ANALYSIS OF FACTORS THAT INFLUENCE COMPLIANCE WITH PRAZIQUANTEL FOR THE CONTROL OF INTESTINAL SCHISTOSOMIASIS IN COMMUNITIES OF MPIGI DISTRICT, UGANDA

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BY

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2013- MPH-FT-016

A research dissertation submitted to the Institute of Health Policy and Management in partial fulfillment of the award of a degree of Master of Science in Public Health of the International Health Sciences University (IHSU), Kampala, Uganda.

October 2014

DECLARATION

I Ssemwanga Edward declare that **"Analysis of factors that influence compliance with praziquantel for the control of intestinal schistosomiasis in communities of Mpigi district, Uganda"** is my own work and is original. All the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted before for any other degree at any other Institution. I henceforth present it for the award of the degree of Master of Science in Public Health of International Health Sciences University, Kampala, Uganda.

RESEARCHER

Signature…… Date…….

Ssemwanga Edward Bamulanzeki

I have read and duly approve this study Thesis

SUPERVISOR

Signature……Date……..

Dr. Robert Basaza (PhD)

DEDICATION

To the following people; my mother Nava Nabumba Ssemwanga, spouses, beloved sons and daughters especially Simon, Olivia, Sarah, Ernest and Yvonne. You are truly a gift from above. May this work inspire you to work hard academically and achieve more in your life, wherever you will be, always remember that Taata loves you all.

ACKNOWLEDGEMENT

Very special gratitude to my academic supervisor Dr. Basaza Robert (PhD) for the technical guidance throughout the research process, which helped me enrich my research skill. I would also like to thank my family for their perseverance during my pursuit of this course. Special thanks go to Mrs. Bosco Kalule for helping me whenever need for financial support arose. My sincere gratitude goes to the staff of Mpigi District Health Department for standing in for me during the course and data collection. Community Medicine Distributors and members who participated in the study, my colleagues the MPH-FT-2013-2014 class for the health discussions, debates and skills throughout the course that helped me to complete the program and carry out this research. I believe without you, I couldn't produce this paper.

God bless you all.

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LIST OF ABREVIATIONS

ALB: Albendazole

CAO: Chief Administrative Officer

CMD: Community Medicine Distributors

DALYs: Disability Adjusted Life Years

DHO: District Health Officer

DVCO: District Vector Control Officer

HIV: Human Immune Virus

MDA: Mass Drug Administration

NTD: Neglected Tropical Diseases

PZQ: Praziquantel

RTI: Research Triangle Institute

SCI: Schistosomiasis Control Initiative

SPSS: Software Package for Social Sciences

SSA: sub - Saharan Africa

USAID: United State Agency for International Development

VCD: Vector Control Division

WHO: World Health Organization

ABSTRACT

Background: Intestinal schistosomiasis has been a major public health problem in Uganda. Government of Uganda during 2006 initiated Mass Drug Administration (MDA) with annual single dose of praziquantel tablets to all the population living at the risk of the infection. Praziquantel (PZQ) is a drug of choice for treating *schistosoma mamansoni* but there are reports that indicate variations in compliance with the drug in endemic areas.

Objective: To assess the factors influencing compliance with praziquantel for the control of intestinal schistosomiasis in communities of Buwama and Nkozi sub-Counties, Mpigi district, Uganda.

Methods: Community based cross-sectional study was undertaken among four selected villages of Buwama and Nkozi Sub-counties in the month of August using results of May 2014 MDA compliance rates in the district. Information pertaining compliance with PZQ was gathered from 164 families and 491 respondents were recruited from 4 Villages 2 from Buwama and 2 from Nkozi by interview technique using structured questionnaire and key informant interviews. Data was analysed using SPSS version 16.0 at univariate, bivariate and multivariate levels.

Findings: There was no significant difference in the compliance rate with PZQ between Buwama and Nkozi Sub-counties ($\chi 2$=0.165, p= 0.685**)**. Eleven factors associated with compliance were identified: awareness of bilharzia (hard about bilharzias (OR=5.222, C.I=2.078-13.122, P=0.000), Vector for bilharzias (OR=1.263, C.I=1.048-1.522, P=0.014), causes of bilharzia (OR=3.222, C.I=2.168-.090), P=.000 and how we get bilharzia (OR=1.2, C.I=1.013-1.423, P=0.035), same religious affiliation as their CMDs (OR=1.372, C.I=1.078-1.751, P=0.011)**,** fear for the smell of the tablets of praziquantel (OR=1.128, C.I=1/001-1.270, P=0.048)**,** dose pole (OR=2.845, C.I=1.025-1.363, P=0.022), period of stay in village

(OR=0.585, C.I =0.471-0.727, P=0.000).Other individual factors such as age, religion and employment of respondents were not associated with PZQ compliance in the area. Gender was the only Socio –behavior factor influencing compliance with praziquantel (OR=0.632, C.I=0.434-0.919, P=0.016). Males were more compliant than the females in both Sub-counties. Other social behaviour factors not influencing compliance were: family members, health seeking behavior, mobility of respondents and having the same religious affiliation as Community Medicine Distributors. Respondents who were sensitized on the disease and its treatment were (OR=2.112, C.I=1.077-4.140, P=0.030), inadequate CMDs training to counteract negative rumors and answer questions from community members, bilharzias seen as a number four disease in the area after malaria and HIV, CMDs do not get enough incentives and allowances during MDA, proportion receiving posters and other IEC materials was found to be small in Buwama and Nkozi respectively($\chi 2$=6.856, p=0.009 and $\chi 2$=0.627, p=0.429), there is a variation in the annual treatment period between the two Sub Counties(OR=3.202, C.I=1.618-6.336, P=0.001), door-to-door distribution strategy(OR=2.032, C.I=1.749-2.295, P=0.000) mostly used in the two Sub-counties and relatively good supervision during MDA(OR=4.434, C.I=2.345-8.387, P=0.000) are positive predictors of compliance with praziquantel.

Conclusion: Results of the study identify individual, social-behaviour and program challenges to treatment adherence that are important in planning, implementing and evaluating national treatment programmes for intestinal schistosomiasis in the area. A large number of previous studies have identified community based mass-treatment interventions as an effective strategy to treat affected populations. However, limited evidence is available to discuss challenges to treatment adherence, access, delivery and monitoring at community level. The study contributes to the body of knowledge to the control of intestinal schistosomiasis in the area. It also revealed

difficulties in CMDs trainings, distribution strategy, IEC distributions and community-based monitoring of MDA in both Sub-counties.

Recommendations: The research findings could contribute to schistosomiasis control in the two Sub-counties of Buwama and Nkozi. They could also have implications on the control of schistosomiasis in other endemic districts in Uganda and other similar settings elsewhere. The study has contributed to a body of knowledge on intestinal schistosomiasis control that could be useful to researchers and other scientists working on a related or similar topic.

Sensitisation of community members is important to increase awareness of the disease and its treatment, training of CMDs should be conducted for several days to empower them with necessary information necessary to counteract negative rumors and answer questions from community members. In addition the trainings should aim at strengthen community sensitization meetings in the effort to increase accessibility to the medicine in all endemic areas.

The program should increase incentives and allowances to CMDs for several days. Increase in the distribution of IEC materials, supervision and monitoring of program activities especially in Nkozi Sub-county is important to give extra support to CMDs and streamlining the distribution strategy.

OPERATIONAL DEFINITIONS:

Drug: For the purpose of this study the word drug will be used interchangeably to mean medicine.

Endemic areas: Parts of Buwama and Nkozi sub-counties in Mpigi district endemic with intestinal schistosomiasis.

Mass drug Administration: WHO's non selective treatment of common endemic diseases in schools and communities. In this study it has been used also to mean mass treatment interventions for intestinal schistosomiasis.

Awareness to bilharzia: If an individual knows the disease bilharzias, the causes, vector, transmission and how we get it, s/he was considered to be aware of the disease.

Bilharzia: Bilharzia, snail fever and intestinal schistosomiasis were names used interchangeably to mean bilharzia.

Community medicine distributors: Village Health Team members who participated in mass treatment interventions of bilharzia

Compliance: Individuals who had been registered on the relevant treatment registers and had taken at least a full dose of praziquantel in a treatment round since 2006.In this study the word compliance was used interchangeably to mean adherence.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

In Uganda, the current strategies to treat intestinal schistosomiais have largely focused on mass drug administration (MDA), either through school-based treatment of children between the ages of 5–14 or through community-based treatment programmes (Massa et al, 2009). In the latter, Community Medicine Distributors (CMDs) from Village Health Teams (VHTs) are selected by community members, who are then trained to distribute the drugs to the endemic communities. Community treatment usually involves either a house-to-house distribution strategy, where CMDs visit each household in the community to distribute medicines, or centralized distribution, where community members gather in a central location and receive treatment from the CMD on specific treatment days (Kabatereine et al, 2010).

Coverage rate has been reported in Uganda as high as 85% ,above the recommended WHO target of 75% for the control of the disease but compliance with Praziquantel has been very low, the highest being 65%.(Kabatereine et al, 2012).There is currently very little information on how individual, social-behaviour and program factors may influence compliance with praziquantel. It was therefore important to assess the factors which influence compliance with praziquantel in Buwama and Nkozi Sub-counties in Mpigi district, Uganda.

The dependent variable was compliance with praziquantel while the independent variables were socio-behavioral aspects, individual and program related factors. This chapter includes the

introduction, background, problem statement, objectives of the study, significance and the conceptual framework.

1.1Background

Schistosomiasis is sometimes called snail fever, bilharziasis or bilharzia in memory of Theodore Bilharz who first diagnosed the disease in 1851 in Cairo Egypt (Nawa et al, 2010). It is a parasitic neglected tropical disease caused by four species of schistosomes to man. They include: *S. mansoni, S. mekongi, S. intercalatum and S.japonicum* which are known to cause intestinal schistosomiasis and *S. haematobium* causes urinary schistosomiasis. These species are transmitted by two major snail vectors of genus Bulinus and Biomphralia (Gurarie and Seto, 2009). Schistosomiasis is the third after Malaria and intestinal worms' devastating disease globally, a major source of morbidity and mortality in developing countries such as Africa, Asia, South America and the Caribbean islands (WHO 2010). Globally over 200 million people are infected and more than 82% of cases are in sub-Saharan Africa (SSA). An estimated 650 million people live in endemic areas of Africa alone (Hotez et al, 2009). However it was estimated to infect 207 million people in 2006, 90% of the cases occurred in SSA and caused a death between 15,000 – 280,000 people in the world 74 endemic countries.

The infection caused a loss of 1.7 – 4.7 Disability Adjusted Life Years (DALYs) worldwide of which 82% were in SSA (Steinman et al, 2006, WHO 2010). Currently it causes an estimated 4.7 million DALYs globally (Santigieet al 2012). In SSA it contributes to 200,000 deaths per year, majority being women of child bearing age which is due to social habits, gender barriers and low social status of the women in the endemic areas. An estimated 40 million women are infected with schstosomes (Friedman et al, 2007, WHO 2010).The drug of choice is praziquantel (PZQ),

which is effective on all the species causing the disease in humans. It is well tolerated and causes minimal side effects when properly administered. The medicine is distributed without charge at treatment point under various global campaigns to control or eliminate neglected diseases in communities (Kabatereine et al, 2010, Dembele et al, 2012 and Tadesse et al, 2012).

More than 33.5 million people were treated with PZQ in the year 2010 alone of which 27.9 million were from Africa. The use of PZQ will increase in years to come (Hotez et al, 2010, WHO 2012, Katemaet al, 2013). Praziquantel has various side effects which affect compliance. Some of them are; abdominal pain or discomfort, nausea, dizziness and headache. They are more prevalent when taken on an empty stomach (Sissonko et al, 2009, Keiser et al, 2010, Obonyo et al, 2010 and Lovis et al, 2012). People refuse to take PZQ especially when the perceived adverse side effects outweigh the perceived benefits of the drug which is distributed massively without proper laboratory diagnosis to confirm the presence of the infection (Parker and Allen, 2011). However timely administration of PZQ may improve the health status of an individual and can reduce the transmission of HIV in places endemic for both diseases (Secor et al, 2012). It can also be given to pregnant and nursing mothers as this has proved to have no effect on the life of the baby and the mother and it can help to treat the infection even in the new born since schistosomisis can be transmitted through congenital means (Nawal -Nour et al, 2010).

In Uganda, the government in 2007 with the global campaign funding to eliminate NTDs initiated the neglected tropical disease control program to integrate the activities done by the Schistosomiasis Control Initiative with other parallel programs which were focusing on individual diseases such as lymphatic filariasis, onchocerciasis and guinea worm infection (Massa et al, 2009). The program supports 58 districts endemic for schistosomiasis by providing funds necessary to carry out all activities leading to treatment interventions in communities and schools found in the endemic areas with annual single dose of PZQ accompanied with

albendazole (Kabatereine et al, 2012). However there are reports which indicate a variation in access and compliance with PZQ from district to district including Mpigi district (Robert and Prichard et al, 2012). The overall objective of the study was to assess the factors which influence adherence to praziquantel for intestinal schistosomiasis control among eligible populations of Buwama and Nkozi Sub-counties, Mpigi district.

1.2Statement of the problem

Although praziquantel is distributed free of charge through the NTD/ENVISION program, not all eligible individuals within communities receive the annual treatment. It has been noted that only 10% of the world's eligible population receive treatment annually (Hotez et al 2009). Even in areas where the prevalence of the infection is reported highest, up to 90%, the compliance rates are as low as less than 60% (Dabo et al 2013). This poses a serious threat such as increased morbidity and mortality of schistosomiasis in communities and can suffocate all the global efforts aimed at controlling or eliminating the infection by 2020.

In Uganda, a variation in compliance with PZQ has been reported between regions, districts, sub-Counties and communities (Kabatereine et al, 2011). Most studies attribute this to the fear of side effects of the medicine (Robert and Prichard et al, 2012). The target of the ministry of health is to control/ eliminate intestinal schistosomiasis in Uganda by 2020 to a level of no significant public health importance. In Mpigi district, a compliance rate of 62% has been reported in communities of Buwama and in Nkozi Sub-counties it is as low as 9.2% (District NTD report, May 2014). Both Sub-counties receive praziquantel and albendazole every year during mass treatment campaigns which includes; training of community medicine distributors, registration of people in the villages and schools, education, mobilization and treatment through the government of Uganda under the Neglected tropical disease control programme (NTD) /ENVISION.

Despite all efforts from the government and development partners, the compliance rates in Nkozi Sub-county remained very low compared to that of Buwama and the reasons were not known. This study attempts to assess factors associated with adherence to praziquantel in this endemic area of intestinal schistosomiasis and provides a basis for trying to understand how best to achieve higher compliance rates in the efforts to control the infection in the district.

1.3 Scope of the study

The study was conducted in four parishes, two from Buwama and two from Nkozi Sub-counties in Mpigi district in the month of August 2014. It focused on the factors associated with adherence with praziquantel in this endemic area of intestinal schistosomiasis and comparison of compliance with praziquantel between the two endemic Sub-counties.

1.4 Objectives of the study

1.4.1 General objective

To assess factors that influence compliance with praziquantel for the control of intestinal schistosomiasis in communities of Buwama and Nkozi sub-Counties, Mpigi District, Uganda.

1.4.2 Specific objectives

i. To assess the individual factors which may influence community compliance with PZQ in communities of Buwama and Nkozi sub-Counties in the months of August 2014
ii. To identify the socio-behavior factors which influence adherence with PZQ in the two sub-Counties.
iii. To explore program related factors which may influence adherence with PZQ in communities of Buwama and Nkozi sub-Counties in the months of August 2014

1.5 Research questions

i. What are the individual factors which may influence community compliance with PZQ in communities of Buwama and Nkozi sub-Counties in the months of August 2014

iv. What are the socio-behavior factors which influence adherence with PZQ in the two sub-Counties.

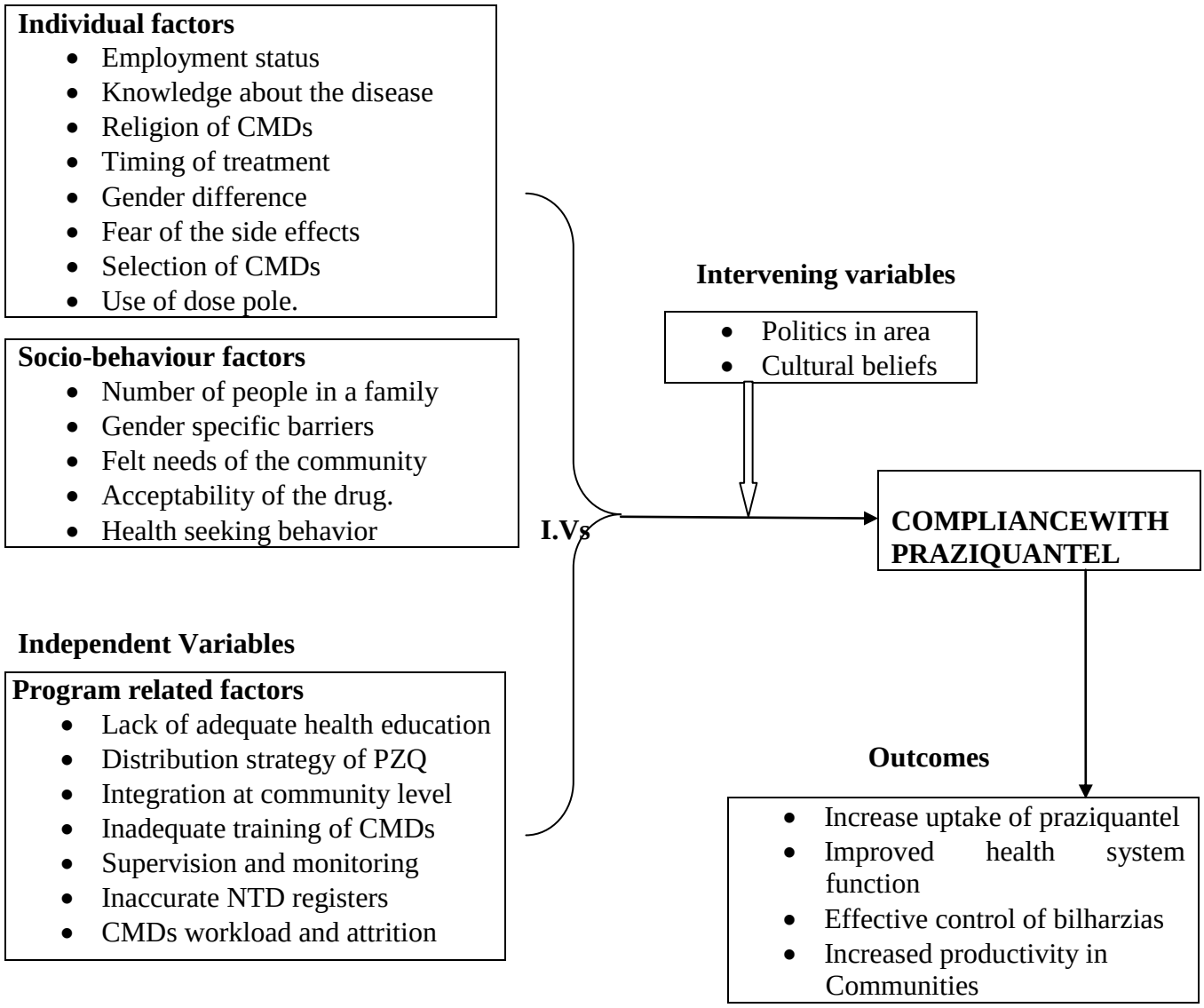
ii. What are the program related factors which may influence adherence with PZQ in communities of Buwama and Nkozi sub-Counties in the months of August 2014

1.6 Significance of the study

Compliance with praziquantel in Uganda is generally poor. Most of the studies and efforts on compliance have been conducted on school children and little was known among community members. This study was trying to address the question, why the compliance rates have been so low in communities of Nkozi Sub-county despite the control interventions in place compared to that of Buwama. The findings would of great importance to program implementers in the area and could be used in other similar settings elsewhere in Uganda. Since the study assessed program factors which directly affect the health system, the findings may support decision making processes at all levels by providing relevant information necessary to control other endemic diseases such as Malaria, HIV and intestinal worms. This could help to improve the health of the population.

1.7 Conceptual framework

The dependent variable (compliance with PZQ) is being influenced by three independent variables the social – behavior, individual and program related factors.



In the conceptual framework compliance with PZQ was a dependent variable. It depends on socio-behaviour, individual and program related factors. There were two intervening variables politics and cultural beliefs, which may have influenced adherence to PZQ treatment but no attention was given to the variables by the researcher in the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The purpose of reviewing literature for this study was to obtain relevant information that is available about the research topic. It provides essential background knowledge about similarities and differences between the present study and prior research studies done which are relevant to this topic. In addition it is also a systematic identification, location, scrutiny and summary of related published works to gain information about the research topic (Burns & Grove, 2007). The review has been made according to the research objectives.

2.1 Review of existing literature

2.1.1 Individual factors

Age: In a study conducted in Ethiopia, compliance with praziquantel is influenced by a number of individual factors including age. It increases with increasing adherence to the medicine and reaches its climax at the age of 39 years (Mengistu et al, 2004). The youth are less likely to take the medicine especially the males. In another study which was conducted in Tanzania younger women were more likely to know the prevention and treatment of the infection than the older men and women (Clemmons et al, 2002). In another study conducted in Siera- Leone men of more than 40 years were significantly more likely to have received the treatment with PZQ (Kamara et al 2011)

Employment status: People who are employed are more likely to adhere to the treatment of intestinal schistosomiasis than those who are not, the reason being that the former have a high community status and are more likely to be educated which makes them understand issues on the infection easily (WHO, Personal communication Malava et al 2007.)

Education level: Illiterate populations do not access health care services even when the services are free therefore care must be taken when addressing their concerns (Stockman et al, 2007). Contrary to the study which was conducted in Ethiopia in which education played no role in the participation of communities in treatment campaigns of intestinal schistosomiasis (Legesse et al, 2004). In a study conducted in Tanzania knowledge was found to be increasing with age (Mazigo et al, 2010), and the male have a greater knowledge on the infection and treatment than the female however they tend to have low compliance with PZQ (Kanga et al, 2012). However the level of knowledge on the infection and praziquantel is still very low, in a study conducted in Ethiopia 80% of the respondents asked their major health infections responded that malaria is the common disease and only 2% mentioned Bilharzia

Religion: People of different religious affiliations are reluctant to take tablets distributed by someone of a different religious affiliation; Muslim dominated communities find it easy to take medicine when dispensed by a fellow Muslim CMD/ Community worker, the same goes for other religions (Kloos et al, 1995).

Use of dose poles: The assumption that the dose of PZQ is better determined by the dose pole rather than the weighing scale also affects compliance. Although dose poles have been validated in Uganda and proved to be an effective method of distributing PZQ in endemic areas some

people see it as a contradiction on the standard use of weighing scales to determine dosage. This leaves many community members including health workers doubting the safety and effectiveness of using dose poles (Sousa et al, 2010)

2.1.2 Socio-behaviour factors

Mass Drug Administration is a pro-poor non-discriminatory and equitable intervention which serves all eligible people irrespective of socio-economic status (Mohammed et al, 2008). This provides an opportunity to improve the health of millions of people who harbor the parasites causing schistosomiasis. The strategy to control this disease is to increase access to treatment among eligible populations, high coverage; long-term mass treatment with praziquantel and health education and sensitization (Massa et al, 2009). The drug has long been proved to be safe for mass treatment and no serious side effects even to pregnant and lactating mothers, but its high cost prohibits many people in endemic areas even where it is donated to get it (Hotez and Feriwick, 2009). A similar finding was made in a study of by Doenhoff (2006), in which he suggested that the use of PZQ is safe to all people in the endemic areas, he also found that in order to increase coverage and compliance community participation and acceptance is very important even for sustainability.

Fear for side effects: Community members in endemic areas tend to fear for side effects of the drug praziquantel and albendazole. Although they can cause increased risk of infantile eczema (Ellion et al, 2011), there is a need to counteract all negative rumors on the ability of praziquantel to make males and female infertile as it does with the female schistosomes). In the same study suggestions were made to improve compliance which focuses on the need to

motivate and inform individuals the benefit of MDA compliance versus the direct side effects of the disease. The study recommended the use of community health workers/ community medicine distributors if a higher compliance is to be realized (Francis et al, 2011).

Family members: Family members who are 6+ in one house showed a high level of compliance to MDA according to a study which was conducted in Ethiopia. The reason given was that they tend to discuss fully on the importance of treatment as group better than those who stay few or alone in the house (Mengistu et al, 2004)

Gender: Adolescent boys and girls differ in terms of socio-behaviour. Socio-behaviours influence the decision to have praziquantel; girls are more likely to have the medicine compared to boys when asked by the parents. The boys are more influenced by their peer group members than the girls, they preferred to train their fellow group members and distribute medicine to them (Clemmons et al, 2002).

Men taking decisions: In some families, taking medicine for bilharzias is a dependent on the man. This has influence on the compliance with the treatment whereby women in the rural families wait for their husbands to take a decision on the swallowing of PZQ. This disadvantaged social status of female in Uganda prevents them from actively participating in the treatment campaigns of the infection (Anguzu et al, 2013). Contrary to this, although women are in most cases not involved in decision making, they tend to identify themselves as more susceptible to the infection than the men due to the social activities they do in the contaminated waters such as

washing clothes, digging along contaminated water, washing utensils and drying fish. This socio-behaviour helps them to take the medicines even without men's consent. (Knutson et al, 2011).

Health seeking behavior: Women have a better health seeking behavior than the men. They tend to respond promptly to their health problems by visiting health facilities than the men in the endemic areas. However majority of community members do not seek health services in facilities (Heather et al, 2013)

Mobility of respondents: In some parts there is a massive and seasonal movement of people from one place to another, especially the islanders as they look for fish catches. The movement makes registration of communities difficult and creates inaccurate NTD registers which impact heavily on the compliance rates (Parker and Allen, 2011). This observation is in contrast to another study which noted a moderate accuracy in recording of community members and record keeping by the CMDS at 61% in highly mobile communities (Kabatereine et al, 2006). Movements also occur between town and town or between urban and rural areas (Stensgard et al, 2012)

2.1.3 Program factors

Sensitized and health education: Communities in endemic areas should be able to understand the health implications of having bilharzia, the transmission mode of the infection and the prevention measures including using praziquantel (Rollinsin et al, 2012). Health education should also address issues concerning fear for side effects of the drug praziquantel and albendazole. However another study noted that higher rate of compliance would be secured if

health professionals distribute drugs rather than people elected from the community (WHO, personal communication Malava, 2007). Health education and information has been identified as a crucial accomplishment to MDA campaign, compliance also is related on a high prevalence of schistosomiasis, it serves as an incentive for community participation in the distribution of medicine and supply for MDA. As the disease reduce its intensity it's hard for the CMDs to treat the asymptomatic individuals to swallow tablets (PATH.2008.)

IEC/posters: A study conducted in Ethiopia about compliance and the use of posters and IEC materials, found a non compliance rate 68% due to failure to access IEC materials during MDA campaigns in endemic areas which highlight the need for more education campaign and delivery of EIC materials to appropriate target communities (Mengistu et al, 2004)

CMD trainings: On the issue of attitude to the program several studies have indicated a difference in attitude to the program such as the harmful rumors among men and asking CMDs tricky questions about why they should take the medicine. Majority think that CMDs are not trained enough to handle medicines, therefore CMDs must be empowered enough to answer such questions (Brieger et al, 2011)

Distribution strategy: The distribution strategy is an important factor influencing compliance. CMDs find the house -to- house distribution strategy difficult. Men tend to be absent during the distribution time due to differences in family numbers, hierarchy and structures (Clemmons et al, 2002). CMDs have to visit house to house and then go back in case they don't find all the occupants, this makes them tired especially in island areas where there is a bigger distance

between household. This creates a very big workload yet they are given very little incentives compared to other programmes which facilitate them well like the HIV and Malaria programs (Heather et al, 2013).

A study was conducted and concluded that the more you give CMDs work to do during implementation the less likely to perform and this result in low compliance (Katabarwa et al, 2010). This when compared with the increasing number of community programs take CMDs from their own income generating activities and create a need for money which cannot be given by the program (Ndyomugyenyi et al, 2010).Treatment compliance of 90% can be achieved only if CMDs work within one kilometer from their home and that there is a need to provide them with incentives to sustain their interests and improved compliance among the community members.

Period of MDA: In the same study compliance was affected by the treatment season, in the rainy season some areas are hard to reach to deliver medicine and also CMDs are more engaged in activities which generate money as compared to the little money they receive from the programme. Similarly in a randomized clinical trial on the safety and use of PZQ, it was observed that CMDs were central in the distribution of the medicine safely to the communities and plays a big role in storing of the excess supplies before being delivered to health facilities (Namwanje et el, 2011).This illustrates the importance of integrating NDTs with other programs to increase coverage and compliance and sustainability (Brooker et al, 2007)

Supervision and monitoring MDA: A study which was conducted in Uganda acknowledged that monitoring and supervision is still a problem at all levels due to physical accessibility and funding. It suggested the identification and training of community members to help in

monitoring and supervision of the distribution of medicine in the effort to increase access to praziquantel in all eligible populations (Kabatereine et al, 2010).

Integration: At all levels integration is still problematic, some programs want to integrate with the NTD program at the implementation level yet integration should be in terms of resources, structures and planning process. For example there has been a problem to integrate child days plus program with NTDs in terms of resources, planning and time of implementations. This ha gravely impacted on the compliance rates of praziquantel (Utzenger et al, 2009, Rollinson et al, 2012).

Despite the challenges, Mass treatment intervention is the main strategy for the control of intestinal schistosomiasisand all efforts aimed at increasing access to treatment increase the compliance rate with praziquantel among communities in the endemic areas (Hotez et al, 2010)

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter describes the methods which were used. It includes the study design, inclusion and exclusion criteria, determination of sample size, and sampling procedures, data collection techniques, quality control of instruments, data management and analysis, ethical considerations approval process and dissemination of results.

3.1 Study area

The study was conducted in Buwama and Nkozi Sub-counties in Mpigi district between August 1st and 28th, 2014. The study area is found in Southwest Uganda, which is located between 64 - 80 kilometers South West of Kampala along Masaka road. The area has a range of altitude between 900 and 1000 meters above sea level with annual rainfall of about 1728millimeters. Lake Victoria is responsible for providing a breeding site for the vector snails and the prevalence of the infection is estimated to be close to 30%, (Kabatereine et al, 2011). Major economic activities include fishing, timber, charcoal making and farming. The area has an estimated 46782 people.

As part of the control program, annual mass treatment was started in the area in 2006 by the neglected tropical control program of the MOH with assistance from the development partners such as USAID, RTI, Sight saver, SCI and the carter center to date. In Mpigi district the program is implemented through the coordination of Mpigi district vector control officer. The Sub-counties were conveniently selected basing on the variations in the reported compliance

rates, occupation, village sizes and accessibility to urban areas. There were 7 health centers and only one PNFP hospital (DHO office). Drug distribution is being carried out by CMDs under the supervision and technical assistance of health extension workers, nurses and community supervisors.

3.2Study design

A community based cross-sectional study was conducted in four selected parishes; two from Buwama and two from Nkozi in Mpigi district as per the May 2014 treatment compliance rates in the area using the following criteria:

i. One parish with >63% in Buwama (higher above the average)
ii. One parish with < 50% in Buwama (below the average)
iii. One parish with > 13% in Nkozi (above average in the sub-county)
iv. One parish with < 8% in Nkozi (below the average)

This design was used because it gives a full account of the community's compliance with the medicine where the variations in rates of different communities were considered. However other factors such as occupation, village sizes and accessibility to urban areas were considered in selecting the Parishes.

From these selected parishes one village was selected by simple random method. A total of 76 households were selected from Buwama and 88 from Nkozi using the calculated sample sizes. Quantitative data was collected using structured questionnaires and the qualitative data was collected using key informant interviews.

3.3Study population and study participants

The study population comprised of all people who were residents of the 15 endemic parishes of Buwama and Nkozi sub-counties. Community members between the age of 6-76 years who consented and were eligible to the treatment were recruited as participants in the study. The reason for this is that treatment of intestinal schistosomiasis starts at the age of five years.

3.4 Eligibility criteria

3.4.1 Inclusion criteria

To be included in the study one must have participated in the treatment interventions with praziquantel at least once from 2007. S/he must be a resident of the village in the age range of 6-76 years and be of sound mind and be able to give consent.

3.4.2 Exclusion criteria

People who never participated in the treatment interventions with PZQ, like visitors and those who have serious health conditions such as terminal illness or at palliative care, children below 5 years and school children were excluded from the study.

3.5 Determination of sample size

The overall sample size was obtained using Keish and Lesley's formula (1965) as the population of the endemic area is beyond 10,000 and the main outcomes can be reported as proportions (Mugenda and Mugenda,2003). Thus the statistical formula was chosen basing on the baseline data on the compliance rates available at the district in the office of the DVCO and biostatistician

Given by $n = \frac{Z^2PQ}{D^2}$

Where n=Desired sample size

Z = Z score responding to 95% confidential limits that is 1.96 P = Expected compliance of MDA. In this case compliance of intestinal schistosomiasis is assumed to be 62% in Buwama = 0.62, Q = 1-P which is I-0.62=0.38

D = Degree of precision 5%=0.05.

Using the above formula: $n = \frac{1.96^2 \times 0.62 \times 0.38}{0.05^2} = 362$ respondents for Buwama.

Using the compliance of Nkozi as 9.2% = P = 0.092, Q = 0.908 and applying the same formula above, the sample size in Nkozi was 129 respondents. Therefore a total of 491 respondents were recruited in the study.

3.6 Sampling unit

The sampling unit was the household.

3.7. Variables and indicators

Table 1: Independent variables and indicators

i. Socio-behaviour factors • People in the family • Gender specific barriers • Priority diseases in the community • Acceptability of the drug • Health seeking behaviour	**Indicators** • Number of people in the family • Number of gender specific barriers identified • Priority diseases identified in the community • Number of PZQ tablets swallowed • Number of people visiting health facilities in the area
ii. Individual factors • Employment status • Knowledge about the disease • Religion of CMDs	• Number of people employed in the area • Number of Individuals who will know the vector, causes and the drug

• Timing of treatment • Gender differences • Fear for side effects • Selection of CMDs • Use of dose pole. **iii. Program factors** • Lack of adequate health education • Distribution strategy of PZQ • Attitude toward programme • Inadequate training of CMDs • CMDs workload and attrition • Inaccurate NTD registers	• Number of people mentioning a particular months • Number of gender differences identified • Number of respondents who participated in CMDs selections identified • Number of people preferring the use of dose pole • Number of people attended sensitization meetings • Number of distribution strategies mentioned by respondents • Number of CMDS who can answer correctly questions from community members • Number of challenges during MDA mentioned by CMDs • Number of CMDs who can keep accurate NTD register.

3.7.2 Dependent variable

Table 2: Dependent variable and indicators

Variable	**Indicator**
Compliance with Praziquantel	Number of people who have ever taken the medicine during MDA in the area.

3.8 Sampling technique / procedure

Two parishes were selected in each sub-county using the compliance rates. From the four parishes four village were selected from a list of names of the villages found in a parish by simple random method. At the village level a sample frame of 3 households was employed to

select the 4th household in a systematic manner (Nirgude et al, 2011). Community members from the selected households were interviewed, preferably a household head, child and any other adult at home. Three respondents were selected from each homestead and they were subjected to an oral interview. Those who could read and write were given an opportunity to answer the questions on the questionnaire themselves.

3.9 Data collection instruments and tools

Quantitative data was collected using pre-designed and structured questionnaire. The questionnaires were developed by first writing down, the purpose of the research, the objectives of the study, conceptual framework and then the research questions. Questions were then developed and organized into a questionnaire where individual questions were grouped into categories in a logical manner.

The research assistants were trained about the data collection tool, how to record the information using the codes given, methods of data collection, how to ask questions and how to check for missing information at the end of the questionnaire. The questionnaire was pretested to check for completeness of validity and reliability, validity and reliability of instruments (questionnaires) were ascertained by discussing it with the supervisor until go ahead to pretest was given by the supervisor. Pretest was done on 16 community members from 4 communities which did not participate in the study but found in the same endemic area, two communities from Buwama and the other two from Nkozi sub counties. Key informant interviews among CMDs and community supervisor were held purposely to support the finding of the quantitative data.

3.10 Plans for analysis of data.

Qualitative data was coded and encoded using SPSS version 16.0 software. It was cleaned and checked for outliers, inconsistencies and missing values and later analysed at a univariate level. Further analysis was performed to determine the socio-demographic characteristics which were significant at bivariate level. Odds ratio and 95% confidence interval (CI) were used to measure the strength of association between the potential factors and the outcome at a multivariate level. Stepwise logistic regression backward likelihood methods were used to control possible confounders and to identify independent factors associated with PZQ compliance. Finally qualitative data was analysed using conceptual content analysis whereby the responses from the key informants were analysed to back up the quantitative findings.

3.11 Quality control

Training of research assistants was conducted to make sure that correct, complete and timely data is collected. The questionnaire was pretested to check for completeness of validity and reliability. Pre-testing was conducted on 20 community members from the same endemic area in villages which were not selected for the study. There was cross checking of filled questionnaire to control bias which could be introduced by the researcher assistants during data collection

3.12 Plans for dissemination of findings

The study findings shall be shared and disseminated to the institute of health policy and management where students and other scholars may benefit from the findings. I also intend to make a copy and submit it to the DHO Mpigi and Buwama H/C 111. A manuscript will be submitted for publication in journals such as PLOS/medicine and parasite & vectors which are known to publish information on parasitology and neglected tropical diseases.

Lastly the researcher plans to conduct meetings and disseminate the findings to the district stakeholders including the CMDs and community members.

3.13 Ethical consideration

Permission to conduct the study was obtained from the Institute of health policy and management of the international health sciences university. At district level it was obtained from the CAO Mpigi, DHO and from community's local council leaders.

To get informed consent from the study participant interviewers saluted participants in the simplest language that the study participant understood and later explain the purpose of the study, the procedures and benefits involved, why they have been selected for the study. They also mentioned the time for each interview of 15-25 minutes face to face interview in an open and isolated place to ensure confidentiality and privacy. Finally they were assured that the information obtained shall be purely for academic use and that they were free to withdraw from the research at any time in case they wished to. At the end they were invited to ask questions and clarifications made before they consent and enrolled in the study. The minors were also given full autonomy as participants and their views were equally considered, the study did not discriminate participants according to religious beliefs and gender. Lastly the study refrained from any bias that might have arisen as a result of personal judgment, opinion or feeling during the research process.

3.14 Limitations of the study

It is possible that community members may have provided socially desirable answers which may not give the right response. The study was supposed to be conducted in less than four weeks after the treatment round in May 2014 to avoid recall bias but it was done in August 2014.

It is possible that some bias was introduced during the selection of parishes, villages and participants and the limited number of villages which were sampled may not allow generalization of findings to other parts of Uganda.

CHAPTER FOUR

RESULTS

4.0 Introduction

The first section of the Chapter describes the sample according to the socio-demographic factors vital in the analysis of factors influencing compliance with praziquantel for the control of intestinal schistosomiasis in the two endemic communities of Buwama and Nkozi. A descriptive analysis was performed in section two using chi-square to test for the association between the independent and dependent variables. Factors significant at P= 0.05 were analyzed further in section three to assess their importance at a multivariate level using the binary logistic model

4.1 The demographic characteristics of the respondents

The results of the demographic characteristics were presented in table 3.They helped me comprehend the composition and nature of the respondents who were involved in the study. A total of 491 community members were recruited in the study, the males were 294 (59.9%) and the females 197 (40.1%)**.** Majority of the respondents were in the age group of 26-35 (61.1%) which represents the adults, 16-25 (31.2%) representing the youth and 6-15 (7.7%) representing the teenagers.

The main religious affiliations among the respondents were Catholics with 274 (55.8%), followed by the Anglicans 121 (24.6%) and then 96 (19.6%) for the Pentecostals. Most of them live 1-3 people in a household 207 (42.2%), followed by 4-6 people 157(32.0%) and those who stay more than 7 people were few 127 (25.9%). Majority of the respondents reported primary level education 291 (59, secondary education were 156 (31.8%) and those who stopped in tertiary or never went to school were 9 (1.8%) and 35 (7.1%) respectively. Those who had something to do either temporally or permanently were the majority represented with 393 (80.0%) and few were unemployed 98 (20.0%). Those who stayed for more than ten years in the same village were the majority 300 (61.1%), followed by new comers in the villages between 1-3 years 120 (24.4%) and those between 4-6 years were 70 (14.5%)

Table 3: Demographic characteristic of the respondents

Variable	**Frequency**	**Percentage**
Sex		
Female	197	40.1
Male	294	59.9
Total	**491**	**100.0**
Age groups		
6-15	38	7.7

16-25	153	31.2
26-35	300	61.1
Total	**491**	**100.0**
Religion of respondents		
Catholic	274	55.8
Pentecostal	96	19.6
Protestant	121	24.6
Total	**491**	**100.0**
Family size		
1-3	207	42.2
4-6	157	32.0
7-9	127	25,9
Total	**491**	**100.0**
Education levels		
No education	35	7.1
Primary	291	59.3
Secondary	156	31.8
Tertiary	9	1.8
Total	**491**	**100.0**
Employment status		
Employed	393	80.0
Not employed	98	20.0
Total	**491**	**100.0**
Duration of stay in the village	**Frequency**	**Percentage**
1-3 years	120	24.4
4-6	71	14.5
7-9	300	61.1
Total	**491**	**100.0**

Respondents who said that they have lived for more than ten years in the same village were the majority 300 (61.1%), followed by new comers in the villages between 1-3 years 120(24.4%) and those between 4-6 years were 70 (14.5%)

4.1.2 The demographic factors influencing compliance with praziquantel

4.1.2.1 Compliance with prazquantel in Buwama and Nkozi sub Counties

Among respondents who were compliant with the medicine for bilharzias majority were from Buwama 203(73.0%) and 75(27.0%) from Nkozi sub-Counties (table 4). There is no statistically

significant difference in compliance with praziquantel for the treatment of bilharzia between the two sub-counties ($\chi 2$= 0.165, p-value 0.685).

Table 4: Compliance with praziquantel in Buwama and Nkozi sub-Counties

Option	Buwama	Nkozi	Totals	$\chi 2$	P-value
Yes	203(73.0%)	75(27.0%)	278	0.165	0.685
No	159(74.6%)	54(25.4%)	213		
Totals	**362**	**129**	**N= 491**		

Level of significance is at 95% C.I = 0.05

4.1.2.2 Gender of respondents and compliance with praziquantel

The proportion of male who ever swallowed the medicine in Buwama was found to be 122 (60.1%) as compared to the female 81(39.9%) and it was60(80.0%) in Nkozi as compared to the female 15 (20.0%), table 5. Highest compliance rates were observed in the males of Nkozi than in Buwama. Overall the males are more compliant to the treatment with PZQ than the females. There was a statistically significant difference in the compliance with PZQ in Buwama between the male and female ($\chi 2$ = 6.008, p-value = 0.014) but no statistically significant difference was observed in Nkozi sub county ($\chi 2$ =2.219, p-value = 0.136).

Table 5: Comparison of sex and compliance with praziquantel

Sub-County	Outcome variable	Sex		Total	$\chi 2$	P-value
		Female	Male			
Buwama	Yes	81(39.9%)	122(60.1%)	203	6.008	0.014
	No	84(52.8%)	75(47.2%)	159		
Nkozi	Yes	15(20.0%)	60(80.0%)	75	2.219	0.136
	No	17(31.5%)	37(68.5%)	54		

Level of significance is at 95% C.I = 0.05

4.1.2.2 Age of respondents and compliance with praziquantel

When different age groups were compared highest compliance with PZQ was observed in the adult group 114(56.2%) in Buwama Sub-county, followed by the youth age group of 16-25, 66(32.5%) and then the teenagers 23(11.3%), similar trend was observed in Nkozi Sub-county where the adults were more compliant to the treatment than any other group 50(66.7%), table 6. There is no statistically significant difference in the compliance rates with praziquantel in Buwama and Nkozi when compared together respectively **(**$\chi 2$=4.820,P= 0.090 and $\chi 2$= 0.003, p =0.998), thus interventions to increase compliance rate should not target Age as it is not associated with compliance of the medicine.

Table 6: Age groups and compliance with praziquantel

Sub-County	**Outcome variable**	**Age groups**			**Total**	**$\chi 2$**	**p-value**
		6-15	**16-25**	**26-35+**			
Buwama	Yes	23(11.3%)	66(32.5%)	114(56.2%)	203	4.820	0.090
	No	8(5.0%)	51(32.1%)	100(62.9%)	159		
Nkozi	Yes	4(5.3%)	21(28.0%)	50(66.7%)	75	0.003	0.998
	No	3(5.6%)	15(27.8%)	36(66.7%)	54		

Level of significance is at 95% C.I = 0.05

4.1.2.3 Religious affiliations

In Buwama the Catholics were more compliant with praziquantel than any other religion 114(56.2%), followed by the Anglicans 52 (25.6%) and then the Pentecostals with a compliance

of 37(18.2%). In Nkozi, the Catholics have a compliance rate of 45(60.0%), followed by the Pentecostals with 21 (28.0%) and then the protestants were the least with 9 (12.0%), table 7. Overall the Catholics were more compliant in both sub Counties compared to other religions, however there is no statistically significant difference between the compliance rates in Buwama and Nkozi sub counties with regard to religious affiliations ($\chi2$= 1.309, p= 0.520 and $\chi2$= 1.709, p= 0.425) respectively.

Table 7: Religious and compliance with praziquantel

Sub County	**Outcome variable**	**Religions**			**Total**	**$\chi2$**	**P**
Buwama		**Catholics**	**Pentecostals**	**Protestants**			
	Yes	114(56.2%)	37(18.2%)	52(25.6%)	203	1.309	0.520
	No	85(53.5%)	25(15.7%)	49(30.8%)	159		
	Total	199(55.0%)	62(17.1%)	101(27.9%)	362		
Nkozi	Yes	45(60.0%)	21(28.0%)	9(12.0%)	75	1.709	0.425
	No	30(56.6%)	13(24.1%)	11(20.4%)	54		
	Total	75(58.1)	34(26.4%)	20(15.5%)	129		

Level of significance is at 95% C.I = 0.05

4.1. 2.4 Family members in a homestead

When the number of family members were analysed against the outcome, the highest compliance rates were obtained from families with numbers between one and three members in both sub-counties 77 (37.9%) and 28 (37.3%) respectively, table 8. Compliance decrease with increase in family number, however there was no statistically significant difference in the compliance rates due to family members in the two sub Counties of Buwama and Nkozi ($\chi2$= 4.646,p = 0.098 and$\chi2$= 1.707, p=0.425) respectively.

Table 8: Number of family members and the compliance with PZQ

Sub-County	**Outcome variable**	**Family numbers**	**Total**	**$\chi2$**	**P**

Buwama		**1-3**	**4-6**	**+7**			
	Yes	77(37.9%)	65(32.0%)	61(30.0%)	203	4.646	0.098
	No	76(47.8%)	49(30.8%)	34(21.4%)	159		
Nkozi	Yes	28(37.3%)	26(34.7%)	21(28.0%)	75	1.709	0.425
	No	26(48.1%)	17(31.5%)	11(20.4%)	54		

Level of significance is at 95% C.I = 0.05

4.1.2.5 Education levels and compliance with praziquantel

Highest compliance rates in Buwama were obtained from those who had never went to school or reached the primary level of education 133(65.5%), followed by those who reached secondary level 64(31.5%) and those with tertiary education were the least 6(3.0%). In Nkozi highest compliance rate were also from the primary level of education 56(74.7%), followed by the secondary level 18(24.0%) and tertiary level 1(1.3%), table 9. Overall there is no statistically significant difference in the compliance rates with PZQ between the different education levels in Buwama and Nkozi Sub-counties ($\chi 2$= 3.223, P = 0.359 and $\chi 2$= 4.647, p=0.200) respectively.

Table 9: Education levels and compliance with praziquantel

sub-County	**Outcome variable**	**Education levels**			**Total**	$\chi 2$	**P**
Buwama		**Primary**	**secondary**	**tertiary**			
	Yes	133(65.5%)	64(31.5%)	6(3.0%)	203	3.223	0.359
	No	100(62.9%)	57(35.8%)	2(1.3%)	159		
Nkozi	Yes	56(74.7%)	18(24.0%)	1(1.3%)	75	4.647	0.200
	No	37(68.5%)	17(31.5%)	0(0.0%)	54		

Level of significance is at 95% C.I = 0.05

4.1.2.6 Employment and compliance with prazquantel

Majority of the respondents with the highest compliance rate in Buwama were employed 152 (74.9%), the rest were unemployed. Similar finding were also obtained from Nkozi where the

employed people had a higher compliance rate with PZQ than those who were unemployed 64 (85.3%), table 10. The employed people in Nkozi adhered more to the treatment than those in Buwama, however a chi-square test revealed no statistically significant difference in the compliance rates between the employed and unemployed in Buwama and Nkozi sub Counties ($\chi2$= 2.009, p = 0.156 and$\chi2$= 0.347, P= 0.556)respectively.

Table 10: Employment status and the compliance rates with PZQ

Subcounty	**Outcome variable**	**Employment status**		**Total**	**$\chi2$**	**P**
Buwama		**Employed**	**Unemployed**			
	Yes	152(74.9%)	51(25.1%)	203	2.009	0.156
	No	129(81.1%)	30(18.9%)	159		
Nkozi	Yes	64(85.3%)	11(14.7%)	75	0.347	0.556
	No	48(88.9%)	6(11.1%)	54		

Level of significance is at 95% C.I = 0.05

4.1.2.7 Duration of stay in the same village and compliance with praziquantel

Respondents who had stayed for more than seven years in the same village were having higher compliance rates in Buwama and Nkozi Sub-counties 137 (67.5%) and 59 (78.7%) respectively compared to those who stayed for a short period table 11. When duration of stay in the same village was compared in the two sub-counties, analysis with the outcome variable presented a statically significant difference in the compliance rates between the villages of Buwama ($\chi2$= 22.528, p= 0.000) but no such a difference was observed in Nkozi ($\chi2$= 4.732, p= 0.094).

Table 11: Duration of stay in the same village and compliance with praziquantel

Subcounty	**Outcome variable**	**Duration of stay in same village(years)**			**Total**	**$\chi2$**	**P**
Buwama		**1-3**	**4-6**	**+7**			
	Yes	36(17.7%)	30(14.8%)	137(67.5%)	203	22.528	0.000

	No	61(38.4%)	27(17.0%)	71(44.7%)	159		
Nkozi	Yes	10(13.3%)	6(8.0%)	59(78.7%)	75	4.732	0.094
	No	13(24.1%)	8(14.8%)	33(61.1%)	54		

Level of significance is at 95% C.I = 0.05

4.2 Independent variables (Individual, socio-behaviour and program factors) Chi-square analysis at 95% confidence interval.

4.2.1 Respondents who ever hard about Bilharzia

Majority of the respondents know the disease bilharziasis and they have a high compliance rate in both sub Counties as shown in the table below. However the compliance rates were higher in Nkozi compared to Buwama Sub-county 74 (98.7%) and 198(97.5%) respectively, table 12. There was a strong association between the outcome variable and knowing bilharzia in Buwama Sub-county ($\chi 2$= 11.758, p= 0.01). However this difference do not exist in Nkozi sub County ($\chi 2$= 3.109, p= 0.078).

Table 12: Compliance rate among respondents who ever had about bilharzia

Subcounty	**Outcome variable**	**Do you know bilharzia**		**Total**	**$\chi 2$**	**P**
Buwama		**Yes**	**No**			
	Yes	198(97.5%)	5(2.5%)	203	11.758	0.01
	No	141(88.7%)	18(11.3%)	159		
Nkozi	Yes	74(98.7%)	1(1.3%)	75	3.109	0.078
	No	50(92.6%)	4(7.4%)	54		

Level of significance is at 95% C.I = 0.05

4.2.2 Causes of bilharzia and compliance with praziquantel

Majority of the respondents in the two Sub-counties who swallowed PZQ reported that they know the causes of the disease. The respondents who complied with the treatment in Buwama were much aware of the causes of the infection than those in Nkozi 161(79.3%) Vs 56(74.7%) and there was a very strong association between knowing the causes of bilharzia and the compliance with its medicine in the two sub Counties respectively ($\chi 2$= 29.824 and 25.821, p = 0.000) as shown in table 13.

Table 13: Caused of bilharzia and compliance with praziquantel

Sub County	Outcome variable	Causes of bilharzias		Total	$\chi 2$	P
		Yes	No			
Buwama	Yes	161(79.3%)	42(20.7%)	203	29.824	0.000
	No	83(52.2%)	76(47.8%)	159		
	Yes	56(74.7%)	19(25.3%)	75	25.821	0.000
Nkozi	No	16(29.6%)	38(70.4%)	54		

Level of significance is at 95% C.I = 0.05

4.2.3 Vector of bilharzia and compliance with praziquantel

Majority of the respondents in Buwama who know the vector for bilharzias swallowed the medicine 106(52.2%) while in Nkozi they were 34(45.3%) as shown in table 14. Higher compliance rate with PZQ were observed in Buwama than in Nkozi among those who know the vector for the infection. The results show a strong statistically significant difference in the compliance rates among those who know the vector and those who do not know in Buwama and Nkozi Sub-counties ($\chi 2$= 51.291, p= 0.000 and$\chi 2$= 13.373, p= 0.001) respectively.

Table 14: Vector of bilharzias and compliance with praziquantel

Sub	Outcome	Vector of bilharzias	Total	$\chi 2$	P

County	variable					
Buwama		**Fresh water snails**	**Do not know**			
	Yes	106(52.2%)	97(47.8%)	203		0.000
	No	27(17.0%)	132(83.0%)	159	51.291	
Nkozi	Yes	34(45.3%)	41(54.7%)	75		0.002
	No	10(18.5%)	44(81.5%)	54	13.373	

Level of significance is at 95% C.I = 0.05

4.2.4 How do we get bilharzia and compliance with praziquantel

Majority of the respondents who were aware of the way we get bilharzia 133(65.5%) swallowed PZQ in Buwama sub-county as compared to 70 (34.5%) who do not take the medicine as shown in table 15. In Nkozi the compliance rates were lower compared to that of Buwama 48(64.0%). There was a strong association between the compliance rates with PZQ between those who know how we get the infection and those who don't know in Buwama and Nkozi sub Counties ($\chi 2$= 25.241, p= 0.000 and$\chi 2$= 7.957, P= 0.005).

Table 15; Respondents who know how we get bilharzia and compliance with praziquantel

Sub County	Outcome variable	How do we get bilharzias		Total	$\chi 2$	P
Buwama		**Contact with contaminated water**	**Do not know**			
	Yes	133(65.5%)	70(34.5%)	203	25.241	0.000
	No	62(39.0%)	97(61.0%)	159		
Nkozi	Yes	48(64.0%)	27(36.0%)	75	7.957	0.005
	No	21(38.9%)	33(61.1%)	54		

Level of significance is at 95% C.I = 0.05

4.2.5 Do you know the medicine for bilharzia and compliance with praziquantel

Respondents who are taking the medicine in Buwama 191 (94.1%) were aware that they were taking the medicine for bilharzia. In Nkozi the compliance rate is slightly higher 72(96.0%), table 16. However when a chi- square test was performed a very strong association was observed between the dependent variable and knowing the medicine for the infection in both Buwama and Nkozi Sub-counties ($\chi 2$= 1.807, P= 0.000 and $\chi 2$= 63.786, p= 0.000) respectively.

Table 16: Respondents who know the medicine for bilharzias and compliance with praziquantel

Sub County	Outcome variable	Medicine for bilharzia		Total	$\chi 2$	P
Buwama		Yes	No			
	Yes	191(94.1%)	12(5.9%)	203	1.807	0.000
	No	41(25.8%)	118(74.2%)	159		
Nkozi	Yes	72(96.0%)	3(4.0%)	75	63.786	0.000
	No	16(29.6%)	38(70.4%)	54		

Level of significance is at 95% C.I = 0.05

4.2.6 Description of how it looks and compliance with praziquantel

There is a high compliance rate among those who can describe how the medicine looks in Buwama 173(85.2%). In Nkozi the compliance rate is slightly higher 67(89.3%) as shown in table 17. However when a chi- square test was performed to establish the association between compliance with PZQ and the description of the drug, a statistically strong association occurred in both Buwama and Nkozi sub Counties**(**$\chi 2$= 1.484, p= 0.000 and $\chi 2$= 59.571, P = 0.000) respectively.

Table 17: Respondents description of the medicine for bilharzia and compliance with praziquantel

Sub County	Outcome variable	Description of PZQ		Total	$\chi 2$	P
		Yes	No			
Buwama	Yes	173(85.2%)	30(14.8%)	203	1.484	0.000
	No	34(21.4%)	125(78.6%)	159		
Nkozi	Yes	67(89.3%)	8(10.7%)	75	59.571	0.000
	No	12(22.2%)	42(77.8%)	54		

Level of significance is at 95% C.I = 0.05

4.2.7 Reasons as to why respondents stop taking the medicine and compliance with prazpquantel.

Respondents who swallowed the drug in Buwamasaid that fear for the smell of PZQ was the major reason which stops them from taking the medicine 103 (50.7%), followed by those who fail to access the drug with 69 (34.0%) and then lastly those who fear the size of the tablet 18 (15.3%), table 18. In Nkozi majority were those who lack access to the medicine 51 (68.0%), followed by those who fear the smell of the tablet 22 (29.3%) and those who fear the size of the tablet were the least 2 (2.7%. There was an observed statistically strong association between the outcome variable and the reasons which cause fear for taking the drug in the two Sub-counties ($\chi 2$=19.255, p = 0.000 and $\chi 2$= 25.288, p= 0.000) respectively.

Table 18: Reasons as to why respondents stop taking the medicine and compliance with praziquantel

Sub-county	Outcome variable	Reason for stopping drug			Total	$\chi 2$	P
Buwama		Size of PZQ	Smell	Access			

	Yes No	31(15.3) 17(10.7%0	103(50.7%) 116(73.0%)	69(34.0%) 26(16.4%)	203 159	19.255	0.000
Nkozi	Yes No	2(2.7%0 13(24.1%)	22(29.3%) 26(48.1%)	51(68.0%) 15(27.8%)	75 54	25.288	0.000

Level of significance is at 95% C.I = 0.05

4.2.8 Selection of CMDs and compliance with praziquantel

Out of those who took PZQ in Buwama the majority never participated in the selection of CMDs/VHTs in their villages 143 (70.4%), table 19. In Nkozi respondents who never participated in the selection exercise of CMDs/ VHTs in their villages were very low compared to Buwama 4(5.3%). Overall there is a statistically strong association between CMD selection and compliance with PZQ between Buwama and Nkozi Sub-counties ($\chi 2$= 14.929, P=0.000 and $\chi 2$= 5.641, P= 0.018) respectively.

Table 19: Selection of CMDs and compliance with praziquantel

SubCounty	**Outcome variable**	**Selection of CMDs**		**Total**	**$\chi 2$**	**P**
Buwama		**Yes**	**No**			
	Yes No	60(29.6%) 20(12.6%)	143(70.4%) 139(87.4%)	203 159	14.929	0.000
Nkozi	Yes No	4(5.3%) 10(18.5%)	71(94.7%) 44(81.5%)	75 54	5.641	0.018

Level of significance is at 95% C.I = 0.05

4.2.9 Religious affiliations of respondents and CMDs and compliance with praziquantel

Among those who were compliant with the treatment of PZQ in Buwama the majority do not have the same religious affiliations with the CMD in their village 88(43.3%), this proportion is followed by those who share religion with CMDs 82(40.4%) and the rest do not know the religion of their CMDs 33(16.3%), table 20. In Nkozi, a larger number of respondents did not have the same religious affiliation with the village CMD 39(52.0%), followed by those who have the same religion with CMD 20(26.7%) and those who do not know if they share religion with CMD were the least 16(21.3%). There is a statistically significant difference between the outcome variable and the religious affiliations between respondents and CMDs in Buwama, however no statistically significant difference was observed in Nkozi sub County ($\chi 2$= 13.429, p= 0.001 and $\chi 2$= 1.634, p= 0.442) respectively.

Table 20: Religious affiliations of respondents and the CMDs and compliance with praziquantel

Sub County	**Outcome variable**	**Same religion with CMD**			**Total**	**$\chi 2$**	**P**
Buwama		**Yes**	**No**	**Don't know**			
	Yes	82(40.4%)	88(43.3%)	33(16.3%)	203	13.429	0.001
	No	52(32.7%)	55(34.6%)	52(32.7%)	159		
Nkozi	Yes	20(26.7%)	39(52.0%)	16(21.3%)	75	1.634	0.442
	No	12(22.2%)	34(63.0%)	8(14.8%)	54		

Level of significance is at 95% C.I = 0.05

4.2.10 Dose pole use and compliance with praziquantel

Majority of the respondents who adhered to the treatment in Buwama acknowledged that dose poles are better to use than the weighing scale during the treatment of bilharzia 88(43.3%), however a bigger proportion also preferred weighing scales 55(27.1%) and the rest do not know which is better 60(29.6%), table 21. Similar trends were observed in Nkozi where a bigger proportion preferred the weighing scale 39(52.0%) and those who don't know 8(10.7%). There was a statistically significant difference in the compliance rates with PZQ and the use of a dose pole for the treatment of the disease among the respondents of Buwama ($\chi 2$= 83.091, p= 0.001) but no such an association was observed in Nkozi sub-county ($\chi 2$= 3.293, p=0.193).

Table 21: Dose pole Vs weighing scale and compliance with praziquantel

sub County	**Outcome variable**	**Dose pole better**			**Total**	**$\chi 2$**	**P**
Buwama		**Yes**	**No**	**Don't know**			
	Yes	88(43.3%)	55(27.1%)	60(29.6%)	203	83.091	0.001
	No	17(10.7%)	19(11.9%)	123(77.4%)	159		
Nkozi	Yes	28(37.3%)	39(52.0%)	8(10.7%)	75	3.293	0.193
	No	13(24.1%)	31(57.4%)	10(18.5%)	54		

Level of significance is at 95% C.I = 0.05

4.2.11 Reasons why dose poles were considered to be better and compliance with praziquantel

In both sub-counties a bigger proportion believe that dose pole can be used easily by the CMDs better than the weighing scale which needs much training 41(45.6%) and 15(55.6%) in Buwama

and Nkozi, followed by those who think that dose poles gives results quickly compared to the weighing scale 46 (51.1%) and 10 (37.0%), table 22. Those who don't know have a reason but just felt comfortable with it 3 (3.3%) and 2(7.4%) respectively. In both sub-counties there was no statistically significant difference in the compliance rates among those who prefer the dose pole for the treatment of schistosomiasis ($\chi 2$= 5.082, p= 0.079 and$\chi 2$= 3.820, p=0.191) in Buwama and Nkozi respectively.

Table 22: Reasons why dose poles were better and compliance with praziquantel

sub County	**Outcome variable**	**If yes (reasons)**			**Total**	**$\chi 2$**	**P**
Buwama		**Fast measurements**	**Easy use (CMDs)**	**No reason**			
	Yes	46(51.1%)	41(45.6%)	3(3.3%)	90	5.083	0.079
	No	8(44.4%)	7(38.9%)	3(16.7%)	18		
Nkozi	Yes	10(37.0%)	15(55.6%)	2(7.4%)	27	3.820	0.191
	No	7(50.0%)	4(28.6%)	3(21.4%)	14		

Level of significance is at 95% C.I = 0.05

4.2.12 Best months for MDA and compliance with praziquantel

In Buwama majority of the respondents preferred to be given medicine between the months of September to December according to the compliance rates 73(36.0%), followed by May to August 63(31.0%), January to April 24(11.8%), those who do not know 40(19.7%) and 3(1.5%) preferred through the year as shown in table 23. There was a statistically significant difference between the suggested period of MDA and the compliance rates with PZQ in the sub County ($\chi 2$= 43.767, p= 0.000). In Nkozi, the biggest proportion do not know 28 (37.3%), followed by

those who prefer Sept to Dec 21 (28.0%), May to August 17 (22.7%), January to April 8 (10.7%) and those who prefer to be given medicine through the year 1(1.3%). There was no statistically significant difference between the suggested period of MDA and the compliance rates with PZQ in Nkozi sub County ($\chi 2$= 2.877, p= 0.579).

Table 23: Best months for MDA and compliance with praziquantel

Subcounty	**Outcome variable**	**Best MDA months**					**Total**	**$\chi 2$**	**P**
Buwama		**Jan-April**	**May-Aug**	**Sep-Dec**	**whole year**	**Do not know**			
	Yes	24(11.8%)	63(31.0%)	73(36.0%)	3(1.5%)	40(19.7%)	203	43.767	0.000
	No	13(8.2%)	32(20.1%)	28(17.6%)	3(1.9%)	83(52.2%)	159		
Nkozi	Yes	8(10.7%)	17(22.7%)	21(28.0%)	1(1.3%)	28(37.3%)	75	2.877	0.579
	No	5(9.3%)	10(18.5%)	22(40.7%)	0(0.0%)	17(31.5%)	54		

Level of significance is at 95% C.I = 0.05

4.2.13 Health seeking behavior and compliance with praziquantel

In Buwama a bigger proportion of respondents seek health care once in a year 36(35.5%), those who do not visit 72(27.1%), twice in year 23(17.7%) and three times a year17 (11.3%) and more than 4 times 55(8.4%) as shown in table 24.There was no statically significant difference between the number of visits and the compliance rates with PZQ in the sub county ($\chi 2$=2.024, p =0.731). In Nkozi, higher proportions were observed in those who make three visits a year 6(28.0%), followed by those who visit once 17(24.0%), twice 21(22.7%), those who don't visit at all 18(17.3%) and those who visit more than four times were the least 13(8.0%). There was no

statistically significant difference in the number of visits and the outcome variable in Nkozi sub counties ($\chi 2$= 6.477, p=0.166).

Table 24: Number of visits in a year to the nearby health facilities and compliance with praziquantel

Sub county	**Outcome variable**	**Visits in a year**					**Total**	**$\chi 2$**	**P**
		One	**Two**	**Three**	**+4 visits**	**Don't visit**			
Buwama	Yes	36(35.5%)	23(17.7%)	17(11.3%)	55(8.4%)	72(27.1%)	203	2.024	0.731
	No	23(39.0%)	20(14.5%)	17(12.6%)	37(10.7%)	62(23.3%)	159		
Nkozi	Yes	17(24.0%)	21(22.7%)	6(28.0%)	13(8.0%)	18(17.3%)	75	6.477	0.166
	No	18(35.2%)	10(33.3%)	3(18.5%)	4(5.6%)	19(7.4%)	54		

Level of significance is at 95% C.I = 0.05

4.2.15 conditions which can stop respondents to take medicine and compliance with praziquantel

In Buwama poverty was mentioned as a condition with the highest proportion 80(39.4%), followed by timing of MDA 57(28.1%), peer influence 51(25.1%)), pregnancy 15(7.4%), and husband refusal was the least 0(0.0%), table 25. There was a strong statistically significant difference between the conditions mentioned and the compliance rates with PZQ in the sub County ($\chi 2$= 12.695, p 0.013). In Nkozi, the biggest proportion mentioned peer influence 34(45.3%), followed by timing of MDA 21(21.0%), poverty 15(20.0%), husband refusal 3(4.0%) and pregnancy was the least with 2(2.7%). There was no statistically significant difference between the conditions mentioned and the outcome variable in Nkozi Sub Counties ($\chi 2$= 5.410,p= 0.248)**.**

In the key informant interviews respondents attributed this to the fear for side effects such as abdominal discomfort including diarrhea, vomiting and nausea 6(50.0%), followed by those who said that ignorance of the consequences of the disease was the problem with 4(33.3%) and those who think it is the fear for the size and smell of the tablets with 2(16.7%). One Parish supervisor narrated that *"they take medicine and immediately feel abdominal pains and start to pas diarrheal frequently which disturbs their normal activities"*

Table 25: Analysis of conditions which stops respondents to access PZQ and compliance with praziquantel

Sub county	**Outcome variable**	**Conditions**					**Total**	**χ2**	**P**
		Pregnancy	**Timing of MDA**	**Peer influence**	**Poverty**	**Husband refusal**			
Buwama	Yes	15(7.4%)	57(28.1%)	51(25.1%)	80(39.4%)	0(0.0%)	203	12.695	0.013
	No	12(7.5%)	29(18.2%)	34(21.4%)	79(49.7%)	5(3.1%)	159		
Nkozi	Yes	2(2.7%)	21(21.0%)	34(45.3%)	15(20.0%)	3(4.0%)	75	5.410	0.248
	No	6(11.1%)	16(29.6%)	17(31.5%)	13(24.1%)	2(3.7%)	54		

Level of significance is at 95% C.I = 0.05

4.2.15 Disease problem of the area and compliance with praziquantel

In Buwama the most disease problem was found to be Malaria with a proportion of 70 (34.5%), HIV was named second with a proportion of 65(32.0%), followed by URTI with 37 (16.7%),

bilharzia with 29(14.3%) and TB was named least with a proportion of 5 (2.5%). In Nkozi, a similar trend was realized with malaria considered most 31(41.3%), followed by HIV with 18(24.0%), URTI with 20(22.7%), bilharzia with 8(10.7%) and later TB with 1(1.3%), table 26. There was no statistically significant difference between felt disease problem and the compliance with PZQ in Buwama and Nkozi sub Counties ($\chi 2$= 2.444, P= 0.655 and$\chi 2$= 2.177, P=0.703) respectively.

During the key informant interview majority of the respondents said that bilharzia is not taken as a problem in the area 9(75.0%). People consider other diseases to be of more health concern than bilharziasis. They mentioned HIV and Malaria as the major diseases in the area. "*A district councilor of Ggolo parish said that if the government can put all the efforts in the fight of HIV, the country would grow drastically because most of his people who are fishermen are infected and others have died. That they no longer produce what they used to due to the infection"*, However they admit that the program for bilharzias is so helpful to the children as it also gives de-wormers to them which help to kill worms in children.

Table 26: Analysis of diseases and compliance with praziquantel

sub County	**Outcome variable**	**Disease**					**Total**	**$\chi 2$**	**P**
		HIV	**TB**	**Malaria**	**Bilharzia**	**(G/c, URTI**			
Buwama	Yes	65(32.0%)	5(2.5%)	70(34.5%)	29(14.3%)	37(16.7%)	203	2.444	0.655
	No	60(37.7%)	5(3.1%)	53(33.3%)	22(13.8%)	24(11.9%)	159		
Nkozi	Yes	18(24.0%)	1(1.3%)	31(41.3%)	8(10.7%)	20(22.7%)	75	2.177	0.703
	No	16(29.6%)	2(3.7%)	23(40.7%)	3(5.6%)	11(20.4%)	54		

Level of significance is at 95% C.I = 0.05

4.2.16 ever moved away from the village for a long time and compliance with praziquantel

Majority of the respondents who swallowed the medicine never moved away from the villages for a long time in Buwama 114(56.2%) and in Nkozi the reverse is true 39(52.0%), table 27. There is no statistically significant difference between those who moved away from the village for longer period and those who never moved away from the village in their compliance rates with PZQ in Buwama and Nkozi Sub-counties ($\chi2$=1.102, p= 0.294 and$\chi2$= 0.037, P= 0.848)respectively.

Table 27: Respondents' movement status and compliance with praziquantel

Sub County	**Outcome variable**	**Movement**		**Total**	**$\chi2$**	**P**
Buwama		**Yes**	**No**			
	Yes	89(43.8%)	143(70.4%)	203	1.102	0.294
	No	61(38.4%)	139(87.4%)	159		
Nkozi	Yes	39(52.0%)	36(48.0%)	75	0.037	0.848
	No	29(53.7%)	25(46.3%)	54		

Level of significance is at 95% C.I = 0.05

4.2.17 Reasons for moving away from the village and compliance with praziquantel

Respondents who were compliant with the treatment the biggest proportion came from Buwama. Those who had gone to visit family members and friends 34 (35.1%), followed by those who went fishing 30 (30.9%), business with 20 (20.6%) and studying were the least with 13 (13.4%). In Nkozi, fishing scored a bigger proportion 24 (60.0%), followed by business with 10 (25.0%),

visiting with 4 (10.0%) and studying was the least with 2 (5.0%), table 28. There was no statistically significant difference in the compliance rates with PZQ and the status of movement among respondents between Buwama and Nkozi Sub-counties ($\chi 2$=4.900, p=0.179 and $\chi 2$=5.773, P= 0.123) respectively.

Table 28: Reasons for moving away from the village and compliance with praziquantel

sub County	**Outcome variable**	**Reasons**				**Total**	**$\chi 2$**	**P**
Buwama		**Visit**	**Fishing**	**Business**	**Studying**			
	Yes	34(35.1%)	30(30.9%)	20(20.6%)	13(13.4%)	97	4.900	0.179
	No	33(52.4%)	15(23.8%)	10((15.9%)	5(7.9%)	63		
Nkozi	Yes	4(10.0%)	24(60.0%)	10(25.0%)	2(5.0%)	40	5.773	0.123
	No	9(30.0%)	14(46.7%)	7(23.3%)	0(0.0%)	30		

Level of significance is at 95% C.I = 0.05

4.2.18 Sensitisation and compliance with praziquantel

Results show that a bigger proportion of respondents were not sensitized to take the medicine in Buwama 126 (62.1%). The same happened in Nkozi where only 16(21.3%) of those who were sensitized were compliant to the treatment compared to those who were not sensitized 59(78.7%), table 29. Overall there was a statistically strong association between sensitization and compliance with PZQ in Buwama and Nkozi sub Counties with ($\chi 2$=24.556. p= 0.000 and$\chi 2$= 4.648, P= 0.031) respectively.

Table 29: Analysis of sensitization of respondents and compliance with praziquantel

Sub County	Outcome variable	Sensitization		Total	$\chi 2$	P
Buwama		Yes	No			
	Yes	77(37.9%)	126(62.1%)	203	24.556	0.000
	No	23(14.5%)	136(85.5%)	159		
Nkozi	Yes	16(21.3%)	59(78.7%)	75	4.648	0.031
	No	4(7.4%)	50(92.6%)	54		

Level of significance is at 95% C.I = 0.05

4.2.19 Role of IEC/posters for the control of bilharzias and compliance with praziquantel

In Buwama a proportion of 76(37.4%) which swallowed the drug ever received IEC/ posters while in Nkozi its 7(9.3%), however there is a statistically significant difference between receiving posters in Buwama and the outcome variable ($\chi 2$= 6.856, p=0.009), table 30. In Nkozi, there was no statistically significant difference between those who receive posters and those who do not receive in relation to the compliance with the medicine ($\chi 2$= 0.627, p= 0.429), table 30.

During the key informant interview, majority of the respondents said that they receive enough materials and supplies during the treatment period 8(66.7%). Much of the supplies reported were dose poles, posters, registers and books. However Parish supervisors and CMDs said that they sometimes don't read the materials since they are written in English, this also makes information about the disease difficult to understand. A male CMD at Katebo narrated that *"printing materials in English is a waste of resources since most of the people in endemic areas are illiterate, the money should be used to organise community meetings with community members"*

Table 30: Distribution of posters for bilharzia among respondents and compliance with praziquantel

Subcounty	Outcome variable	Received posters		Total	$\chi 2$	P
Buwama		Yes	No			
	Yes	76(37.4%)	127(62.6%)	203	6.856	0.009

	No	39(24.5%)	120(75.5%)	159		
Nkozi	Yes	7(9.3%)	68(90.7%)	75	0.627	0.429
	No	3(5.6%)	51(94.4%)	54		

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Level of significance is at 95% C.I = 0.05

4.2.20 Annual treatment with Praziquantel and compliance with praziquantel

In Buwama a bigger number takes the drug annualy110 (54.2%) while in Nkozi few people take the drug annually 7(9.3%), table 31. Overall there is a strong statistically significant difference between taking drugs annually and compliance to the treatment in both Buwama and Nkozi sub Counties ($\chi 2$= 43.393, p= 0.000 and$\chi 2$= 5.329, P=0.021) respectively.

Table 31: Analysis of the annual treatment with PZQ and compliance with praziquantel

sub County	**Outcome variable**	**Annual treatment**		**Total**	**$\chi 2$**	**Pv**
Buwama		**Yes**	**No**			
	Yes	110(54.2%)	93(45.8%)	203	43.393	0.000
	No	32(20.1%)	127(79.9%)	159		
Nkozi	Yes	7(9.3%)	68(90.7%)	75	5.329	0.021
	No	0(0.0%)	54(100.0%)	54		

Level of significance is at 95% C.I = 0.05

4.2.21 Distribution strategy of Praziquantel and compliance with praziquantel

The biggest proportion of the respondents reported receiving medicine from CMDs as they move door to door in Buwama 71(35.0%), followed by those who receive it from a gazatted place 61(30.0%), CMDs homes were 49(24.1%), school as the major distribution strategy for PZQ with 22(10.8%) and those who did not receive the medicine 7(3.4%) in Buwama($\chi 2$= 77.186,

P=0.000). In Nkozi, CMDs as they move 43(57.3%), followed by CMDs home with 16(21.3%), gazette area and school have equal proportions 7(10.7%) each, table 32. There is a statistically strong association between the distribution strategy and the compliance with PZQ in the sub County with (χ2= 30.641, p= 0.000).

Table 32 : Analysis of the distribution of PZQ and compliance with praziquantel

	Outcome	**CMDs homes**	**CMDs as they move**	**Gazetted area**	**School**	**Total**	**χ2**	**P**
Buwama	Yes	49(24.1%)	71(35.0%)	61(30.0%)	22(10.8%)	203	77.186	0.000
	No	31(19.5%)	121(76.1%)	6(3.8%)	1(6.0%)	159		
Nkozi	Yes	16(21.3%)	43(57.3%)	7(10.7%)	8(10.7%)	75	30.641	0.000
	No	0(0.0%)	54(100.0%)	0(0.0%)	0(0.0%)	54		

Level of significance is at 95% C.I = 0.05

4.2.22 Supervision during MDA and compliance with praziquantel

The bigger proportion of respondents who see supervisors during MDA came from Buwama with 72(35.5%) while in Nkozi, it was 21(28.0%), table 33. There is a statistically strong association between supervision during mass treatment interventions and the compliance rates with PZQ in both sub Counties with (χ2= 33.100, p= 0.000 and χ2=15.175, P= 0.000).

Table 33: Supervision during annual treatment of bilharzia and compliance with praziquantel

sub County	**Outcome variable**	**Supervisors**		**Total**	**χ2**	**P**
Buwama		**Yes**	**No**			
	Yes	72(35.5%)	131(64.5%)	203	33.100	0.000

	No	15(9.4%)	144(90.6%)	159		
Nkozi	Yes	21(28.0%)	54(72.0%)	75	15.175	0.000
	No	1(1.9%)	53(98.1%)	54		

Level of significance is at 95% C.I = 0.05

4.3 Multivariate analysis

This section three of the research results were conducted to remove possible confounders which may influence the compliance with praziquantel in the study area. Therefore all factors which were significant at a bivariate level were assessed to ascertain their importance at a multivariate level using binary logistic model. Results were computed at 95% C.I, P-Value = 0.05 and the interpretation were arranged according to the study objectives. Lack of participation in the selection of CMDs in the community and use of posters/IEC materials were the only confounding factor found to have no influence on the compliance with praziquantel (Table 34).

Table 34: Multivariate analysis of significant variable during cross tabulations

Variable	**Significance p)**	**Odds ratio(OR)**	**95% CI**
			Low –Upper
Gender Male Female	0.016	0.632	(0.434- 0.919) 1
Duration of stay in village < 4 years >4 years	0.000	0.585	(0.471-0.727) 1
Had about bilharzias Yes No	0.000	5.222	(2.078-13.122) 1
Causes of bilharzias Know Do not know	0.000	3.322	(2.168-5.090) 1
Vector of bilharzias			

Yes No	0.014	1.263	(1.048-1.522) 1
How we get it Know Do not know	0.035	1.200	(1.013-1.423) 1
Appearance of drug Know Do not know	0.000	16.266	(7.475-35.399) 1
Participation in CMD selection Yes No	**0.051**	**1.651**	**(0.998-2.731)** **1**
Same religion with CMD Yes No	0.011	1.372	(1.078-1.751) 1
Use of dose poles Like Unlike	0.000	2.845	(2.219-3.648) 1
Best months for MDA September-December Others	0.022	1.182	(1.025-1.363) 1
Reason which stops PZQ taking Fear for smell Others	0.048	1.128	(1.001-1.270) 1
Participation in sensitization Yes No	.030	2.112	(1.077-4.140) 1
Receiving posters/IEC Yes No	**0.10**	**1.733**	**(1.134-2.469)** **1**
Receive annual treatment Yes No	0.001	3.202	(1.618-6.336) 1
Distribution strategy Door-to-door Others	0.000	2.032	(1.799-2.295) 1
Supervision during MDA Yes No	0.000	4.434	(2.345-8.387) 1

4.3.1Gender

According to the findings in table 34, gender of the respondents is significantly associated with compliance with praziquantel with (OR= 0.632, 95%CI= .434-.919) and P=0.016.The females are half times more likely to comply with the treatment of bilharzias than the males. The findings agree with the cross tabulation results in table 3.

4.3.2. Period of stay in the village and compliance with praziquantel

Respondents who have stayed in the village for more than 4 years have an association with compliance with PZQ (OR= 0.585, CI= .471-.727, P= .000). Those who have stayed for a short time < 4 years in the area have .585 odds less of complying with the treatment of bilharzia, table 34.

4.3.3. Awareness of the disease

From table 34, respondents who ever hard about bilharzias have (OR=5.222, CI=2.078-13.122, P= .000). Those who were aware of the disease have 5.222 odds which mean that they are 5 times more likely to adhere to the treatment than those who were not aware about the disease.

4.3.4 Vector for bilharzia

Respondents who knew the vector for the disease had (OR =1.263, C.I= 1.048-1.522, P=0.014) table 34, which shows a strong relationship between knowing the vector and the outcome variable. In this study the odds of knowing the vector for bilharzias were 1.263 this means that respondents who knew the vector were 1.3 times more likely to take the medicine for bilharzia in this area.

4.3.5 Causes of bilharzia

From table 34, causes of bilharzia were statistically related with compliance with praziquantel, the (OR = 3.222, C.I= 2.168-.090, P=.000). This implies that study participants who knew the causes of bilharzia had 3.2 odds more of being compliant with praziquantel compared to those who do not know the causes of the infection.

4.3.6 How we contract the infection

Results from table 34 indicate that respondents who understand how we contract the infection had (OR=1.200, C.I=1.013-1.423, P=0.035). This implies that respondents who were aware of the way we get the infection had 1.2 odds more compared to those who were ignorant.

4.3.7 Knowing the medicine

Respondents who know how the drug for bilharzia looks like are seen to be sixteen times more likely to comply with the medicine than those who cannot remember the drug (OR= 16.266, C.I=7.475-0.399, P=.000), table 34.

4.3.8 Same religion like CMD

From table 34, having the same religious affiliation with the CMD is strongly associated with compliance with praziquantel of the respondents (OR=1.372, C.I=1.078-1.751, P=0.011). The findings suggest that having the same religion between the CMD and respondent attracts 1.2 times more likely to comply with the treatment intervention than those who have a different religion to that of the village CMD.

4.3.9 Use of a dose pole

From table 34, preferring a dose pole to a weighing scale has a significant relationship with the compliance to the medicine (OR=2.845, C.I=2.219-3.648, P=0.000). The odds of preferring a dose pole in the treatment of bilharzia are seen as 2.845 times more likely to comply with the PZQ treatment in the communities.

4.3.10 Best months for MDA

From table 34, the selected months for MDA was strongly related with compliance with PZQ in the area (OR=1.182, C.I=1.025-1.363, P=0.022). Selection of the best months is strongly related to the compliance rates of the respondents thus it is seen that this is likely to cause 1.182 times in the compliance rates with the medicine.

4.3.11 Reasons which can stop respondents from taking the medicine

This according to table 34, above has a significant relationship with the outcome variable (OR=1.128, C.I=1.001-1.270, P=0.048). Respondents who fear for the smell of the tablet are seen to be 1.128 times more likely to refuse tablets due to its smell than those who refuse depending on other factors. On the same issue key informant respondents attributed this to the fear for side effects such as abdominal discomfort including diarrhea, vomiting and nausea 6 (50.0%), followed by those who said that ignorance of the consequences of the disease was the problem with 4 (33.3%) and those who think it is the fear for the size and smell of the tablets with 2 (16.7%).

4.3.12 Sensitisation

According to table 34, sensitization is strongly related to the compliance with PZQ in the endemic area with (OR=2.112, C.I=1.077-4.140, P=0.030). Respondents who had odds 2.112 are more likely to adhere to the treatment of bilharzia than those who are not sensitized.

4.3.13 Annual taking of medicine

From table 34, annual taking of tablets was statistically significant with the outcome variable with (OR=3.202, C.I=1.618-6.336, P=0.001). This implies that respondents who take medicine annually have 3.2 odds more than those who do not take medicine annually.

4.3.14 Distribution strategy

Table 34 show that there is a significant relationship between the distribution strategy and compliance with the medicine for bilharzia with (OR=2.032, C.I=1.749-2.295, P=.000). This indicates therefore that the door-to-door distribution strategy which was preferred by the respondents can attract 2.032 times more chances that the compliance rate will increase than the other strategy illustrated in table 31. However during the key informant interview, respondents said that the major challenge during the treatment of bilharzia was little allowances and lack of transport 4(33.3%), followed by the size of village to treat/area to supervise with 3 (25.0%). The study found out that it was not easy for CMDs to treat people at once because they cannot be available at home at one go and they do not want to come for the medicine at their home. They went on to say that many a time implementation occurs in a rainy season which makes door-to-door treatment strategy problematic due to lack of umbrellas and gum boots to proof the medicine and registers. The findings support the quantitative findings and emphasize the importance of facilitating program implementer. A senior health officer at the district made the

following comment *"Implementation of MDA takes usually one month, there is no transport in terms of motorcycles even at district level to transport materials in time, no logistics such as gumboots, umbrellas, and rain coats for CMDs to facilitate the exercise yet they are paid a one days' allowance".*

4.3.15 Supervision

According to table 34, supervision is associated with compliance with PZQ in the area. It attracts 4.434 odds, 2.345-8.387 C.I and 0.000 p-values. This suggests that supervision of CMDs during MDA is 4.4 times more likely to increase compliance with praziquantel in the endemic area. In the key informant interview CMDs said that they receive supervisors sometimes during the treatment 6(50.0%). A top official from the NTD secretariat made the following comment during the interview *" We still have a problem on issues of supervision during Mass Drug Administration(MDA), we have more than 60 Districts implementing MDA, the number keeps on growing as they keep on dividing the districts which constrains our resources in terms of human, funds and material supply"*.

CHAPTER FIVE

DISCUSSION

5.0 Introduction

In this chapter we present a discussion of the study findings and the possible solutions (Table 34). However based on table 4, there is no statistically significant difference in compliance with praziquantel for the treatment of bilharzia between Buwama and Nkozi sub-counties ($\chi 2 = 0.165$, p-value 0.685). Thus no comparison was made in discussing the results between the two sub-counties. The study findings were used to draw conclusions and recommendations on the factors

influencing compliance with praziquantel in Buwama and Nkozi Sub-counties. They may be used in other similar related studies conducted elsewhere on intestinal schistosomiasis.

5.1 Individual factors

5.1.1Awareness of bilharzias and its treatment

In this study if an individual can comprehend the disease bilharzia, how we acquire it, its cause and the vector for the infection that person is considered to be aware about the infection (Table 34). Respondents who know the disease were five times more compliant with praziquantel than those who are naïve about it. The study also found that respondents who understand the causes of bilharzia were more compliant with the treatment. The reason could be that respondents, who know the causes, understand that it is not easy to prevent them from acquiring the infection due to the socio-economic activities they carry out in the contaminated water. This leaves them with one alternative of taking the annual dosage of praziquantel. Respondents who knew the causes of the disease were three times more compliant with the drug than those who did not know the causes. The reason could be that respondents who knew the cause of bilharzia tend to disassociate themselves from activities which can result into an infection such as snail collection, swimming and bathing in contaminated waters. Similar finding were obtained in another study on community acceptance of PZQ in which awareness of the infection was seen as a factor increasing compliance with the medicine (Rollinson et al, 2012)

5.2.5 Knowing the drug for bilharzias

There was a statistical association between compliance with PZQ and knowing the medicine for bilharzia (Table 34). The reason for this is that it allays fears within communities targeted for the treatment due to the negative rumors on the size of the tablets and its medical importance.

Respondents who were conversant with the drug for the infection were sixteen times more likely to take the medicine for bilharzias. This suggests that it is very important to show the appearance, color and size of the tablets during MDA community meetings. Similar observations were also made in a study on saving billions of Dollars through controlling neglected diseases. It emphasized the importance of conducting health education and sensitization meetings among community members (Hotez and Feriwick, 2009)

5.2.6 Reason which can stop them from taking medicine

The study found out that fear for the smell of the tablet was the major reason given by the respondents from Buwama while in Nkozi it was lack of access to the medicine (OR=1.128, C.I=1.001-1.270, P=0.048). The reason for this could be that in Buwama, the distribution and sensitization about the medicine is better than in Nkozi due to the better attitude of the CMDs, accessibility in terms of distance and program supervision. Similar findings were also observed in a study on schistosomiasis control in Nigeria which emphasized the importance of accessibility of communities and constant supervision of activities during MDA (Francis et al 2011). Contrary to the study findings, other similar studies on resisting control of neglected tropical diseases: dilemmas in the mass treatment of schistosomiasis and soil transmitted helminthes in north-west Uganda, found that fear for side effects was the major reason for refusal to take medicine (Allen and Hasting, 2008).In this study fear for the smell of the tablets is a positive factor influencing compliance. The reason could be that CMDs were not empowered enough to counteract all negative rumors which can deter community members from taking the medicine.

In the key informant interviews respondents attributed this to the fear for side effects such as abdominal discomfort including diarrhea, vomiting and nausea.

5.2.8 Use of dose pole

In Buwama, the use of dose pole was accepted in the treatment of bilharzia; however in Nkozi respondents prefer the weighing scale. The reason given for the findings in Buwama was that dose poles are easy to use with minimum training of the CMDs and can be transported easily to remote areas than the weighing scales. In Nkozi the reason given was that weighing scales give the exact dose for the individual and can be used by trained health personnel .The findings reflect some of the challenges of MDA and the reasons for the variations in compliance rates in different areas. Further analysis of the results from respondents reveals that those who prefer the use of dose pole were three times more likely to adhere to the bilharzia treatment than those who prefer the weighing scales(OR=2.845, C.I=2.219-3.648, P=0.000). This observation was also obtained in another study where the use of dose poles to every community member was examined and it was concluded that in some areas it would be better to use weighing scales and trained health personnel to measure community members (Figuriredo et al, 2010). In this study dose poles and weighing scales were preferred in Buwama and Nkozi respectively. The reason could be that community members in Buwama have a good attitude to the CMDs than those of Nkozi who prefer health workers during PZQ distribution.

5.3 Socio-behaviour factors

The only socio- behavior factors which were discussed under socio-behaviour factors include; gender of respondents, family size, religious affiliation, health seeking behavior and mobility of community members.

5.3.1 Gender of respondents

The study found that the males were more compliant to the treatment than the females in Buwama and Nkozi respectively. Males in Nkozi were more compliant with PZQ than those of Buwama, the reason for this could be that although males in Nkozi majority are fishermen, and they are also permanent farmers who have permanent residences. This suggests that they have minimal movements than those of Buwama who have temporally residences and depend on the lake for most of their family incomes. The findings were supported by a study conducted in Sierra Leone in which males were more likely to take the treatment than the females (Kamara et al 2011). It is also noted in a study on the social behavior of respondents in intestinal schistosomiasis areas that females in the fishing communities spend 25% of their reproductive life pregnant and 60% breastfeeding. This makes many women miss the treatment of bilharia (WHO, 2002). In a similar Knowledge, attitude and practice (KAP) study, the males were seen to have greater knowledge than the females on the infection (Kanga et al, 2012). Further analysis of this study findings found out that the females were half times more likely to take the medicine than the males (Table 34). The reason for this could be due to gender based factors such as pregnancy, breastfeeding, refusal by men to allow then to take the medicine and the roles of females in the family which include washing clothes. Contrary to this two related study findings on the use and awareness of praziquantel, females were found to adhere to the treatment than the males (Kumutsoret et al, 2011, Heather et al, 2013). The reason was that although females have

such barriers they tend to identify themselves most vulnerable than the males and thus tend to take medicine.

5.3.3 Having the same religion with the CMD

The study found out that majority of the respondents who took the medicine, were not having the same religious affiliation with the CMD table 18. However there was a statistical association between the two in Buwama Sub-county. Further analysis of the factor revealed that respondents whose religion was similar to that of the CMD, were 1.37 times more likely to take the medicine for bilhazia, than those who belong to a different religious affiliation (Table 34).The reason for this could be due to the different religious beliefs in the area where Muslims consider Muslims to be clean to give them medicine, Catholics prefer catholic and so does other religious briefs. The findings were also observed in a similar study on human behavior, health education and schistosomiasis control in which the religion of a CMD was observed to be a positive factor which influences compliance of the medicine (Kloos et al, 1995). The findings suggest that involving community members in the selection of CMDs is important as an intervention to increases adherence with the drug.

5.4 Program factors

5.4.1 Health education/ community sensitization

The study found that those who were not sensitized about the disease and its treatment were more compliant to the treatment than those who were sensitized, table 28. The reason could be

that community members who are not sensitized tend to identify themselves as more vulnerable to infections due to their socio-economic behaviours such as fishing, washing clothes, cultivating near contaminated water and swimming in what they call dirty water. This enabled the respondents to swallow the medicine even though they did not understand its importance in Buwama and Nkozi Sub-counties ($\chi 2=24.556$, $p=0.000$ & $\chi 2= 4.648$, $p=0.031$). The reason could be that due to several infections such as skin rashes, HIV, TB and Malaria, they tend to identify themselves as more vulnerable thus, take the medicine even with low awareness. Further analysis suggests that respondents who were sensitized were two times more likely to take the medicine than those who were not (Table 34). The findings disagree with what other studies observed that when one encourages sensitization as a way of improving treatment compliance, it empowers community members to take a decision as it handles ignorance about the disease and its treatment. Those community members comprehend the intended purpose of the treatment (PATH, 2008, Rollinson et al, 2010). In this study, sensitization of community members should be taken as a positive factor which influences the uptake of praziquantel in communities of Mpigi district

5.4.2 Trainings of CMDS

Results from the key informants' interview; CMDs mentioned that they do not receive enough training to enable them answer questions from the community member annex 3a. The reason for this is that they receive only one day mainly to learn how to register and treat community members. Similar findings were obtained in a study on eight years compliance with ivermectin

for the control of onchocerciasis in which he suggested that empowering CMDs to deliver the message about MDA can improve compliance rates in all NTDs (Brieger et al, 2011). Several CMDs said that they don't find bilharziasis a serious threat to the people. This is also reflected in the quantitative results where bilharziasis emerged as number four after Malaria, URTI and HIV, table 25.

CMDs also mentioned that the books they receive as community guidelines are written in English which they cannot understand fully to enable them sensitize the communities. CMDs cannot fully explain the causes and transmission of the disease despite the annual trainings about the infection; they cannot sensitize people fully on the treatment and how it is taken and to counteract negative rumors about the program. The findings are supported by a study which was conducted on the challenges of the treatment of bilharzias in SSA (Francis et al, 2011). During the key informants' interview on training, majority admit that they don't receive enough training to equip them with knowledge on how to answer well questions from community members who always ask difficult questions during the treatment campaigns 7(58.3%). A female CMD in Senyondo commented that *"They call us one day and tell us to go and register people; the next time they call us to give us medicine for distribution".* The findings reveal that there was inadequate training at all levels. However, District and national leaders attribute this to delays in release of funds and inadequate funding of program activities which affects the implementation plan at all levels. On the same issue majority admit that they still have problem filling correctly the NTD register 7(58.3%) they said that they cannot tabulate well the drug balances and the numbers treated. The findings were similar to those in a study conducted on the compliance of NTD drugs which suggested that CMDs were not receiving enough training for community registration (Ndyomugyenyi et al, 2010)

5.4.3 Incentives and allowances

In the interview several CMDs mentioned that they do not receive enough allowances and incentives to enable them treat community members. They pointed out that the allowance they receive is just only for one day yet they have to move long distances to cover a bigger an entire village. CMDs interviewed majority use the door-to-door treatment strategy which is so problematic. The reason for this is that when they sit in one particular area or at home people do not come for the treatment. This finding express the need to increase on the allowance and incentives to the CMDS, they should be facilitated well if higher compliances with PQ are to be realized. Similarly in a randomized clinical study on the PZQ combinations, giving CMDs enough allowances and incentives was identified as a positive factor in the effort to increase compliance. (Namwanje et al, 2011).

5.4.4 Integration

Integration of NTD program with other programs such as the malaria control and child days plus is still problematic. The reason could be failure to integrate funds and materials from the center and timing of program activities. Similar observations were also made in a study on schistosomiasis and other neglected tropical diseases towards integration and sustainable control which illustrated the importance of integrating NTDs in a bid to increase compliance rates (Utzenger et al, 2009). In this study integration was not observed at all levels. This was revealed in a key informant with a senior program member from the ministry who said that "*They call you asking for integration but when you ask them to bring what they have they say they have very*

little. When you ask them to bring the little they have they say we have nothing, so how can you integrate". The comments point out the reason why NTD and other programs were still carrying out a vertical implementation strategy.

5.4.6 Annual treatment with PZQ

The study found a variation in the annual uptake of PZQ between Buwama and Nkozi Sub-counties with 110 (54.2%) and 7 (9.3%) respectively, table 30. This variation could be due to the distribution strategies employed by the CMDs in the two sub Counties, lack of supervision at all level, changes in implementation periods and the delay in release of medicine, funds and supply in the Sub Counties. In Nkozi and Buwama, MDA implementation usually occurs between October and November, however sometime it was conducted between April and May. This disorganizes the normal activities and the mindset of the community members which impact heavily on the compliance rates. Similarly in a study conducted in onchocerciasis endemic areas of western Uganda, observed that community members become more compliant with the treatment when the annual distribution was maintained at a given period (Nyomugyenyi et al, 2010). Further analysis revealed that community members who receive medicine annually are three times more likely to maintain the uptake of the medicine that those who miss treatment (Table 34).

5.5.7 Distribution strategy

The study found that door-to-door distribution strategy is mostly used by the CMDs, table 31. The reason for this is that most people do not want to go for the medicine when put in one place; this could also be due the big sizes of the villages, seasonal changes and lack of interest from the

people. The distribution strategy causes much stress and fatigue to the CMDs and this impact on the compliance rates in the two Sub Counties. A good distribution strategy is two more times likely to increase compliance with PZQ (Table 34). Similarly a study was conducted on the role of CMDs during NTDs control in Uganda and concluded that the more you give CMDs work to do during implementation the less likely to perform and this result in low compliance (Katabarwaet el, 2010). This when compared with the increasing number of community programs take CMDs from their own income generating activities and create a need for money which cannot be given by the program (Ndyomugyenyi et al, 2010). In this study the distribution strategy of prazquantel is a positive factor to consider while planning for MDA interventions in the two sub Counties. Remarks from a senior health officer at the district indicates that there was inadequate supply of materials necessary for MDA and this impact heavy to the compliance of the medicine in the two sub-counties.

5.5.8 Supervision and monitoring

In this study supervision of CMDs during MDA was found to be moderate in Buwama and poor in Nkozi Sub-counties, (Table 32). The reasons could be due to easy accessibility of the endemic areas of Buwama in terms of distance and funds than Nkozi which is at the farthest end of the district neighboring Kalungu district ($\chi2=33.100$, $p =0.000$ & $\chi2= 15.175$, $p=0.000$). Further analysis of supervision of CMDs during the treatment period, revealed that CMDs who were supervised were found to be 4.4 times more likely to increase their performance in giving medicine better than those who receive no top supervision and who are not closely followed in what they do during the treatment time (Table 34). The reason could be that supervision helps CMDs to strengthen their ability to register communities and distribute the medicine in time and

also to interact with community members and to explain some of the issues and questions which were pending before MDA. The same observation was concluded in a study on the challenges of MDA in north western Uganda in which supervising CMDs during the implementation of Mass treatment interventions was observed to be a positive factor on drug compliance (Kabatereine et al, 2010).The study findings above suggests that supervision is a factor to consider while planning for interventions aimed at increasing the uptake of praziquantel in communities of Buwama and Nkozi Sub-counties. Similar findings were also obtained from a key informant interview of a top official from the NTD secretariat, it was clear from the results that supervision of MDA was still a problem at all levels which influences compliance with PZQ

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

This chapter provides a summary of the study findings, the action which should be take, recommendations and also points out gaps which can be filled when other studies are conducted.

6.1 Conclusion

As programs to control intestinal shcistosomiasis become more developed and have completed several annual PZQ treatment rounds, it may become necessary to address the issue of non-compliance at sub-county and even village level in all districts endemic with bilharzias. Designing interventions that reduce the number of non-compliant persons might make the difference between successful control of transmission of bilharzia, and mere control of the parasite. To that end; the distribution of the medicine by the CMDs should last long enough, at each treatment round, in order to reach less compliers (eg. more mobile and unemployed village members.), health education should focus on empowering community members to take positive decisions regarding the use of the medicine. In addition health education should also incorporate information regarding the use of measuring height as it is equally reliable with measuring weight in determination of PZQ dose that somebody should take. Fear for side effects and the CMDs importance in medicine distribution, issues of gender, distribution of IEC materials and provision of logistics, motivation and continual support to improve CDD's performance including training and incentives are crucial.

6.2 Recommendations

Out of the research findings, I do come out with the following recommendations:

i Adequate funding of schistosomiaiss control, early release of funds and materials and medicine used during MDA are important issues which should be addressed in the effort to increase compliance with PZQ in the two sub-Counties of Buwama and Nkozi.

ii The study has contributed to a body of knowledge on intestinal schistosomiasis control that could be useful to researchers and other scientists working on a related or similar topic.

iii Sensitisation of community member is important to increase awareness of the disease and its treatment and give correct information and messages to guide them in decision making processes regarding praziquantel compliance.

iv Training of CMDs should be conducted for several days to empower them with necessary information necessary to counteract negative rumors, answer questions from community members, register communities and report well compliance and coverage rates in the areas

v The program should Increase incentives and allowances to CMDs for several days during MDA to make them able to move villages during MDA.

vi Posters and other IEC materials should be designed well to suit the local conditions and the infection for example posters wish a swollen abdomen depicting intestinal schistosomiasis when little or no people are having such signs and the use of hard to understand languages.

vii Annual treatment of bilharzias should be held between September- December

viii Both dose poles and weighing scales should be used in the treatment of intestinal schistosomisis in communities. Dose pole should be used in Buwama and weighing scales in Nkozi.

ix Supervision and monitoring of program activities especially in Nkozi Sub County should be strengthened to give extra support to CMDs during mass treatment activities.

6.3 Areas for further research

Following this study, I do propose the following areas for further research so as to create a knowledge basis for further intestinal schistosomiasis control activities:

1) A study should be conducted to analyses the gender dimensions in the treatment of intestinal schistosomisis in the area.
2) Study on the use of quantitative data from the community registers as a basis for NDT program implementation
3) Study on the culture aspect of the community members in the two sub-Counties.

References

BriegerWR, Okeibunor JC, Abiose AO, Wanji S, Elhassan E (2011). Compliance with eight years of annual ivermect treatment of onchocerciasis in Cameroon and Nigeria. Parasites & vectors 4: 152. Available:http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3162569&tool=pmcentrez&rendertype=abstract. Accessed 23 May (2012).

Dembélé R, (2007).Strategic plan for fighting against neglected tropical diseases (NTD) 2007–2011, Integration of mass chemotherapy strategy for trachoma, lymphatic filariasis, onchocerciasis, schistosomiasis and soil-transmitted helminths control. Report of Schistosomiasis and Soil-transmitted Helminths National Control Programme (PNLSH), Bamako

Elliott AM, Ndibazza J, Mpairwe H, Muhangi L, Webb EL(2011). Treatment with anthelminthics during pregnancy: what gains and what risks for the mother and child? Parasitology 138: 1499–1507. Available:http://www.pubmedcentral.nih.gov/ articlerender.fcgi?artid=3178871&tool=pmcentrez&rendertype=abstract.Accessed 9 October(2012).

Gurarie D, Seto EY(2009). Connectivity sustains disease transmission in environments with low potential for endemicity: modelling schistosomiasis with hydrologic and social connectivities. J R Soc Interface 6: 495–508.

Heather Rilkoff, Edridah Muheki Tukahebwa, Fiona M. Fleming, Jacqueline Leslie, Donald C. Cole (2013). Exploring Gender Dimensions of Treatment Programmes for Neglected Tropical Diseases in Uganda

Hotez P (2009). Mass drug administration and integrated control for the world high-prevalence neglected tropical diseases. Clin Pharmacol Ther (2009).

Hotez PJ, Ehrenberg JP (2010). Escalating the global fight against neglected tropical diseases through interventions in the Asia Pacific region Adv Parasitol72: 31–53

Hotez PJ, Fenwick A, Savioli L, Molyneux DH(2009). Rescuing the bottom billion through control(of neglected tropical diseases. Lancet 373: 1570–1575.Available: http://www.ncbi.nlm.nih.gov/pubmed/19410718. Accessed 7 March (2012).

Kabatereine NB, Malecela M, Lado M, Zaramba S, Amiel O(2010). How to (or not to) integrate vertical programmes for the control of major neglected tropical diseases in sub-Saharan Africa. PLoS neglected tropical diseases 4: e755.Available: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2894133&tool=pmcentrez&rendertype=abstract. Accessed 31 January (2012).

Kabatereine NB, Tukahebwa E, Kazibwe F, Namwanje H, Zaramba S (2006). Progress towards countrywide control of schistosomiasis and soil transmitted helminthiasis in Uganda. Trans R Soc Trop Med Hyg 100:208–215.

Kamara W, Toubali EH, Sonnie M, Zoerhoff K, Chowdhury D (2009). Post-Preventive Chemotherapy Coverage Survey in Sierra Leone.

Karmakar PR, Mitra K, Chatterjee A, Jana PK, Bhattacharya S(2011). A study on coverage, compliance and awareness about mass drug administration for elimination of lymphatic filariasis in a district of West Bengal, India. J Vector Borne Dis 48: 101–104.

Kloos, H., Correa-Oliveira, R., Quintes, H. F. O., Souza, M. C.C., Gazzinelli, A. (2008). Socioeconomic studies of schistosomiasis in Brazil: an overview. *Acta Tropica,* 108,194-201

Massa K, Magnussen P, Sheshe A, Ntakamulenga R, Ndawi B, Olsen A (2009). The effect of the community-directed treatment approach versus the school-based treatment approach on the prevalence and intensity of schistosomiasis and soil-transmitted helminthiasis among schoolchildren in Tanzania.

Mazigo, H. D., Waihenya, R., Lwambo, N., Mnyone, L. L., Mahande, A. M., Seni, J., Zinga, M., Kapesa, A., Kweka, E. J., Mshana, E. S., Heukelbach, J. and Mkoji, G.M, (2010). Co-infections with *Plasmodium falciparum, Schistosoma mansoni* and intestinal helminths among schoolchildren in endemic areas of northwestern Tanzania. *Parasites & Vectors 2010, 3:44*

Mengistu Legesse,MSc, Chelsea R. Jones,BSc,Sarita K. Singh,BSc, Berhanu Erko,MSc,Yalemtsehay Mekonnen PhD (2004). Community's awareness about intestinal schistosomiasis and the prevalence of the infection in two endemic localities of Ethiopia

Nawal M. Nour (2010). Schistosomiasis: Health Effects on Women. *Reviews in Obstetrics & Gynecology*.

Randa, M.(2007). *Workshop on health system research*. Egypt: Alexandria faculty of medicine.

Secor, W. E. & Colley, D (2005). Schistosomiasis. Springer Science and Business Media Incoporated, New York, USA.

Steinmann P, Keiser J, Bos R, Tanner M, Utzinger J (2006). Schistosomiasis and water resources development: systematic review, meta-analysis, and estimates of people at risk. Lancet Infect Dis 6: 411–425

Utzenger J (2009). Schistosomiasis and neglected tropical diseases towards integrated and sustainable control. A word of caution.

1. World Health Organization (2010). Schistosomiasis, Fact Sheet No 115; Available at http://www.who.int/mediacentre/factsheets/fs115/en/.
2. Yumkella F (1996). Women, onchocerciasis and ivermectin in Sierra Leone. Geneva, TDR/World Health Organization (WHO/TDR/GTD/RP/96.2). Available: http://www.who.int/tdr/publications/tdr-research-publications/oncho-ivermectin-gender/en/index.html. Accessed 22 September (2012).

ANNEX 1: Release letter to do research.

Annex 1

IHSU INTERNATIONAL HEALTH SCIENCES UNIVERSITY

PART OF INTERNATIONAL MEDICAL GROUP

Making a difference to Health Care in Uganda
Office of the Dean, Institute of Health Policy and Management

Kampala, On the 5th-August of -2014

The
CAO/RDC
MPIGI DISTRICT

Dear Sir/Madam,

Re: Assistance for Research

Greetings from International Health Sciences University.

This is to introduce to you **Mr. Ssemwanga Edward Bamulanzeki** Registration Number **2013-MPH-FT- 016** a student of this University. As part of the requirements for the award of a Masters Degree of Public Health of this University, the student is required to carry out field research for the submission of a Research Dissertation. **Edward** would like to carry out research on issues related to:

Analysis of factors that influence access and compliance with Prazuantel for the control of Intestinal Schistosomiasis in communities of Mpigi district, Uganda.

I kindly request you to render this student any assistance necessary for his research.

I and indeed the entire University are thanking you in anticipation for the assistance you will render to the student.

INSTITUTE OF HEALTH POLICY AND MANAGEMENT IHSU

Sincerely Yours,

Prof. David Ndungutse. MAJWEJWE

Dean, IHPM

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the teaching college of International Hospital Kampala

ANNEX2 District letter authorizing to do research

Annex 2

General line :710079
Direct lines :
Chairan Dristrict Council :710092
Chief Admin. Officer :0392 - 715397
Director of Health Services :0392 - 715398
District Water Officer :0392 - 715396
District Forest Officer :0414 - 710036
Chief Finance Officer :710051
Fax :710011

MPIGI DISTRICT LOCAL GOVERNMENT
www.mpigi.go.ug

Office of .....
CAO
.....
P.O.Box 172,
Mpigi

INANY CORRESPONDENCE ON
THIS SUBJECT PLEASE QUOTE NO. **CR.309/1**

Date: 29/09/2014

The Dean IHPM
International Health Sciences University (IHSU)

Dear Sir/Madam

RE: SSEMWANGA EDWARD BAMULANZEKI

Reference is made to your letter dated 5th/8/2014 which was introducing the above person as a student in your organization.

Having received the letter Mr. Ssemwanga was given all what he needs to carry out his research study on the topic **"Analysis of factors that influence compliance with prazquantel for the control of intestinal schistosomiasis in communities of Mpigi district, Uganda"** in the district. The study was conducted in areas near Lake Victoria known to be endemic for bilharziasis.

I am glad to inform you that he has successfully completed the research and I wish to forward to you his findings.

Thank you

CHIEF ADMINISTRATIVE OFFICER
P.O. BOX 172 MPIGI
29 SEP 2014
MPIGI DISTRICT LOCAL GOV'T

Wamala Francis
For Chief Administrative Officer

(All Correspondences to be addressed to the Chief Administrative Officer)

Annex 3a **Key informant interview (N=12)**

Category	Question	Response	Numbers
Material and supplies during MDA	Do you receive enough materials and supplies during MDA	Yes No	8 4
Training	Do you receive enough training to make you answer well questions from community and fill register	Yes No	5 7
Bilharziasis as a disease	Do you think bilharziasis is a problem to your people	Yes No	3 9
Other programs	Do you have other programs working with the bilharzias program	Yes No	2 10
Allowances and incentives	Do you receive enough allowance and incentives to carry out MDA	Yes No	0 12
Refusal of drug	Why do you think people refuse the drug	Fear for side effects Ignorance of disease Big and smelling tablets	6 4 2
Challenges during MDA	What most challenge during MDA	• Rain • Big area to cover • Small allowance and transport • People come at their own pace	2 3 4 3
Supervision	Do you receive supervision during MDA	Yes No	6 6

Annex3b: Questionnaires (English version) Questionnaire number.....

Questionnaire for household members to analyse the factors which may influence compliance with praziquantel in four randomly selected villages of Nkozi and Buwama sub-counties, Mpigi district

A, DEMOGRAPHIC CHARACTERISTICS

Sub-county (0) Buwama, (2) Nkozi,

Parish (1) Bunjako, (2) Bulunda, (3) Golo, (4) Muge

Name of Village (1) katebo, (2) senyondo, (3) Kitokolo, (4) Lwalalo

Sex: (1) Male (0) Female

Age group (1) 6-15, (2) 16-25, (3) 26-35, (4) 36-45, (5) 46-55, (6) 56+

Religion (1) catholic, (2) Pentecostal, (3) protestant, (4) Muslim, (5) SDA, (6) no religion, (7) others specify....

Family size (1) 1-3, (2) 4-6, (3) 7-9, (4) 10+

Education level (0) no education, (1) primary, (2) secondary, (3) tertiary

Employment status (1) employed, (2) unemployed

Duration of stay in the village (1) 1-3, (2) 4-6, (3) 7-9, (4) 10+

B: INDIVIDUAL FACTORS

1: Do you know the disease bilharzias and its treatment

1. Yes
2. No

2: Do you know what causes bilharzias

1. Yes
2. No

3. What is the vector of bilharzias

1. Mosquito
2. Fresh water snails
3. Flies
4. Others specify….
5. Do not know

4: How do we get bilharzias

1. Drinking dirty water
2. Drinking un boiled water
3. Contact with contaminated water for bathing, swimming etc
4. Others specify….

5. Do not know

5: Do you know the medicine for bilharzias
1. Yes
2. No

6: If yes describe how it looks
1. White large and long tablet like hedex
2. Do not know

7: Do you take the medicine for bilharzias
1. Yes
2. No

8: What is the reason which can stop you to take bilharzias medicine?
1. Size of tablet
2. Smell of tablet
3. Fear for side effects
4. Lack of access
5. Others specify…..
6. No reason

9: Do you participate in the selection of CMDs?
1. Yes
2. No

10: What should be considered to select CMDs
1. Age
2. Education
3. Wealth
4. Relationship
5. Others specify…
6. Do not know

11: Do you have the same religious beliefs as your CMDs?
1. Yes
2. No
3. Do not know.

12: Do you think a dose pole is good to measure tablets than the weighing scale?
1. Yes
2. No
3. Do not know

13: If ye why…
1. Take quick measurement
2. Can be used easily
3. Others specify……

14: If no why.

1. Not accurate
2. Cannot measure each individual
3. Others specify…….

15: When do you think campaigns for bilharzias treatment should be conducted?

1. January-February
2. April – May
3. June- July
4. October-November
5. Others specify….
6. Do not know.

C) SOCIO-BEHAVIOUR FACTORS.

16: How many time you visit a health worker or health facility in a year.

1. Do not visit them
2. Once
3. Twice
4. Thrice
5. More than 3 times

17: What can stop you from taking birhazia medicine?

1. Pregnancy and breast feeding
2. Time of giving medicine
3. Peer group
4. Poverty
5. Husband/ house head/ father
6. Others specify…

18: What do you think is the most disease problem of the village?

1. HIV
2. TB
3. Malaria
4. bilharzias(bloody diarrhea)
5. Others specify…
6. Do not know

19: Have you ever moved away from this village to another village for a longer period?

1. Yes
2. No

20: If yes for what was the reason?

1. Visit
2. Holiday
3. Fishing in other areas
4. Studying
5. Business
6. Jobs

D) PROGRAM RELATED FACTORS.

21: Do you ever participate in a sensitization meeting on bilharzias and the drug?

1. Yes
2. No

22: Do you receive posters and for bilharzias treatment?

1. Yes
2. No

23: Do you receive medicine annually?

1. Yes
2. No

24: How do you receive the medicine?

1. From the home of the CMD
2. From CMDs as they move from door to door
3. From one gazetted place for drug distribution
4. From the nearby health facility
5. From schools

25: Do you see other people coming to help your CMD during the distribution in the village?

1. Yes
2. No

THANK YOU.

Annex 3c: Key Informant interview guide

As preparation for the treatment of intestinal schistosomiasis, activities are set which led to mass treatment campaigns in the districts endemic for the infection. A number of people are involved at national, district and community level to participate in these activities which includes, advocacy, trainings of district and sub- County trainers/ supervisors, and community medicine distributors. They also include social mobilization, registration of communities and treatment of communities.

Advocacy is usually conducted by the NTD secretariat. Trainings in districts were conducted by district supervisors called trainer of trainers (ToTs), they are responsible for the training of sub-County supervisor who also train parish and CMDs respectively. Trainings were conducted for one day at all levels including the training of CMDs for community registration and treatment. During registration of communities CMDs move in the village and register all house occupants which help them to indentify the eligible population for treatment and to calculate the medicine and materials needed. Mass treatment occurs annually and CMDs are supposed to treat all eligible people in communities with close supervision from the parish, sub- County and district supervisors. Social mobilization occurs on radio stations covering the endemic areas and little or no community meeting are held prior to the treatment.

Questions

1. Do you receive enough materials and supplies for the treatment of bilharzia with PZQ?
2. Do you receive enough training to empower you with skills on how to answer questions from community members?
3. Do you think bilharzia is a problem in the village?

4. Do you have a problem filling your register for bilharzia?
5. How can NTD program integrate with other programs in the area?
6. Do you get incentives and allowances to enable you perform fully during the treatment campaigns?
7. Why do you think people refuse to swallow PZQ pills?
8. What challenges do you face during drug distribution?
9. Do you receive top supervisors during the treatment time?

Thank you for your responses

END

ANNEX 4: CONSENT FORM

Schistosomiasis is the leading cause of morbidity and mortality in Uganda. Many deaths and disabilities would be avoided by community members if they take a full dose of praziquantel every year. This is during mass treatment campaigns, at the time when community medicine distributor move door-to-door distributing the medicine. However, many community members do not take the medicine and the reasons are not known. A study is therefore being conducted in Mpigi district by Ssemwanga Edward Bamulanzeki, a Public Health Officer in collaboration with the International Health Sciences University, Kampala, Uganda to analyse the factors that influence the compliance with praziquantel in intestinal schistosomisis endemic communities. This information will help the district to plan adequately for schistosomiasis control programs.

The information you will give us will be kept confidential. You are not required to give us your names, so your identity remains anonymous. You are therefore unconditionally requested to participate in the study by responding to the questions that are going to be asked, to the best of your knowledge.

Interviewer……...

Interviewee……

ANNEX 5 **WORKPLAN**

General objective: To analyse factors that influence community compliance with PZQ for the control of intestinal schistosomiasis in Buwama and Nkozi Sub-counties, Mpigi District- Uganda

Specific objectives

1. To analyse the individual factors which influence community compliance with PZQ in the intestinal Schistosomiasis endemic Sub-counties of Buwama and Nkozi- Mpigi District, Uganda
2. To identify the socio-behavior factors which influence adherence with PZQ
3. To explore program related factors which influence adherence with PZQ

ITEM	ACTIVITY	TIME FRAME	PERSON RESPONSIBLE	AMOUNT	REMARK
1	Development and approval of proposal	Feb-June	Researcher	50000	Funds available
2	Training of data assistants and laboratory assistant	July-Aug	Researcher and laboratory technician	240,000	
3	Data collection	Aug-September	Data assistants	400,000	
4	Data cleaning, coding and analysis	September	Researcher and statistician	610,000	
5	Development of dissertation and dissemination of findings.	October	Researcher	240,000	
Total				**1,540,000**	

Annex 6: BUDGET (Breakdown)

ITEM	ACTIVITY	AMOUNT
1	Developing a proposal, typing at 30000/ and printing at 20000/ for one copy	50000
2	Training of data assistants, 2 at 20000@ for 3 days +Transport refund at 20000@ for 3 days	240,000
3	Fuel using motorcycles for collecting data for 2 assistants 10L@ for 3 days at 4000shs per liter + Fuel for the researcher 10L for 3 days + Data collection at 30000@ per day for 3 days	400,000
4	Data coding and entering at 160000 to the statistician for 1 day + Data analysis at 450000	610,000
5	Writing a dissertations at 30000 per copy for 3 copies marking and at 50000 per copy for submission for 3 copies	240,000
Total		**1,540,000**