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COMMUNITY PERCEPTION OF INTESTINAL SCHISTOSOMIASIS IN BUSIA DISTRICT OF UGANDA

J. ANGUZU, M. ORYEMA-LALOBO, G.B. OUNDO and F. NUWAHA

ABSTRACT

Objective: **To elicit and understand peoples' perceptions of intestinal schistosomiasis that is a prerequisite for designing appropriate control strategies.**

Design: **Cross-sectional study using six focus group discussions (FGDs) and 432 semi-structured interviews (SSIs).**

Subjects: **Community members in Busia district of Uganda.**

Main outcome measures: **Data was collected on causes, transmission, health seeking behaviour, hygiene behaviour and on prevention/control strategies for schistosomiasis.**

Results: **The symptoms of early intestinal schistosomiasis were poorly understood whereas those of late schistosomiasis were well appreciated. Cause and transmission of schistosomiasis were used interchangeably and schistosomiasis was mainly thought to be caused by drinking dirty or unboiled water. Schistosomiasis was perceived to be a treatable disease and modern medicines were said to be effective. Community members said that it is impossible to avoid contact with possible sources of infection for schistosomiasis as the lake was linked to livelihood of people. The groups that were particularly at increased risk of not participating in schistosomiasis prevention strategies included women, the uneducated and those involved in subsistence agriculture.**

Conclusions: **In order to effectively control schistosomiasis in this district, there is need to adapt prevention and control strategies to peoples' livelihoods. There is also need to target the less advantaged groups (women, uneducated and subsistence farmers) for intense health education strategies aimed at increasing participation in the control of schistosomiasis.**

INTRODUCTION

Uganda is described as the cradle of schistosomiasis in Africa with country wide distribution ranging from a prevalence of 20% in the south to 100% in the North West (1,2). The parasites are widely distributed and no where else in the world is there such a variety of transmission pattern involving so many different host-snails (3). This variation has been attributed to varied, vector snails, favourable ecology and different strains (2). It is estimated that 1.5 million people in Uganda are infected with schistosomiasis, and 13% of the population (3.12 million people) are at risk of infection (2). Three species of *S. mansoni, S. heamatobium* and *S. intercalatum* occur in Uganda but the most prominent (>80%) of the infections are attributable to *S.mansoni* (1-4). *S.mansoni* (the only form of schistosomiasis in Busia district) is particularly favoured by large water bodies (such as Lakes Victoria, Kyoga, Albert, Edward, George

and the river Nile) that harbour the snail of the species of the genus *Onchomelania* that transmits *S. mansoni* (2).

The strategies advocated for control of schistosomiasis include target mass chemotherapy, snail control, health education, provision and use of latrines, safe water supply and avoiding contact with contaminated water source (5-9). The main stay for control of schistosomiasis in Busia and in Uganda is mass chemotherapy with praziquantel. The Ugandan National Programme for the Control of Bilharzia and Intestinal Worms was officially launched in Pakwach, Nebbi District, in March 2003. Its primary objectives were to treat at least 75% of school-age children in areas where schistosomiasis (bilharzia) is a serious threat to public health, and to provide targeted treatment to all high-risk communities (children and adults) where prevalence of schistosomiasis is over 50%. However, relying on mass treatment for schistosomiasis control is endowed with many difficulties. These include limited effectiveness of the drugs especially for *S. mansoni* (10), the high cost of drugs delivery and of logistics (11). Other difficulties are emergence and development of drug resistance (12,13), requirement of repeated treatments (14-16), and drugs not significantly affecting transmission of the disease (17). In order to control schistosomiasis effectively comprehensive control measures such as on sanitation, water supply, treatment, focal use of molluscides (18-20) and on modification of people's behaviour (9,21) are needed. For a comprehensive schistosomiasis control approach to be effective, community participation is vital (9,16,22). Therefore, all schistosomiasis control programmes require understanding of community behaviours in relation to personal hygiene, perceptions of schistosomiasis, its diagnosis and treatment (9). The understanding of how people regard a problem such as schistosomiasis makes it easier to communicate with them about it and help them to see that solution of the problem may in fact coincide with their interests and priorities (9,23-27).

This study was aimed at understanding and eliciting the people's perception of schistosomiasis and response to the disease, and how it affects control measures in Busia district of Uganda. The study helps to improve on health education by building on existing knowledge of the community on schistosomiasis and by focusing on redesigning control strategies with community's participation.

MATERIALS AND METHODS

Study sites: The study was carried out in Busia district (Buhehe, Masaba, Lumino and Lunyo sub-counties that border Lake Victoria) of Eastern Uganda near the border with Kenya. Busia district has one county, 10 sub-counties, one town council, 58 parishes, 474 villages and about 45,500 homesteads. The districts' population was 227,561 people (2002 census) spread over a total area of 743 square kilometers. About 83% of the population resides in rural areas. The district has 246 functional boreholes and 113 protected springs. Safe water coverage is 52% with average walking distance to the nearest source of water being 0.5 km during wet season and 3 km during the dry season. The latrine coverage in the district is about 51%. The literacy rate in the district is 56% for those aged 18 years and above (71% for males and 42% for females). The main economic activity is subsistence agriculture supplemented by fishing, and cross-border trade with Kenya. There are ten health centres in the district. Of the ten health centres, only two have laboratory facilities with capacity to diagnose schistosomiasis. It is estimated that only 37% of the population are within a radius of less than 2 km from a health facility. The furthest some people have to travel to get to a health facility is 10 km.

Busia district (especially in the south) has many water bodies like Lake Victoria, swamps, and rivers that are important for schistosomiasis transmission. About 87,296 people (37% of the total district population) are at risk of schistosomiasis infection. Only *S. mansoni* is endemic in the district. The prevalence of *S. mansoni* in endemic communities (mainly in south of the district) ranges between 45% and 55%. With support from the schistosomiasis control initiative (SCI), the control of schistosomiasis is organised under three levels; the national, the district and the community. The central team based at the vector control division (VCD) of the Ministry of Health and headed by a programme coordinator is responsible for drug procurement and storage, training, printing and distributing information education communication (IEC) materials and general national management of the programme. At the district, implementation is managed by a district team headed by the district director of health services (DDHS), assisted by the vector control officer (VCO), district health educator (DHE), the district education

officer (DEO), the district inspector of schools (DIS) and the district community development officer (DCDO). At the community, implementation is managed by assistant community development officers (ACDOs), assisted by community leaders, that include teachers, community drug distributors (CDDs) health educators, civic and political leaders and trained health workers (2).

Data collection: Data were collected in February and March 2005 using focus group discussions (FGDs) and semi-structured individual interviews (SSIs). These two methods are useful in explorative research related to health promotion, to understand, and to elicit determinants for behaviour (28-30).

Focus Group Discussions: Six FGDs with 64 participants (33 women and 31 men) were carried out with the help of a discussion guide. Discussion topics included: causes, transmission, signs symptoms; health care seeking behaviour, hygiene behaviour, control and prevention of schistosomiasis. The FGDs participants were purposely chosen to include people that had possible answers to our questions (30, 31). The FGDs were led by a moderator and an assistant. The moderator facilitated the discussions and the assistant took care of the tape recorder and noted non-verbal communication.

Semi-structured interviews: The SSIs involved 432 heads of households, their spouses or any responsible person found at home during the survey. The homesteads were selected using a multistage sampling technique incorporating purposive, simple random and cluster sampling procedures. First four out of ten sub-counties (Lunyo, Buhehe and Lumino and Masaba) that border Lake Victoria were purposely chosen. Second eight parishes proportionately to the population size of each sub-county were selected from the four sub-counties, using simple random sampling. Third from a list of villages in all selected parishes, 36 villages were randomly selected using simple random sampling. Within each village a random starting point was identified, a research assistant then made a list of five houses in front of the starting point and carried out random sampling of the houses, to select the first house. From this household, after spinning a pen he/she followed the direction where the pen pointed and selected every 3rd household, until when all the twelve households per village were got. Where the head of household or their spouse or an adult were not found, the next household was included. Less than 2% of the households did not initially have anybody to interview at home (probably due to the prior mobilisation done with help of community leaders). In the SSI, respondents were questioned on socio-economic situation, knowledge of transmission, cause and symptoms for schistosomiasis, health seeking behaviour, hygiene behaviour, and water contact and on control/preventive measures for schistosomiasis using a pre-tested questionnaire with open and closed questions.

Analysis: The analysis of the FGDs included; transcribing, translating into English, re-ordering of the transcripts and notes according to discussion topics putting together issues according to emerging themes and making summaries (30,31). Data from the SSI was coded, cleaned and entered using *Epi info* 2002 *(CDC, Atlanta Georgia)*. To identify the factors in the community that facilitate appropriate behaviour (such adequate knowledge of transmission and prevention and of hygiene behaviour) we compared proportions of those with and without appropriate behaviour. The tests of significance were carried out using crude odds ratio (COR) and their corresponding 95% confidence intervals (CI). Computer softwares version 10.0 of *SPSS (SPSS Inc., Chicago, IL)* and version 8 of *STA TA* for Windows *(StataCorp LP)* were used in the analyses. Standard STATA commands were used for adjusting the data for clustering at the village level.

Ethical considerations: The Uganda National Council for Science and Technology (UNCST) and the Makerere University Institute of Public Health (MUIPH) higher degrees and ethics committee approved the study. Prior to data collection permission was sought from Busia district authorities. Informed verbal consent was obtained from all subjects before interviewing commenced.

RESULTS

This section summarises and integrates the results of 64 participants in the six FGDs, with that from SSIs with 432 community members.

Socio-demographic characteristics: The ages of the respondents in SSI ranged from 15 to 79 years with a mean age of 35 years and a standard deviation (SD) of 13 years. Fifty three percent (230/432) and 89% of the respondents were females and of Basamia ethnicity respectively. Other ethnicities included Baganda (4%), and the Iteso, Basoga, Bagisu, Banyole, Baluhyas and Bagwere (7%). The majority of the respondents (77%) had at least attended school but more than half had attended only up to primary seven. The religious distribution was 193/432 (45%) protestant, 40% catholic, 5% Muslim and 11% belonged to other religions. A big proportion 381/432 (88%) were married. The respondents' occupations included subsistence agriculture for 336/432 (78%), fishing 10%, trading 4% and others comprising of students/civil servants 8%.

Perceived causes and transmission of schistosomiasis: The local name for schistosomiasis that was mentioned in all the FGDs and by 306 (73%) respondents in SSIs was Bilharzias, pronounced *Bil-a-zia.* One hundred and twelve respondents (27%) in SSI individual interviews referred to the disease as *Esidada* which in *Lusamia* (the local language) means swelling of the abdomen. This sentiment was echoed in the FGDs as one woman said. *I lost my husband due to bilazia. When they tried to put the body in a coffin it could not fit because the abdomen was grossly distended. We had to burry him without a coffin.*

In all the FGDs and for 413/432 of (99%) respondents in SSI participants could not differentiate between cause and transmission of schistosomiasis. A common reaction from participants during the SSI and FGDs regarding questions on cause and transmission of schistosomiasis was whether the interviewers/moderators are not repeating themselves. The modes of causation/transmission for schistosomiasis mentioned in the FGDs were, drinking dirty/unboiled water, by four out of six FGDs and, eating of contaminated food, by one FGD. Water contact (swimming, playing, bathing or washing in lake water) was mentioned as mode of transmission in only two of the six FGDs. In one FGD no mode of causation/transmission was mentioned. The sentiments about cause/transmission were echoed in the community survey. The majority of respondents 311(74%) reported mode of transmission of bilharzia as being through drinking dirty water, 52 (16%) reported eating contaminated food, 95 (23%) said that transmission is through a wound when one steps in water and 80 (19%) said that transmission/ cause is by drinking un-boiled water. However, 261 out of 418 (62%) respondents correctly mentioned the mode of transmission of schistosomiasis as being swimming, bathing or playing in the lake. As seen from Table 1 saying that schistosomiasis is transmitted by water contact is favoured by having at least secondary education, not being a peasant farmer, and being older than 30 years of age.

Knowledge of water snails: Associating any disease with water snail may mean that the snails could be targeted for control/eradication by the community. However, only one out of the six FGDs associated water snail with bilharzia and in five out of the six FGDs water snail were associated with fever and diarrhoea. In the SSI when asked whether they knew a disease caused by water snail more than half of the 418 respondents *(55%)* said that they did not know. Table 2 shows the socio-demographic characteristics influencing associating any disease with water snail. Knowing any disease carried by water snail is favoured by being a male, having at least secondary education and being employed.

Practices that favour transmission of schistosomiasis: Among the SSI respondents their source of water includes; bore hole 215 (51%), wells 199 (47%), lake 86 (20%), stream 35 (8%), river 15 (4%) and spring 12 (2%). Over 70% of residents living within 1 Km of the lake mentioned the lake as one of their sources of water. In four out of six focus groups the sources of water for domestic use were either bore hole and wells or bore hole and pond water. Two out of the six focus groups mentioned bore hole and lake as their sources of water. However it was said that lake water and water from other sources has different roles in the community as this quote from a woman in one FGD illustrates. *"We use lake water for washing dirty things and cooking because it is nearer so we don't need to move a long distance. We also use borehole or protected wells water for drinking and washing white clothes. Bore hole is far and usually congested."*

Table 1

Factors influencing having correct knowledge about transmission of schistosomiasis

Variable	Correct knowledge* (n = 261)	Incorrect knowledge* (n = 157)	Row§ (%)	Crude Ratio	Odds (95% CI)
Sex					
Male	137	98	58.3		
Female	124	59	67.8	0.67	(0.43-1.02)
Age					
≤30	128	118	52.0		
>30	133	39	77.3	3.14	(1.99-5.00)
Education					
Secondary and above	88	11	88.9		
Primary and below	173	146	54.2	6.75	(3.14-14.5)
Marital status					
Married	237	138	64.2		
Not married	24	20	51.1	1.51	(0.89-3.32)
Religion					
Christians	249	148	62.7		
Moslems	12	9	57.1	1.72	(0.46-3.35)
Occupation					
Employed**	68	23	74.7		
Peasant farming	193	134	59.0	2.05	(1.19-3.63)

* Correct knowledge on transmission of Schistosomiasis is swimming, playing or bathing in lake water
** Employed occupations other than peasant farming i.e. fisherman, businessman, and civil servants
NB: 14 respondents did not answer the question on transmission
§ Percent with correct knowledge

Table 2

Factors influencing knowing any disease associated with water snail

Variable	Associates (n = 191)	Does not associate (n = 227)	Row§ (%)	Crude Ratio	Odds (95% CI)
Sex					
Male	106	90	54.1	1.90	(1.26-2.86)
Female	85	137	38.3		
Age					
≤30	94	100	48.5	0.81	(0.82-1.84)
> 30	97	127	43.3		
Education					
Secondary and above	64	33	66.0	2.96	(1.80-4.93)
Primary and below	127	194	39.6		
Marital status					
Married	168	201	45.5	0.94	(0.50-1.80)
Not married	23	26	46.9		
Religion					
Christians	178	220	44.7	0.44	(0.14-1.25)
Moslems	13	7	65.0		
Occupation					
Employed	60	30	67.4	3.02	(1.86-5.33)
Peasant farming	131	198	39.8		

§ refers to percentage of variable that associate snail with any disease

Out of the 432 respondents in SSI 187 (43%) said that they have been to the lake in the past one week to carry out one or more activities. The commonest activities mentioned included bathing 142 (76%), washing clothes 128 (70%), fetching water 86 (46%), fishing 81 (43%), washing kitchen utensils 81 (17%), transport 70 (37%) and playing by (4%). Intensity of contact with the lake is also high with 79 (41%) of the respondents using the lake for up to three times a week.

Respondents in SSI were asked whether people defecate in places other than latrines. Of the 432 respondents, 380 (88%) agreed that some people defecate in the *sambas* (gardens), bushes or even in the lake. The majority of the respondents 244 (65%) in SSI said that people defecate in the lake when they go to the lake, while 112 (30%) said that people defecate in the lake whenever they are fishing, whereas 111(30%) mentioned lack of latrine as the reason for people defecating in lake. In one FGD that had one participant who was a local leader (Council chairman of one sub-county), the chairman had this to say *"Low hygienic standards associated with indiscriminate disposal of faecal matter are practices which are responsible for persistence of bilharzia on the lake shores. Lack of latrines alone leads to defecation in compounds or nearby bushes. When it rains, faeces are washed into the lake hence get bilharzia by drinking the contaminated water from the lake. I request government to build latrines in all the landing sites."* However, when respondents in SSI were asked whether they have a latrine, the majority 380 (88%) said they have and 285 (66%) said they wash their hands after using a pit latrine.

Manifestations of schistosomiasis: In all the six FGDs it was mentioned that respondents have ever seen someone suffering from bilharzia. The commonest signs and symptoms mentioned by those in FGDs for bilharzia were diarrhoea and abdominal distension. Other symptoms mentioned were, swelling of legs, brown silky hair and change of skin colour. Similarly the majority 418 (97%) of the respondents in SSI had heard of a disease called bilharzia and 243 *(58%)* had ever seen someone suffering from schistosomiasis. When asked what they would say about schistosomiasis in their area, 254 (55%) of respondents reported that it was common, whereas 168/418 (40%) said it was uncommon. Furthermore, respondents in SSI mentioned the following as the symptoms of bilharzia; recurrent diarrhoea 109 (25%), abdominal pain 106 (25%), blotted abdomen 228 (55%), and presence of blood in stool 111(27%). Other symptoms mentioned included loss of weight, painful urination, vomiting, fever, swelling of legs and general body weakness. About 31% of the respondents mentioned one symptom, 26% mentioned two symptoms, and 21% mentioned three symptoms and 14% were able to mention four symptoms.

Treatment of schistosomiasis: All the FGDs said that schistosomiasis could be treated. When asked who could treat it, they mentioned health workers in health centres. It was only in one FGD that traditional healers were mentioned as being able to treat schistosomiasis. The medicines used were well described by its route of administration (as oral) and by formulation (as tablets). According to the FGDs people feared side effects of modern medicine. They however, accepted that no life threatening side effects have been experienced. The traditional medicines used for treating schistosomiasis mentioned were mostly herbs called *esisi* and *yeke yeke.* The medicines were prepared for the patients to drink or sometimes the preparation was introduced into the patient's body through small cuts on the abdomen. These sentiments were echoed in SSI whereby, majority of the 99% of the respondents said that schistosomiasis could be treated by modern drugs. Most of the respondents 351 (85%) said that there were no traditional medicines for treating schistosomiasis and only a few 43 (11%) of the respondents said there were traditional medicines for treating schistosomiasis.

Control measures of schistosomiasis: In the FGDs the most frequently mentioned means of controlling/ preventing schistosomiasis were avoiding of drinking dirty or unboiled water, avoiding people with schistosomiasis and taking tablets provided by the district. However it was mentioned that the medicines for treating schistosomiasis were expensive and not readily available as the following quotation shows. *"I knew about bilharzia because of death of my grandson. The government should help people by providing drugs for bilharzia in all the health units. You have to cross to Kenya and buy drugs very expensively."* When respondents in SSI were asked how they could avoid getting bilharzia, the majority 323 (78%) said avoid drinking dirty water. Other measures mentioned by

respondents were; avoiding drinking unboiled water 89 (21%) and avoiding contact with infected persons 20 (5%). Among the correct responses mentioned include; avoid swimming/bathing in the lake that was mentioned by 172 (41%) of respondents and taking medicines that was mentioned by only 85 (21%) of the respondents. Measures aimed at sanitary faecal disposal (use of latrines) were mentioned by only 125 (30%) of respondents in SSIs. As seen from Table 3 a higher proportion (40%) of respondents with secondary education and above compared to 25% of respondents with primary education and below were likely to mention use of latrine as a control measure for schistosomiasis.

The respondents' correct knowledge about preventive measures of avoiding swimming, bathing, washing or playing in lake water is favoured by being a male, having secondary education and above and being employed (Table 4.). However, it was felt that it is difficult to avoid the lake as the following quote from one FGDs shows. *"Even recently we lost three people with big stomach, pink skin and silk hair. Health workers said it was Bilharzia but people still go to the lake. This is because many people along the lakeshore earn their living through fishing, so there is no way you can prevent them from coming into contact with contaminated water".* In another FGD one fisherman said *"bilharzia is a big problem in this area, but we can't avoid the lake because it is our plate of food. We can't starve to death when the lake is here. We just request the government to provide us with drugs and construct for us a community latrine."*

Table 3

Factors influencing associating prevention of schistosomiasis with use of latrine

Variable	Associates (n = 118)	Does not associate (n = 302)	Row§ (%)	Crude Ratio	Odds (95% CI)
Sex					
Male	61	139	30.5		
Female	57	163	26.0	0.8	(0.80-1.94)
Age					
≤ 30	54	144	27.3		
> 30	64	158	29.1	0.93	(0.59-1.45)
Education					
Secondary and above	39	60	39.4		
Primary and below	79	242	24.6	1.99	(1.20-3.29)
Marital status					
Married	99	266	27.1		
Not married	19	36	34.5	0.71	(0.37-1.37)
Religion					
Christians	114	290	28.2		
Moslems	6	12	33.3	0.79	(0.27-2.62)
Occupation					
Employed	30	67	30.9		
Peasant farming	88	235	27.2	0.84	(0.70-2.01)
Distance from the lake					
Less than 5 kilometres	47	102	50.2		
5 kilometres or more	71	200	35.1	1.30	(0.82-2.06)

§ refers to percentage of variable that associate latrine with prevention

Table 4

Factors influencing association of avoiding contact with infected water with prevention of schistosomiasis

Variable	Correct knowledge (n = 172)	Incorrect knowledge (n = 246)	Row§ (%)	Crude Ratio	Odds (95% CI)
Sex					
Male	92	104	46.9		
Female	80	142	36.0	1.57	(1.04-2.37)
Age					
≤ 30	89	109	44.9		
> 30	83	137	37.7	0.74	(0.89-2.03)
Education					
Secondary and above	78	19	80.4		
Primary and below	94	227	29.3	9.91	(5.54-18.25)
Marital status					
Married	156	212	42.4		
Not married	16	34	32.0	0.64	(0.81-3.14)
Religion					
Christians	165	234	41.4		
Moslems	7	13	35.0	0.76	(0.47-3.96)
Occupation					
Employed	49	42	53.8	1.93	(1.18-3.18)
Peasant farming	123	204	37.6		

§ refers to percent of those who have correct knowledge

Community involvement in schistosomiasis control was generally perceived to be very low by all the six focus groups, and some participants argued that the community is never involved, although they generally accepted there were control measures in place. They suggested group discussions, and seminars to be organised for training the people as they did for bilharzia drug distributors. They said the district should train the people on the aspects of prevention and control measures. "The community is little involved in the control of schistosomiasis because of ignorance" (FGD participant). *"The control of bilharzia needs the help of the parents and every body to advice children not to go to play, swim or fish in the lake. People must be sensitized about the cause and transmission of bilharzia."*

Furthermore, data from SSI showed that only 188 (45%) of the respondents in SSI knew the existence of a schistosomiasis control programme in their area. Among those who knew about the programme, their source of information about the programme were from peers/ friends 156 (83%), health workers 139 (74%), local council village committees 53(28%), media (23%), schools (9%) and others 10(5%). The 230 respondents who did not know about the existence of the schistosomiasis control programme were asked to say what they think government should do in order to control bilharzia. The majority 210 (92%) mentioned providing drugs, 63 (28%) mentioned increase community education about the disease, only 26 (11%) said the government should provide a schistosomiasis health worker.

DISCUSSION

This study assesses community perception towards transmission, cause, signs/symptoms and control/ prevention of schistosomiasis. We used two approaches of focus group discussions and semi-structured interviews. By relating data from these two different sources to each other it is possible to establish the consistency and meanings of the findings (28,29). Thus the combined approaches gave the advantages of exploring the depth of the studies issues in question as well as determining the prevalence of knowledge, attitudes and behavioural

practices in the study population. Besides we previously found these combined approaches useful in understanding and eliciting reasons for human behaviour in Uganda (32).

Cause/transmission of schistosomiasis: In this community, schistosomiasis is regarded as a naturalistic disease not caused by supernatural causes but by an agent of contamination or pollution in water. As expected for a disease with a complex transmission cycle like schistosomiasis, cause and transmission were not distinguished and were used interchangeably in this community. This is similar to what has been observed for other diseases in Uganda such as for sexually transmitted infections (33) and malaria (32). Although schistosomiasis was linked to water, correct knowledge on cause/transmission was wanting with many people thinking that it is as a result of drinking unboiled or dirty water. These findings are similar to what has been found in Cameroon by Cine and Hewlet (23) where the Moundang and Guiziga people were more likely to identify drinking dirty water as a cause of schistosomiasis There was minimal linkage with fresh water snails and with faecal matter. The belief that schistosomiasis is transmitted by drinking unboiled/dirty water although erroneous is a good entry point for health education. People could be educated about the role of water as an agent of disease transmission including schistosomiasis. The health education could also emphasize that water can cause transmission of diseases through means other than drinking, such as when fishing, swimming and/or playing in it.

Furthermore, some respondents appreciated that schistosomiasis was got from the lake, but admitted that there is no way they could avoid the lake, since it was part of their life (used for transport, recreation, source of water and source of income). The implication of this for schistosomiasis control is that the control programme needs to adapt to the life of the people rather than avoiding the lake. For example people like fishermen who are at risk may be targeted for mass treatment. On the other hand, excreta disposal facilities may be provided at lakeshores and people encouraged to use them. Furthermore, more water sources (e.g. bore holes) may be provided to avoid overcrowding at the existing ones. The linking of schistosomiasis with water snails during health education may also improve community participation in targeting snails for control such as by using molluscides. For example people may be involved in using local molluscides such as *Phytoloca dodecandura* for snail control (20). Although this may be of limited role in Busia district (due to the nature of water bodies-huge lake), these findings may be useful in areas where schistosomiasis transmission is focal (19).

Hygiene behaviour: The practice of indiscriminate defecation (including defecating in the lake) was perceived to be very high in this community, with more than 80% of the respondents saying that people defecate in the lake. The practice of indiscriminate defecation appears wide-spread in other schistosomiasis endemic areas (34,35). This practice has severe implications for continued transmission of schistosomiasis and probably development of complications. Reasons that emerged from this study for not using latrines include not having them and not having them at place of work (as for fishermen). Other possible reasons for non-use of latrines from literature include bad odours, problems of maintenance and not being appropriate for small children (34,35). Thus measures are needed for increasing latrine coverage, for making them user friendly (such using ventilation improved pit latrines) and encouraging the community to use them (through intense health education).

The results of this study also show that only a few (20%) of the people regard use of latrines as a schistosomiasis control strategy. The majority linked major strategies to health workers or to the drug. This may not be surprising since the schistosomiasis control project relies mainly on mass treatment with praziquantel with low priority on community participation and other control strategies. There is thus need to consider using of a combined integrated schistosomiasis control strategy rather than relying on mass treatment predominantly. Data from else where shows that such an integrated approach with changed hygiene behaviour and use of drugs achieves maximum benefit (11,27,36).

Symptom recognition and health seeking behaviour: Generally, the community was aware of schistosomiasis and they had a local name for the disease *"esidada"*. However, less than 30% of respondents had a common knowledge about early symptoms and signs of the disease. Schistosomiasis

is a disease which presents in various ways and sometimes the clinical picture may be confusing. It is not surprising that most people may not perceive the early symptoms of disease. However, this low level of knowledge of common symptoms may affect the community participation in control programmes. In places where adequate sensitisation about the disease had taken root, people linked symptoms like bloody diarrhoea to lack of treatment for schistosomiasis (27) and this linkage improved their treatment seeking behaviour. Thus, the linking of schistosomiasis with late manifestations of the disease can lead to delay in seeking for health care. Therefore, there is need to emphasise the early symptoms and signs of schistosomiasis in health education so as to encourage early health seeking behaviour/participation in mass treatment campaigns that limits complications of the disease. There is also need to emphasise that schistosomiasis infection may be asymptomatic.

The majority of the respondents (95%) agreed that modern medicine could treat schistosomiasis. The medicine used was well described by its route of administration and formulation. According to the respondents' people feared side effects of modern medicine. They however, accepted that no life threatening side effects have been experienced. These sentiments indicate that mass treatment may be acceptable and there is need to ensure that tablets should be available to the communities all the time and at an affordable cost and probably free of charge (29).

Social-economic issues: It is clear from this study that people of low social economic status (women, the less educated and those in subsistence agriculture) are disadvantaged regarding schistosomiasis control and prevention. This has been shown in multiple ways. The low social economic class were less likely to mention the correct method of transmission for schistosomiasis, to link schistosomiasis with fresh water snails, to have correct knowledge about preventive measures, and less likely to mention use of latrine as preventive measure for schistosomiasis control. All these issues point to disadvantaged social-economic situation and relations in gaining access to knowledge, in having skills/resources to implement the knowledge and in participation in disease control programmes as has been documented in various other setting and situations (22,23). The use of education strategies aimed at low socio-economic status e.g. (use of appropriate drama, music and dance and participatory appraisal methods) and providing skills and resources to these disadvantaged communities (such as helping in construction of latrines and in providing safe water sources) may be useful interventions in such situations.

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