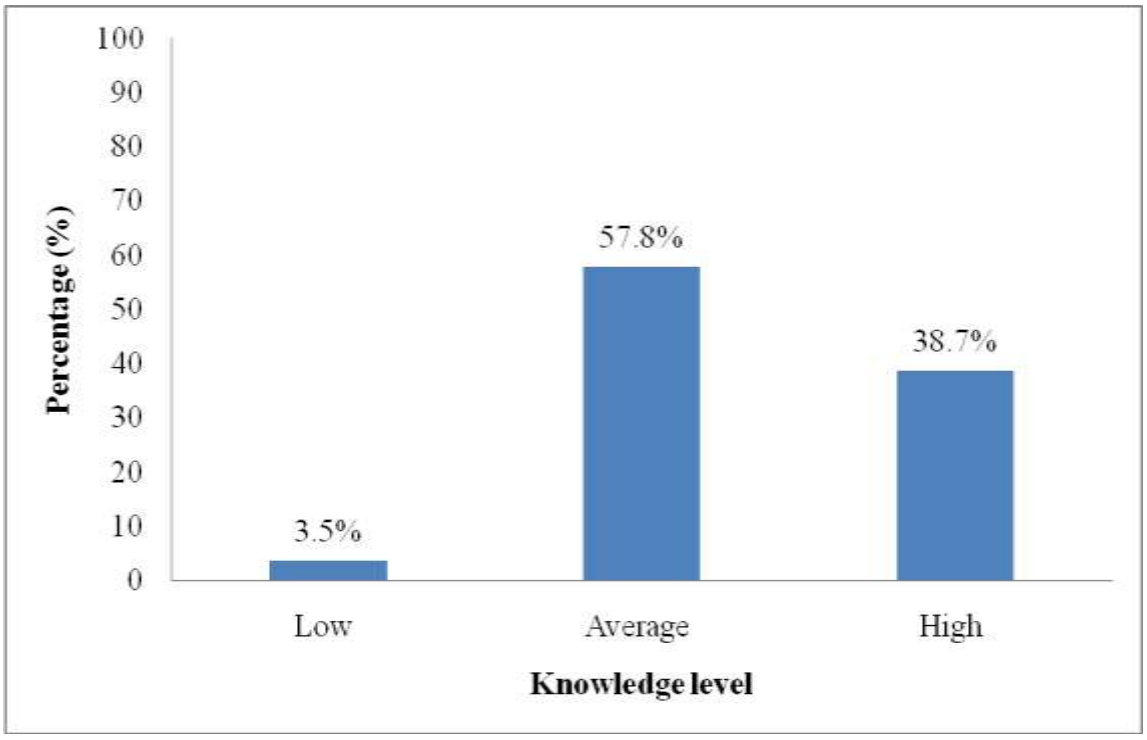


Figure 2: Level of knowledge about urogenital Schistosomiasis among study participants

4.4 Attitude towards Urinary Schistosomiasis transmission and Prevention

The attitude score ranged from 10 to 25 points with the mean score of 20.31 points. Of the 460 surveyed participants, majority 85.4% of them demonstrated good attitude towards urogenital schistosomiasis. Majority (90.22%) believed that bloody in urine is a serious disease that needed treatment, (90.66%) believe that they are at risk of getting urogenital schistosomiasis infection, (88.05%) believe that using toilet always can prevent spread of urogenital schistosomiasis and (89.56%) believe that urination in the stagnant water is a way of enriching the transmission of Schistosomiasis. However, less than half of respondents (44.79%) believed that avoiding swimming, bathing or washing clothes in the stagnant water can prevent the spread of urogenital schistosomiasis (Table 5)

Table 5: Attitudes of school children towards Urinary Schistosomiasis (N = 460)

Characteristics	Participants' response				
	Agree (%)	Strongly agree (%)	Don't know (%)	Disagree (%)	Strongly disagree (%)
Bloody in urine is not a serious disease disappears without treatment	10(2.17)	7(1.52)	28(6.09)	93(20.22)	322(70.00)
School children are not at risk of getting urogenital infection	15 (3.26)	9 (1.96)	19 (4.13)	155 (33.70)	262 (56.96%)
Using toilet always cannot prevent the spread of urogenital schistosomiasis	17(3.70)	16 (3.48)	22(4.78)	208 (45.22)	197 (42.83)
Avoiding swimming, bathing or washing clothes in the water	19 (4.13)	21 (46.74)	20 (4.35)	116 (25.22)	90 (19.57)
Urination in the stagnant water is a way of enriching the transmission	94 (20.43)	318 (69.13)	17 (20)	17 (3.70)	14 (3.04)

4.5 Proportion of pupils who participated in MDA uptake with praziquantel among school children

Majority of school children (91.5%) participated in the last round of MDA treatment cycle 2020, while only a few (8.5%) of school children did not participate in MDA uptake.

4.6 Type of water contact activities among the school children in selected schools

4.6.1 Water contact activities

With regard to water contact activities, more than one third (38.9%) of the school children mentioned to cross the bridge on the way to or from school while less than a quarter (10.8%) of pupils cross the river/stream.

As indicated in Figure 3, water contact activities varied among school children, majority mentioned washing clothes (80%), more than one third reported bathing (40%), while (0.7%) clean legs.

Regarding source of water, majority of respondents reported to use tap water at home (93%) and at school (98.9%)

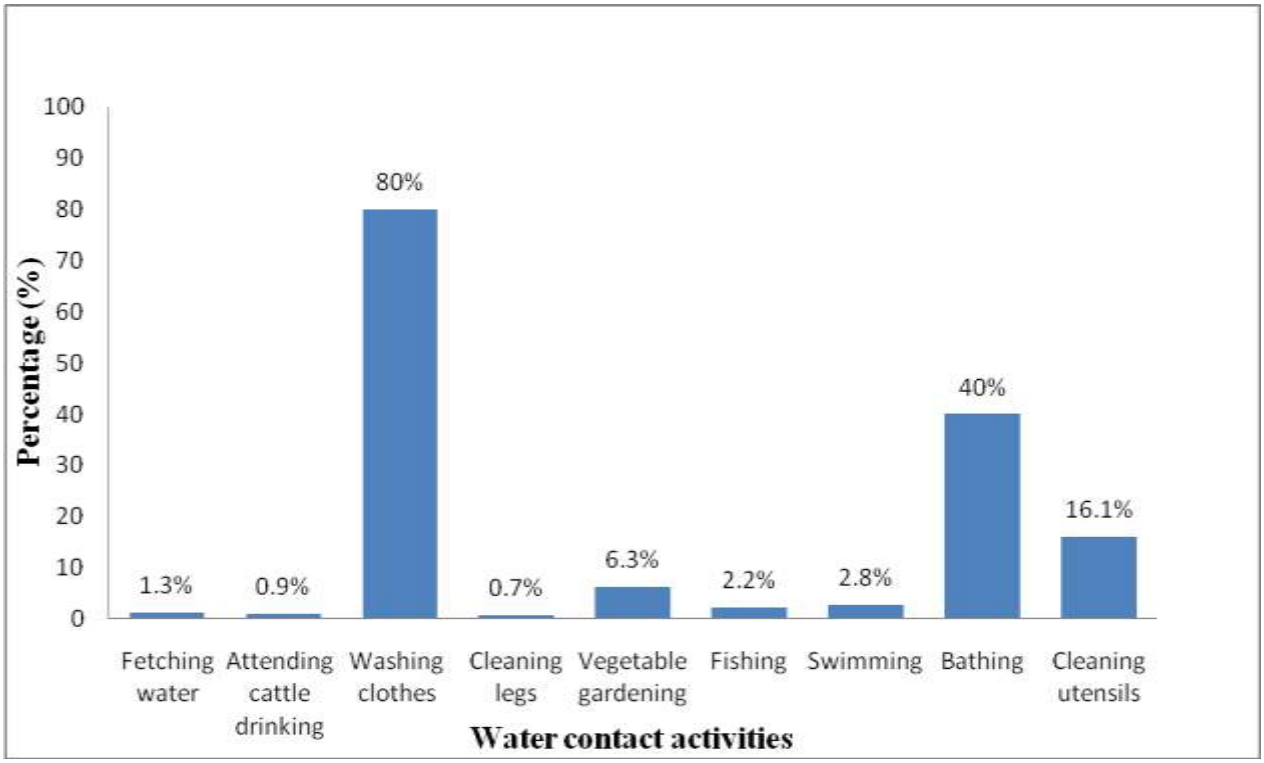


Figure 3: Water contact activities done by pupil on daily basis.



Figure 4: The picture above shows school children observed activities including fishing and washing utensils around water bodies

4.7 Infection status of *Bulinus* snail

Total of 27 *Bulinus* snail the principal intermediate host were collected from pond and stream of Ole, Vitongoji and Ngomeni at the swimming, bathing and clothes washing sites where human conduct activities which may expose them S. *haematobium* infection. None of sites was found to had infected snail following examination by cercarial when subjected to shedding experiment.

4.8 Availability and use of toilet facilities by school children at household level

Regarding availability and use of toilet facility among school children at household level, majority of respondents (80.4%) reported use of household's toilet facility to respond to call of nature but less than quarter of respondent (4.8%) and (14.8%) use neighbor's toilet and bushy area around a river/stream respectively.

4.9 Factors associated with *S. haematobium* infections school children

In bivariate logistic regression analysis, demographic factors (age group, gender and school level); knowledge; attitude; water contact activities (swimming) and places used to respond to call of nature were significantly associated with *S. haematobium* infection (P<0.2).

In multivariate regression analysis, after adjusting for confounders only two variables were found to be significantly associated with infection. Pupils who had good attitude had reduced risk of *S. haematobium* infections compared to those with poor attitude {AOR= 0.004, 95% CI: 0.006 -

0.074, p=0.011}. Also pupils who reported to be swimming had 22 times risk of getting infection {AOR=22.204, 95% CI: 7.487- 65.074, p= 0.001} compared to pupils not swimming (Table 6).

Table 6: Multivariate logistic regression analysis of infection status and risk factors

VARIABLE	CATEGORY	AOR(95% CI)	P-VALUE
School	Ole	1	
	Vitongoji	2.734(0.356-23.528)	0.233
	Ngomeni	4.356(0.036-328.199)	0.549
Knowledge level	High	1	
	Average	0.172(0.100-6.415)	0.732
	Low	0.516(0.070-8.353)	0.325
Attitude	Good attitude	0.04(0.006-0.074)	0.011*
	Poor attitude	1	
Water bodies crossed	River/stream	1	
	Pond	2.315(0.074-23.881)	0.498
	A swamp area	0.734(0.021-26.208)	0.866
	Pool of rain water	0.163 (0.009-2.914)	0.219
	Lagoon	44.823(0.049-40.800)	0.274
	Paddy field	0.444(0.024-8.053)	0.583
	River with bridge	0.137(0.016-1.199)	0.072
	Do not pass	0.001 (0.001)	0.959
Swimming	Yes	22.204(7.487- 65.848)	0.001*
	No	1	
Places used to respond to call of nature	Bush/stream/river	0.241(0.031-5.311)	0.208
	Go Household's	0.014(0.001-1.740)	0.039
	Go Neighbors	1	

*Significant factors with p-value < 0.05, AOR= Adjusted Odds Ratio

CHAPTER FIVE

5.0 DISCUSSION

Despite the implementation of eight rounds of mass drug administration (MDA) with praziquantel to all school-aged children and snail control measures since 2012, there are still hotspot areas with urogenital schistosomiasis prevalence of greater than 10% in Chake-Chake district.

The findings of this study have demonstrated that urinary schistosomiasis is still a public health problem among school pupils as the prevalence was 9.6% of whom 86.4% carry light intensity infections of *S. haematobium.* The findings from the current study indicate that the prevalence was lower compared to that observed in Uwandani and Unguja (11%) (Pennance *et al.*, 2016; Makame, 2017; Ming-zhen *et al.*, 2019), Bahi district (15%) (Chaula & Tarimo, 2014), Um-Asher Area, Khartoum, Sudan (12.9%) (Hajissa et al.,2018), the low prevalence of *S. haematobium* in the present study is most likely attributable to preventive chemotherapy campaign that has been carried out in Chake-Chake district for several rounds (Knopp *et al.*, 2019). However, the prevalence of urogenital schistosomiasis in Chake-Chake was higher (9.6%) compared to average of Zanzibar (3%) (Knopp *et al.*, 2019), Kilosa district (4.96%) (Kavana, 2018). Moreover, was similar to Kenya (9.5%) (Sang *et al.*, 2014). The difference in prevalence might be due to difference in sample sizes, the study areas and sampling technique applied in these studies.

The prevalence reduction was supported in the study conducted in Mbozi district where Praziquantel MDA reduced the prevalence form 36% 2010 to 7.9% (Kabululu, 2013) and also, has been successful in different areas of the world such as Chad (Krauth *et al.*, 2015) and Pemba where praziquantel efficacy for the treatment of urinary schistosomiasis demonstrated that, 7 weeks after initial treatment of *S. haematobium* infected children a 95% cure rate was reported (Guidi *et al.*, 2010).

In this study, males were more affected with urinary schistosomiasis than females. These findings are similar to an earlier study done in Mbozi district where the prevalence in males were higher than that of females (Kabululu, 2013), Nigeria, Ghana and Yemen where same observations were made (Bassiouny*et al.*, 2014). However, the current findings are different from the study done in Cameroon which indicated that females were more affected than male (Ndassi *et al.*, 2019). Variations in gender susceptibility to infection might be attributed to differences in gender roles

and economic activities which may influence exposure to cercarial infested waters. Males are exposed more during fishing and swimming in infested water while females are exposed when washing clothes or utensils near or in water sources infested with cercarial infected snails and fetching water for other domestic use (Ndassi et al., 2019).

The findings in this study indicated that the intensity of *S. haematobium* infection was light in 85.7% of the participants. The Geometric mean was 9.15 Eggs/10ml. WHO recommended that for *S. haematobium* infection would be light intensity and heavy if <50 eggs/10 ml and >50 eggs/10 ml respectively (WHO, 2013).

The findings of the present study indicated that the level of knowledge about urogenital schistosomiasis among pupils was average on the main signs/symptoms, transmission, treatment and preventive methods. The findings show that close to three quarters of the respondents (65.2%) mentioned the snail to be the cause of urogenital schistosomiasis, although close to the truth it was an incorrect idea, the confusion about causes of urogenital schistosomiasis was similar to study in Swaziland (Maseko *et al.*, 2016).

Less than a half of the study participants (47.9%) mentioned blood in urine as the sign/symptom of urogenital schistosomiasis and use of praziquantel drug was mentioned by majority of respondents (85.2%) as treatment of urogenital schistosomiasis, while the study done in North-Western Tanzania mentioned traditional medicine as a treatment of urogenital schistosomiasis (Munisi *et al.*, 2017). More than three quarters (77.2%) mentioned avoiding contact with infested waters with cercaria, as an appropriate measure of preventing the infection, a proportion was higher compared to the study carried out in Dodoma (Kitalile, 2012).

The observed attitude on causes, signs transmission, prevention measures as well as treatment against urinary schistosomiasis among study respondents indicates that behaviour of non swimming or bathing in stagnant water cannot prevent getting infection in the at-risk groups, which should be provided health education campaigns to understand right and wrong attitude such campaigns should enhance pupils' to influence positive practices which will lower re-infection rates of urogenital schistosomiasis.

Findings of the present study show that the proportion of the pupils who participated in MDA uptake was 91.5%, which is in-between the WHO goal for schistosomiasis control that emphasizes a coverage of between 75% and 100% of all schoolchildren at risk of morbidity by

2010, this indicates that after a decade the goal had been close to be achieved(Knopp *et al.*, 2016). However, the findings in the current study were similar to the study conducted in Uwandani (Makame, 2017). The variation might be due to previous experience with MDA activities such as behavioral change intervention and good MDA delivery system (Knopp *et al.*, 2016). This study also reported that some pupils did not participate in the last round of MDA cycle due to various reasons such as: just being afraid to take the drug, sickness during MDA delivery, guardian or parent refusal and those absent from school on the day of delivery and, fear of drug side effects.

Water contact is the risk factor where by groups that are involved in fishing, washing in the water bodies and swimming are highly infected (Kulinkina *et al.*, 2019). The findings of the present study indicated that human water contact activities such as swimming in various permanent and temporary fresh water bodies was significantly associated with transmission. This finding showed that 10.4% of the respondents reported to have had water contact in ponds, streams and temporary water pools, the findings were consistent to the studies previously conducted in Zanzibar (Pennance *et al.*, 2016; Knopp *et al.*, 2019) and in Sudan (Ahmed *et al.*, 2014).

Furthermore, the present study showed that washing clothes, cleaning utensils and swimming were major activities which expose school children to *S. haematobium* infection. This observation was comparable to the report from a study carried out in Swaziland (Maseko *et al.*, 2016).

None of the *Bulinus* snails the principal intermediate hosts collected from the study area were positive for cercarial shedding as demonstrated in other areas where the shedding experiment did not result in any cercaria, like in Kinondoni (Ng'weng'weta and Tarimo, 2017). However, this is different from the study done in Bahi Dodoma which showed that the collected *Bulinus* snail intermediate hosts carried cercariae (Chaula and Tarimo, 2014**).** Though the sampled *Bulinus* snails did not shed cercariae, their presence in the hot-spot is an indication for the potential of transmission, rightly so because *S. haematobium* is still prevalent in 9.6% of the pupils and egg from them can potentially infect the snails and maintain transmission (Ng'weng'weta and Tarimo, 2017).

The findings of the present study indicate that, all studied schools have toilet facilities of which majority of the pupils use without any impediment. Furthermore majority 80.4% of respondents reported to use household toilets, this finding is consistent with studies conducted in Lake

Victoria basin, Rorya District, north-western Tanzania (Munisi *et al.*, 2017;Rollinson *et al.*, 2012). Available data shows that access and use of adequate sanitation available at schools and household catch most schistosoma eggs and prevent miracidia from infecting intermediate host snails. This is due to the fact that eggs in latrines cannot enable schistosome transmission, unless transferred in the water sources with hosts, despite the use of adequate sanitation and may create sufficient risk of exposure to all community members who come into contact with that water later (Aagaard-hansen and Watts, 2008; Stothard *et al.*, 2017). In this study the presence of latrines did not mean proper use as intended whereas some pupils fear using them since they were not well maintained. None use may perpetuate transmission by defecation/urination in water bodies through playing, swimming, bathing and washing clothes in the river or pond which often contribute to contamination of river water with human excreta (Stothard *et al.*, 2017).

Findings of this study demonstrated that attitude on urogenital schistosomiasis was a significant predictor of infection. School children with good attitude prevent pupils' exposure to transmission and they tend to avoid swimming/bathing or washing clothes and urination in stagnant fresh water bodies and this is associated with decreased infection compared to those with poor attitude. Therefore, provision of health education to promote continuous change of behavior is very important. These findings were comparable to a study conducted in Zanzibar (Person *et al.*, 2016). However, it was contradicting with the study conducted in Swaziland (Maseko *et al.*, 2016). Furthermore, the present study showed that swimming among school children was a significant predictor of infection, whereby school children who practice swimming in river or pond have increased chance of getting infection compared to those who were not swimming. These findings are consistent with the studies in Côte d'Ivoire and Sudan (Hajissa *et al.*, 2018; Angora *et al.*, 2019). In fact, swimming in the river or pond exposes individuals to contact with unsafe water, therefore, decreasing swimming practices can lower the prevalence of *S.haematobium* infection among pupils (Stothard *et al.*, 2017).

Study Limitations

The present study was subject to some limitations. Due to shortage of time, urine samples were collected only on a single day for examination of S. *haematobium* hence it may have underestimated the prevalence of infection in the study population as parasite eggs yield fluctuate day to day. Therefore, future population studies may enhance this by collecting urine samples for

at least two consecutive days. Collection of few *Bulinus* snail might be influenced by spraying of molluscicides to the study sites, three months before the study time. Therefore, further studies may enhance this by at least collecting two times at different occasions and improve examination of sampled snails by use of polymerase chain reaction (PCR).

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study confirms that urogenital schistosomiasis is still prevalent among pupils in Chake-Chake district; nevertheless, the overall prevalence was 9.6% slightly lower than that reported in the previous years. Conceivably, persistent *S. haematobium* transmission is influenced by the prevailing risk factors for transmission (presence of infected pupils, water contact activities such as swimming). Presence of *Bulinus* snails' intermediate hosts in sampled water sources indicates potential/likelihood of transmission of schistosomiasis in the study area.

6.2 Recommendation

Behavioural change intervention campaign should be implemented to effect pupils risky behavioural change, such as stop swimming and playing in fresh water pools, in particular to offer continuous health education in schools and community, and if, possible provide swimming facilities which are treated.

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APPENDICES:

Appendix IA: Consent form (English Version)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES (MUHAS)

DIRECTORATE OF RESEARCH AND PUBLICATIONS

ID - NO ……

Consent to participate in this study

Introduction

Greetings! My name is **……**, a student from MUHAS researching with a tittle; **''Factors Influencing Persistence Urogenital Schistosomiasis Among School Children in Chake-Chake District Pemba, Zanzibar - Tanzania, 2020''**.

Purpose of this study

This study is proposed to assess the Factors influencing the persistence urogenital schistosomiasis among school children after wide-scale use of Praziquantel in school-based schistosomiasis morbidity in the elimination program in Chake-Chake District Pemba Island Zanzibar – Tanzania. 'Results from this study will help me to write a thesis that required for a master's degree award as MSc.TDC student for the academic year 2018/2020

Participation

If you accept to participate in this study, you will be required to answer questions and to grant urine for diagnosis.

Benefits and Risks

The information you will provide may help us to know factors influencing urogenital schistosomiasis in the hot spot area, to know the magnitude of the urinary schistosomiasis after six rounds of Praziquantel MDA. Those who will be found infected will be treated accordingly

There is no harm to anyone who will voluntarily participate in the study

Confidentiality

Confidentiality will be assured through secrecy by the use of identification numbers; also only authorized person shall have access to the collected data

Who to contact

If you have any inquiry you may contact me by sending a letter with this address: **……., to MUHAS, P.O BOX 65001 Dar es Salaam**. If you have any questions about your rights as a participant please contact**,** Chairman of the Science and Publications Committee, P.O.BOX 65001.Dar es Salaam.Tel:2150302-6 2152489

Dr Dinah Gasarasi, The supervisor of this study Muhimbili University of Health and Allied Sciences (MUHAS), P.O. Box 65001, Dar es Salaam (Mob. no. +255 715301849)

Agreement part

I, therefore, request you to contribute to this study by feeling the questionnaire and then collect your urine sample

DO YOU AGREE YES: ..... NO: ..... (Put √ for appropriate response)

I have read/listened to the contents in this form. I agree to participate in this study

Participant Signature..... Date.....

Research Assistant Signature..... Date.....

Appendix II B: Informed Consent form (Swahili Version)

CHUO KIKUU CHA SAYANSI ZA TIBA NA AFYA MUHIMBILI

KURUGENZI YA UTAFITI NA MACHAPISHO

Namba ya Utambulisho.....…….

Ridhaa ya kushiriki katika utafiti

Nambaya Fomu ……...

Utambulisho

Habari! Jina languni: **……**, ni mwanafunzi wa Chuo Kikuu Muhimbili nikisomea shahada yauzamili katika fani ya magonjwa ya ukanda wa joto. Ninafanya utafiti kama sehemu ya masomo yangu kuhusu **— Vyanzo Vinavyoathiri kundelea kupatikana kichocho cha mkojo kwa wanafunzi wa shule za msingi wilaya Chake-Chake baada ya kupatiwa dawa kwa vipindi nane"**

Kusudi la utafiti

Utafiti huu unakusudia kufanya tathmini ya vyanzo vinavyopelekea kuendelea kupatikana kichocho cha mkojo baada ya kupatiwa dawa kwa vipindi nane.

Ushiriki

Ukikubali kushiriki katika utafiti huu kwa hiari, utapewa karatasi ya maswali utakayo yajibu pia utapewa kifaa/chombo kwa ajili ya kuweka sampuli ya mkojo.

Faida na hasara

Taarifa zitakazotokana na utafiti huu zitasaidia kufahamu vyanzo sahihi vinavopelekea kuendelea kuwepo kichocho cha mkojo, pia kugundua ukubwa wa tatizo hili la kichocho cha mkojo katika maeneo hot spot baada ya kupatiwa dawa kwa zaidi ya vipindi nane. Wote watakao kutwa na tatizo watatibiwa ipasavyo.

Zoezi hili halina tatizo kwa mshiriki.

Usiri

Usiri utazingatiwa kwa kutotumia majina, washiriki watapewa namba, na niwahusika tu ndio wataweza kuwa na ukaribu na takwimu zitakazokusanywa

Watu wa kuwasiliana nao

Endapo utakuwa na swali lolote kuhusu utafiti huu wasiliana name kwa kutumia anwani ifuatayo; **……, MUHAS, S.L.P 65015 Dar es Salaam**. **Endapo una swali lolote kuhusu haki zako kama mshiriki katika utafiti huu, wasiliana na Mwenyekiti wa Utafiti na Machapisho, P.O.BOX 65001. Dar es Salaam.Tel:2150302-6 2152489.**

Pia unaweza kuwasiliana

Dr. Dinah Gasarasi, (Msimamizi wa utafiti huu) **Chuo Kikuu cha Afya Muhimbili,**

S.L.P 65001, Dar es Salaam Mobile number: (Mob. no. +255 715301849)

Kipengele cha Makubaliano

Baada ya maelezo hapo juu, nakuomba sasa ukubali kushiriki katika utafiti wangu, kwa kujibu maswali na kunipatia sampuli ya mkojo.

Je unakubali kushiriki?

NDIYO: ..... HAPANA: ..... (Weka yavyema√ kwenye sehemu husika)

Mimi nimesoma/nimesomewa na kuyaelewa maelezo yaliyomo katika fomu hii. Ninakubali kushiriki katika utafiti huu

Sahihi ya mshiriki..... Tarehe.....

Sahihi ya mtafiti msaidizi..... Tarehe.....

Appendix II A: Questionnaire (English Version)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

DIRECTORATE OF RESEARCH AND PUBLICATIONS

Primary schoolchildren questionnaire form

Introduction statement:

We are researchers from the Muhimbili University of Health and Allied Sciences, Dar es Salaam. We are carrying out a study titled ***"FACTORS INFLUENCING THE PERSISTENCE OF UROGENITAL SCHISTOSOMIASIS AMONG SCHOOL CHILDREN IN CHAKE-CHAKE DISTRICT ZANZIBAR - TANZANIA".***

You are requested to participate in this study. Your participation will be kept confidential the responses you provide will not be linked to you because we will use numbers and not names.

The results of this study will be used by the School Health Program and the Ministry of Health for the improvement of Schistosomiasis control in School children.

Instructions to Interviewer; Read each question to the interviewee and the relevant responses then wait for the answer. Attempt all questions by putting tick (√) in front of your correct answer and Circle all the mentioned answers for multiple responses.

Identification

Serial No…….

Name of Interviewer ……....

Date of interview ……..

I. Social - demographic characteristics of the student

1. Name of school 1.1 Ole ☐ 1.2 Vitongoji ☐ 1.3 Ngomeni ☐
2. Class 2.2. II ☐ 2.3.III ☐ 2.4.IV ☐ 2.5. V ☐ 2.6. VI ☐
3. Age of student……
4. Gender of student (4.1) Male ☐ (4.2) Female ☐

II. Awareness and knowledge of urogenital schistosomiasis

5. Have you ever heard about urogenital schistosomiasis?
   (5.1) Yes ☐
   (5.2) No ☐
   IF YES GO to question 6 IF NO GO to question 7
6. If yes, where did you get the information about urogenital schistosomiasis urinary schistosomiasis?
   (6.1) School ☐
   (6.2) Hospital/Health facilities ☐
   (6.3) News media (radio, television) ☐
   (6.4) Other options specify…….
7. What is the cause of urogenital schistosomiasis?
   (7.1) Worms ☐
   (7.2) Mosquito ☐
   (7.3) I don't know ☐
   (7.4) Other options specify……..
8. Which of the following ways may lead to getting urogenital schistosomiasis?
   (8.1) Drinking untreated water ☐
   (8.2) Contact with an infected person ☐
   (8.3) Walking barefoot in freshwater ☐
   (8.4) Contact with an infested water ☐
   (8.5) I don't know ☐
9. Which of the following are signs and symptoms of urogenital schistosomiasis?
   (9.1) Blood in urine ☐
   (9.2) Blood in stool ☐

(9.3) Painful urination ☐

(9.4) Stomach pain ☐

(9.5) Other options specify…….

10. How can you protect yourself from getting urogenital schistosomiasis?

(10.1) Avoid contact infested water ☐

(10.2) Avoid drinking untreated water ☐

(10.3) Wash hand with water and soap ☐

(10.4) I don't know ☐

11. Which way can be used to treat urogenital schistosomiasis?

(11.1) Traditional medicine ☐

(11.2) Hospital medicine ☐

(11.3) I don't know ☐

(11.4) Other options specify……

III. Attitude toward urogenital schistosomiasis and treatment

12. Attitude questions(I am going to read several statements regarding urinary schistosomiasis , please rate the degree which you are agree or disagree with each)

CODE	QUESTION	AGREE	STRONG AGREE	I DON'T KNOW	DISAGREE	STRONG DISAGREE
A12.1	Bloody in urine is not a serious disease since it disappears without treatment					
A12.2	School children are not at risk of getting urogenital schistosomiasis infection					
A12.3	Using toilet always cannot prevent the spread of urogenital schistosomiasis					

A12.4	Avoiding swimming, bathing or washing clothes in the stagnant water cannot prevent the spread of urogenital schistosomiasis					
A12.5	Urination in the stagnant water is a way of enriching the transmission of schistosomiasis					

IV. Students Participation in Mass Drug Administration (MDA) uptake with Praziquantel.

13. Are you aware of the School Health Treatment program conducted at school every year?

(13.1) Yes, I know about it ☐

(13.2) No, I am not aware of it ☐

IF YES GO to **question** 15 IF NO GO to **question 16**

14. How did you know about it?

(14.1) We are taught about the program in health education

(14.2) The schools organize meetings with the parents to inform about the program ☐

(14.3) Information is given on the radio about the school health program ☐

(14.4) Information is given on TV about the school health Program ☐

(14.5)Other sources of information specify……

15. Did you participate on MDA treatment cycles in this year?

(15.1) Yes, I am participated ☐

(15.2) No I not participated ☐

CONTINUE QUESTION 17

16. If you are not aware of the school health Treatment program what are the reasons?

(16.1) I was away when the program was introduced ☐

(16.2) Parents have not told me about it ☐

(16.3)I was often absent from school due to sickness, I missed the information ☐

(16.4) I am afraid of the medicines so I just do not pay attention ☐

(16.5) Other options specify…….

17. If you have never participated in the School health treatment program what were the reasons?

(17.1) Afraid of taking the drug

(17.2) Parents/guardian prohibited me

(17.3) Drug cause skin itching

(17.4) Drug cause stomach upset

(17.5) Drug cause infertility

(17.6) Do not pass any water

V. Assessment of water contact patterns (the answers to these questions will be complemented by observations of student water contact activates)

18. In the route you take to go to school are there any water bodies which you have to cross?

(18.1) I cross a river/stream every day to and from school

(18.2) I cross a pond every day to and from school

(18.3) I go through a swamp area to and from school

(18.4) I go through temporary water pools when it rains

(18.5) I go through a lagoon to and from school

(18.6) I go through a paddy field every day to and from school

(19.7) There is a river but we go over the bridge

(19.8)Other options specify……..

19. Are there any activities that bring you into contact with open water sources?(Circle all the answers the respondent mentions)

(19.1) Fetching water

(19.2) Taking cattle for drinking water

(19.3) Washing clothes in the river

(19.4) Cleaning my legs while on the way to school

(19.5) Vegetable gardening

(19.6) Fishing

(19.7) swimming

(19.8) Bathing

(19s.9) Other options specify…….

20. How often do you contact water sources?(Write how many times he/she gets contact with water to all the mentioned activities in the table below

S/N	WATER CONTACT ACTIVITIES	CONTACT PER DAY
20.1	Drawing water for domestic use	
20.2	Taking cattle for drinking water	
20.3	Washing clothes in the river	
20.4	Cleaning my legs while on the way to school	
20.5	Vegetable gardening	
20.6	Fishing	
20.7	Swimming	
20.8	Bathing	
20.9	Other options specify……	

21. What are the sources of drinking water and other purposes such as (washing clothes, bathing, cooking, and cleaning? for members of your household? (Circle all the answers mentioned by the participant)
    (21.1) Tape water
    (21.2) Deep wells
    (21.3) River water
    (21.4) Shallow wells
    (21.5) Stream water
    (21.6) Other options specify…….
22. What is the source of water used by your school for other purposes such as (toilet cleaning, gardening?) (Circle all the mentioned answers)
    (22.1) Tape water
    (22.2) Deep wells
    (22.3) River water

(22.4) Stream water

(22.5) Other options specify……..

23. If you obtain water for family/school use from the river/ stream or pond how is it done?

(23.1)Astand is in place to facilitate drawing water without getting into the river/stream or pond

(23.2) Steps are provided to get close to the water for drawing without standing into the river /stream/pond

(23.3)A stand into the river/stream to draw the water

(23.4) Other options specify…….

24. How are the water sources (Rivers/Streams) for drinking and domestic use maintained in your community?

(24.1) There is a regular clearing of vegetation around the water source

(24.2)There is a regular clearing of vegetation IN and AROUND the water source

(24.3)There is regular straitening of the edges of the river/ streams

(24.4)Others options specify……..

VI. Assessment of availability and use of the toilet facility.

25. If you had a need to respond to the call of nature and there is no toilet facility around what are you likely to do?

(25.1) Go to the nearby bushes

(25.2) Go the bushes nearby a pond

(25.3) Go to the bushes nearby a river/ stream

(25.4) Find a secure bushy area further from the river/ stream

(25.5) Other Options Specify……

26. While at home, what would be the most likely place for responding to the call of nature?

(26.1) Go to the Household's toilet facility

(26.2) Go to a bushy area around a river/stream

(26.3) Go to a Neighbors toilet facility

(26.4) Other options specify……

Thanks

Appendix II B: Questionnaire (Swahili Version)

CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI MUHIMBILI

KURUGENZI YA UTAFITI NA MACHAPISHO

Fomu ya dodoso la wanafunzi shule za msingi

Utambulisho:

Sisi watafiti kutoka Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili, Dar es salaam. Ninafanya utafiti wenye lengo la kuangalia*"**SABABU ZINAZOPELEKEA KUENDELEA KUWEPO KWA UGONJWA WA KICHOCHO KWA WANAFUNZI WA SHULE ZA MSINGI KATIKA WILAYA YA CHAKE-CHAKE ZANZIBAR TANZANIA".***

Unaombwa kushiriki katika utafiti huu. Ushiriki wako utakua ni siri na majibu utayotoa hayatounganishwa na wewe kwa sababu nitatumia nambari badala ya jina.

Matokeo ya utafiti huu za afya za shule na wizara ya Afya katika kuboresha udhibiti wa kichocho kwa wanafunzi wa shule za msingi.

Muuongozo kwa anaehoji dodoso; Soma kila suali kwa anaehojiwa na jibu husika kasha subiria jibu. Weka alama ya vema (√) mbele ya jibu sahihi ulochagua na zungushia kwa masuali yenye jibu zaidi ya moja.

Utambulisho

Namba ya mshiriki…….……...

Jina la mhojaji ……..…….....

Tarehe ya mahojiano ……..

I. Taarifa za Kidemografia kijamii ya mwanafunzi na mzazi/mlezi

1. Jina la shule 1.1 Ole ☐ 1.2 Vitongoji ☐ 1.3 Ngomeni ☐
2. Darasa 2.2.II ☐ 2.3.III ☐ 2.4. IV ☐ 2.5.V ☐ 2.6. VI ☐
3. Umri wa mwanafunzi……
4. Jinsia ya mwanafunzi(4.1) Mwanaume ☐ (4.2) Mwanamke ☐

II. Ufahamu na uelewa kuhusu kichocho cha mkojo

5. Ulishawahi kusikia kuhusu kichocho cha mkojo?
   (5.1) Ndio ☐
   (5.2) Hapana ☐
   Kama NDIYO suali **6** Kama hapanasuali **7**
6. Kama ndio, ulipata wapi taarifa kuhusu kichocho cha mkojo?
   (6.1) Shuleni ☐
   (6.2) Hospital/ Klinikiya Afya ☐
   (6.3) Vyombo vya habari (redio, televisheni) ☐
   (6.4) Sijui ☐
   (6.5) Nyenginezo……..
7. Kichocho cha mkojo kinasababishwa na nini?
   (7.1) Minyoo ☐
   (7.2) Mmbu ☐
   (7.3) Konokono ☐
   (7.4) Sijui ☐
   (7.5) Nyenginezo……
8. Mtu anapata kichocho cha mkojo kupitia njia ipi?
   (8.1) Kunywa maji machafu ☐
   (8.2) Kugusa mtu mwenye kichocho ☐
   (8.3) Kutembea peku/bila kuvaa viatu ☐
   (8.4) Kugusa maji yenye mambukizi ☐
   (8.5) Sijui ☐

9. Dalili kuu ya kichocho cha mkojo ni ipi?
   (9.1) Kukojoa damu
   (9.2) Kuharisha damu
   (9.3) Maumivu wakati wa kukojoa
   (9.4) Maumivu ya tumbo
   (9.5) Sijui
10. Unaweza kujikinga na kichocho kupitia njia ipi?
   (10.1) Kuacha kugusa maji yenye maambukizi
   (10.2) Kunawa mikono kwa maji safi na sabuni
   (10.3) Kuacha kuywa maji machafu
   (10.4) Sijui
11. Njia ipi inatumika kutibu kichocho cha mkojo?
   (11.1) Dawa za asili
   (11.2) Dawa za hospital
   (11.3) Sijui
   (11.4) Nyenginezo…….

III. Muelekeo wa kichocho cha mkojo na matibabu husika

12. Muelekeo (Nitasoma maelezo tofauti kuhusu kichocho cha mkojo utakubaliana na maelezo utayosomewa au kukataa)

MSIMBO	SUALI	KUKUBALI	KUKUBALI ZAIDI	SIJUI	KUTOKUBALIANA	KUTOKUBALIANA ZAIDI
A12.1	Kukojoa damu hupona bila matibabu (sio ugonjwa wa hatari zaidi)					

A12.2	Watoto wa shule hawapo hatarini kupata kichocho cha mkojo					
A12.3	Kutumia choo kujisaidia haja ndogo hakuwezi kuzuia kuenea kwa kichocho					
A12.4	Kuacha kuogelea, kuoga au kufua nguo kwenye maji ya yaliyotuama hakuwezi kuzuia kuenea kwa kichocho cha mkojo					
A12.5	Kukojoa katika maji yaliyotuama kunapelekea kupata kwa kichocho cha mkojo					

IV. Ushiriki wa mwanafuzi katika mpango wa utolewaji wa dawa za kichocho (MDA) ya Praziquantel

13. Je, unaufahamu wa mpango wa matibabu unaofanyika shuleni kila mwaka?

(14.1) Ndio, ninaufahamu ☐

(14.2) Hapana, sina ufahamu kuhusu ☐

Kama Ndio nenda suali la 15 Kama Hapana nenda suali 16

14. Ulijua kupitia njia gani?

(14.1) Tunasoma katika mpango wa elimu ya afya ☐

(14.2) Shule hupanga mkutano kwa kuwashirikisha walezi ili kuwaelezea mpango wa afya ☐

(14.3) Habari hutolewa kupitia redio ☐

(14.4) Habari hutolewa kupitia runinga ☐

(14.5)**Nyengiezo**……..

15. Ulishiriki katika matibabu ya kichocho cha mkojo mwaka huu?

(15.1)Ndio, nimeshiriki ☐

(15.2) hapana sikushiriki ☐

16. Kama hauna ufahamu mpango wa matibabu shuleni, Je ni kwa sababu gani?

(16.1) Sikuwepo wakati mpango ulipozu ngumzwa ☐

(16.2) Mzazi hakunipa habari

(16.3) Sikuepo shuleni nilikua naugua, habari zilipo tolewa

(16.4) Naogopa kutumia dawa hua sitoi uangalifu

(16.5)**Nyinginezo……..**

17. Kama, hukuwahi kushiriki kabisa katika mpango wa matibabu shuleni, Je ni kwa sababu gani?

(17.1) Kuogopa kunywa dawa

(17.2) Mzazi/mlezi alikataa

(17.3) Dawa inasababisha muwasho

(17.4) Mvurugiko watumbo

(17.5)**Nyinginezo……..**

V. Tathmini mwenendo wa ugusanaji wa maji. (jawabu itakamilika kwa kuangalia kazi zinazopelekea mwanafunzi kugusa na maji)

18. Ukiwa njiani kuelekea au kutoka shuleni, ni chanzo gani cha maji unachovuka?

(18.1) Ninavuka mto/chemchem kila siku niendapo au kurudi shuleni

(18.2) Ninavuka bwawa kila siku niendapo au kurudi shuleni

(18.3) Naenda kwenye mkusanyiko wa maji ninapoenda au kurudi shuleni

(18.4) Ninapita kwenye maji yanayotowama kwa muda inyeshapo mvua

(18.5) Ninapita katika bwawa ninapoenda au kurudi shuleni

(18.6)Ninapita katika mashamba yaliyotuama maji ninapoenda au kurudi shuleni

(18.7) Upo mto ninapita katika daraja

(18.8) **Nyinginezo…….**

19. Je, ni kazi zipi zinazokupelekea kukutana na mkusanyiko wa maji katika shughuli zako za kilasiku? Zungumshia majibu yote atayochagua.

(19.1) Kutafuta maji

(19.2) Kunywesha maji wanyama

(19.3) Kufua nguo

(19.4) Kusafisha miguu wakati wakuenda shuleni

(19.5) Kumwagilia bustani

(19.6) Uvuvi

(19.7) Kuogelea

(19.8) Kuoga

(19.9) Nyinginezo……..

20. Je, ni kwakiasi gani unagusana na maji? (**Andikani mara ngapi mme/mke anagusana na maji, na jaza majibu yote atayochagua katika jadweli hapo chini)**

S/N	KAZI UKUSANAZO NA MAJI	KUGUSANA KWA SIKU
20.1	Kutafuta maji	
20.2	Kunywesha maji wanyama	
20.3	Kufua nguo	
20.4	Kusafisha miguu wakati wakuenda shuleni	
20.5	Kumwagilia bustani	
20.6	Uvuvi	
20.7	Kuogelea	
20.8	Kuoga	
20.9	**Nyinginezo**……..	

21. Ni kipichanzocha majiyakunywanamatumzimenginekama vile (kupikia, kuoshanguo, kuogea, nausafi?) katika kaya yako? (**Zungumshiamajibu yote atayochagua)**

(21.1) Maji yabomba

(21.2) Maji yavisimavirefu

(21.3) Maji yamto

(21.4) Maji yavisimavifupi

(21.5) Chem Chem

(21.6) **Nyinginezo**…….

22. Je, ni kipi chanzo cha maji katika shule yako kwa ajili ya (kusafisha choo kumwagilia bustani?)(**Zungumshia majibu yote atayochagua)**

(22.1) Maji ya bomba

(22.2) Maji ya mto

(22.3) Maji ya visima vifupi

(22.4) Chem Chem

(22.5) **Nyinginezo**…….

23. Ikiwa unahitaji maji kwa matumzi ya kaya/shule kutoka vyanzo kama mto/chem chem au bwawa unayachota vipi?

(23.1) Ninachota nikiwa katika eneohusika bila kugusa maji katika ziwa/chem chem au bwawa ☐

(23.2) Nina yakaribia maji wakati wa kuchota bila kusimama katika ziwa/chem chem au bwawa ☐

(23.3)Ninasimama katika mto/chem chem wakati wa kuchota maji ☐

(23.4)**Nyinginezo……**

24. Je, ninamna gani vyanzo vya maji (mto/chem chem) vinaimarishwa kwa matumizi ya kunywa na mengeneyo katika jamii yako?

(24.1) Kawaida kusafisha majani katika vyanzo vya maji ☐

(24.2) Kuondoa majani nje na ndani ya vyanzo vya maji ☐

(24.3) Kusafisha pembezoni mwa mto/chem chem ☐

(24.4)**Nyinginezo**…….

VI. Tathmini ya uwepo na matumizi ya choo.

25. Je, kama umehisi kujisaidia na hamna choo karibu unafanyeje?

(25.1) Huenda kwenye vichaka vilivyo karibu ☐

(25.2) Huenda karibu na bwawa ☐

(25.3) Huenda kwenye vichaka vilivyo karibu na mto ☐

(25.4) Hutafuta sehemu iliyombali na mto/chem chem ☐

(25.5)**Nyinginezo**……

26. Unapokuanyumbani, sehemuipihupendeleakujisaidia?

(26.1) Choo cha nyumbani ☐

(26.2) Huenda katika vichaka vilivyo pembezoni mwa mto ☐

(26.3) Huenda katika choo cha jirani ☐

(26.4) **Nyinginezo**……

Appendix II C: Availability and use of the toilet facility observation checklist

School identification number: ☐

Name of school ……

1. The school has a toilet facility? **(Write the number corresponding area)**
   (1.1) Yes ☐
   (1.2) No ☐
2. If present, type of toilet facility do members of the school usually use?
   (2.1) Pit latrine with slab (not washable) ☐
   (2.2) Flush to a piped sewer system ☐
   (2.3) Flush to a septic tank ☐
   (2.4) Flush to a pit latrine ☐
   (2.5) Ventilated improved pit latrine ☐
   (2.6) Pit latrine with slab (washable) ☐
   (2.7) Pit latrine without slab/open pit ☐
   (2.8) Bucket latrine ☐
3. The school has separate toilet facility for the following groups?
   (3.1) Females and Males students ☐
   (3.2) Students and teachers ☐
   (3.3) Female and Male teachers ☐
   (3.4) 2 only ☐
4. The main source of water does the school use for other purposes such as cleaning?
   (4.1) Tape water ☐
   (4.2) Deep wells ☐
   (4.3) River water ☐
   (4.4) Shallow wells ☐
   ☐

(4.5) Stream water

5. The cleaning materials present in the toilet?
   (5.1) Yes
   (5.2) No
6. If cleaning materials present, type do toilet facilities have?
   (6.1) Bucket of Water
   (6.2) Mopes
   (6.3) Toilet brush
   (6.4) Trash can
   (6.5) Hand soap
7. **Observe students for two hours daily for one week to establish the level of utilization of the toilet facilities (record the observation)**

No. of days	**No of students use toilet facility/2hrs**	**No. of students Attended school**
(7.1) Day 1		
(7.2) Day 2		
(7.3) Day 3		
(7.4) Day 4		
(7.5) Day 5		

Appendix II D: Snail examination form

Snail identification number: ☐

Name of the water source……

No. of snail collected: ……..

Date of shedding (dd/mm/yy)	Time of shedding (morning/evening)	Snail infection status		Name of Cercariae Collector
		Infected	Not infected	

Appendix II E: urine analysis form

Personal Data

ID Number……. The school (or village), Date……/……. /……..

Name …… Age……years……. Sex M…. F…

<table>
<tr><td colspan="2">A. Urine visual examination</td><td colspan="4">Present</td></tr>
<tr><td colspan="2">Visible hematuria</td><td>YES</td><td colspan="3">NO</td></tr>
<tr><td rowspan="2">B. Urine examination by a microscope</td><td rowspan="2">Eggs/10mls of urine</td><td colspan="2">Heavy intensity threshold</td><td colspan="2">Heavy intensity infection</td></tr>
<tr><td>YES</td><td>NO</td><td>YES</td><td>NO</td></tr>
</table>

Appendix III: Ethical clearance letter

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR OF RESEARCH AND PUBLICATIONS

P.O. Box 65001
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Ref. No.DA.282/298/01.C/ Date: 10/08/2020

MUHAS-REC-08-2020-336
Juma H. Khamis
Shool of Public Health and Social Sciences
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: FACTORS INFLUENCING PERSISTENCE OF UROGENITAL SCHISTOSOMIASIS AMONG SCHOOL CHILDREN IN CHAKE-CHAKE DISTRICT ZANZIBAR - TANZANIA

Reference is made to the above heading.

I am pleased to inform you that the Chairman has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 10/08/2020
EXPIRATION DATE OF APPROVAL: 09/08/2021

STUDY DESCRIPTION:
Purpose:
" The purpose of this descriptive school-based cross-sectional study is to assess the factors influencing the persistence of urogenital schistosomiasis among school children in Chake-Chake District"

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided:
https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2026.pdf and in the MUHAS archives.

Appendix IV: Permission letter from Zanzibar

REVOLUTIONARY GOVERNMENT OF ZANZIBAR

SECRETARY
ZANZIBAR RESEARCH COMMITTEE
P. O Box 239
Tel: 2230806
FAX: 2233788



RESEARCH/FILMING PERMIT
(This Permit is only Applicable in Zanzibar for a duration specified)

SECTION

Name:	Juma H. Khamis
Sex	Male
Date and Place of Birth	12/01/1977
Nationality:	Tanzanian
Passport Number:	-
Date and Place of Issue	-
Date of arrival in Zanzibar	-
Expected date of departure	-
Duration of study	Two Month (2)
Research Tittles	Factors Influencing Persistence of Urogenital Schistosomiasis Among School Children in Chake – Chake District Zanzibar - Tanzania

Full address of Sponsor P.O. Box 236, Vuga

Name of the authorizing officer: Abdalla M. Denge
Signature and seal:
Institution: Office of Chief Government Statistician
Address: P. O Box 2321
Zanzibar

Date: 12/08/2020

Appendix V: Permission letter from 2nd Vice-president Zanzibar

SERIKALI YA MAPINDUZI YA ZANZIBAR
OFISI YA MAKAMU WA PILI WA RAIS

P. O. Box 239
Vuga Street
Zanzibar-Tanzania

Tel. 024 22 30808
Fax. 024 22 30808
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OMPR/M.95/C.6/2/VOL.VIII/16 12/08/2020

MHESHIMIWA,
MKUU WA WILAYA,
WILAYA YA CHAKECHAKE,
PEMBA.

KUH: RUHUSA YA KUFANYA UTAFITI

Kwa heshima, naomba uhusike na mada ya hapo juu.

Serikali ya Mapinduzi ya Zanzibar imemruhusu **Ndg. Juma H. Khamis** mtafiti Mwanafunzi kutoka **Chuo Kikuu cha Sayansi za Afya na Tiba Shirikishi Muhimbili** ambae anasomea Shahada ya Uzamili katika fani ya **Sayansi ya Kudhibiti maradhi ya Kitropiki** kufanya utafiti katika mada inayohusiana na **"Factors influencing persistence of urogenital schistosomiasis among school children in Chake – Chake District Zanzibar"**. Utafiti huo utafanyika katika maeneo ya Chakechake, Vitongoji, Ngomeni kuanzia tarehe **12/08/2020** mpaka **12/10/2020.** Tunaomba asaidiwe ili aweze kukamilisha utafiti huo.

Kwa nakala ya barua hii mara baada ya kumaliza utafiti, mtafiti anatakiwa kuwasilisha nakala (copy) 3 za ripoti ya utafiti huo Ofisi ya Makamu wa Pili wa Rais- Zanzibar.

Naomba kuambatanisha na kivuli cha kibali cha kufanyia utafiti.

Wako mtiifu,

ABDALLAH H. MITAWI

ABDALLAH H. MITAWI,
/KATIBU MKUU,
OFISI YA MAKAMU WA PILI WA RAIS,
ZANZIBAR.

NAKALA: Ndg. Juma H. Khamis.