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A Baseline Assessment of Soil Transmitted Helminths in Mayuge District, Uganda

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ABSTRACT

Mayuge district is one of the 95 districts out of 146 districts struggling to eradicate Soil Transmitted Helminths as a public health concern. The study aimed to carry out a baseline assessment of Soil Transmitted Helminths 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 STH 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 about half (50.5%) had heard about soil transmitted helminthes. Furthermore, almost half (43.9%) of the families of the participants had suffered from STH and these were most prevalent among the children 7-14 years. 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 worm infections 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.

Keywords: Soil Transmitted Helminths (STH), MDA, and Demography

INTRODUCTION

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) [1]. 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 [2]. Despite efforts being deployed to 17 diseases, soil-transmitted helminth infections (STHs) are among the commonest and affect the biggest numbers of people worldwide. SHTs are estimated to affect 200 million persons in 78 countries located in tropical and sub-tropical regions. While three types of STH

are estimated to affect over 1.7 billion people [3]. 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 [4].

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 [5] including soil-transmitted helminth infections in Mayuge District [6]. Studies have shown communities are always diverse and such factors as ethnicity and social networks can influence the likelihood of intervention [7]. There has been low treatment coverage for soil-transmitted helminth infections over the years in Mayuge District as evidenced in studies by Adriko [8]. The Ministry of Health's Health Information management System (HMIS) shows no data on the prevalence of soil-transmitted helminth infections 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, soil-transmitted helminth infections (STH) continues to affect a number of peoples especially those living in rural areas.

Aim of the study

The project aims to conduct a baseline assessment of Soil Transmitted Helminths 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 [9]. 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 [79]. 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 [80]. It has an estimated 95,349 households and a total population of 437,239 people[10]. 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 soil-transmitted helminth 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 soil-transmitted helminth, while the grounded theory was employed to understand the context and perceptions concerning STH 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 [11].

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

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 STH infection. The KII guide aided in exploring insights into real issues about key factors influencing prevention and control of STH 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 SCH and STH 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 [12]. 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

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Focus Group Discussions

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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 [14]. 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 [15]. 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.

RESULTS

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 Soil Transmitted Helminths (STH)

Since the project goal is to reduce both Schistosomiasis and Soil Transmitted Helminths infections in Mayuge, the baseline also assessed the knowledge and practices related to STH. The findings are presented in the following tables and figures. The data variables analyzed are similar to what was used for Bilharzia above.

Heard about Soil Transmitted Helminths (STH)

Half of the respondents (50.5%) had ever heard about STH and this was below as compared to those who reported to have heard about Bilharzia (68.6%). Like Bilharzia, the adults above 36 years of age were likely to have heard about STH more than the young ones. The information about these infections was therefore more available to adults compared to children even across the sub-counties. The age category that had not heard about STH was majorly children 7-14 years (70.9%) and then followed by those 15-18 years (47%).

Association of awareness of STH with some demographic factors

Finding indicated that there was a strong association across all the demographic factors as indicated in table 1.10 below except gender

Table 2: Association of awareness of STH with some demographic factors in Mayuge district

		Ever heard about STH		
Variable	**Response**	**Yes (%)**	**No (%)**	***P-Value***
Gender	Male	203 (48.5)	216 (51.5)	0.341
	Female	345 (51.4)	326 (48.6)	
Education level	No Education	98 (70.0)	42 (30.0)	<0.00001
	Primary	350 (43.3)	450 (56.7)	
	Secondary	95 (70.4)	40 (29.6)	
	Tertiary	06 (71.4)	02 (28.6)	
Marriage status	Married	319 (63.9)	180 (36.1)	<0.00001
	Never Married	175 (34.5)	332 (65.5)	
	Divorced	25 (67.6)	12 (32.4)	
	Widowed	37 (64.9)	20 (35.1)	
Respondent HH status	Household Head	183 (66.1)	94(33.9)	<0.00001
	Spouse	193 (63.3)	112 (36.7)	
	Sibling	139 (31.3)	305 (68.7)	
	Other household member	33 (51.6)	31(48.4)	
Age	7-14yrs	295 (70.9)	121 (2.1)	<0.00001
	15-18 years	39 (47.0)	44(53.0)	
	19-35 years	81 (38.0)	132 (62.0)	
	36+	129 (33.2)	259 (66.8)	

Source of Soil STH information

While respondents reported to mainly get information on Bilharzia from radio or Television, they reported to get information on worm infestation from community drug distributors (31.9%) and then community leaders (23.2%), followed by the health workers (21.5%). Radio or TV as a spruce of information for STH ranked forth as listed by the respondents.

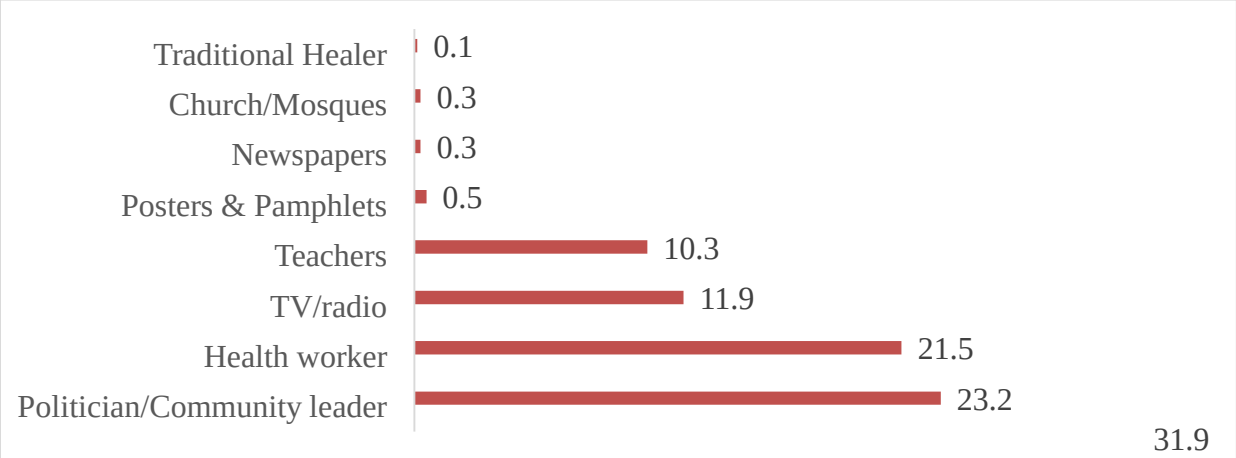
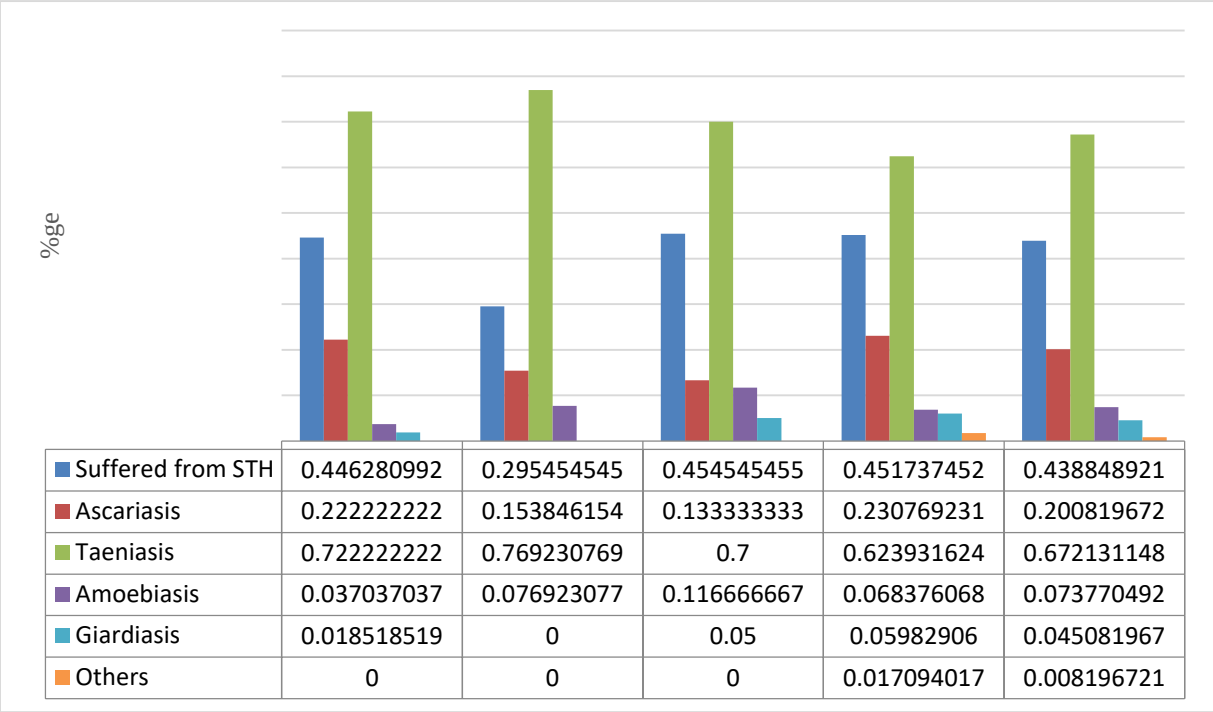


Figure 1: Source of information for STH

Suffered or anyone in family from STH before?

Overall, 43.9% of the respondents reported to have suffered from these infestations or at least a family member. The adults between 19-35 years reported to suffer the worm infestations with slight changes with the rest of the age groups. The most common worm infestation reported was Taeniasis, reported by 67.2% of the respondents, followed by Ascariasis and then Amoebiasis. There were no major variations across the age groups as summarized in Figure 2. From the baseline,

the communities in Mayuge districts have local names for the different forms of worms and this is how they are able to identify and distinguish them.



Suffered from STH	0.446280992	0.295454545	0.454545455	0.451737452	0.438848921
Ascariasis	0.222222222	0.153846154	0.133333333	0.230769231	0.200819672
Taeniasis	0.722222222	0.769230769	0.7	0.623931624	0.672131148
Amoebiasis	0.037037037	0.076923077	0.116666667	0.068376068	0.073770492
Giardiasis	0.018518519	0	0.05	0.05982906	0.045081967
Others	0	0	0	0.017094017	0.008196721

Figure 2: Respondents who suffered from STH and type of infestation

Association between Family members ever suffering from STH with some demographic factors

According to the finding from the study, no association was found between family members that had ever suffered from STH and all the demographic factors as indicated in table 3 below except gender.

Table 3: Association between Family members ever suffering from STH with some demographic factors

Family Member ever suffered from STH				
Variable	**Response**	**Yes (%)**	**No (%)**	***P-Value***
Gender	Male	88 (41.7)	123 (58.3)	0.3773
	Female	158 (45.5)	189 (54.5)	
Education level	No Education	52 (52.5)	47 (47.5)	0.2692
	Primary	152 (42.7)	204 (57.3)	
	Secondary	38 (39.6)	58 (60.4)	
	Tertiary	03 (42.9)	04 (57.1)	
Marriage status	Married	139 (43.6)	180 (56.4)	0.5362
	Never Married	73 (41.7)	102 (58.3)	
	Divorced	14 (56.0)	11 (44.0)	
	Widowed	18 (48.7)	19 (51.3)	
Respondent HH status	Household Head	76 (40.0)	114(60.0)	0.1589
	Spouse	98 (50.2)	97 (49.8)	
	Sibling	60 (42.9)	80 (57.1)	
	Other household member	12 (36.4)	21(63.6)	
Age	7-14yrs	54 (44.6)	67 (55.4)	0.2471
	15-18 years	13 (29.6)	31(70.4)	
	19-35 years	61 (45.9)	72 (54.1)	
	36+	118 (45.4)	142 (54.6)	

Seeking treatment/support for STH within the community

Most of the respondents indicated to seek support from health workers (74.8%) when faced with any problems related to STH. The variation was not any significant across the age categories. Only 10.8% sought support from the community drugs distributors and 8.5% from family members, mostly being the children 7-14 years (25.6%).

Table 4: Who to ask for help or support when respondents get a STH problems

Age category	Who to ask for help when as STH problems				
	Family member	**Community drug distributor**	**Health workers.**	**Traditional Healer**	**Other**
7-14	31 (25.6%)	12 (9.9%)	71 (58.7%)	0 (0.0%)	7 (5.8%)
15-18	4 (9.1%)	3 (6.8%)	34 (77.3%)	0 (0.0%)	3 (6.8%)
19-35	3 (2.3%)	16 (12.1%)	107 (81.1%)	0 (0.0%)	6 (4.5%)
36+	9 (3.5%)	29 (11.2%)	204 (78.8%)	3 (1.2%)	14 (5.4%)
Total	**47 (8.5%)**	**60 (10.8%)**	**416 (74.8%)**	**3 (0.5%)**	**30 (5.4%)**

Knowledge on transmission of STH

The baseline findings also indicate that the main transmission mode for STH as known by the respondents is faecal-oral route (34.1%), followed by taking contaminated water (22.3%) and then contaminated water. The rest of the modes of transmission ranged between 0.1% and 5.5%. According to the findings, only 6.4% of the community members did not know the ways through which STH is transmitted.

Table 5: Respondents' listing of ways of STH transmission

Ways for STH transmission	Percentage (%)
Faecal-oral route	34.1%
Through contaminated needle	1.0%
Through bite of insects	1.1%
Penetration of skin by parasite	5.4%
Contaminated water	22.3%
Contaminated food	9.3%
Taking unboiled milk	2.8%
Eating raw meat	1.7%
Eating Soil	3.8%
Eating sorghum, wheat, bread, vegetable	0.1%
Bathing in river/lake/swamp	4.8%
Sexual intercourse	0.2%
Poor hygiene & Sanitation	2.4%
Others	4.7%
Don't know	6.4%

According to the District Vector Control Officer, poor sanitation and hygiene is common in areas of congestion, islands and low altitude land, soft and rocky soils. This has resulted into infections within the district *"It's hard to control NTDs, poor sanitation and hygiene and usage of contaminated water lead to the spread of NTDs",* **DVCO, Mayuge district**.

Opinion on STH prevention

Overall, 82.7% (460/556) of the respondents reported STH being preventable in their opinion with only 17.3% noting otherwise. Jagusi sub-county had the highest respondents (29.4%) who thought STH could not be prevented, followed by those from Busakira and the least being from Mpungwe (5.0%) and Imanyiro sub-counties (7.3%).

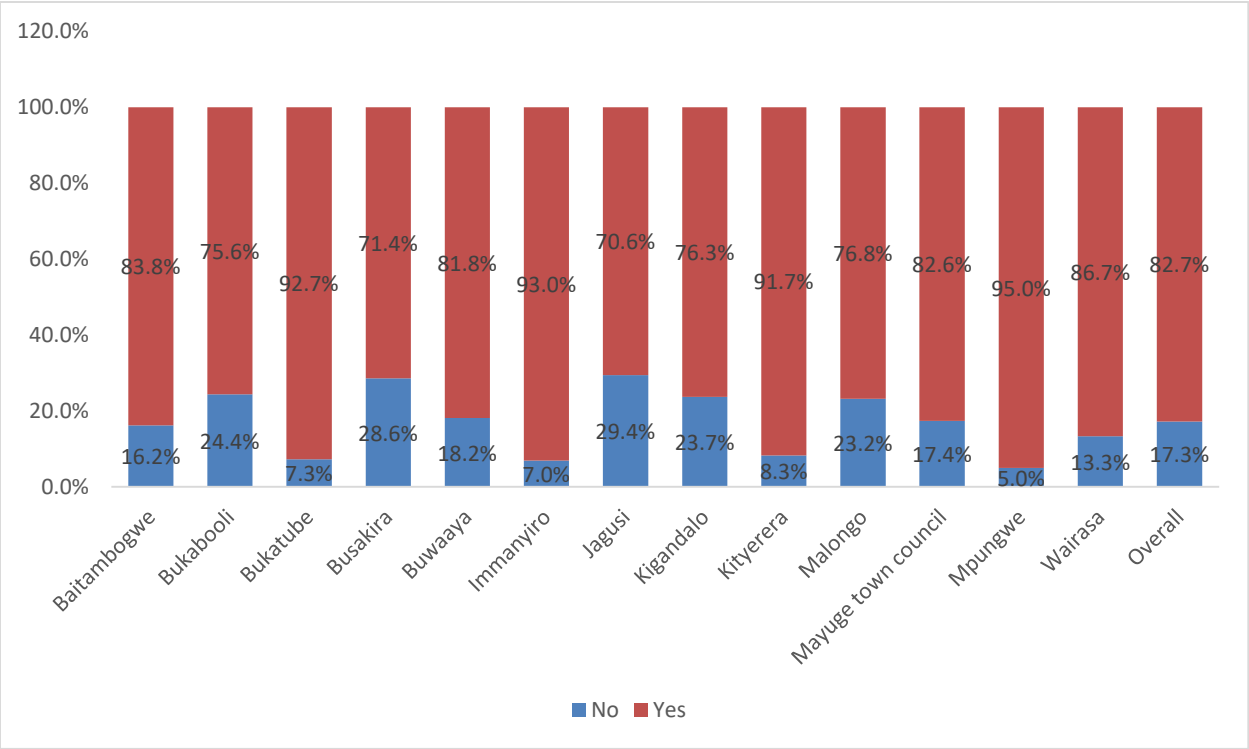


Figure 3: Respondents' opinion if STH can be prevented

Prevention strategies for STH suggested by respondents

Overall, 460 respondents suggested the strategies below as summarized in Table 6. The strategies suggested by the respondents that thought STH can be prevented are summarized in Table 6 and most indicated taking preventive medication (28.7%). Preventing the body from direct contact with soil (19.7%) especially by avoiding walking bare footed was also listed as a preventive measure for STH. Despite fecal-oral being mentioned at the main cause of STH, only 18.5% of the respondents suggested safe disposal of human excreta as a preventive strategy. From the findings, only 3.2% of respondents could not provide or suggest a preventive approach despite their positive opinion. Respondents from Kigandalo sub-county (40%) mainly suggested taking preventive medications, while those from Jagusi suggested safe disposal of human excreta (36.4%). Baitambogwe residents found boiling water for drinking as a more preventive approach while those from Wairasa were suggestive of preventing the body from direct contact with the soil (41.2%). The preventive approaches therefore varied across the sub-counties.

Table 6: Prevention strategies for STH as listed by the respondents

Sub-county	Safe disposal of human excreta	Boiling of drinking water	Avoid eating raw foods (vegetables and meats)	Preventing the body from direct contact with the soil	Taking preventive medications	Others	Don't know	Multiple Responses	Total respondents
Baitambogwe	11.4%	25.0%	2.3%	15.9%	29.5%	11.4%	4.5%	44	31
Bukabooli	19.6%	15.2%	8.7%	23.9%	30.4%	2.2%	0.0%	46	31
Bukatube	15.9%	20.3%	5.8%	20.3%	23.2%	8.7%	5.8%	69	51
Busakira	33.3%	0.0%	0.0%	37.5%	20.8%	4.2%	4.2%	24	20
Buwaaya	34.5%	17.2%	0.0%	24.1%	17.2%	3.4%	3.4%	29	18
Immanyiro	19.6%	16.1%	8.9%	12.5%	37.5%	3.6%	1.8%	56	40
Jagusi	36.4%	0.0%	0.0%	27.3%	18.2%	9.1%	9.1%	11	12
Kigandalo	8.6%	2.9%	8.6%	25.7%	40.0%	8.6%	5.7%	35	29
Kityerera	25.9%	33.3%	4.9%	11.1%	24.7%	0.0%	0.0%	81	55
Malongo	14.7%	18.6%	5.8%	16.7%	35.3%	5.8%	3.2%	156	109
Mayuge TC	21.4%	32.1%	17.9%	21.4%	7.1%	0.0%	0.0%	28	19
Mpungwe	5.0%	30.0%	5.0%	10.0%	30.0%	10.0%	10.0%	20	19
Wairasa	11.8%	2.9%	5.9%	41.2%	29.4%	5.9%	2.9%	34	26
Overall	**18.5%**	**18.9%**	**6.1%**	**19.7%**	**28.7%**	**4.9%**	**3.2%**	**628**	460

Knowledge on signs and symptoms for STH

Most of the respondents indicate skin change (40.3%), however this is not documented as a sign of STH in literature an indication that they were not aware. Only 45.4% of the respondents listed correct signs and symptoms among which included enlargement of the stomach (14.6%), abdominal discomfort (9.8%), weight loss and weakness (5.1%) among others. Only 14.3% of the respondents reported not to know any signs and symptoms.

Table 7: Respondents' knowledge on signs and symptoms for STH

STH Signs and Symptoms	Frequency	Percentage (%)
Skin change	314	40.3
Enlargement of stomach	114	14.6
Abdominal discomfort	76	9.8
weight loss, weakness	68	8.7
Increasing appetite	40	5.1
Worm expel	28	3.6
Back pain, headache	16	2.1
Itching	8	1.0
Body Swelling	4	0.5
Don't know	111	14.3
Total	**779**	**100**

Association between Family members ever suffering from STH with some demographic factors

Findings from the study indicated an association between age and opinion on whether or not STH can be. The rest of the demographic factors were insignificant as indicated in table 8 below

Table 8: Association between Family members ever suffering from STH with some demographic factors

Treated/Prevented		STH can be		
Variable	**Response**	Yes (%)	No (%)	*P-Value*
Gender	Male	178 (84.4)	33 (15.6)	0.3519
	Female	282 (81.3)	65 (18.7)	
Education level	No Education	80 (80.8)	19 (19.2)	0.1221
	Primary	288 (88.9)	68 (19.1)	
	Secondary	87 (90.6)	09 (9.4)	
	Tertiary	05 (71.4)	02 (28.6)	
Marriage status	Married	271 (85.0)	48 (15)	0.3105
	Never Married	137 (78.3)	38 (21.7)	
	Divorced	21 (84.0)	04 (16.0)	
	Widowed	31 (83.8)	06 (16.2)	
Respondent HH status	Household Head	167 (87.9)	23(12.1)	0.7090
	Spouse	159 (81.5)	36 (18.5)	
	Sibling	108 (77.1)	32 (22.9)	
	Other household member	26 (78.8)	07(21.2)	
Age	7-14yrs	88 (72.7)	33 (27.3)	0.0097
	15-18 yrs	40 (90.9)	04(9.1)	
	19-35 yrs	114 (85.7)	19 (14.3)	
	36+	218 (83.9)	42 (16.1)	

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 STH. 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)	

Activities participated in for MDA

For those who reported to have participated in MDA activities at community level, most had been involved on registration for treatment (38.6%) while 22.9% had attended sensitization meetings and 18.9% attended health education and mobilization meetings (Table 10).

Table 10: MDA Activities participated in

Activity	**Percentage(%)(n=285)**
Attend sensitization meetings	22.9%
Selection of CMDs/VHTs	10.8%
Registration for treatment	38.6%
Attended health education * mobilization meeting	18.7%
Reporting of serious adverse events	9.0%
Total	**100.0%**

Reasons for not participating in MDA

The outstanding reason for not participating in MDA activities was that the respondents had not mobilized (31.9%), and then being absent at the time the activities were implemented. Other reasons given were for the children who were at school (9.4%) and VHTs not being activities within their villages (9.4%).

Table 11: Respondents' reasons for not participating in MDA

Reasons for not participating in MDA	Percentage(%)((n=138)
Absent when services are offered	15.2%
At school	9.4%
Don't know	4.3%
Don't have time	1.4%
MDA programme is not effective in our area	0.7%
No reason	15.2%
Not mobilized	31.9%
Not sick	4.3%
Parents did not take me	7.2%
VHTs not active	9.4%
We don't have doctors	0.7%

Satisfaction with the MDA programme

The MDA programme satisfaction was measured based on the respondents' opinion within their communities. The areas assessed included quality of the drug distribution, and satisfaction with the services offered during these activities.

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 12: 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 13.

Table 13: 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 14: 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

The findings indicate a strong association between participants having heard about STH and all demographic factors except gender, this can be due to the fact that Neglected tropical disease activities have been implemented in the District for over a decade and could have contributed to people's awareness. Half (50.5%) the participants had heard about soil transmitted helminths (STH). Results also indicate a similar trend among ages of the participants for both STH as children below 14 years had least heard of them while adults above 35 years had heard most about the diseases. Drug distributors were the main source of information for STH. This discrepancy could possibility be since key interventions of MDA for STH are implemented independently and in different months according to information from the district health office.

Finding further indicate that almost half 43.9% of the families of the participants had suffered from STH and these were most prevalent among the children 7-14 years. This finding is consistent with literature [17] on the most at-risk age groups which indicated that intestinal protozoa infections where highly prevalent among school-aged children on Pemba Island. The attitude on health seeking behaviour for STH was mainly from health workers 74.8%. Like SCH it's important to note that there is very limited knowledge on the actual causes of STH was limited and as such it remains a gap for the project to fill. This may also be since the effects of STH take long to get noticed, persons suffering from it may have not particular symptoms that may prompt them to seek medical attention. However, it is important to note that majority of the participants have an attitude of treatment of STH as opposed to prevention. A good number of participants 19.7% know it is important to protect the body from direct contact with the soil as one of the mechanisms of preventive against STH. It's vital to invest in providing accurate messages for STH signs and systems as participants didn't demonstrate accurate knowledge of them. 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 STH. STH 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 STH. This study reveals inadequate knowledge, attitude and practices concerning STH among the Mayuge population, which could be a challenging obstacle to the endeavor towards the elimination of STH. Furthermore, MDA administration health education i.e. community mobilization, having sanitation facilities (Latrine), hand washing, provision of clean and safe drinking water, are essential among the communities in order to curtail the transmission and morbidity despite not finding significant association. The findings support the need to implement an integrated approach for control of STH 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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