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A Baseline Assessment of Schistosomiasis in Mayuge District, Uganda

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ABSTRACT

Mayuge district is one of the 95 districts out of 146 districts struggling to eradicate Schistosomiasis as a public health concern. The study aimed to carry out a baseline assessment of Schistosomiasis (Bilharzia) to guide overall implementation in Mayuge District, Uganda. The baseline was a descriptive cross-sectional design that adopted both quantitative and a qualitative data approaches for assessing knowledge, attitudes and practices on SCH prevention and control. A total sample size of 1,110 respondents were recruited and interviewed, with 55% above 18 years of age. The qualitative data collection targeted the men, women, and district leadership. Study findings showed that majority (68.6%) of the respondents had heard about the Schistosomiasis. Only 50.7% of the participants had taken part in MDA with 16.9% children 7-14 years. Findings further indicated associations between MDA participation with all demographic factors except gender, a trend like having knowledge or heard about the diseases before. This study reveals inadequacies in terms of knowledge, attitude and practices concerning disease knowledge, prevention and control for schistosomiasis amongst the Mayuge population, which could be a challenging obstacle to the endeavors towards the elimination of these infections as a public health problem. The findings suggest need for implementation to focus on strengthening health systems and influencing behavior change for communities to demand for MDA services. There is need for future projects to promote ownership through involvement of the various stakeholders especially at the district level. Targeted community engagement meetings before, during Mass drug administration and after MDA is implemented are key elements of to better reach all people rather than changing opinions on treatment side-effects. There is a need for heightened and strengthened health education for improved sanitation and hygiene at household level with more emphasis on community empowerment as a long-term measure. This will go a long way especially when there is limited or low buy-in from the local political leaders who should champion this aspect.

Keywords: Schistosomiasis, MDA, and Demography

INTRODUCTION

Schistosomiasis is a severe, debilitating neglected tropical disease associated with poverty [1]. Schistosoma parasites are transmitted in areas with limited infrastructure and minimal access to, or use of, improved water, sanitation, and hygiene (WASH) facilities [2-3]. The disease is endemic in 78 countries, causing an estimated 1.864 million disability-adjusted life years lost (DALYs), with over 250 million people infected, of whom >90% live in Sub-Saharan Africa [4-7]. Improvements in diagnostics show that prevalence may be higher than previously thought [8]. Currently, schistosomiasis control in endemic regions focuses heavily on annual Praziquantel MDA which aims at preventing morbidity in later life by reducing infection intensities and prevalence [9]. The global distribution map of Schistosoma shows a large overlap of Schistosoma mansoni- and Schistosoma haematobium-endemic areas (Figure 1).

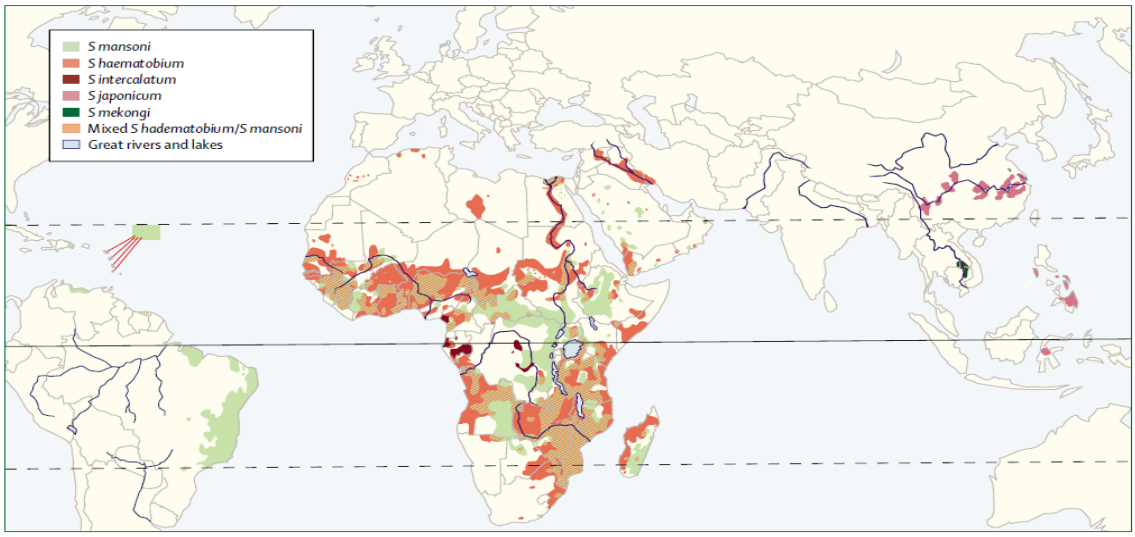

Figure 1: Global distribution of Schistosomiasis [10] and WHO [11]

For over two decades, focus on global health has majorly been on "Big three" diseases of malaria, HIV/AIDS and tuberculosis (TB), with initiatives such as Global Fund to Fight AIDS, TB and Malaria and US President's Emergency Plan for AIDS Relief (PEPFAR) [12]. Many tropical diseases that caused less mortality per year were at this point termed as "others" within Millennium Development Goal 6. These were thus neglected as they received less funding despite their contribution to morbidity. The term 'Neglected Tropical Diseases' (NTDs) was thus created to describe a sub-set of common chronic infectious 'other' diseases which were overlooked then. These diseases impose a great burden on poor populations in developing World such as Uganda yet robust, low-cost and effective public health interventions are available to relieve epidemiologic burden and contribute to a better quality of life among people living in low-resource settings [13]. Despite efforts being deployed to 17 diseases, Schistosomiasis is among the commonest and affect the biggest numbers of people worldwide. In Uganda, the burden of NTDs is high especially among rural low-income communities with limited access to health care, inadequate information, means of prevention and control measures.

NTDs of highest public health importance are categorized into two: those amenable to either preventive chemotherapy (PC-NTDs) or control through case management (CM-NTDs). PC-NTDs prevalent in Uganda are Lymphatic filariasis (filarial elephantiasis), Schistosomiasis (bilharzia), STHs, Onchocerciasis (River blindness) and Trachoma while CM-NTDs include Human African Trypanosomiasis (sleeping sickness), Leishmaniasis (Kala-azar), Plague, Buruli Ulcer Disease (BUD), Rabies, Podoconiosis (non-filarial elephantiasis), Tungiasis (Jiggers), Brucellosis, Cysticercosis (Taeniasis), Echinococcosis (hydatidosis), Leprosy and (Dracunculiasis) Guinea worm. Uganda, a signatory to international treaties and conventions, committed to control and eliminate targeted NTDs by year 2020. With a vision to eliminate NTDs in Uganda by year 2020, MoH, through VCD has a master plan to provide strategic direction on coherently integrated, planning, implementation, monitoring and of programme performance across key stakeholders [15].

Schistosomiasis (SCH) is endemic to 95 districts out of 146 districts of Uganda including Mayuge. It is associated with large water bodies, permanent and semi-permanent rivers, streams, water reservoirs constructed for watering animals and irrigation schemes. MoH's strategy for SCH focuses on controlling morbidity through treatment of at-risk

groups according to WHO risk categories and adjusted to reflect high levels of SCH transmission in the country. In high risk (≥50% prevalence) areas, NTD Programme adopts WHO guidance in treating school-aged children (SAC) and high risk adults annually. High endemicity SCH districts, such as Mayuge are currently targeted for elimination [16] WHO (2006) recommends community-wide MDA in areas where prevalence in school-aged children (SAC; enrolled and non-enrolled children aged 5-14) is >50%. To achieve WHO goal of reducing schistosomiasis morbidity by 2020, countries need to reach targets of at least 75% preventive chemotherapy (PC) coverage of SAC and at-risk adults annually in hyper-endemic communities [17]. At-risk adults range from entire communities living in endemic areas to special groups (i.e. occupations involving frequent contact with infested water such as fishermen or irrigation workers). WHO promotes integrated approaches with Water Sanitation and Hygiene (WASH) and continuous health education targeting high risk populations [18].

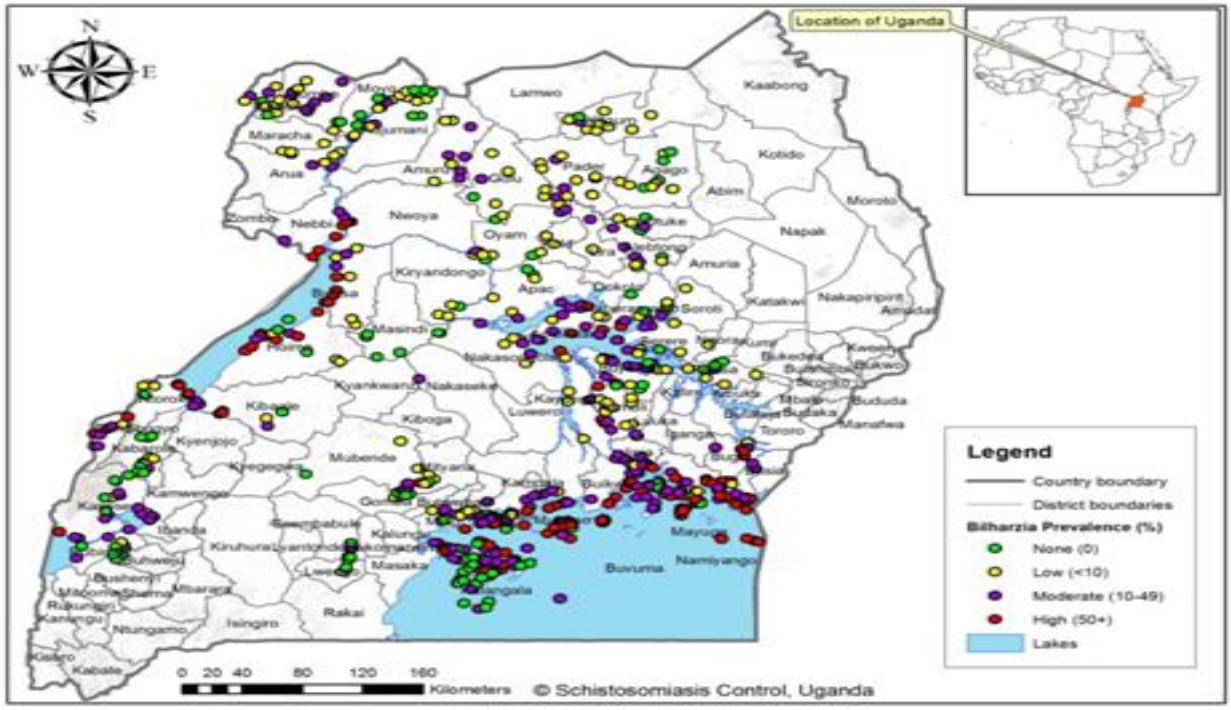

Figure 2: Map of Uganda showing distribution of Schistosoma mansoni

Problem Statement

There has been lack of evidence for a baseline data to provide the benchmarking information to achieve quality and development results for Neglected Tropical Diseases into health system integration [19] including Schistosomiasis in Mayuge District [20]. Studies have shown communities are always diverse and such factors as ethnicity and social networks can influence the likelihood of intervention [1]. There has been low treatment coverage for Schistosomiasis over the years in Mayuge District as evidenced in studies by Adriko [13]. The Ministry of Health's Health Information management System (HMIS) shows no data on the prevalence of Schistosomiasis in all districts in Uganda including Mayuge. This translates into a lack of available evidence to the MoH system delivery and explains why the medicines are not readily available to facilities. Although MoH has been implementing annual treatment programs such as child days plus resulting in a reduction in prevalence.

Aim of the study

The project aims to conduct a baseline assessment of Schistosomiasis in Mayuge District, Uganda

METHODOLOGY

Study Area

Mayuge district was chosen amongst the 95 out of 146 districts to pilot and implement this study because of the high burden of the disease and reportedly low treatment coverage as earlier observed [8]. Mayuge became a district in December 2000 by an act of parliament. It is located in eastern region of Uganda. The district consists of 13 sub-counties with headquarters located at Mayuge town council, nearly120km from Kampala and 40km from Jinja. It is boarded by Iganga district in the north, Jinja in the west, Bugiri district in the east. Topographically, Mayuge district is relatively flat with high ridges, isolated hills and undulating terrains. Hills are linear with a convex pattern ranging from 2% to 8% and valleys of less than 2% slope. Lowest and highest points are located 1,200m and 1,500m above sea level in the south and north, respectively. The district has a long shoreline of Lake Victoria in the south and six islands [17].Mayuge district has a total geographical area of 4,672.22Km^2, consisting 76.6% (3,584.7Km^2) water and 23.4% (1,093.6Km^2) land [12]. It has an estimated 95,349 households and a total population of 437,239 people[81]. Mean annual rainfall ranges from 900mm-1,200mmin the wetter south and 450-500mm in the drier west. The study baseline was conducted across 13 sub-counties. Since risk of exposure to potential vectors for SCH varies with environmental conditions such as temperature, rainfall, elevation and land surface, the study team will divide the district into three zones based on risk mapping to allow for better understanding and provision of effective control recommendations.

Study design

A cross-sectional study design was employed to obtain quantitative data on the knowledge, attitudes and practices about Schistosomiasis, while the grounded theory was employed to understand the context and perceptions concerning Schistosomiasis in Mayuge.

Sample size determination

Household survey: The target population for the household survey included adult men, women and children aged 8 years and above. Sample size determination: The sample size for the household survey was determined by using a formula by Fischer [2].

$$N = \frac{z2pq \times Deff}{\delta 2}$$

Where;

Z is the Standard normal deviate (1.96) corresponding to 95% confidence level of significance

P is the estimated uptake of MDA in the district (50.7% according to the baseline report).

Q is 1-p =0.493.

δ2 is the Standard error, measure of precision of the estimated parameter = CI/ Cα.

CI is the width of the desired confidence interval ±5%:

Cα = value from the normal curve corresponding to accepted alpha value,

Z score at 95% confidence interval, = 1.96: s = 0.05.

Deff shows the Design effect of 2 was used.

The obtained sample size was subjected to a non-response rate of 20%. Overall, a total sample size of 1,158 respondents was reached across the 13 sub counties. These included 585 (50.5%) adult women, 348 (31.1%) adult men and 225 (19.4%) children aged 8 years and above.

Sampling procedure

A multistage sampling approach was used to select the households for the survey. In each of the 13 sub counties, a list of all the administrative units (parishes and villages) was obtained and used as the sampling frame. At each level, Probability Proportional to Size (PPS) sampling was used to select the administrative units for inclusion in a 3-stage cluster sampling procedure was adopted. Systematic sampling was used to select the parishes and the villages for inclusion in the. At household level, one member of the household eligible for MDA was interviewed. If there was nobody in the selected household, the next household whose main entrance is nearest to the main entrance of the current household was visited.

Data Collection: Household data was collected by trained research assistants who conducted face to face interviews with the eligible respondents. As much as possible, the variables used at baseline were integrated into the endline tools to allow for meaning comparison between the two time points. Open Data Kit (ODK) was used to collect household data. ODK is a suite of tools that allows data collection using Android mobile devices and data submission to an online server, even without an internet connection at the time of data collection. The structured data tools were automated in an electronic form using the ODK collect form designer. The deigned ODK form was installed on an Android based phones which enabled offline data collection and submission of data to the central aggregate server. Data collected on the tablets/phones was synchronized to the online ODK aggregate server.

Selection of households

In the quantitative part of the study, a two-stage cluster sampling was conducted to select the households required for the study. For the first stage, purposive sampling was conducted to identify high risk areas based on data and district experience. The study team mapped out parishes with high risk exposure to disease for the survey. Once parishes are selected, they were validated to ensure compliance with high-risk assessment criteria. From selected parishes, villages were determined using probability proportional to size. Finally, villages within parishes were selected using simple random sampling. Household heads were interviewed in selected households but in the absence of a household head, an adult resident was interviewed using a structured questionnaire.

Interviewees and FGD participants

The targeted participants for the key informant interviews were the local administrators, head teachers, opinion leaders, religious/ group leaders and health officers. These participants were selected using a stratified purposive sampling technique. In each village, schools were selected in each sub-county and headmasters interviewed at their respective schools. Furthermore, purposive selection was done in the village. Local Councils (LC1s), councilors, health workers in health facilities and leaders of churches or mosques were also interviewed. A total of 13 key informant interviews were conducted across 13 sub-counties. The key informant guide was developed and pre-tested outside the study area, refined and finalized before interviewing the above selected participants in various aspects. The guide was used to explore individual knowledge, attitudes and practices on Schistosomiasis infection. The KII guide aided in exploring insights into real issues about key factors influencing prevention and control of Schistosomiasis infection from informants. Focus Group Discussions (FGDs) were organized and held by trained moderators and note-takers fluent in the Lusoga dialect among above selected participants. The study team developed themes and sub-themes for discussion. These themes and sub-themes were used to probe FGD members, while note takers record gestures, assent, expressions and other non-verbal forth coming communication. Additionally, an evaluation assessment was conducted at the end of each FGD meeting by researchers to validate information collected. Discussions were captured by digital voice recorders and transcripted using voice recognition software called CMU Sphinx before processing in Microsoft Word. Due to the nature of transmission, areas of exploration may cover sensitive topics such as defecation and behavioral aspects that are influenced by power structures within the community. Individuals may therefore be distressed when discussing these topics in front of others. To mitigate, a funnel approach of focal groups prior to the main community meeting was used to allow individuals to discuss matters amongst their direct peers in the absence of social dynamics between the groups. The discussions were focused on the wider concepts within their society rather than the personal behavior. The research teams ensured that the more obvious dynamics are mitigated against by having females interview female only groups, and through the engagement and consent procedures and the welcome and

introduction on each day of research by explaining fully why these sensitive topics are to be discussed.

Data collection techniques and tools

Questionnaires

Interview-based questionnaires were used to collect data from household heads. They captured data on socio-demographic characteristics, water usage, sanitation, knowledge, attitudes and practices related to Schistosomiasis infection, housing factors (e.g. construction of houses, type of flooring, waste disposal, sanitary conditions), acceptability and willingness to use current preventive and control measures. Questionnaires were administered with both closed- and open-ended questions to capture elements of quantitative and qualitative data respectively. Questionnaires were administered in Lusoga and translated back into English. Data cleaning was managed at a multi-stage process. The data was cleaned using Microsoft excel and fed into STATA during analysis until the final report was completed. Data was collected using the Open Data Kit (ODK) platform on SMART phones as this also improves data quality. The data was collected on a daily basis, downloaded and backed up to ensure it was not distorted and changed. Quantitative data was downloaded from the server, cleaned and analyzed using STATA ver14. The data was analyzed based on the project indicators to benchmark the baseline before implementation. Descriptive statistics to indicate the frequencies for selected indicators was run. Some of these included social demographic characteristics and knowledge and attitudes of the respondents. The second level of analysis was conducted, mainly associations between the project outcomes and demographic characteristics. Data from the transcripts of the translations, interviews, focus group discussions and notes from the researcher were managed and sorted by selective and open coding using the qualitative data analysis software application MAXQDA[83]. Interpretation of the coded segments composed the final stage of analysis in which the following aspects were considered: intensity, frequency, context of the comments and internal consistency of the comments.

Key Informant Interviews

A total of 13 key informant interviews were conducted across 13 sub-counties. The key informant guide was developed and pre-tested outside the study area, refined and finalized before interviewing the above selected participants in various aspects. The guide was used to explore individual knowledge, attitudes and practices on Schistosomiasis infection. The KII guide aided in exploring insights into real issues about key factors influencing prevention and control of Schistosomiasis infection from informants.

Focus Group Discussions

Focus Group Discussions (FGDs) were organized and held by trained moderators and note-takers fluent in the Lusoga dialect among above selected participants. The study team developed themes and sub-themes for discussion. These themes and sub-themes were used to probe FGD members, while note takers record gestures, assent, expressions and other non-verbal forth coming communication. Discussions were captured by digital voice recorders and transcripted using a voice recognition software called CMU Sphinx before processing in Microsoft word and analysis using NVIVO software [8].

Approaches to measure and demonstrate

Qualitative analysis methods were applied because the analysis process provided meaningful information to the study context. Data from transcripts of translations, interviews, focus group discussions and notes from the researcher were managed and sorted by selective and open coding using a qualitative data analysis software application, MAXQDA [3]. Selective coding was performed based on a coding sheet, which in turn were coherently connected to the conceptual framework of the study survey. Interpretation of coded segments highlighted the final stage of analysis in which aspects of intensity, frequency, context of comments and internal consistency of the comments were considered. Quantitative data collected was cleaned every day to address any errors and bias. Data was captured twice in Microsoft Excel spread sheet, cleaned and

exported to STATA (Ver12, Stata Corp, College Station TX, USA) for analysis[85]. Descriptive statistics was used to describe respondents' characteristics. Continuous variables were analysed using means with standard deviations or median with inter-quartile range (IQR). In addition, categorical variables were analyzed using their frequencies and percentages. Crude (unadjusted) correlates of outcome indicators were examined using univariate logistic regression analysis. All variables with a P-value <0.2 and those significant on the bivariate analysis were further considered in the multivariable logistic regression model. Results of multivariable and univariate analyses were presented as crude and adjusted odds ratios with corresponding confidence intervals and p-values (alpha =0.05) to determine factors independently associated with outcome indicators after controlling for potential confounding bias and interaction.

Data Quality assurance

Quality assurance measures were adopted in the study during the training of enumerators and data entry clerks on instruments, field testing with a special focus on a 'real-life' situation and process improvement to enhance deep and integrated understanding of the study team. Study tools and templates were shared among implementation team members for input and subject to various face validity exercise for clarity and relevancy. Field supervisors were timely engaged in reviewing questionnaires generated by the mobile SMART phone platform daily to address any inconsistencies in content. Additionally, the team conducted data triangulation to ensure all the data are available before cleaning and analysis stages.

Household data management and statistical analysis:

Survey data was downloaded from the server, cleaned and exported to STATA (Ver12, Stata Corp, College Station TX, USA) for analysis[85]. Univariate analysis was performed to generate descriptive statistics including frequencies, percentages, means (S.D), medians of selected indicators. Statistical tests such as Chi Square tests were used to test for differences between the baseline and endline indicators. In addition, bivariate and multivariable models were used to identify independent factors associated with uptake of MDA. The models generated odds ratios and their 95% confidence intervals (CIs).

Ethics Statement and IRB approval

Prior to conducting this study ethical clearance was sought from the Vector Control Research Ethical Committee (VCDREC/104) and the graduate school of the Nexus International University formerly Virtual University of Uganda (VUU-PGDBA-2018-001). Each participant was taken through an informed consent or assent process per national guidelines (UNCST, 2014), the documentation for which (or lack thereof) was informed by national guidelines/regulatory agencies. For the individual <18 years of age but ≥7 years of age, they were requested to assent and consent obtained from their Parent or guardian Participants before this process prior to any assessments or interview. During the informed consent process, a trained member of the study team described the purpose, risks, and benefits related to participation in the survey. The participants were given the opportunity to ask any questions that he or she may have about the survey; and the field investigator obtaining informed consent asked questions to assess the subject's understanding. The study participants were informed that their participation in this study was voluntary and that they may refuse participation or withdraw at any time without prejudice. The team ensured that there were safety parameters in place related to the training of the study participants. All study team members were instructed on proper behaviors during assessment period and how to handle participants. The study findings were presented in a dissertation submitted to Nexus International University of Uganda and copies availed to the MOH, District Health Offices of Mayuge districts. In addition, a copy of the report posted on the internet for access by everyone in need of the findings and recommendation. The study findings were also shared in scientific journals as publication.

Demographic characteristics

The baseline assessment included both children and adults. The adults were slightly more at 55% of the total sample, while the children were 45%. Overall, 62.0% were children aged 7-12years and only 38% were between 13-17years. In regard to the respondents' status majority were children (40.9%), followed by 27.6% who were spouses within the households while 25.7% were the household heads included in the baseline. In terms of religion, most were Muslims (41.8%), the Protestants (24.5%) and Catholics being 20.0%. The findings show that 46.8% had never been married while 44.6% were married, of which 0.6% were aged children between 16-18years.The findings also show that 44.3% of the respondents were peasants, while 42.5% were children in school and only 1.6% of the respondents were fishermen.

Table 1: Respondents' demographic characteristics

Variable	Response	No. of respondents (N = 1100) (%)
Age (years)	7-12	301(27.9%)
	13-17	188(17.1%)
	18+	605(55.0%)
Status of the Respondent in the HH	Household Head	283(25.7%)
	Spouse	303(27.6%)
	Sibling	450(40.9%)
	Other household member	64(5.8%)
Religion	Catholic	220(20.0%)
	Protestant	269(24.5%)
	Muslim	460(41.8%)
	Born again	151(13.7%)
Marital Status	Never married	515(46.8%)
	Married	491(44.6%)
	Separated/divorced	37(3.4%)
	Widowed	57(5.2%)
Employment status	Unemployed	46(4.2%)
	Student/Pupil	467(42.5%)
	Peasant/farmer	487(44.3%)
	Business	72(6.6%)
	Fishmonger/fisherman	18(1.6%)
	Others	**10(0.9%)**

The analysis was aligned to the objectives of the baseline and project indicators. The sections below therefore highlight the findings based on the project indicators, presented by sub-county and other selected demographic characteristics – mainly gender and age.

Knowledge and Practices on Schistosomiasis

To assess knowledge and practices on schistosomiasis among the households and respondents, the baseline data include asking if they had heard about bilharzia, and if they know symptoms to the infection among other variables.

Heard about Bilharzia

According to the findings summarized in Table 1, majority of the respondent had heard about Bilharzia with no major variations across the sub-county. Waira sub-county respondents (91.7%) had heard about Bilharzia more than the rest of the sub-counties followed by those from Mayuge town council (90.9%) and then Buwaya sub-county (81.8%). The sub-county with the least respondents who had heard about Bilharzia was Busakira and then Kigandalo.

Table 2: Respondents who have ever heard about Bilharzia by sub-county

Sub-county	No	Yes	n
Baitambogwe	20 (31.8)	43 (68.3)	63
Bukabooli	29 (29.9)	68 (70.1)	97
Bukatube	34 (29.8)	80 (70.2)	114
Busakira	30 (47.6)	33 (52.4)	63
Buwaaya	6 (18.2)	27 (81.8)	33
Immanyiro	20 (29.9)	47 (70.2)	67
Jagusi	9 (20.5)	35 (79.6)	44
Kigandalo	40 (44.0)	51 (56.0)	91
Kityerera	36 (31.9)	77 (68.1)	113
Malongo	94 (33.5)	187 (66.6)	281
Mayuge Town Council	3 (9.1)	30 (90.9)	33
Mpungwe	21 (39.6)	32 (60.4)	53
Wairasa	4 (8.3)	44 (91.7)	48
Total	**346 (31.5)**	**754 (68.6)**	**1,100**

Heard about Bilharzia by age category

The analysis was further disaggregated by age category and the findings show that those above 36 years of age heard about Bilharzia as compared to the rest. The respondents between the years of 15-18 had heard about Bilharzia the least (5.6%) (Figure 3).

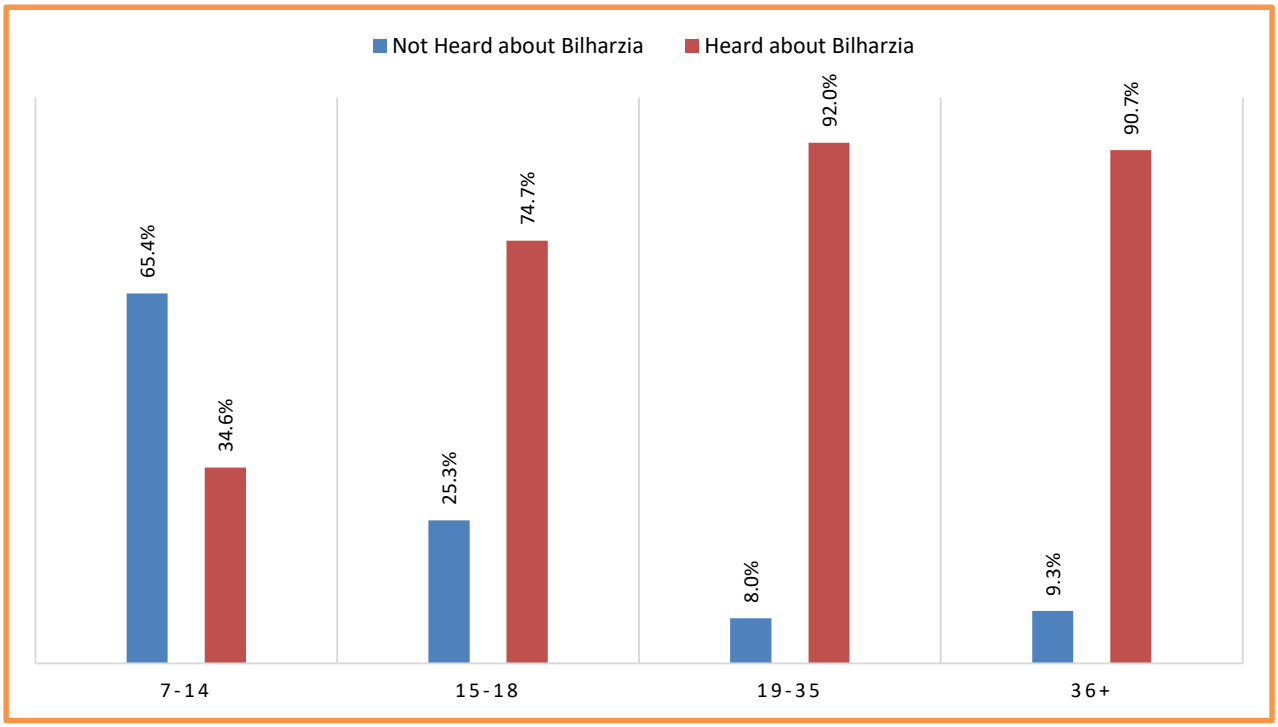

Figure 3: Respondents heard about Bilharzia by age category

According to the results from the qualitative data during focus group discussions with men, women, boys and girls, Bilharzia were highlighted as a health problem in the communities. An implication that they were aware and heard about it. The men and women were equally aware of the Bilharzia infections within the communities. However, the adults reported to know more about bilharzia as opposed to the children. Other health problems highlighted from the data collection were mainly malaria, and diarrhoea. *"Me I think when someone*

*develops a swollen stomach, we just know that that's bilharzia", **FGD respondent from Bwondha**.*

Association of awareness of schistosomiasis with selected demographic factors

Findings from the study indicted a strong association among awareness of schistosomiasis and demographic characteristics except gender. The findings suggest that awareness of schistosomiasis with education level; marriage status, respondent's status and age of the respondents were not statistically independent. Results are demonstrated in table 3 below

Table 3: Association of awareness of schistosomiasis with some demographic factors in Mayuge district

Have ever heard about Bilharzia				
Variable	**Response**	**Yes (%)**	**No (%)**	***P-Value***
Gender	Male	278 (66.3)	141 (33.7)	0.285
	Female	466 (69.5)	205 (30.5)	
Education level	No Education	122 (87.1)	18 (12.9)	<0.00001
	Primary	488 (60.4)	320 (39.6)	
	Secondary	128 (94.8)	07 (5.2)	
	Tertiary	06 (85.7)	01 (14.3)	
Marriage status	Married	445 (90.6)	46 (9.4)	<0.00001
	Never Married	216 (50.8)	209 (49.2)	
	Divorced	32 (88.9)	04 (11.1)	
	Widowed	51 (45.5)	6 (54.5)	
Respondent HH status	Household Head	256 (92.4)	21(7.6)	<0.00001
	Spouse	273 (89.5)	32 (10.5)	
	Children	179 (40.3)	265 (59.7)	
	Other household member	36 (56.3)	28(43.7)	
Age	7-14yrs	144 (34.6)	272 (65.4)	<0.00001
	15-18 years	62 (74.7)	21(25.3)	
	19-35 years	196 (92.0)	17 (8.0)	
	36+	356 (90.8)	36 (9.2)	

Source of Bilharzia information

The source of information on Bilharzia as reported by the respondents is mainly from the radio/TV at 26.4%, followed by political/community leaders (22.9%) and then the community drug distributors and health workers at 21.1% and 21.0% respectively. The least source of information reported is churches/mosques (0.3%) and posters/pamphlets (0.4%) (Table 4).

Table 4: Respondents' source of information for Bilharzia

Sub-county	Church/Mosques	Community drug distributor	Health worker	Newspapers	Politician/ Community leader	Posters & Pamphlets	Teachers	Traditional Healer	TV/radio	n
Baitambogwe	2.3%	4.7%	39.5%	0.0%	23.3%	0.0%	2.3%	2.3%	25.6%	43
Bukabooli	0.0%	20.6%	20.6%	0.0%	16.2%	1.5%	0.0%	2.9%	38.2%	68
Bukatube	0.0%	8.8%	6.3%	0.0%	52.5%	0.0%	8.8%	2.5%	21.3%	80
Busakira	0.0%	33.3%	0.0%	0.0%	0.0%	0.0%	9.1%	0.0%	57.6%	33
Buwaaya	0.0%	25.9%	7.4%	0.0%	14.8%	0.0%	3.7%	0.0%	48.1%	27
Immanyiro	0.0%	34.0%	19.1%	0.0%	12.8%	0.0%	4.3%	0.0%	29.8%	47
Jagusi	0.0%	40.0%	14.3%	0.0%	0.0%	0.0%	8.6%	0.0%	37.1%	35
Kigandalo	0.0%	11.8%	25.5%	0.0%	27.5%	0.0%	7.8%	2.0%	25.5%	51
Kityerera	0.0%	23.4%	28.6%	0.0%	20.8%	0.0%	10.4%	0.0%	16.9%	77
Malongo	0.5%	19.8%	31.6%	0.0%	20.3%	1.1%	10.7%	0.0%	16.0%	187
MayugeTC	0.0%	16.7%	6.7%	3.3%	50.0%	0.0%	6.7%	0.0%	16.7%	30
Mpungwe	0.0%	18.8%	9.4%	0.0%	37.5%	0.0%	0.0%	0.0%	34.4%	32
Wairasa	0.0%	36.4%	15.9%	0.0%	11.4%	0.0%	4.5%	0.0%	31.8%	44
Total	**0.3%**	**21.1%**	**21.0%**	**0.1%**	**22.9%**	**0.4%**	**7.0%**	**0.8%**	**26.4%**	**754**

Suffered or anyone in family from Bilharzia before?

Based on the findings summarized in Figure 4, only 11.0% of the respondents reported to have suffered or a family member to have suffered from Bilharzia. Baitambogwe sub-county reported the least individuals to have suffered from Bilharzia (4.7%) while Mayuge Town Council reported the most, followed by Wairasa and then Kigandalo sub-counties. While the baseline survey could not verify this, the prevalence study can be able to determine the actual prevalence. However, the possible reasons could be that this being an urban center, more people migrate from the exposed areas like the lake shores to the urban centers. Secondly, this could also be attributed to the fact that the urban residents have more information on the condition compared to others.

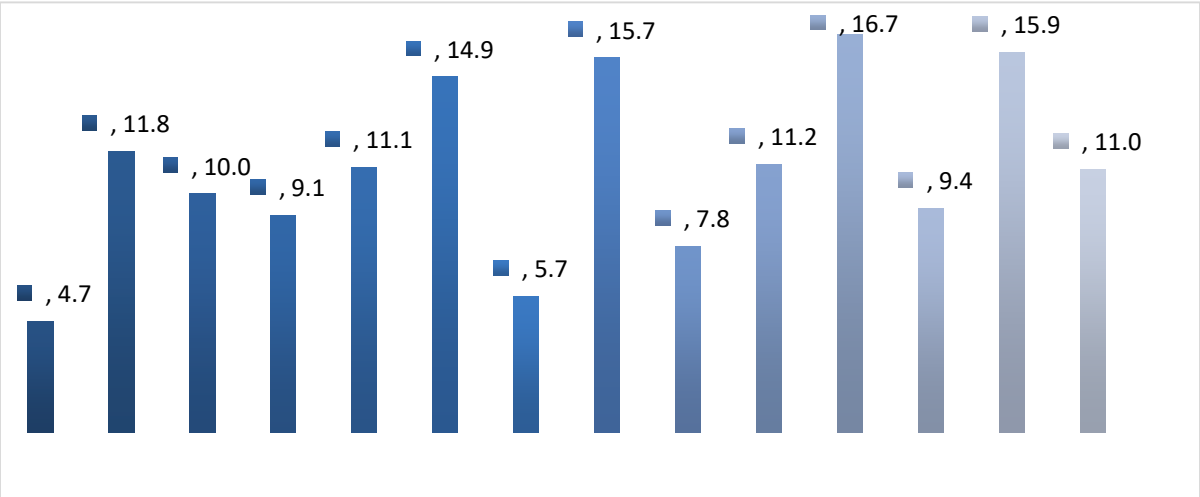

Figure 4: Respondents suffered or any member of family from Bilharzia

Association of Suffering from schistosomiasis with some demographic factors

From the baseline findings, there was only an association between participants with family member that had suffered from schistosomiasis and respondents' household status and marriage status. However, no scientific evidence to explain thus was found. The rest of the variables were all-independent from having a family member ever suffering from schistosomiasis.

Table 3: Association of Suffering from schistosomiasis with some demographic factors in Mayuge district

		Family Member ever suffered from Bilharzia		
Variable	**Response**	**Yes (%)**	**No (%)**	***P-Value***
Gender	Male	191 (68.7)	87 (31.3)	0.392
	Female	296 (63.4)	171 (36.6)	
Education level	No Education	13 (10.7)	109 (89.3)	0.336
	Primary	57 (11.7)	431 (88.3)	
	Secondary	08 (6.2)	120 (93.8)	
	Tertiary	01 (16.7)	05 (83.3)	
Marriage status	Married	45 (10.1)	400 (89.9)	0.016
	Never Married	18 (8.3)	198 (91.7)	
	Divorced	04 (12.5)	28 (87.5)	
	Widowed	12 (23.5)	39 (76.5)	
Respondent HH status	Household Head	35 (13.7)	221(86.3)	<0.00001
	Spouse	27 (9.9)	246 (88.9)	
	Sibling	12 (6.7)	167 (93.3)	
	Other household member	05 (13.9)	31(86.1)	
Age	7-14yrs	15 (10.4)	129 (89.6)	0.055
	15-18 years	03 (4.9)	58(95.1)	
	19-35 years	14 (7.3)	179 (92.7)	
	36+	47 (13.6)	299 (864)	

Knowledge on transmission of Bilharzia from person to person

The respondents' knowledge on how Bilharzia is transmitted was also assessed and the findings show that 23.8% related it to fetching water from the contaminated sources and drinking dirty water (22.8%). Other ways of transmission highlighted from the baseline were poor hygiene and sanitation practices (17.8%), and bathing or walking in dirty water. Only 17.3% of the respondents reported not to know the ways of transmission for Bilharzia.

Table 6: Respondents' knowledge on transmission of Bilharzia

Sub-county	Drinking water	Fetching water from	Poor hygiene/sanitation	Bathing/swimming/Walking in	Working in paddy	Fishing	Drinking dirty water	Eating contaminated food	Other	Don't know	n
Baitambogwe	0.0%	28.6%	22.2%	11.1%	1.6%	1.6%	20.6%	1.6%	1.6%	14.3%	63
Bukabooli	2.0%	20.4%	15.3%	13.3%	3.1%	1.0%	23.5%	3.1%	7.1%	19.4%	98
Bukatube	0.0%	14.8%	27.8%	10.4%	2.6%	0.0%	16.5%	6.1%	4.3%	17.4%	115
Busakira	0.0%	9.4%	9.4%	7.8%	3.1%	0.0%	21.9%	0.0%	0.0%	18.8%	64
Buwaaya	0.0%	34.3%	17.1%	17.1%	0.0%	0.0%	5.7%	0.0%	5.7%	17.1%	35
Immanyiro	0.0%	20.9%	17.9%	10.4%	9.0%	0.0%	37.3%	0.0%	0.0%	22.4%	67
Jagusi	0.0%	18.2%	11.4%	18.2%	0.0%	2.3%	45.5%	0.0%	0.0%	20.5%	44
Kigandalo	0.0%	9.9%	16.5%	3.3%	0.0%	0.0%	16.5%	0.0%	3.3%	22.0%	91
Kityerera	0.9%	44.2%	21.2%	19.5%	0.0%	0.0%	16.8%	2.7%	2.7%	8.0%	113
Malongo	0.4%	25.8%	19.4%	13.4%	2.5%	0.0%	24.4%	5.3%	2.5%	15.5%	283
Mayuge TC	0.0%	26.5%	23.5%	14.7%	2.9%	2.9%	41.2%	2.9%	2.9%	20.6%	34
Mpungwe	0.0%	16.7%	1.9%	18.5%	0.0%	0.0%	11.1%	1.9%	7.4%	25.9%	54
Wairasa	0.0%	38.8%	10.2%	20.4%	2.0%	2.0%	28.6%	0.0%	4.1%	16.3%	49
Total	**0.4%**	**23.8%**	**17.8%**	**13.2%**	**2.2%**	**0.5%**	**22.8%**	**2.8%**	**3.2%**	**17.3%**	**1110**

Transmission of Bilharzia was associated with poor hygiene and sanitation and use of contaminate water. The men and women highlighted these are the main transmission modes during the FGDs. *"There is carelessness to good sanitation and hygiene in the area...", Male respondent from Bwondha."Negligence to good sanitation and hygiene and use of contaminated water causes the infections", Boy from Ibanga Primary School.*

Seeking treatment/support for Bilharzia within the community

The respondents who had suffered or had a member of their family reported to majorly seek treatment from the health workers (70%) and only 15% get it from the community drug distributors. Other source of treatment as reported are indicated in Figure 5.

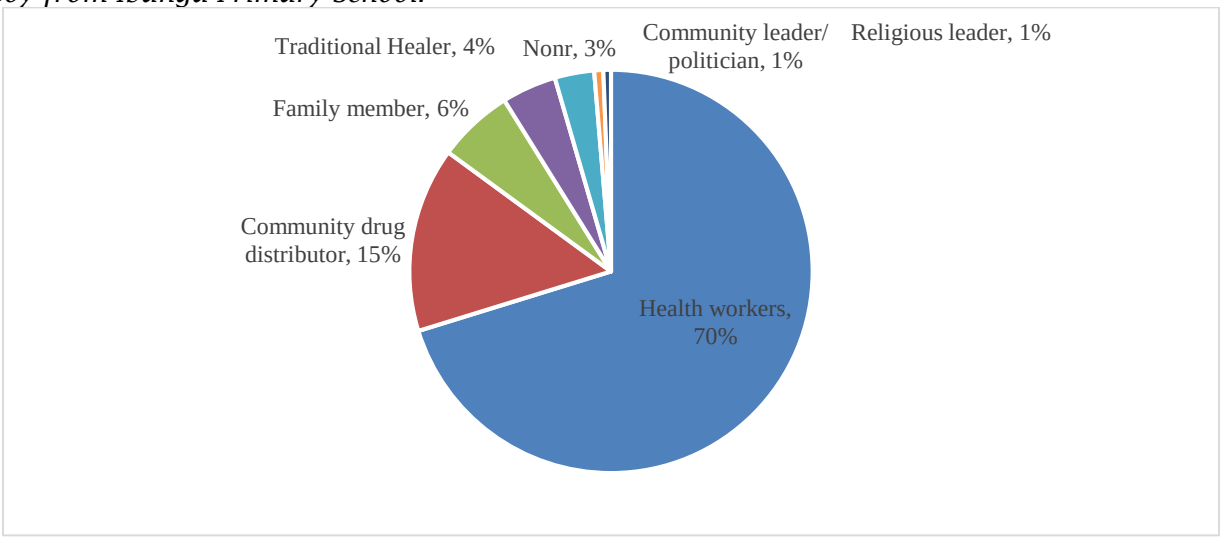

Figure 5: Whom support/treatment is sought from in case of Bilharzia

Opinion on Bilharzia prevention

In terms of attitude, the respondents' opinion on whether Bilharzia is preventable indicated that majority from Imanyiro sub-county (85.1%) thought it so. While 65.7% of the respondents thought this was preventable, majority from Jagusi sub-county indicated it couldn't. Most of the respondents from Mpungwe sub-county also reported the infection as being unpreventable at community level (Figure 6).

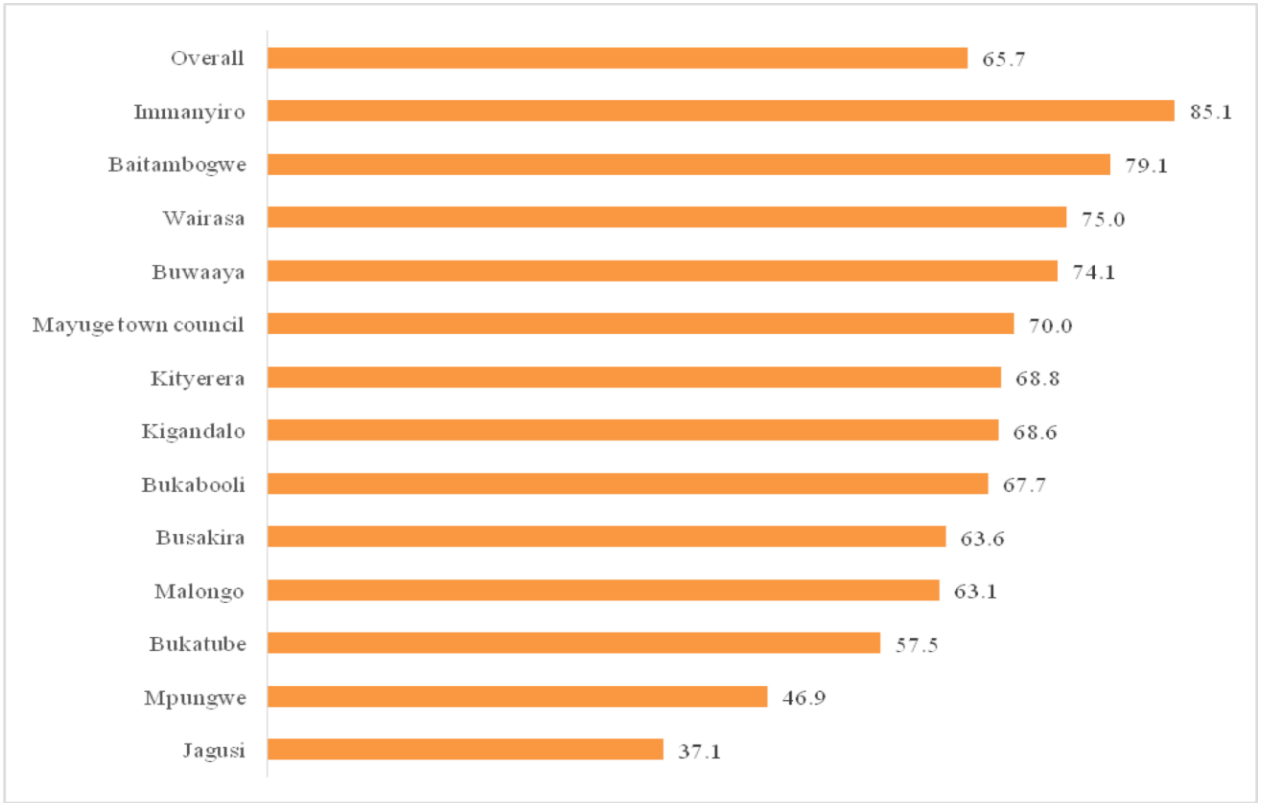

Figure 6: Respondents who think Bilharzia is preventable

Prevention strategies for bilharzia suggested by respondents

The findings show that treatment of infected person (44%) was pointed out as the main preventive strategy with the communities. The respondents also suggested avoiding contact with standing water and then drinking boiled water (22.6%). While health education (19.1%) was known as a preventive approach or strategy, this was most predominant on Mayuge Town Council as compared to other sub-counties.

Table 7: Respondents'' strategies for preventing Bilharzia

Sub-county	Avoid contact with standing water	Health education	Treatment of all infected persons	Spraying/dosing water with drugs	No swimming /playing in water	Provision of safe water	Use latrine	Drinking boiled water	Others	n
Baitambogwe	32.4%	20.6%	52.9%	2.9%	0.0%	26.5%	14.7%	17.6%	8.8%	34
Bukabooli	21.7%	15.2%	45.7%	4.3%	8.7%	6.5%	19.6%	26.1%	19.6%	46
Bukatube	4.3%	8.7%	47.8%	0.0%	13.0%	10.9%	13.0%	32.6%	15.2%	46
Busakira	19.0%	19.0%	47.6%	4.8%	9.5%	9.5%	4.8%	42.9%	9.5%	21
Buwaaya	55.0%	20.0%	30.0%	0.0%	20.0%	10.0%	0.0%	5.0%	15.0%	20
Immanyiro	10.0%	30.0%	47.5%	0.0%	2.5%	10.0%	10.0%	27.5%	10.0%	40
Jagusi	0.0%	23.1%	30.8%	0.0%	15.4%	0.0%	15.4%	23.1%	23.1%	13
Kigandalo	5.7%	14.3%	37.1%	0.0%	2.9%	37.1%	2.9%	14.3%	17.1%	35
Kityerera	22.6%	11.3%	32.1%	0.0%	47.2%	20.8%	20.8%	11.3%	9.4%	53
Malongo	21.2%	17.8%	55.9%	1.7%	14.4%	18.6%	9.3%	19.5%	12.7%	118
Mayuge TC	38.1%	47.6%	38.1%	9.5%	0.0%	23.8%	14.3%	19.0%	0.0%	21
Mpungwe	53.3%	20.0%	13.3%	0.0%	13.3%	0.0%	6.7%	33.3%	26.7%	15
Wairasa	21.2%	27.3%	36.4%	3.0%	24.2%	9.1%	18.2%	36.4%	3.0%	33
Overall	**21.0%**	**19.2%**	**44.0%**	**1.8%**	**14.5%**	**16.0%**	**12.1%**	**22.6%**	**12.5%**	**495**

Prevention of Bilharzia at community level

In an effort to further understand the community understanding of Bilharzia, information on whether this infection can be controlled and prevented at the community level was collected. The respondents were required to indicate if this could be done and what strategies the community would employ. Slightly more than half (52.5%) of the respondents believed this could be prevented at the community level, and most were adults above 36 years of age compared to young ones and children of different categories (Table 8).

Association of Knowledge on schistosomiasis with selected demographic factors

The only significant association was found between education levels and knowledge on schistosomiasis. Table 8 shows details of the associations.

Table 4: Association of Knowledge of schistosomiasis with selected demographic factors in Mayuge district

Bilharzia can be Treated/prevented				
Variable	**Response**	**Yes (%)**	**No (%)**	***P-Value***
Gender	Male	191 (68.7)	87 (31.3)	0.134
	Female	296 (63.4)	171 (36.6)	
Education level	No Education	62 (50.8)	60 (49.1)	<0.0007
	Primary	315 (64.5)	173 (35.5)	
	Secondary	103 (80.5)	25 (19.5)	
	Tertiary	05 (83.3)	01 (16.7)	
Marriage status	Married	291 (65.4)	154 (34.6)	0.9997
	Never Married	141 (65.3)	75 (34.7)	
	Divorced	21 (65.6)	11 (34.3)	
	Widowed	33 (64.7)	18 (35.3)	
Respondent HH status	Household Head	178 (69.5)	78(30.5)	0.1955
	Spouse	168 (61.5)	105 (38.5)	
	Sibling	114 (63.7)	65 (36.3)	
	Other household member	26 (72.2)	10(27.8)	
Age	7-14yrs	81 (56.2)	63 (43.8)	0.061
	15-18 years	24 (38.7)	38(61.3)	
	19-35 years	95 (48.5)	101 (51.5)	
	36+	158 (44.8)	14 (55.2)	

Knowledge on signs and symptoms for Bilharzia

During the baseline assessment, the respondents also provided information on the signs and symptoms of Bilharzia best known to them. The main symptom listed by most respondents was enlargement or swelling of body parts – especially the stomach (32.4%). However, the main sign related to this could be the enlargement of the spleen and liver that is documented in literature. Abdominal pain (25.2%) was also highlighted as sign of Bilharzia, followed by weakness (10.8%) and then diarrhoea (7.7%). The baseline also shows that 10.3% of the respondents did not know that signs and symptoms of Bilharzia (Figure 7).

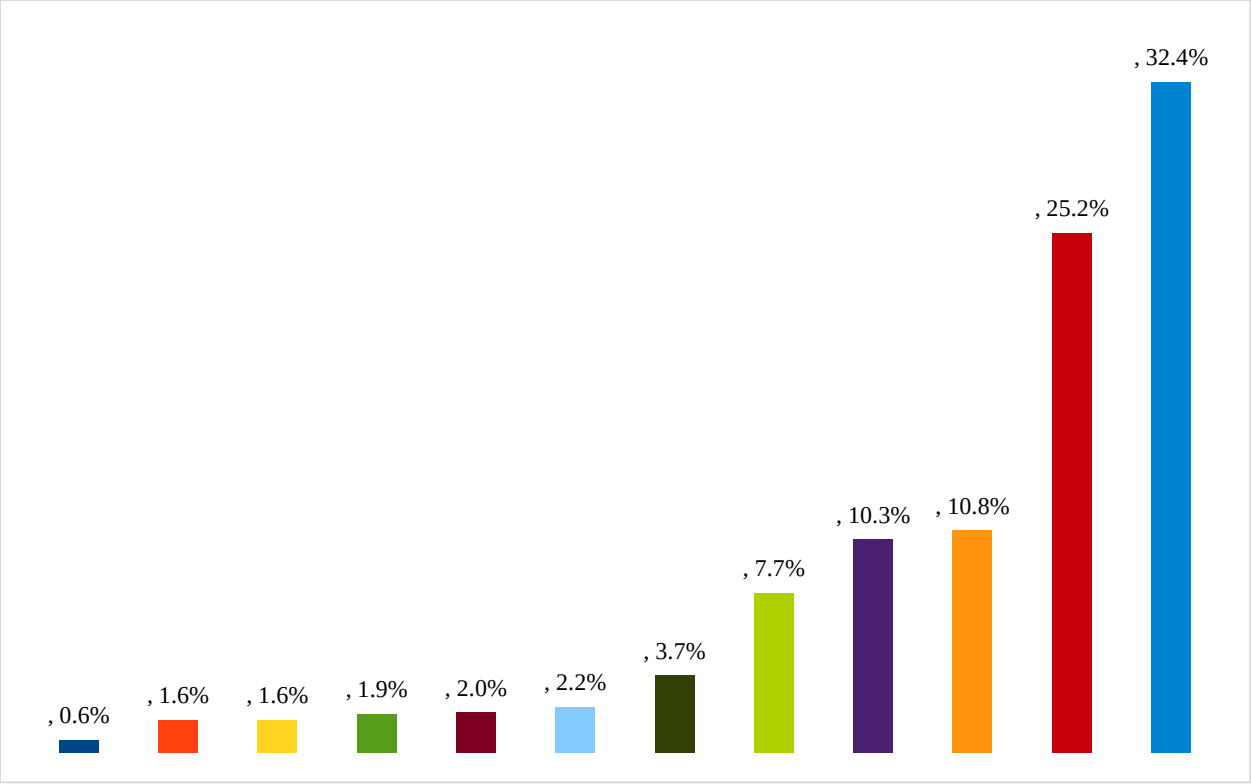

Figure 7: Respondents' listing of the signs and symptoms of Bilharzia

Participation in MDA Activities

The baseline survey further collected information on participation of communities in Mass Drug Administration (MDA) activities. This mainly focused on only those who had indicated to have some knowledge on Schistosomiasis. Findings from the study indicated that half of the respondents (50.7%) had participated in the various MDA activities while 24.6% did not. The findings also show that more female (33.6%) had participated in the activities as compared to the male counterparts. In terms of age disaggregation, 16.9% were children aged 7-14 years who had participated, and then adults about 36 years (16.7%).On the other hand, about a quarter of the respondents did not know if they had participated in MDA activities and most were children 7-14 years (20.5%).When the association between participation and demographic factors was tested, a strong association was found across all factors expect gender. The association was strongest for age and respondents' status as indicated in table 9 below.

Table 9: Respondents' participation in MDA activities by Demographic factors

		Ever participated in MDA- Response			
Variable		**Don't Know**	**Yes (%)**	**No (%)**	***P-Value***
Gender	Male	81 (23.4)	73 (21.2)	189 (55.1)	0.2205
	Female	58 (26.5)	65 (29.7)	96 (43.8)	
Age	7-14yrs	115 (40.1)	77 (26.8)	95 (33.1)	<0.00001
	15-18 years	08 (20.0)	10 (25.0)	22(55.0)	
	19-35 years	07 (7.2)	16 (16.5)	74 (76.3)	
	36+	09 (6.5)	35 (25.4)	94 (68.1)	
Education	No Education				
	Primary	217 (46.6)	116 (24.9)	133 (28.5)	0.0051
	Secondary	29 (72.5)	10 (25.0)	01 (2.5)	
	Tertiary	01 (33.3)	01 (33.3)	1 (33.3)	
Respondent HH status	House hold head	75 (70.1)	28 (26.2)	04 (3.7)	<0.00001
	Spouse	93 (73.8)	22 (17.5)	11 (8.7)	
	Sibling	108 (36.0)	76 (25.3)	116 (38.7)	
	Other household member	09 (32.1)	11 (39.2)	08 (28.7)	
Marriage status	Married	135 (68.2)	49 (24.8)	14 (7.0)	0.0021
	Never Married	121 (46.6)	81 (24.9)	123 (28.5)	
	Divorced	08 (72.5)	04(25.0)	01 (2.5)	
	Widowed	20 (33.3)	03 (33.3)	02 (33.3)	

Quality of drug distribution through community directed approach

The findings show that 39.1% of the respondents appreciated the quality of community drug distribution through the community directed approach and 13.7% considered it very good. However, 23.4% of the respondents considered the services poor – and most of these were female (14.5%) while the children 7-14years also considered the services poor.

Table 10: Respondents' rating of quality of drug distribution through community directed approach

Variable		Quality of drug distribution				N
		Poor	Fair	Good	Very good	
Age	7-14	12.7%	8.1%	12.9%	4.1%	416
	15-18	1.5%	1.8%	3.5%	0.8%	83
	19-35	3.7%	4.2%	7.9%	3.5%	213
	36+	5.5%	6.2%	14.8%	8.8%	388
Gender	Female	14.5%	11.5%	24.5%	10.6%	672
	Male	8.9%	8.8%	14.5%	6.6%	428
Overall		23.4%	20.3%	39.1%	17.3%	1100

Association between (perception) Quality of medicine Distribution and Demographic Factors

Findings indicate a strong relationship between age and participants perception of medicine distribution whereas there was no association on agenda as indicated in table 11

Table 11: Association between (perception) Quality of medicine Distribution and selected Demographic Factors

		Quality of medicine Distribution				
Variable Response		**Poor (%)**	**Fair (%)**	**Good (%)**	**Very good (%)**	***P-value***
Gender	Male	39 (9.3)	112 (26.7)	200 (47.7)	68 (16.3)	0.9291
	Female	69 (10.3)	185 (27.6)	312 (46.5)	105 (15.6)	
Age	7-14	62 (9.3)	140 (26.7)	169 (47.7)	45 (16.3)	<0.00001
	15-18	10 (10.3)	17 (27.6)	44 (46.5)	11 (15.6)	
	19-35	14 (9.3)	57 (9.3)	103 (9.3)	36 (9.3)	
	36+	22 (10.3)	83 (10.3)	196 (10.3)	81 (10.3)	

Satisfaction with the Programme

Overall, 47.5% of the respondent who had benefited from the MDA activities found the services satisfied and 15.5% were very satisfied with amount of help offered during the implementation. Furthermore, 46.9% also reported to satisfied with MDA services.

Table 12: Respondents' satisfaction with MDA programme

Age category	Satisfied with amount of help received during MDA			
	Very dissatisfied	**Dissatisfied**	**Satisfied**	**Very satisfied**
7-14	15.4%	33.4%	40.6%	10.6%
15-18	12.0%	19.3%	56.6%	12.0%
19-35	6.6%	26.8%	49.3%	17.4%
36+	6.2%	21.4%	52.1%	20.4%
Overall	**10.2%**	**26.8%**	**47.5%**	**15.5%**
	Satisfied with MDA services			
7-14	14.9%	33.7%	40.6%	10.8%
15-18	12.0%	20.5%	54.2%	13.3%
19-35	6.6%	27.7%	48.4%	17.4%
36+	5.9%	21.9%	51.3%	20.9%
Overall	**9.9%**	**27.4%**	**46.9%**	**15.8%**
	Opinion on Reduction of Bilharzia problems			
	Worse	**Never changed**	**Fairly**	**Very much**
7-14	16.1%	24.0%	43.0%	16.8%
15-18	13.3%	15.7%	51.8%	19.3%
19-35	7.5%	20.2%	51.6%	20.7%
36+	5.4%	13.7%	52.8%	28.1%
Overall	10.5%	19.0%	48.8%	21.7%

DISCUSSION

Study findings showed that majority 68.6% of the respondents indicated that they had heard about the Schistosomiasis, and majority of them had heard from Radio/Tv followed by politicians 22.9%, medicine distributors and health workers 21%. These findings suggest high awareness of the disease across the district due NTD by the Government through MDA activities may account for such high awareness. The source of information for Schistosomiasis was most heard from radio and this is inline with the fact that the district reported running pre-MDA announcements via local radios. It is however important to note that politicians were also key information sources and may from time to time be used as influential and change agents by the project. Additionally, most of the study participant demonstrated accurate knowledge of transmission, where to seek support/ treatment and 65.7% were sure it was preventable. MDA implementation could have contributed to basic knowledge as noted [16] which indicated Nine studies evaluated the impact of the health education component of MDA programs and reported increase in participants' knowledge, attitudes and practices related to schistosomiasis. However, our findings suggested limited understanding of disease signs except distended abdomen. Therefore, improvement of quality of information to the different targeted groups may improve knowledge, prevent misconceptions and ultimately encourage compliance to Mass

Drug administration.

Study Findings showed that only 50.7% of the participants had taken part in MDA. And of these majority 16.9% were children 7-14 years. Findings also indicated that most participated in activity registration and the reasons for not participating were mainly lack of mobilization. And there is clearly little appreciation of MDA program from the community. The finding on MDA program only point to call for improvement in organization of the entire program. It is important to consider necessary improvement that will eventually lead increased uptake the program. Findings further indicated associations between MDA participation with all demographic factors except gender, a trend like having knowledge or heard about the diseases before. It thus means there is a higher chance of someone that heard of the diseases to participate in MDA.

CONCLUSION

This study recommends a focus on change in practices in the community to complement existing efforts aimed at creating knowledge and awareness on Schistosomiasis. Schistosomiasis infections are still a major problem with regard to prevention and control in Mayuge thus, there is a great need for a proper health education intervention and community mobilization in order to enhance prevention and instill better knowledge concerning the transmission and prevention of Schistosomiasis. This study reveals inadequate knowledge, attitude and practices concerning Schistosomiasis among the Mayuge population, which could be a challenging obstacle to the endeavor towards the elimination of schistosomiasis.

The findings support the need to implement an integrated approach for control of Schistosomiasis with a mission to move towards the elimination phase. Screening, registration and management of the already sick should also be adopted by the project and the district as a way of combating infections in these communities.

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