RISK FACTORS FOR SCHISTOSOMA HEMATOBIUM IN NORTHERN RURAL VILLAGES IN UNGUJA ISLAND, ZANZIBAR.

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RISK FACTORS FOR *SCHISTOSOMA HAEMATOBIUM* IN NORTHERN RURAL VILLAGES IN UNGUJA ISLAND, IN ZANZIBAR.

By

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A dissertation submitted in partial fulfillment of the requirements for the degree of Master of Science in Tropical Disease Control of the Muhimbili University of Health and Allied Sciences

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CERTIFICATION

The undersigned certifies that he has read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled "**Risk factors for schistosomiasis in northern rural villages in Unguja island, Zanzibar"**." in (Partial) fulfillment of the requirements for the degree of Master of Science in Tropical Diseases Control of the Muhimbili University of Health and Allied Sciences.

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DEDICATION

This work is dedicated to my beloved mother Jokha Ali Simba and my late father Mohamed Mbarouk Kombo for their warm and lovely parenthood they gave me during my childhood. I also thanks sisters and brothers; Salha, Aisha, Zulekha, Ally, Aboud and Suleiman for their honest support.

ABSTRACT

Back ground

Schistosomiasis continues to be a scourge of the health of people living in sub-Saharan Africa with a yearly ascribed death rate of over 200,000. In Zanzibar, *Schistosoma haematobium* is a public health problem but the level of its prevalence varies from one area to another. In endemic areas, the prevalence and intensity of schistosomiasis is usually higher in children than in adults, giving rise to typically convex age-infection profiles. Recently, most schistosomiasis based research in Zanzibar has focused on parasite infections, transmissions and control strategies and very few studies have reported on the risk factors for *Schistosoma haematobium* in the islands. On the other hand studies on the health effects of schistosomiasis have been carried out particularly to school age children. Therefore, there is need for updated information on the extent of disease burden and factors associated with infection in the Island, so as to simplify effective prevention and control programme.

Main Objective of the study

To examine associations of schistosomiasis infections with behavioral, soci-economic and environmental risk factors among people of northern rural villages at Unguja Island in Zanzibar.

Methodology

This study was conducted in six (6) villages between March and June 2012 to represent northern rural villages in Unguja Island where schistosomiasis is endemic. The study design was a cross sectional study in which an unstructured questionnaire was used to produce the data. Urine samples were collected and tested by using haemastix so as to detect blood and then all urine samples were examined for *Schistosoma haematobium* ova using filtration method. The multi stages sampling procedure was deployed to select participants during this study. The sample size was 438. Data were entered, processed and analyzed by using SPSS 13.0. Based on the low prevalence encountered in this study we have failed to generate

Multivariate logistic regression analyses of the relationship between *Schistosoma haemat*obium with available risk factors.

Result

About 438 people of whom (211, 48.2%) males and 227, 51.8% females), were registered with a mean age of 21.19 and (S.D.) of 13.31 years and a median of 17 years. All subjects submitted urine sample and all were included in the data analysis. The age of the participants varied from (children between 6 to 15 years old), this is due to the fact that, School children, aged around 6 and 15 years have the highest infection rates as well as the highest worm burden, which contribute greatly to contamination of the environment with infective stages of the parasites (WHO, 1995) and adults aged between 16 to 70 years old.

Most participants reported having completed either primary (*n* = 210, 48%) or secondary (*n*= 112, 25.6%) level education. In general, (n= 100 22.8%) individuals were with no formal education, mostly in the age of 7–55 years. Most common occupations were students (*n* = 183, 41.78%) or farmers (*n* = 157, 35.9%), only 1.6% of the participants were government employees. About 85% were from family with income less than Tshs. 100,000/= per month. *Schistosoma haematobium* eggs were found in 31 (7.1%) individuals. Infection was higher in males compared with females (9.0% versus 5.3%) however this difference was not statistically significant, Chi-*square* = 2.2989 and *P value* = 0.129. Across age intervals, infection was higher between 7-17 years at 67.7% compared to the 18 – 35 years which was 29.0% and for the 36-55 years and over the prevalence was 3.2%. This showed that, prevalence decreased as age was increasing.

Conclusion

The findings from this study present an important update on the position of infection in this part of Tanzania and it will guide the policy makers to design extra reasonable, ample and integrated schistosomiasis control programme in Zanzibar.

ABBREVIATIONS

MDA - Mass Drug Administration

PZQ - Praziquantel

ALB - Albendazole

NTD - Neglected Tropical Diseases.

WHO - World Health Organization

TMC - Temeke Municipal Council

DEFINITION OF TERMS

- **Irrigation** - The artificial application of water to land to assist in the production of crops
- **Sanitation** - The state of being clean and conducive to health
- **Swimming** - Move the body through the water by using arms and legs.
- **Toilet** A sanitation fixture used primarily for the disposal of human excrement and urine.
- ***Shehia*** - A division of district or town, as for administrative or political purposes.
- **Sheha** – Leader of a *Shehia*

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

Schistosomiasis is a parasitic disease caused by parasitic worms known as schistosomes. It is also known as bilharzia. These worms have a complicated life cycle that requires both humans and snails for continuous transmission. Schistosomiasis is common among the peoplewho live in poverty areas in the developing world particularly in sub-Saharan Africa. Schistosomiasis is estimated to infect 200 million people in 74-76 countries (Oniya *et al*., 2006: Morenikeji, 2009) of whom 20 million individuals suffer severe consequences of the disease.

The disease also accounts for 20,000 annual deaths (Oniya *et al*., 2006). High and repeated exposure to parasite infection is a result of multiple and inter-related risk factors that include: poverty, exposure to contaminated freshwater bodies, poor hygiene practices, basic housing conditions, limited health education, inadequate access to health services and lack of other essential services such as clean water and sanitation (de Silva *et al*., 2003) ;(King, 2010) , and (Jex *et al.*, 2011).

The problem of schistosomiasis and soil-transmitted helminths in Tanzania has been known since colonial era. The results of a recent national survey which was done prior to commencing school de-worming exercise, shows that the risk prevalence of *S. haematobium* was found to range between 3.9% and 53.5%. Another important study is a joint study between Tanzania and Ghana prior to the introduction of the school-based deworming program which revealed that the most intense worm infections and related illnesses occur at school age children (Partnership for Child Development, 1999).

Urinary schistosomiasis caused by *Schistosoma haematobium* is a disease of public health importance in Zanzibar islands. Study done in Zanzibar by Souse-Figueiredo *et al*. (2009) showing the prevalence of urinary schistosomiasis to be 43.1% among school-children and the infection was found to be significantly associated with gender, with boys being twice as likely to be infected as girls.

The finding concluded that transmission of schistosomiasis is still exist and that the age group which common affected are the primary school children with which boys are more affected than the girls. The aim of the study described here was to examine associations of schistosomiasis infections with behavioral, demographic, economic, environmental and social risk factors among people of northern rural villages at Unguja Island in Zanzibar. Additionally, the prevalence of schistosomiasis infections among the people of northern rural villages in Unguja island were also determined..

Moreover, an improved understanding of the risk factors for schistosomiasis in northern rural villages in Unguja, a detailed assessment of its extent, and a better knowledge of health effects can provide more accurate estimations of disease burden and can direct us to explore new, combined and integrated control strategies for specific epidemiological settings.

1.1 STATEMENT OF THE PROBLEM

In Zanzibar schistosomiasis is more geographically focalized than other helminthes infections such as soil - transmitted helminth infections due to the particular environmental requirements of its aquatic life - cycle phases. In 2003, Ministry of Health and Social Welfare (MOHSW) of Zanzibar through Helminth Control Programme (HCP) conducted a comprehensive parasitological baseline assessment of schistomiasis. It was four years programme known as *Kick out Kichocho (Piga vita Kichocho*) from 2003.

Kick out Kichocho is a partnership between the Ministry of Health and Social Welfare (Zanzibar) and Natural History Museum (United Kingdom) with additional support from the African Development Bank, Tanzania and the Schistosomiasis Control Initiative, United Kingdom. The programme focused upon combined control of urinary schistosomiasis and STH with annual MDA of PZQ and ALB in primary schools, targeting some 130, 000 school children (Southgate *et a,* 2005; Stothard *et al,* 2006).

In sub-Saharan Africa, there is compelling evidence for an association between the occurrence of human schistosomiasis and several socio–cultural factors (Farooq et al, 1966). Similar observations have been made in other endemic regions, in Africa, Asia, Latin America and the Caribbean, where socio–economic and behavioural factors, as well as water-supply patterns, have been shown to play major roles in the transmission of the parasites causing human schistosomiasis Kloos et al., 2008; Rudge et al., 2008). Since, transmission of urinary schistosomiasis within Zanzibar still exist, and the degree to which behavioral, socio–economic, and environmental factors influence the prevalence of the disease transmission is not well-known. this study can provide better understanding of the risk factors for schistosomiasis that can direct the people and experts to explore new, combined and integrated control strategies.

1.2 OBJECTIVES

1.2.1 Broad objective

To examine associations of schistosomiasis infections with behavioral, social-economic and environmental risk factors among people of northern rural villages in Unguja island in Zanzibar.

1.2.2 Specific objectives

i. To determine the extent of schistosomiasis infections in terms of prevalence among the people of northern rural villages at Unguja Island.

ii. To determine proportion of residents with knowledge on schistosomiasis in northern rural villages at Unguja Island.

iii. To identify urine disposal practices that may facilitate transmission of *S. haematobium* among people of northern rural villages at Unguja Island.

iv. To determine proportion of people who received Praziquantel in the last deworming campaign in northern rural villages in Unguja Island.

v. To find out the relationship between the schistosomiasis infections with socio-economic and environmental risk factors among the people of northern rural villages at Unguja Island.

1.2.3 Research questions

i. Are there any associations of schistosomiasis infections with behavioral, social-economic and environmental risk factors among people of northern rural villages at Unguja Island?

ii. To what extent the schistosomiasis infections affect the people of northern rural villages at Unguja Island?

iii. What is the proportion of residents with knowledge on schistosomiasis in northern rural villages at Unguja Island?

iv. How to identify urine disposal practices that may facilitate transmission of *S. haematobium* among people of northern rural villages at Unguja Island?

v. What are the proportion of people who received Praziquantel in last deworming campaign in northern rural villages in Unguja Island?

vi. What are the relationships between the schistosomiasis infections with socio-economic and environmental risk factors among the people of northern rural villages at Unguja Island?

1.3 RATIONALE OF THE STUDY

Recently, most schistosomiasis based researches in Zanzibar have focused on parasite infections, transmissions and control strategies. On the other hand studies on the health effects of schistosomiasis have been carried out particularly to school age children. Despite the fact that, it is well known that behavioral, demographic, economic, environmental and social risk factors play an important role in schistosomiasis transmission. There are few related studies done on this important aspect.

This study will contributed towards understanding associations of schistosomiasis infections with behavioral, demographic, soci-economic, and environmental risk factors among people of northern rural villages at Unguja Island in Zanzibar. This study is therefore significant because its findings will contribute to the growing body of knowledge about risk factors as well as health effects of schistosomiasis in northern rural villages at Unguja Island in Zanzibar. The study will also give broader picture on the extent and impact of schistosomiasis in northern rural villages at Unguja Island in Zanzibar. The study will also be expected to incite more researchers toward designing other studies related to it.

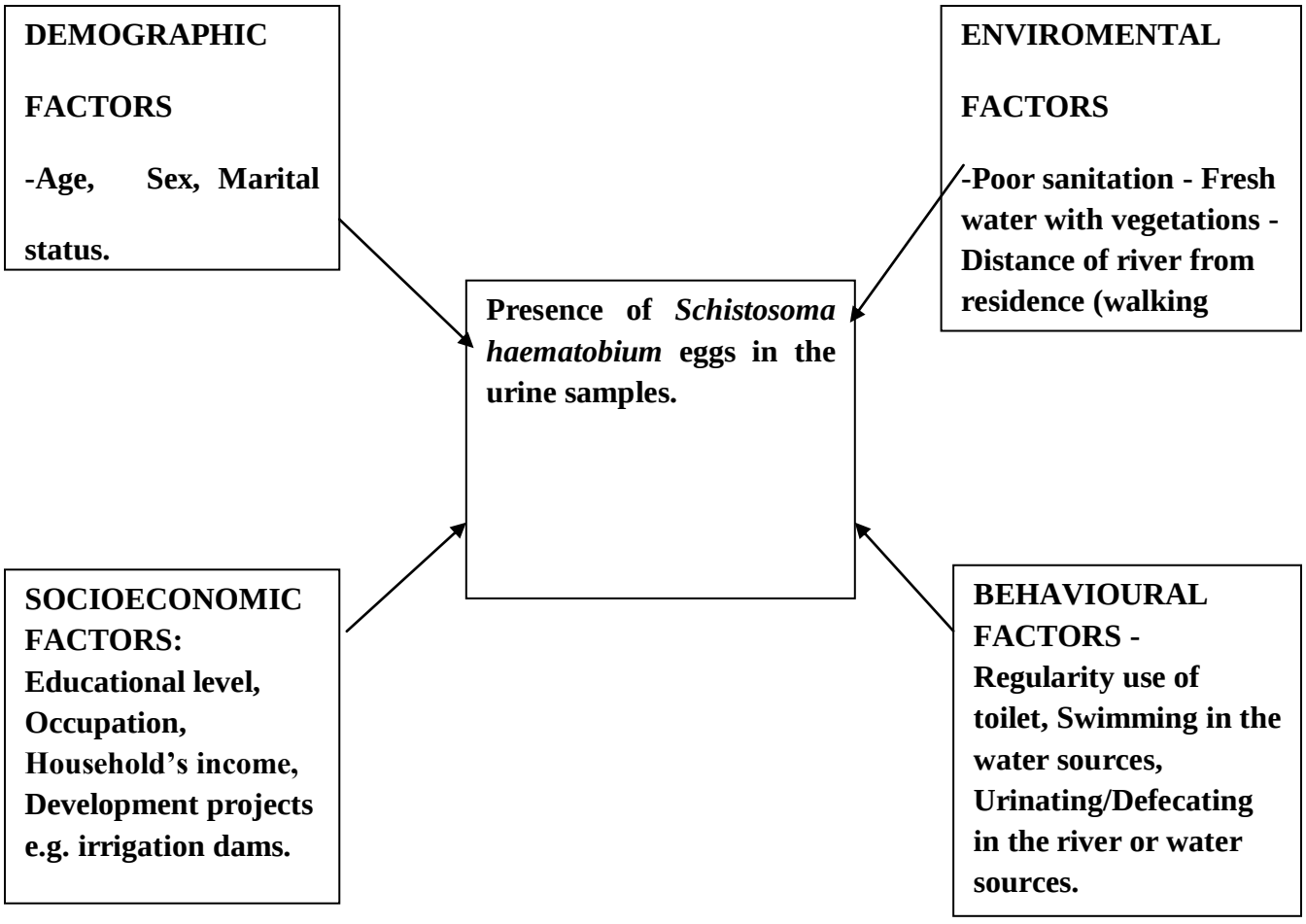
CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents literature review on issues related to risk factors for *Schistosoma hematobium* in northern rural villages at Unguja Island in Zanzibar. It also reviews the effects of S. *hematobium* in northern rural villages at Unguja Island in Zanzibar and knowledge gaps that exist as far as this study is concerned.

2.1 Conceptual Framework



2.2 Empirical Review of the Study

Engels et al, (2002) argues that schistosomiasis remains an important public health problem globally with an estimated 200 million cases reported each year. Again, Southgate et al., (2005) and Van der Werf et al. (2003) commented that about 85% of the cases reported annually occur in sub-Saharan Africa and over 150,000 deaths are attributable to chronic infection with *S. haematobium* in this region.

Urinary schistosomiasis, in which the bladder is affected, is caused by infection with *S. haematobium,* which occurs mainly in Africa. *S. haematobium* causes bladder wall pathology, leading to ulcer formation, haematuria, and dysuria. Granulomatous changes and ulcers of the bladder wall and ureters can lead to bladder obstruction, dilatation, secondary urinary tract infections and subsequent bladder calcification, renal failure, lesions of the female and male genital tracts, and hydronephrosis. *S. haematobium* is also associated with increased risk of bladder cancer. Schistosomiasis also causes chronic growth faltering and can contribute to anaemia (Ross et al, 2002).

Previous studies revealed that prevalence of *S. haematobium* in Unguja island was >50% in high risk areas (Mgeni et al., 1990) and for Pemba island, it was >60% of the population (McCullough and Kraft, 1976).However the most recent survey in 2011 shows that in Unguja prevalence was 8% (range: 0-38%) in a 24-school survey (n=3263) and in Pemba the prevalence was 15% (range: 1-43%) in a 24-school survey (n=2338),(N.T.D Report 2011). *S. haematobium* infection in Unguja is highly prevalent in the northern regions of the island, rural villages in the north of Unguja represent locations where there is prominent prevalence of *S. haematobium* infection and it illustrates that, possibly local risk factors are particularly favourable for transmission of these parasites.

Risk factors for schistosomiasis are factors that do not seem to be a direct cause of the disease, but seem to be associated in some way. Having a risk factor for schistosomiasis increases the chances of being contracting the infection but does not always lead to it. Also, the absence of any risk factors or having a protective factor does not necessarily guard one against getting schistosomiasis (http://www.rightdiagnosis.com/riskcenter.htm).

There are various factors that are said to influence the risk of acquiring schistosomiasis infections. These include environmental factors, behavioural factors, and economic factors as described below.

i. Environmental factors include poor sanitation that facilitates eggs from urine to reach fresh water with vegetations that may facilitate snail's habitats.

ii. Behavioural factors are concerning with indiscrimate urination in water sources leading to water contamination with schistosome eggs. Also human activities or recreation that may facilitate contact with water e.g. are swimming, bathing, washing clothes and fetching water for domestic purposes.

iii. Socio-economic factors deal with the development projects that create snail habitats, e.g hydropower and irrigation dams. However, communities with high infection rates are usually clustered around contaminated water sources.

iv. Urban or rural location. Typically schistosomiasis is a disease of rural and poor. However, urban schistosomiasis is not uncommon.

The Neglected Tropical Diseases (NTD) Control Program formerly known as Helminth Control Programme is now engaged in different studies based on schistomiasis elimination following the agreement of the Ministry of Health and Social Welfare (Zanzibar) and other partners after several years of schistosomiasis control activities that have brought down the prevalence of the disease to the extent that elimination measures are now being contemplated. Among the proposed measures or interventions are distributing Praziquantel twice a year to all community

members including children in areas where schistosomiasis is endemic; to control the snail intermediate hosts within their habitat using niclosamide and also to use measures that will change the behaviour of children and stop them from urinating in the water bodies so as to bring down disease transmission.

In illustrating the association between risk factors and S. *hematobium* infection, the following factors were significantly associated with infection; age 11–13 years, socio-economic status, gender, location, household, water source, pupil's knowledge of existence of an open water source, previous history of urinary schistosomiasis and proximity of school to an open water source Kapito-Tembo et al. (2009). Distance from home to an open water source, previous history of schistosomiasis treatment, frequency of water contact and dysuria were not significantly associated with infection. The association between gender and *S. hematobium* infection varies in different communities (Kapito-Tembo et al., 2009). Some studies have reported no association between *S. hematobium* infection and gender (Satayathum et al., 2006), while other studies have reported association with female gender (Ogbeide et al., 1994).

The review of literature has shown that there is a growing body of knowledge on the risk factors for *Schistosoma haematobium* in northern rural villages in Unguja island in Zanzibar. The available studies have briefly indicated that *Schistosoma haematobium* has enormous effect on health for the people of the northern villages of Unguja Island. However, the review of literature shows that there is no in-depth study which solely focus on the risk factors for *Schistosoma haematobium* in northern rural villages in Unguja Island in Zanzibar, hence the extent to which socio–economic, behavioural and environmental factors contribute to the highly diverging prevalences and intensities of urinary schistosomiasis reported in Zanzibar is little known. In an attempt to fill this gap, this cross-sectional study intended to add to the existing body of knowledge about risk factors for *Schistosoma haematobium* in northern rural villages in Unguja Island in Zanzibar.

CHAPTER THREE
METHODOLOGY

3.0 Introduction

This chapter discusses the methodology used in the study/ research design, description of the study area, study population, sample size and sampling procedure, study variables, inclusion and exclusion criteria, recruitment and training of the research assistants, data collection methods and instruments, data analysis and processing,

Pre-testing, parasitological work, intensity of infection and ethical consideration.

3.1 Description of the study area

This study was conducted in six (6) villages between March and June 2012 to represent northern rural villages in Unguja Island where schistosomiasis is endemic. These villages were selected from three *Shehias* which are Banda maji, Kitope and Kandwi whereby two villages from each Shehia. These *Shehias* has been chosen on the basis of previous studies investigated the prevalence of parasitic infections including schistosomiasis. Banda maji, Kitope and Kandwi are the *Shehias* located in northern district of Unguja island. The local climate is tropical with distinct dry (December–February) and rainy (March – May) seasons and a mean annual rainfall of 1100 mm, a mean annual temperature of 27oC, and a mean relative humidity of 85% (Tanzania Metrological Authority). The ecological characteristics, as well as the socio–cultural and daily economic activities of all communities of these *Shehias* are similar. Subsistence agriculture and petty trading are the main occupations, and most residents are of Muslim ethnicity.

3.2 Study population

The study population comprised of children (between 6 to 17 years old) and adults aged between 18 to 70 years old. The households belonging to six (6) randomly selected villages of these three (3) *Shehias* were also randomly selected. All categorized individuals from all six (6) villages were invited to participate in this study.

3.3 Study design

The study design was cross sectional study in which a structured questionnaire was used to produce the primary data.

3.4 Sample size estimation

The multi stage sampling formula was used to obtain minimum sample size. From that formula, the total number of 438 respondents was obtained and involved in this study.

$$n = \frac{3.84\pi(1-\pi)}{d^2} f$$

Where:

n = is the minimum sample size required

d = is the degree of precision for estimating the proportion of infected individuals from previous study (0.05)

f **=** is the Variance Inflation Factor or Designing effect for this study f = 1.2 and

$\boldsymbol{\pi}$ = estimate of the proportion of infected individuals.

Let π = 39%, (from previous study done in Tanga) and d = 5%

$$n = \frac{3.84 \times 0.39 (1- 0.39) \times 1.2}{0.05 \times 0.05}$$

n = 438.4 ~ 438

3.5 Sampling procedure

The multi stages sampling procedure was deployed to select participants in this study.Initially three Shehia out of fifteen Shehia of Northern district of Unguja Island were randomly selected. A sampling frame of all villages belonging to three (3) selected *Shehias* located in Northern district of Unguja Island was prepared. A simple random sampling was applied to select number of villages in each *Shehia*. The said six (6) villages were selected from the box with folded pieces of paper containing the names of all villages in the three *Shehias*, and the study households were selected at random using a table of random numbers, with all the inhabitants of each selected household who had lived at least 4 months in the villages.

3.6 Study variables

3.6.1 Dependent variables

Presence of *Schistosoma haematobium* eggs in the urine samples. prevalence

3.6.2 Independent variables

- Age
- Swimming/Bathing
- Education level
- Occupation
- Presence of toilet
- Sex
- Length of stay in village in years,
- Distance of water source from residence,
- Household income,
- Project for irrigation.
- Poor sanitation
- Owner of the house

- Type of water

3.7 Data collection methods:

The study used structured questionnaires as the main data collection instrument. A Swahili version of the questionnaire was used to collect information from the participants Demographic information, information on socio-economic factors, and other risk factors were obtained by using questionnaires. Questionnaires were filled by researcher assistant after rdelivering a consent letterrticipants to the pa.

3.8 Parasitological survey

A cross-sectional parasitological survey was done in which all participants were requested to provide urine samples and storing it in a special transparent plastic bottle which was given to each participant by research assistant. All urine samples were transferred to the laboratory for testing blood in urine by using haemastix, they were filtered and examined using microscope to check for presence of *S.haematobium* eggs and intensity of the infection. In cooperation with Zanzibar NTD Control Programme Director and Staffs all people who were found to be positive through microscopic examination were referred for treatment.

3.9 Intensity of infection

By using World Health Organization (WHO) classification methods, urine sample with *Schistosoma haematobium* eggs was classified as:

i. **Up to** 50 eggs/10mls of urine - Light infection .

ii. **More than** 50 eggs /10mls of urine - Heavy infection

3.10 Inclusion criteria

Children between 6 and 17 years old and adult between 18 to 70 years in considering their sex was given chance to participate in this study.

3.11 Exclusion criteria

Children under six (6) years and adults over 70 years.

3.12 Recruitment and training of research assistants

The post of research assistant was advertised and the advertisement described the qualifications required. Two research assistants were required in this study. A short training for one day on filling questionnaires, collection and processing of urine, and other data collection procedures and logistics was done and trial of all activities was done during the pre - testing days of this study.

3.13 Pretesting of research tools

After setting up all the essential research tools such as structured questionnaire, bags, and plastic container for collecting urine samples, the researcher and her assistants tested the instrument assigned for data collection so as to determine its validity and reliability. Pretesting of the research instruments was done at Mtopepo Shehia in West district in Unguja Island.

In pretesting, fifteen (15) households were randomly selected from the streets of Mtopepo *Shehia.* A researcher selected Mtopepo *Shehia* to test the research instruments because it was similar environmental characteristics to the areas of the study.

3.14 Data processing

Data was entered, processed and analyzed by the using SPSS 13.0 computer software. Frequency tables cross tabulation and figures were produced to identify explanatory variables that had significant role in influencing dependent variables.

The Pearson Chi-square test ($\chi 2$**)** was used to explore the association between two variables, such as independent and dependent variables in which the significant test was at $P \leq 0.05$. During the analysis the matching was done to control for the confounding factors.

3.15 Ethical consideration

Ethics statement for this study obtained from the Muhimbili University of Health and Allied Sciences (MUHAS) Ethical Review Board and permission to conduct the study was granted by the medical research ethics committees of the Ministry of Health and Social Welfare in Zanzibar. The *Shehias* leaders known as *Sheha* were informed about the aims, procedures, potential risks and benefits of the study so as to provide written consent prior to conducting and proceeding to the study. Written informed consent was obtained from each participant and for those below the age of 14 years was obtained from their parents or guardians.

In this research, a researcher has done what required be doing and avoiding what not accepted to be done. In order the finding to be more objective, valid and reliable; a researcher observed the principles of confidentiality and anonymity to the respondents. A researcher did not disclose any private and personal information of the respondent so as to avoid unnecessary inquiry if any and harm. A researcher observed all ethical consideration in data collection, analysis, interpretation, processing and representation so as to get correct, accurate and reliable results.

CHAPTER FOUR

RESULTS

4.0 RESULTS

4.1 Demographic characteristics of the study population

About 438 individuals were registered, from three *Shehias* of Banda maji, Kandwi and Kitope, however, 438 of them (211, 48.2%) males and 227, 51.8% females), 145 from Bandamaji,144 from Kandwi and 149 from Kitope *Shehias* submitted urine samples which was examined for *S. hematobium* ova and all 438 people were included in the data analysis. The individuals were from six villages out of eighteen villages present in the Shehias, these villages were randomly selected. These villages were: in Kitope (Mkaratini and Bondeni) in Kandwi (Muembeni and Urejua) and in Bandamaji (Skuli and Sokoni). Compliance for the cross-sectional parasitological survey for all three parts of the study, prevalence of infections was noticeably highest in Kitope (12.8 %) and was 4.18% and 4.2% in Banda maji and Kandwi respectively.

The age of the participants varies from 6 to 70 years, with a mean of 21.19 and (S.D.) of 13.31 years and a median of 17 years. Most participants reported having completed either primary 210, (48%) or secondary 112 (25.6%) level education. In general, 100 (22.8%) individuals were with no formal education, mostly in the 7–55 years old age-groups.

Most common occupations were students 183 (41.78%) or self employment 157 (35.9%), only 7 (1.6%) of the participants were government employees. About 85% were from family with income less than Tshs. 100,000/= per month while 15% were from family with income between Tshs. 100,000 and 300,000/= per month.

Table 1. Demographic characteristics of the study population in northern rural villages in Unguja Island. N=438

Age Group	**Education level**				**Total (%)**
	Nursery (%)	Primary (%)	Secondary (%)	No formal education (%)	
0 – 6	5 (31.3)	0 (0.0)	0 (0.0)	5 (5)	10 (2)
7 – 17	9 (56.3)	157 (74.8)	25 (22.3)	26 (26)	217 (49.5)
18 – 35	2 (12.5)	35 (16.7)	79 (70.5)	29 (29)	145 (33.1)
36 – 55	0 (0.0)	18 (8.6)	7(6.3)	34 (34)	59 (13.5)
56 and above	0 (0.0)	0 (0.0)	1 (0.9)	6 (6)	7 (1.6)
Total	**16 (3.7)**	**210 (48)**	**112 (25.6)**	**100 (22.8)**	**438 (100)**

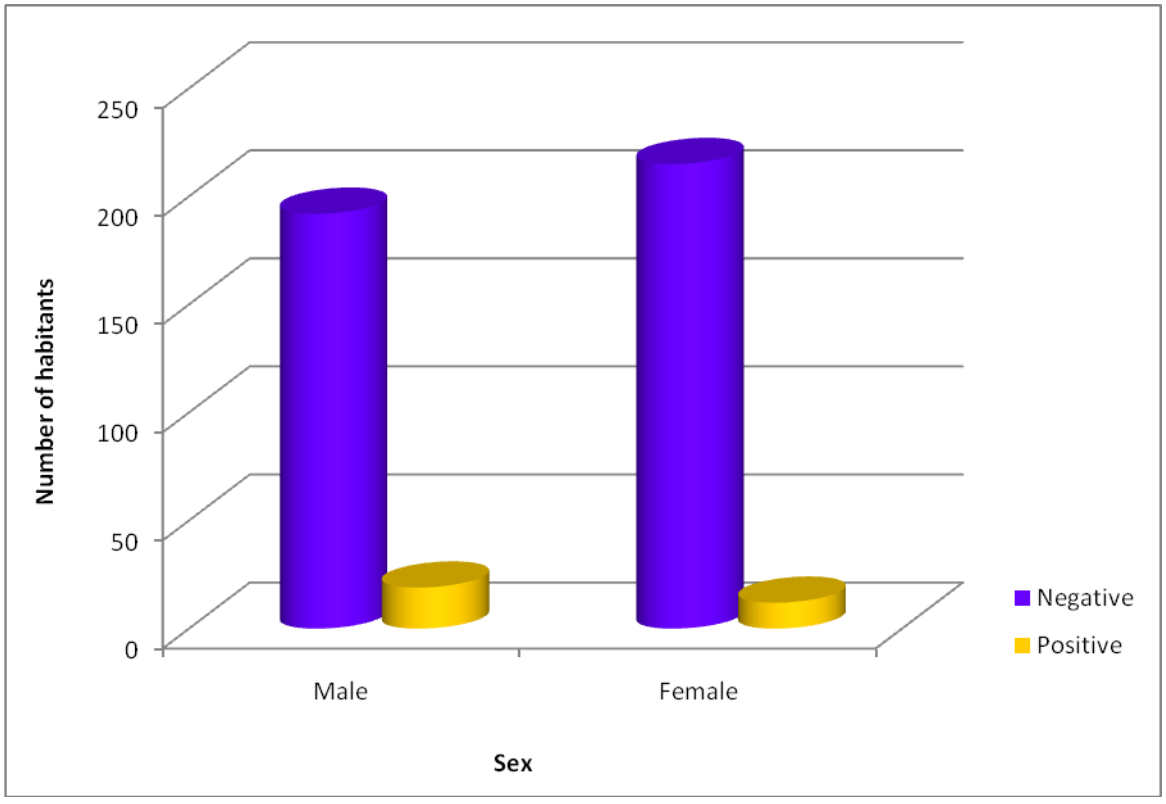
Occupation	Sex		Total (%)
	Male (%)	Female (%)	
Government employee	5 (2.4)	2 (0.9)	7 (1.6)
Private employee	4 (1.9)	0 (0.0)	4 (0.9)
Farmers	61 (28.9)	96 (42.3)	157 (35.8)
Home care	0 (0)	37 (16.3)	37 (8.4)
Fishermen	9 (4.3)	11 (4.8)	20 (4.6)
Not working/ child	16 (7.6)	14 (6.2)	30 (6.8)
Student	116 (55)	67 (29.5)	183 (41.8)
Total	**211 (48.2)**	**227 (51.8)**	**438 (100%)**

Income per month	Sex		Total (%)
	Male	Female	
Less than Tshs. 100,000/=	176 (83.4%)	197 (86.8%)	373 (85%)
Between Tshs. 100,000/= and 300,000/=	35 (16.6%)	30 (13.2 %)	65 (15%)
Total	**211 (48.2%)**	**227 (51.8%)**	**438 (100%)**

4.2 Prevalence of infection

Schistosoma haematobium eggs were found in 31 (7.1%) individuals. Infection was higher in males compared to females (9.0% versus 5.3%) however this difference was not statistically significant, Chi-*square* = 2.299 and *P value* = 0.129. Across age intervals, infection was higher between 7-17 years at 67.7% compared to the 18 – 35 years which was 29.0%, and for the 36-55 years and over the prevalence was 3.2%. This showed that, prevalence decreasing with increasing of age. Figure 1 below shows Prevalence of *Schistosoma hematobium* infection by sex**.**

Figure 1: Showing Prevalence of *Schistosoma hematobium* infection by sex. N=438



http://www.plosntds.org/article/slideshow.action?uri=info:doi/10.1371/journal.pntd.0000361&imageURI=info:doi/10.1371/journal.pntd.0000361.g002

4.3 Intensity of infection

Almost S. *haematobium* infections were of low intensity in the study area, although some individuals exhibited heavy infections. Infection intensity ranged from 0 to 240 eggs/10 ml of urine. The mean of ova density (eggs/10 ml of urine) among the infected in the study population was 2.16 (range 0–240). The level of intensity was calculated for each shehia and it was found that, intensity level (heavy infection) among infected was higher, 66.7% in Kitope compared with other *shehias* of Kandwi ,33.3% and no heavy infection individual found in Bandamaji, this results is a statistically not significant difference (*Chi-square* = 11.656, *P* = 0.020. The prevalence of heavy infection (≥50 eggs/10 mls) among those infected was 3/31, 9.8 %.).Intensity of the infection in relation to sex showed, male were significantly more infected than female (8.1% versus 4.9%) but there was no significant sex difference (*Chi-square* = 2.337, *P* = 0.31). as shown in table 2 & 3 below.

Table 2: Shows intensity of infection by sex. N=438

Level of intensity	**Sex**		**Total (%)**
	Male (%)	**Female (%)**	
No infection	192 (91)	215 (94.7)	407 (92.9)
Light infection	17 (8.1)	11 (4.9)	28 (6.4)
Heavy infection	2 (1.0)	1 (0.4)	3 (0.7)
Total	211 (48.2)	227 (51.8)	438 (100 %)
Pearson Chi-Square	2.337		
p-value	0.311		

Table 3: Shows intensity of infection by *shehia* N=438.

Shehia	Level of intensity			Total (%)
	No infection (%)	Light infection (%)	Heavy infection (%)	
Bandamaji	139 (34.2)	6 (21.4)	0 (0)	145 (33.1)
Kandwi	138 (33.9)	5 (17.9)	1, (33.3)	144 (32.9)
Kitope	130 (31.9)	17 (60.7)	2 (66.7)	149 (34)
Total	**407 (92.9)**	**28 (6.4)**	**3 (0.7)**	**438 (100)**
Pearson Chi-Square		11.656		
p-value		0.020		

4.4 General awareness on schistosomiasis

Males were more likely to be general aware of schistosomiasis infection compared to females, 143, (53.8%) and 123, (46.20%) respectively (p = 0.004). Among residents who were general aware with schistosomiasis treatment is about 255, (95.9%) out of 266, people aged 7-35 years, 210, (79%) but this result are statistically not significant, (Chi-square 37.46 p = 0.013).

The finding revealed that 255 (95.9%) out of 266 who have general awareness of the disease, said schistosome can be treated, among them 211, (82.8%) in which (124, (58.8%) have completed primary and 87,(41.2%) secondary education) level compared to 11, (4.1)% individuals who said schistosome cannot be treated 6, (54.6%) in which 5,(83.3%) have primary and 01,(16.7%) has secondary) education level, this difference was a statistically significant. (Chi-square 14.900, p = 0.002). The findings of some questions showed that 231 (86.8%) out of 266 who have knowledge of the disease, stated the true answer on the important sign of the disease i.e. " passing blood in urine," 228, (98.7%) of them were aged 7-55 years compared to other age group, this difference was highly statistically significant

(Chi-square 40.973 and P- value = 0.000). Moreover, the findings showed that 165, 62% out of 266 residents who were knowledgeable of *schistosomiasis* disease, stated the right answer that the disease is acquired through parasite penetration in contaminated water through skin, among them 161, (97.6%) were people aged 7-55 years, however this difference was not statistically significant (Chi-square 9.323 and P- value = 0.675).**Tables 4(a) to 4(e) show awareness on *schistosomiasis* infection in various aspects.**

Table 4(a): Shows the general awareness on *schistosomiasis* by sex. N=438

Do you know what schistosomiasis?	**Sex**		**Total** (%)
	Male (%)	**Female** (%)	
Yes	143 (67.8)	123 (54.2)	266 (60.7)
No	68 (32.0)	104 (45.8)	172 (39.3)
Total	**211** (48.2)	**227** (51.8)	**438** (100)
Pearson Chi-Square	8.465		
p-value	0.004		

Table 4(b) shows the treatment of schistosomiasis from those with general awareness, by age group. N=266

Age Group	**Is Schistosomiasis treatable?**		Total (%)
	Yes (%)	No (%)	
0 – 6	1 (0.4)	1 (9.1)	2 (0.8)
7 – 17	112 (43.9)	3 (27.3)	115 (43.2)
18 – 35	98 (38.4)	4 (36.4)	102 (38.4)
36 – 55	38 (14.9)	3 (27.3)	41 (15.4)
56 and above	6 (2.4)	0 (0.0)	6 (2.3)
Total	**255 (58.2)**	**11 (41.8)**	**266 (100)**
Pearson Chi-Square	12.606		
p-value	0.013		

Table 4(c) shows the treatment of schistosomiasis from those with general general awareness by their education levels. N=266

Education level	Disease can be treated?		**Total**
	Yes	No	
Nursery	1 (0.4%)	1 (9.1%)	2 (0.8%)
Primary	124 (48.6%)	5 (45.5%)	129 (48.5%)
Secondary	87 (34.1%)	1 (9.1%)	88 (33.1%)
No formal education	43 (16.9%)	4 (36.4%)	47 (17.7%)
Total	**255** (95.9%)	**11** (4.1%)	**266** (100%)
Pearson Chi-Square	14.900		
p-value	0.002		

Table 4(d): Shows signs of schistosomiasis from those with general awareness general awareness by age group. N=266

Age Group	Major sign of schistosomiasis				Total
	Pain in the stomach	Passing blood in urine	Fever	Other	
0 – 6	0 (0.0)	0 (0.0)	0 (0.0)	2 (9.5)	2 (0.8)
7 – 17	3 (23.1)	103 (44.6)	0 (0.0)	9 (42.9)	115, (43.2)
18 – 35	7 (53.9)	86 (37.2)	1 (100)	8 (38.1)	102 (38.3)
36 – 55	1 (7.7)	39 (16.9)	0 (0.0)	1 (4.8)	41 (15.4)
56 and above	2 (15.4)	3 (1.3)	0 (0.0)	1 (4.8)	6 (2.3)
Total	13 (4.9)	231 (86.6)	1 (0.4)	21 (7.9)	266 (100)
Pearson Chi-Square	40.973				
p-value	0.000				

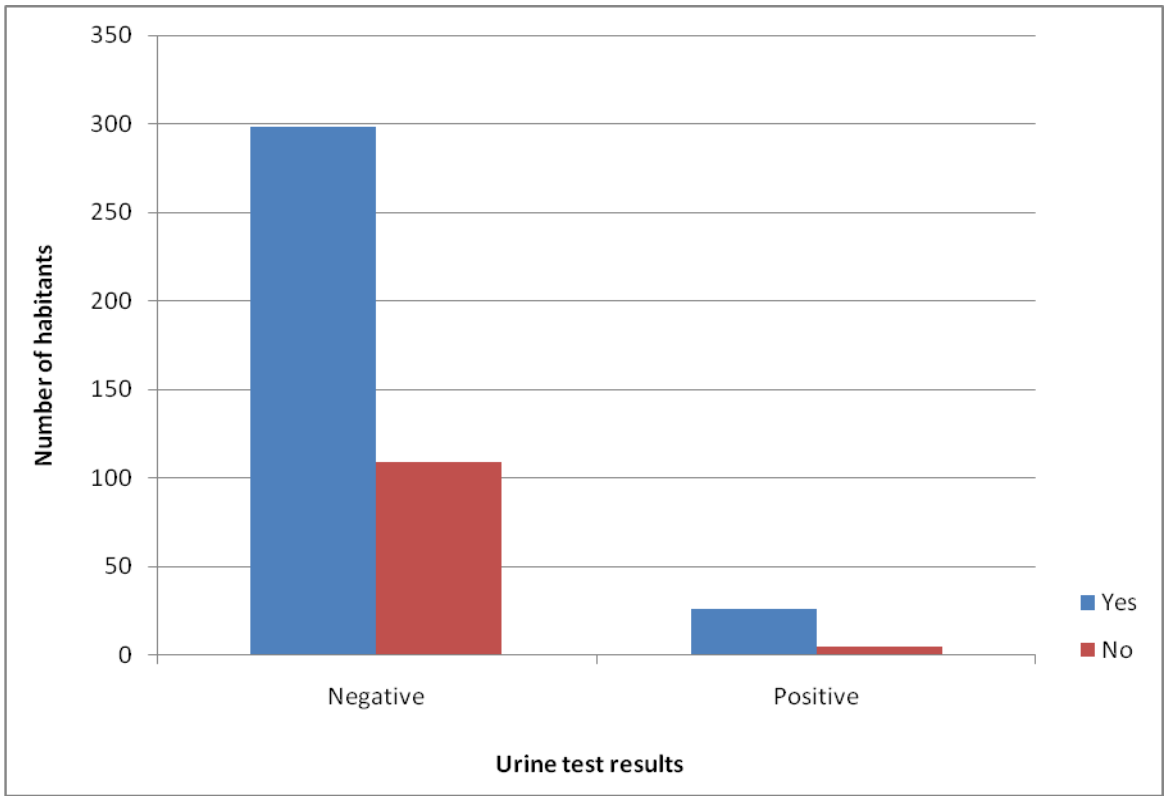
Table 4(e) shows the transmission of schistosomiasis from those with general general awareness by age group. N=266

Age Group	Schistosomiasis is transmitted through				**Total** (%)
	By penetration of parasite through skin (%)	By mosquito bite (%)	Drinking contaminated water (%)	Other (%)	
0 – 6	0 (0.0)	0 (0.0)	1 (2.1)	1 (2.2)	2 (0.8)
7 – 17	71 (43.0)	3 (37.5)	19 (40.4)	22 (47.8)	115 (43.2)
18 – 35	65 (39.4)	2 (25)	18 (38.3)	17 (37)	102 (38.3)
36 – 55	25 (15.2)	3 (37.5)	7 (14.9)	6 (13)	41 (15.4)
56 and above	4 (2.4)	0 (0.0)	2 (4.3)	0 (0.0)	6 (2.3)
Total	**165** (62.0)	**8** (3.0)	**47** (17.7)	**46** (17.3)	**266** (100)
Pearson Chi-Square		9.323			
p-value		0.675			

4.5 Urine disposal practices

The study aimed to identify urine disposal practices that may facilitate transmission of *S. haematobium* among people of northern rural villages at Unguja Island, questions concerning presence of toilet in each house hold were asked in order to be familiar with any chance that may facilitate transmission of the disease agent. Findings showed that 114 (26.0%) out of 438, households have no toilet. Prevalence of infections were not statistically significantly between house hold with toilet 324, (74.0%) and those household with no toilet 114, (26.0%), Chi-square = 1.697 = 1, P value = 0.192). This is shown in figure 2 below.

Figure 2: Shows Prevalence of infections among the household with toilets and those with no toilets.



Also, this findings shows that about 100 (87.7%) out of 114 residents who have no toilet in their households, use bushes for urination and defecation, remained 14 residents urinate/defecate in farms, streaming rivers and other illegal means. However there was no significant difference in the proportions between prevalence of diseases and those households who use illegal means of urination/defecation, (chi square= 6.635, p value = 0.084).**This is shown in Table 5 below.**

Table 5: Shows the prevalence of infection from in relation to various urine disposal practices. N= 114.

Where are you using for urination/ defecation	**Urine test results**		**Total** (%)
	Negative (%)	**Positive** (%)	
In streaming river	1 (0.9)	0 (0.0)	1 (0.9)
In bushes	96 (88.1)	4 (80.0)	100 (87.7)
In farms	2 (1.8)	1 (20)	3 (2.6)
Other	11 (10.1)	0 (0.0)	11 (9.6)
Total	**109** (95.6)	**5** (4.4)	**114** (100)
Pearson Chi-Square 6.635			
p-value 0.085			

4.6 Proportional of people who receive Praziquantel in last de-worming campaign. Result indicated that out of 438 individuals interviewed 337 (76, 9%) of them 162, (48.1%) males and 175, (51.9%) female participated in the taking drugs in last National Mass Drug Administration (January, 2012), the finding show that the difference in participation between male and female is not statistically significant (Chi-square = 0.006 and p -value = 0.938)

With regard to relationship of participants with age , the finding showed that majority of the participants,(81.6%) were those in age of 7-35 compared to other age group, however the difference is not statistically significant (Chi-square 8.643 and p- value= 0.071) .

Moreover, the finding revealed that 93.5% of individuals who received Praziquantel were not infected compared with 6.5% infected, but this difference is not statistically significant (Chi-square 0.671 and p- value= 0.413).These are shown in tables below.

Tables 6(a) to 6(c): Showing proportional of people who receive Praziquantel in last de-worming campaign.

Table 6(a) Shows participation in de-worming campaign by age N=438

Age Group	**Participate in de-worming campaign**		**Total** (%)
	Yes (%)	No (%)	
0 – 6	7 (2.1)	3 (3)	10 (2.3)
7 – 17	174 (51.6)	43 (42.6)	217 (49.5)
18 – 35	101 (30)	44 (43.6)	145 (33.1)
36 – 55	48 (14.2)	11 (10.9)	59 (13.5)
56 and above	7 (2.1)	0 (0.0)	7 (1.6)
Total	**337** (76.9)	**101** (23.1)	**438** (100)
Pearson Chi-Square	8.643		
p-value	0.071		

Table 6(b) Shows participation in de-worming campaign by sex N=438

Sex	**Participate in de-worming campaign**		**Total** (%)
	Yes (%)	No (%)	
Male	162 (48.1)	49 (48.5)	211 (48.2)
Female	175 (51.9)	52 (51.5)	227 (51.8)
Total	**337** (76.9)	**101** (23.1)	**438** (100)
Pearson Chi-Square	0.006		
p-value	0.938		

Table 6(c) Shows prevalence of infection from residents who Participated in de-worming campaign

Urine test results	**Participate in de-worming campaign**		**Total** (%)
	Yes (%)	No (%)	
Negative	315 (93.5)	92 (91.1)	407 ()
Positive	22 (6.5)	9 (8.9)	31 ()
Total	**337** (76.9)	**101** (23.1)	**438** (100)
Pearson Chi-Square		0.671	
p-value		0.413	

4.7 Factors associated with urinary schistosomiasis

In examining factors **associated with urinary schistosomiasis** the following factors were significantly not associated with infection during analysis; gender, socio-economic status (household's income per month, owner of house, projects for irrigation). Environmental factors (household's water sources distance from home to an open water source, length of stay in the shehia). **Behavior factors (**presence/use of toilet in the house hold, swimming/bathing, fishing and farming in nearby river/water body), other factors are previous history of receiving schistosomiasis treatment.

4.7.1 Prevalence of Schistosoma haematobium infection in relation to environmental variables

Although about 301, 68.7% out of 438 subjects use tape water as the main source for domestic uses and drinking the prevalence of infection was higher 77.4% compared to 22.6% to subjects who use well as the main source of water. Subjects who lived within a 30-min walk of the local river were also more likely to be infected 71% than subjects who lived far away from the river 29%.Further more, infection appeared to be higher 10.6% to individuals who stayed more than five years in the shehia than 6.6% of those stayed less than five years.

Tables 7(a) to 7(c) shows prevalences of Schistosoma haematobium infection in relation to environmental variables N=438

Table 7(a): Prevalence of *Schistosoma haematobium* versus Source of water for domestic purposes and drinking

Source of water that you are using for domestic purposes and drinking	**Urine test results**		**Total (%)**
	Negative (%)	**Positive (%)**	
Tape water	277 (68.1)	24 (77.4)	301 (68.7)
Streaming river	1 (2.5)	0 (0.0)	1 (0.2)
Well	129 (31.7)	7 (22.6)	136 (31.1)
Total	**407 (92.9)**	**31 (7.1)**	**438 (100)**
Pearson Chi-Square 1.214			
p-value 0.545			

Table 7(b): Prevalence of *Schistosoma haematobium* versus distance from home to an open water source

Distance from home to an open water source	**Urine test results**		**Total (%)**
	Negative (%)	**Positive (%)**	
Less than 30 minutes walking	247 (60.7)	22 (71)	269 (61.4)
More than 30 minutes walking	160 (39.3)	9 (29)	169 (38.6)
Total	**407 (92.9)**	**31 (7.1)**	**438 (100)**
Pearson Chi-Square 1.285.			
p-value 0.257			

Table 7(c): Prevalence of *Schistosoma haematobium* versus length of stay in the shehia

length of stay in the shehia	Urine test results		Total (%)
	Negative (%)	Positive (%)	
Less than 5 years	42 (89.4)	5 (10.6)	47 (10.7)
More than 5 years	365 (93.4)	26 (6.6)	391 (89.3)
Total	**407 (92.9)**	**31 (7.1)**	**438 (100)**
Pearson Chi-Square 1.015			
p-value 0.314			

4.7.2 Prevalence of *Schistosoma haematobium* infection in relation to behavioural variables

Study revealed that, Infection was higher in people who visited river for swimming/birthing 9.2% compared to people who did not visit 5.9%. Also, about 64.5% of the subjects who did not visit river for fishing were infected compared to 35.5% who did so. More over people, who do not farm around river/nearby water bodies, seemed to be most infected 90.3% compared to those who did so, 9.7%.However, these difference are statistically not significant. (Chi square= 1.610, p value = 0.205), (chi square= 2.903, p value = 0.088) and (chi square= 0.077, p value = 0.782) respectively.

Table 8(a) to 8(c) showing Prevalences of *Schistosoma haematobium* infection in relation to behavioural variables

Table 8(a) : Prevalence of *Schistosoma haematobium* versus people who visited rivers for swimming/bathing

Visited rivers within past three months for swimming/bathing	**Urine test results**		**Total** (%)
	Negative (%)	**Positive** (%)	
Yes	138 (90.8)	14 (9.2)	152 (34.7)
No	269 (94.1)	17 (5.9)	286 (65.3)
Total	**407** (92.9)	**31** (7.1)	**438** (100)
Pearson Chi-Square 1.610			
p-value 0.205			

Table 8(b): Prevalence of *Schistosoma haematobium* versus people who visited rivers for fishing.

Visited rivers within past three months for fishing	**Urine test results**		**Total** (%)
	Negative (%)	**Positive** (%)	
Yes	90 (22.1)	11 (35.5)	101 (23.1)
No	317 (77.9)	20 (64.5)	337 (76.9)
Total	**407 (92.9)**	**31 (7.1)**	**438 (100)**
Pearson Chi-Square 2.903			
p-value 0.088			

Table 8(c): Prevalence of *Schistosoma haematobium* versus people who farm around the rivers, ponds, dams or streams

Farm around the rivers, ponds, dams or streams	Urine test results, (%)		Total (%)
	Negative (%)	Positive (%)	
Yes	46 (11.3)	3 (9.7)	49 (11.2)
No	361 (88.7)	28 (90.3)	389 (88.8)
Total	**407 (92.9)**	**31 (7.1)**	**438 (100)**
Pearson Chi-Square 0.077			
p-value 0.782			

4.7.3 Prevalence of Schistosoma haematobium infection in relation to socio-economic variables

Among the occupational groups recorded, students 54.8% and farmers 32.3% gave the higher prevalence of infection compared to other. Infection appeared to be higher, 83.9% in household with income less than 100,000, than those with income between Tshs. 100,000/= and 300,000 per month. Subjects whose household's owners shown higher prevalence, 96.8% of infection than not house hold owners. However these different were not statistically significant, since the p value was greater than 0.05.Additionaly,there is no any water projects for irrigation in the area of our study, hence association of schistosomiasis with this variable could not determined. **Table 9(a) to 9(c) showing, prevalence of *Schistosoma haematobium* infection in relation to socio-economic variables**

Table 9(a): Prevalence of *Schistosoma haematobium* versus Occupation

Occupation	**Urine test results**		**Total** (%)
	Negative (%)	**Positive** (%)	
Government employee	7 (1.7)	0 (0.0)	7 (1.6)
Private employee	4 (1.0)	0 (0.0)	4 (0.9)
Farmers	147 (36.1)	10 (32.3)	157 (35.8)
Home care	35 (8.6)	2 (6.5)	37 (8.5)
Fishers	20 (4.9)	0 (0.0)	20 (4.6)
Not working/ child	28 (6.9)	2 (6.5)	30 (6.9)
Student	166 (40.9)	17 (54.8)	183 (41.8)
Total	**407**	**31**	**438** (100)
Pearson Chi-Square 4.007 p-value 0.676			

Table 9(b) Prevalence of *Schistosoma haematobium* versus Income

Income	**Urine test results**		**Total** (%)
	Negative (%)	**Positive** (%)	
Less than Tshs. 100,000/=	347 (85.3)	26 (83.9)	373 (85.2)
Between Tshs. 100,000/= and 300,000/=	60 (14.7)	5 (16.1)	65 (14.8)
Total	**407 (92.9)**	**31 (7.1)**	**438 (100)**
Pearson Chi-Square 0.044 p-value 0.834			

Table 9(c) Prevalence of *Schistosoma haematobium* versus owner of the house

Is the family heads the owner of house	**Urine test results**		**Total** (%)
	Negative (%)	**Positive** (%)	
Yes	381 (93.6)	30 (96.8)	411 (93.8)
No	26 (6.4)	1 (3.2)	27 (6.2)
Total	**407** (92.9)	**31** (7.1)	**438** (100)
Pearson Chi-Square 0.498			
p-value 0.480			

Based on the low prevalence encountered in this study we have failed to generate Multivariate logistic regression analyses of the relationship between *Schistosoma haemat*obium with available risk factors.

CHAPTER FIVE

DISCUSSION

5.0 Discussion

In this study, we investigated the prevalent of *S. haemat*obium in northern rural villages at Unguja Island in Zanzibar The results indicated that schistosomiasis haematobium is still endemic but, overall, low prevalence 7.1% were found which ranged from 0.0% to 24.0% in villages of our study. Sex, age, and occupation, were independently associated with infection in our study. Furthermore, there were significant disparities in parasitic infections between people who did not visit river for swimming and/or bathing (54.8%) compared to people who visited (45.1%). Also, between people who did not visit river for fishing compared to those who did so. And same condition appeared, between people who do not farm around river/nearby water bodies, 90.3% compared to those who did so, 9.7% as explained in tables above.

It is possible that the low prevalence of *S. hematobium* infections is due to the ongoing Zanzibar Elimination of Schistosomiasis Transmission (ZEST) Project in Zanzibar, which has reduced prevalence of infection. Certainly, vast socio-economic development in Zanzibar has brought about improved access to anthelminthic drugs, as well as improvement in access to clean water and sanitation in the general population of Zanzibar, Zanzibar MOHSW report (2010).

However, the current Zanzibar NTD Control Program report of 2011, (not published) indicated that, S. *hematobium* prevalence was 2.35% in Unguja Island. My study prevalence estimate is higher than the Zanzibar NTD Control Program report of 2011 currently in use. More over the dissimilarity in sample size and methodology of studies could partly explain the observed findings. Therefore, further current large-scale surveys are likely to be more precise compared to previous studies that may have had some selection bias for high endemic villages.

The finding showed that the relationship between male gender and *S. haematobium* found in this study is similar to findings from other studies (El-Gendy ***et al.***, 1999). In this region, there was an increasing trend of infection among children from seven years to seventeen years with a decline from 18 years. As well, children aged 14-17 years or more were less liable to report swimming or fishing in water in our study. This suggests that children 14 years and older have lower risk of being infected as they are less likely to be engaged in recreational water-contact behaviors compared to younger children. Studies conducted in a different place have reported similar outcome, for instance, Survival analysis during a nine-year, schistosomiasis study in Kenya, schistosomiasis infection was lower in older children (Satayathum ***et al***., 2006).

The poor living conditions of the villagers, including poor housing, poor sanitation and a general lack of piped water with intense contamination of peridomestic areas with human faeces and urine, with intense contamination of peridomestic areas with human faeces and urine these problems and other socio–cultural characteristics are important risk factors for human schistosomiasis (Raso ***et al.***, 2005; King, 2010).

However in our study, we did not find a significant association between schistosomiasis infections between subjects who use piped water as the main source for domestic uses and drinking compared to subjects who use well as the main source of water, proportion was 77.4% and 22.6 % respectively. As in previous studies conducted in rural Brazil (Gazzinelli ***et al.***, 2006) could find no significant relationship between intestinal schistosomiasis and any of the socio–economic factors that they investigated, same condition appeared in our study, we did not find significant association between urinary schistosomiasis and any of the socio–economic factors that we investigated. Despite the low prevalence of urinary schistosomiasis infection, about 39.3% of the people living in of northern rural villages in Unguja island have no idea of such infection.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The study at hand will contribute to the growing body of literature on the association between variation and the schistosomiasis infection. This finding did not prove a strong association between urinary schistosomiasis with environmental, behavioral as well as socio-economic factors among the people of of northern rural villages at Unguja Island. However assessment of these and other potential risk factors, in other epidemiological settings, may be essential prior to successful and sustainable measures for schistosomiasis control in northern rural villages in Unguja island and Zanzibar in general.

6.2 Recommendations

- The provision of free treatment for individuals harbouring *S.haematobium* and other STH is very important, district health officers may consider targeted treatment after every two years in endemic villages and surrounding communities, hence administration of anthelminthic drugs, serving as the backbone of integrated control together with other preventive and curative measures.
- Health education, information and communication (EIC) materials, should be distributed in the rural villages of Zanzibar in which schistosomiasis infection is endemic, particularly those relating to hygiene practices, improved sanitation and a more regular supply of piped water, may help further decrease these parasitic infections and lead to better health condition.
- NTD Control Program of Zanzibar in collaboration with Village health providers should make more effort to increase the awareness of the diseases to the community through various mass media such as radio, cars with loud speaker, brochures and local

entertainment; this will be successfully if local community leaders (*Sheha*) will be involved in this intervention. the local communities

- Community should be encouraged to change their bad behaviour that may predispose them to be infected with *Schistosoma* cercarie such as swimming/bathing, urinating and defecating in the water bodies.
- A *Bulinus* snail (intermediate host of *S. haematobium*) control intervention is another important preventive measure of schistosomiasis infection, since it cut off continuous life cycle of the parasites.
- Further clinical studies to determine the risk factors that that may predispose peoples to be infected with schistosomiasis infection is still needed in this region since most **r**ecent schistosomiasis based researches in Zanzibar have focused on parasite infections, transmissions and control strategies.

REFERENCES

de Silva, N.R., Brooker, S. Hotez, P.J., Montresor, A. Engels, D. and Savioli, L. (2003). Soil-transmitted helminth infections: updating the global picture. *Trends Parasitol.*, 19 (2003), pp. 547–551.

Engels, D., Chitsulo, L., Montresor, A. and Savioli, L. (2002). The global epidemiological situation of schistosomiasis and new approaches to control and research, 82(2): 139–146.

El-Gendy, S.D., Osman, A.M., Al-Sherbiny, M.M. (1999). Epidemiology and immunodiagnosis of schistosomiasis haematobium in low endemic area in Egypt. 29(1): 229–246.

Farooq, M., Nielsen, J., Samaan, S. A., Mallah, M. B. and Allam, A. A. (1966). The epidemiology of Schistosoma haematobium and Schistosoma mansoni infection in the Egypt-49 project area. Part 2. Prevalence of bilharziasis in relation to personal attributes and habits. *Bulletin of the World Health Organization*, 35, 293–318.

Gazzinelli, A., Velasquez-Melendez, G., Crawford, S. B., LoVerde, P. T., Correa-Oliveira, R. & Kloos, H. (2006). Socioeconomic determinants of schistosomiasis in a poor rural area in Brazil. *Acta Tropica*, 99, 260–271. http://www.rightdiagnosis.com/riskcenter.htm.

Jex, A.R., Lim, Y. A., Bethony, J.M. Hotez, P.J., Young, N.D. and Gasser, R.B. (2011). Soil-transmitted helminths of humans in Southeast Asia: Towards integrated control. *Adv. Parasitol.*, 74: 231–265.

José C. Sousa-Figueiredo, María-Gloria Basáñez, I. Simba Khamis, Amadou Garba, David Rollinson, J. Russell Stothard 2009. Measuring Morbidity Associated with Urinary Schistosomiasis: Assessing Levels of Excreted Urine Albumin and Urinary Tract Pathologies.

Kapito-Tembo AP, Mwapasa V, Meshnick SR, Samanyika Y, Banda D, et al. (2009) Prevalence Distribution and Risk Factors for *Schistosoma hematobium* Infection among School Children in Blantyre, Malawi.

King C.H. (2010), Parasites and poverty: the case of schistosomiasis. *Acta Tropica.*, 113 : 95–104.

Kloos, H., Correa-Oliveira, R., Quites, H. F. O., Souza, M. C. C. & Gazzinelli, A. (2008). Socioeconomic studies of schistosomiasis in Brazil:a review. Acta Tropica, 108, 194–204.

Kothari, C. R (2004), Research Methodology: Methods and Techniques, Second Revised Edition, New Delhi.

Mahmoud AA (2001) Schistosomiasis. London: Imperial College Press.

Morenikeji, *O.A.*, Azubike, N.C. and A.O. Ige (2009). Prevalence of intestinal and Vector-borne urinary parasites in communities in south-west Nigeria. *J Vector Borne Dis* 46, , pp. 164–167.

Oniya, M.O. and Odaibo, A.B., (2006). Reinfection pattern and predictors of urinary Schistosomiasis among school pupils in southern west village in Nigeria. *International Journal of Tropical Medicine* 1 (4): 173-177.

Partnership for Child Development (1999). "The Cost of Large-Scale School Health Programmes Which Deliver Anthelmintics to Children in Ghana and Tanzania." *Acta Tropica* 73: 183–204.

Pugh, R. N. H. & Gilles, H. M. (1978). Malumfashi endemic research project. III. Urinary schistosomiasis, a longitudinal study. Annals of Tropical Medicine and Parasitology, 72, 539–546.

Raso, G., Utzinger, J., Silue, K. D., Ouattara, M., Yapi, A., Toty, A., Matthys, B., Vounatsuo, P., Tanner, M. & N'Goran, E. K. (2005). Disparities in parasitic infections, perceived ill health

and access to health care among poorer and less poor schoolchildren of rural Coˆ te d'Ivoire. Tropical Medicine and International Health, 10, 42–57.

Ross A. G., Bartley P. B., Sleigh A. C., Olds G. R., Li Y., Williams G. M., McManus D. P. Schistosomiasis. New England Journal of Medicine. 2002.

Rudge, J. W., Stothard, J. R., Basanez, M., Ali, F. M., Khamis, I. S., Khamis, A. N. & Rollinson, D. (2008).Micro-epidemiology of urinary schistosomaisis in Zanzibar: local risk factors associated with distribution of infections among schoolchildren and relevancefor control. *Acta Tropica*, 105, 45–54.

Satayathum SA, Muchiri EM, Ouma JH, Whalen CC, King CH (2006) Factors affecting infection or reinfection with schistosoma haematobium in coastal kenya: Survival analysis during a nine-year, school-based treatment program. Am J Trop Med Hyg 75(1): 83–92.

Southgate VR, Rollinson D, Tchuem Tchuente LA, Hagan P (2005) Towards control of schistosomiasis in sub-saharan africa. J Helminthol 79(3): 181–185.

Sousa-Figueiredo, J.C., Basa´n˜ ez M-G, Khamis I.S., Garba, A., Rollinson, D. J, Russell, Stothard. (2009). Measuring Morbidity Associated with Urinary Schistosomiasis: Assessing Levels of Excreted Urine Albumin and Urinary Tract Pathologies. *PLoS Negl Trop Dis* 3(10): e526. doi:10.1371.

Stothard, J R., Mook, P., Mgeni, A. F., Khamis, I. S., Khamis, A. N. and Rollinson, D. (2006). Control of urinary schistosomiasis on Zanzibar (Unguja Island): a pilot evaluation of the educational impact of the "*Juma na Kichocho*" health booklet within primary schools. Memorias do Instituto Oswaldo Cruz 101, 119–124.

van der Werf MJ, de Vlas SJ, Brooker S, Looman CW, Nagelkerke NJ, et al. (2003) Quantification of clinical morbidity associated with schistosome infection in sub-Saharan africa. *Acta Tropica* 86(2–3): 125–139.

World Health Organization. 1995. Bulletin of the World Health Organization, 73:510.

World Health Organization, (1992), Health of school children: treatment of intestinal helminths and schistosomiasis. Geneva.

Zanzibar's Ministry of Health and Social Welfare (MoHSW) report (2003).

Zanzibar's Ministry of Health and Social Welfare (MoHSW) report (2010).

Zanzibar's Neglected Tropical Diseases Programme report (2011).

APPENDICES

APPENDIX I: Informed consent form - (English Version)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
DIRECTORATE OF RESEARCH AND PUBLICATIONS

ID-NO: .....

Risks Title of the research: "risk factors for schistosomiasis in northern rural villages at Unguja island in Zanzibar".

Purpose of the study "To examine associations of schistosomiasis infections with behavioral, demographic, economic, environmental and social risk factors among people of northern rural villages at Unguja Island in Zanzibar."

Researcher's Declaration
My name is Asya Mohamed Mbarouk,I am doingMaster of sciences in tropical diseases control at Muhimbili Uiversity of Health and Allied Sciences,(MUHAS).Findings from this study will help me to write a dissertation which is a part of fulfillment of MSc TDC) for academic year 2010/2011.

If you consent to involve yourself in this study, you will be required to answer questions which appear in the questionnaire and to provide urine sample for schistosomiasis diagnosis. Do not hesitate because in this interview there is no RIGHT or WRONG answers.

Confidentiality:
A researcher will observe the principles of confidentiality and anonymity to the respondents, to ensure the finding to be more objective, valid and reliable. A researcher will not disclose

any private and personal information of the respondent so as to avoid unnecessary inquiry if any and harm.

Benefits

Your participation in this study, will give you benefit by knowing your health status and getting a chance of finding medical advice. Also, the information you will provide will help us to understand **risk factors for schistosomiasis in northern rural villages at Unguja island in Zanzibar".**. The findings will be disseminated to the policymakers especially health planners so as to help in addressing the problem of schistosomiasis hence its control.

We guarantee you that no harm will occur to you if you participate in this study. Moreover, if you will be detected to be schistosomiasis positive, you will be referred to the hospital to get proper treatment.

Rights to Withdraw and Alternatives

Its your choice to participate in this study, withdrawal from the study will not involve penalty or loss of any benefits to which you are otherwise entitled.

Who to contact

For further information about this study, make contact with:

Principal Investigator: Asya Mohamed Mbarouk, Muhimbili University of Health and Allied Sciences, P. O. Box 65015, Dar es Salaam.

Cosrse coordinator: **Prof.** C.M. Kihamiya, and

Prof. E .F. Lyamuya, Chairman of the College Research and Publications Committee, P. O. Box 65001, Dar es Salaam

Signature:…….

Do you agree? YES…… NO ……

I _____have read/listened the contents in this form. My questions have been answered. I agree to participate in this study.

Signature of participant _____

Signature of research assistant _____

Date of signed consent _____

APPENDIX II: Fomu ya ridhaa

CHUO CHA SAYANSI ZA TIBA MUHIMBILI
IDARA YA UTAFITI NA MACHAPISHO

ID-NO: .....

Jina la utafiti: " Sababu hatarishi zinazochangia maambukizi ya kichocho katika vijiji vya kaskazini ya kisiwa cha Unguja, Zanzibar."

Lengo la utafiti " Kuangalia uhusiano baina ya maambukizi ya kichocho na tabia za watu, idadi ya watu, hali ya kiuchumi,mazingira na sababu za kijamii miongoni mwa watu wa vijiji vya kaskazini Unguja, Zanzibar".
Tamko la mtafiti

Jina langu ni Asya Mohamed Mbarouk, ni mwanafunzi wa shahada ya uzamili, fani ya udhibiti wa maradhi ya kitropikali, katika Chuo Kikuu cha Sayansi za Afya Muhimbili. Utafiti huu ni sehemu ya masomo yangu, ambayo yataniwezesha kupata shahada yangu kwa mwaka wa masomo 2010/2011.

Ikiwa utakubali kushiriki katika utafiti huu, utatakiwa kujibu maswali yote yatakayojitokeza katika karatasi ya maswali na kutoa sampuli ya mkojo kwa ajili ya uchunguzi wa vimalea vya kichocho. Usisite kushiriki kwani katika masuali haya hakuna jawabu sahihi wala isiyo sahihi.

Usiri
Mtafiti atazingatia maadili na kudhibiti usiri za washiriki ili kuhakikisha utafiti unakua na maana, thamani na ukweli. Mtafiti hatotowa siri au maelezo yoyote binafsi ya mshiriki kwa mtu mwengine ili kuepuka usumbufu usiokua wa lazima.

Faida

Ushiriki wako katika utafiti huu utakupa faida ya kujua afya yako na kukusaidia kupata ushauri wa kidaktari.Vilevile, maelezo utakayotoa yatatusaidia kufahamu

"**Sababu hatarishi zinazochangia maambukizi ya kichocho katika vijiji vya kaskazini Unguja, Zanzibar"** Matokeo ya utafiti huu yatatumiwa na watunga sera za kiafya ili yawasaidie katika kuandaa mipango madhubuti ya kutokomeza kichocho nchini.

Haki ya kujitoa na mambo mbadala

Ushiriki wako katika utafiti huu ni wa hiari. Hivyo unayo haki ya kujibu au kutojibu swali lolote katika dodoso. Kukataa kujibu swali lolote hakuna adhabu yoyote wala haupotezi haki zako kama mshiriki na katika kupata huduma za kijamii kama mwananchi mwengine. Vilevile ,ikiwa itagundulika kua una kichocho utapata maelekezo ya kwenda hospitali ili upate tiba sahihi.

Mawasiliano

Kwa maswali au maelezo zaidi kuhusiana na utafiti huu wasiliana na msimamizi wa utafiti huu Prof. C. M. Kihamia au mtafiti mkuu Asya Mohamed Mbarouk, Chuo Kikuu cha Sayansi za Afya Muhimbili, P.O.Box 65015, Dar es Salaam.

Endapo una swali lolote kuhusu haki zako kama mshiriki katika utafiti huu, wasiliana na **Profesa. E .F. Lyamuya,** ambaye ni **Mwenyekiti wa kamati ya chuo ya utafiti na machapisho,** S.L.P 65001, Dar es Salaam. Simu namba:21503026

Sahihi.....

Je unakubali kushiriki? NDIYO..... HAPANA.....

Mimi _____ nimesoma/nimesomewa na kuyaelewa vyema maelezo yaliyomo katika fomu hii. Maswali yangu yamejibiwa. Ninakubali kushiriki katika utafiti huu.

Sahihi ya Mshiriki _____

Sahihi ya Mtafiti _____

Tarehe ya kusaini _____

APPENDIX III:

Structured questionnaire (English version)

Serial no._____ **ID NO ----------**

Structured questionnaire "for risk factors for *schistosomiasis* in northern rural villages at Unguja Island in Zanzibar"

Demographic information:

Name of respondent: ……

Occupation ……

Age: ……..

Sex: Male ……Female……

Shehia……..Village ……

House number ……

Education …… Religion…

Date: ……

To investigate environmental factors that may predispose them to be infected with schistosoma cercarie.

1.) What is the source of water that you are using for drinking?

a) Tap water
b) River
c) Swamps
d) Wells
e) Others (identify) …….

2.) What is the source of water that you are using for domestic purposes i.e. (cooking, washing clothes, dishes and cleaning?)

a) Tap water

b) River

c) Swamps

d) Wells

e) Others (identify) ……..

3) What is the distance (walking time) from the river /lakes to your house

a) less than, 30 min

b) more than 30 min

4) For how long you have been in this village?

a) less than five year

b) more than five year length of stay in community (years)

To investigate villager's behaviors that may predispose them to be infected with schistosoma cercarie.

5) Have you visited rivers within past three months for swimming/bathing?

a) Yes

b) No

6) Have you visited rivers within past three months for fishing?

a) Yes

b) No

7) Do you farm around the rivers, ponds, dams or streams?

a)Yes

b) No

8) (i) Does your household have a latrine? If YES go to (ii), if NO go to number (iii).

a) YES ……..

b) NO ……..

(ii) What type of latrine?

a) Pit latrine.

b) Ventilated improved pit latrine

c) Flash

d) Others (identify)……..

(iii) Where are you using for urination/ defecation?

a) In the river

f) In the farms

g) Bushes

h) Others (identify) …….

To investigate soci-economic activities that may facilitate transmission of *S. haematobium* among the people of northern rural villages.

9) What is your relationship to family head?

a) self

b) wife

c) child

d) Other

10) Is the family heads the owner of house?

a) Yes

b) No

11) What is the household's income per months?

a) Less than 100000

b) Between 100000 and 300000

c) More than 300000

12) (i) Is there any water projects for irrigation in your shehia? If answer Yes go to (ii), if answer no go to no: 11.

(a) Yes

(b) No

(ii) What type of crops are you farming?

a. Rice

b. Vegetables

To determine proportion of nothern rural villagers with knowledge on schistosomiasis

13) (i) Do you know what schistosomiasis is? If yes, go to (ii)

a) YES

b) NO

(ii) Where did you hear about schistosomiasis

a. At health centre, via health workers

b. At school,via teachers.

c. At home, via parent, relative and friends, mass media.

d. Others mention ……

iii) Schistosomiasis is transmitted through

a) Cercaria penetration in contaminated water.

b) Mosquitoes bite.

c) Drinking contaminated water

d) Other identify…….

iv) Major sign of schistosomiasis is,

a) Lower abdominal pain

b) Passing blood in the urine

c) Fever

d) Others (identify)……..

v) Is Schistosomiasis treatable?

a) YES

b) NO

vi) How can the disease be treated?

……..……

To determine proportional of people who receive Praziquantel in last de-worming campaign.

14) Have you ever taken schistosomiasis treatment?

a) YES

b) NO

If YES, Did you eat the drug?

a) YES

b) NO

NB: Has the respondent accept to produce urine? YES [ ] NO [ ]

APPENDIX IV:

Structured questionnaire (Swahili version)

Namba ya dodoso..... **Namba ya utambulisho.....**

Dodoso kwa ajili ya uchunguzi wa "Sababu hatarishi zinazochangia maambukizi ya kichocho katika vijiji vya kaskazini ya kisiwa cha Unguja, Zanzibar."

Taarifa binafsi

Jina la mshiriki: ……

Kazi ……

Umri : ……..

Jinsia Male ……Female……

Shehia.....Kijiji ……

Namba ya nyumba ……

Kiwango cha elimu ……Dini …….

Tarehe : ……

Kuchunguza sababu za kimazingira zinazoweza kusababisha maambukizi ya kichocho.

1.) Ni kipi chanzo cha maji unachotumia kwa shughuli za nyumbani, kwa kupikia,kufulia,kuoshea vyombo na usafi?

a) Maji ya mfereji
b) Mto
c) Kisima
e) Nyengine, (ainisha) ……..

2.) Ni kipi chanzo cha maji unachotumia kwa kunywa?

a) Maji ya mfereji
c) Mto
c) Kisima
e) Nyengine, (ainisha) ……..

3) Jee kuna umbali gani kutoka mtono na nyumbani kwako?

a) Chini ya dakika, 30

b) Zaidi ya dakika 30

4) Una muda gani tokea uishi katika kijiji hiki?

a) Chini ya miaka mitano

b) Zaidi ya miaka mitano

Kuchunguza tabia hatarishi za wanakijiji zinazoweza kusababisha maambukizi ya kichocho.

5.) Jee umetembelea mito vidimwi na mabwawa kwa ajili ya kuoegelea au kuoga ndani ya miezi mitatu ilopita?

a) Ndiyo

b) Hapana

6) Jee umetembelea mito vidimwi na mabwawa kwa ajili ya kuvua samaki ndani ya miezi mitatu ilopita?

c) Ndiyo

d) Hapana

7) Jee unafanya shughuli za kilimo pembezoni mwa ya mIto,vidimwi na mabwawa?

a) Ndiyo

b) Hapana

8) (i) nyumbani kwako kuna choo? Kama jawabu Ndiyo, nenda (ii), kama jawabu Hapana nenda namba (iii).

a) Ndiyo

b) Hapana

(ii) Ni choo cha aina gani?

a) Shimo .
b) Choo cha shimo kilichoboreshwa.
c) Choo cha flashi
d) Nyengine, (ainisha) ……

iii) Wapi unafanyia haja ndogo na haja kubwa ?

a) Kwenye mito
b) Vichakani
c) Mashambani
d) Nyengine, (ainisha) ……

Kuchunguza shughuli za kijamii na kiuchumi zinazoweza kusababisha maambukizi ya kichocho.

9) Una uhusiano gani na mkuu wa kaya ?

a) ni mimi mwenyewe

b) mke wangu

c) mtoto wangu

d) nyengine ainisha……..

10)Jee mkuu wa kaya ndo mwenye nyumba?

a) Ndiyo
b) Hapana

11) Pato lako (mwenye nyumba)ni kiasi gain kwa mwezi?

a) chini ya shilingi 100,000
b) baina ya shilingi 100,000 and 300000
c) zaidi ya shilingi 300,000

12.) (i) Kuna mradi wowote wa umwagiliaji katika shehia yenu? Kama jawabu Ndiyo nenda kifungu (ii) kama jawabu hapana nenda na: (11).

a) Ndiyo

b) Hapana

(ii) Jee wewe unajihusisha na kilimo chochote kupitia mradi huu? Kama jibu ndiyo nenda (iii)

a)Ndiyo

b) Hapana

iii) Ni aina gani ya kilimo unalima?

a. Mpunga
b. Mbogamboga
c. Hapana hata kimoja
d. Nyengine, (ainisha) ……

Kuchunguza uelewa wa wanakijiji kuhusu maradhi ya kichocho.

13) (i) Unafahamu kuhusu maradhi ya kichocho? Kama jawabu Ndiyo nenda kifungu (ii)

a) Ndiyo

b) Hapana

(ii) Je ni wapi ulisikia kuhusu maradhi ya kichocho

a) Kituo cha afya,kupitia wataalamu wa afya.
b) Skuli ,kupitia mwalimu.
c) Nyumbani , kupitia wazazi,jamaa,marafiki au vyombo vya habari
d) Nyengine, (ainisha) ……

iii) Kichocho kinaambukizwaje?

a. Kuingiliwa na kimelea cha kichocho kupitia kwenye ngozi
b. Kuumwa na mbu
c. Kunywa maji yenye kimelea cha ugonjwa
d) Nyengine, (ainisha) ……

iv) Dalili kubwa ya kichocho ni

a) Kuumwa na tumbo
b) kukojoa damu
c) Homa
d) Nyengine, (ainisha) ……

v) Je kichocho kinatibika?

a) Ndiyo
b) Hapana

vi) Jee unafahamu vipi anaweza kutibiwa maradhi ya kichocho?

Elezea kwa ufupi……..……

Kuchunguza idadi ya wanakijiji waliokula dawa za kichocho katika kampeni ya kula dawa za kujikinga na kichocho uliopita.

14) Je ulipata dawa za kichocho katika ugawaji wa dawa za kichocho uliopita?

a) Ndiyo
b) Hapana

Kama jawabu ndiyo, jee ulimeza dawa?

a) Ndiyo
b) Hapana

TANBIHI: Mshiriki amekubali kutoa mkojo? Ndiyo…..…….. Hapana…….

APPENDIX V: URINE ANALYSIS FORM.

Urine examination form for *S. haematobium* eggs by filtration technique.

Serial number	**Identity number**	**Positive**	**Negative**
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
Total			

APPENDIX VI: URINE EXAMINATION FORM FOR TESTING BLOOD IN URINE BY USING HAEMASTIX

Serial number	**Identity number**	**Positive**	**Negative**
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
Total			

APPENDIX VII: ETHICAL CLEARANCE LETTER.