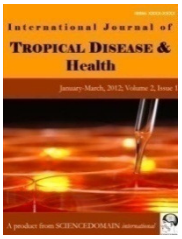

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Assessment of Knowledge about Schistosomiasis among Paddy Rice Farmers in Doho and Kibimba, Eastern Uganda

Imran Ejotre[1*], Sarah Nachuha[2] and Polycarp M. Mwima[3]

[1]Department of Biological Sciences, Islamic University in Uganda, P.O.Box 2555, Mbale, Uganda.
[2]Department of Environmental Science, Islamic University in Uganda, P.O.Box 2555, Mbale, Uganda.
[3]Polycarp M. Mwima, IUCN Uganda Country Officer, P.O.Box 10950, Kampala, Uganda.

Authors' contributions

This work was carried out in collaboration between all authors. All authors designed the study, collected data. Author SN performed the statistical analysis and wrote the first draft of the manuscript. Authors PMM and IE gave the comments. All authors read and approved the final manuscript before submission.

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ABSTRACT

Aim: To assess knowledge levels on schistosomiasis in farmers and laborers working in paddy rice fields in eastern Uganda.
Study Design: A cross-sectional survey among farmers practicing paddy rice farming in Doho and Kibimba.

**Corresponding author: Email: iejotre@gmail.com;*

Place and Duration of Study: The study was carried out in April 2014 in Doho and Kibimba rice schemes, eastern Uganda.
Methodology: Unequal number of respondents was interviewed and these were selected purposively. Ninety samples (90) were used, 50 from Doho and 40 from Kibimba. A chi-squared test was used to test schistosomiasis knowledge differences among respondents between schemes.
Results: A chi squared test indicated that there were significant differences in the number of people who had suffered from schistosomiasis at Doho and Kibimba rice schemes ($P<0.001$). For example Four percent (4%) of respondents in Doho indicated to have suffered from schistosomiasis at one time while 35% interviewed at Kibimba scheme had suffered from this disease. Although there were variations in the proportions of respondents on the rest of the knowledge items between the two sites, these variations were not statistically significant ($P>0.05$). About 63% of respondents in Kibimba scheme declared to have received schistosomiasis education from the Ministry of health officers. On the contrary, 80% of respondents in Doho scheme indicated that they have not received any schistosomiasis training/education of any kind.
Conclusion: Schistosomiasis is prevalent amongst paddy rice farmers in Doho and Kibimba schemes. Although the farmers at Kibimba were more sensitized about this disease, this did not have a significant effect on the level of knowledge about the farmers in the two schemes. We recommend that a much more intensive study supported by laboratory test be done to comprehensively bring out the magnitude of the disease and its impacts in order to inform policy and management decisions by government and respective public and private stakeholders.

Keywords: Schistosomiasis; knowledge; farmers; paddy; Doho; Kibimba; Eastern Uganda.

1. INTRODUCTION

Schistosomiasis is an important water-borne tropical morbidity disease that is increasing in the tropics as a result of landscape changes associated with the building of dams and the expansion of irrigation [1]. It is one of the most rampant neglected tropical diseases only second to malaria in tropical Africa [2]. It is claimed to be primarily a disease that results from lack of education, public health facilities and poverty [3,4]. This is because it has been found to persist in rural marginalized areas of Sub-Saharan Africa whose people are often subsistence farmers living on low incomes and with poor education [5]. The presence of this disease within communities does not only cause illness to those infected, but may as well impact on the socio economic development of the entire household [6]. For example a study on paddy growers in Morogoro, in Tanzania found differences in net working hours per month between infected and non-infected farmers prior to and after translating time exhausted on treatment and caring of oneself/other family members into financial cost [7]. Regardless of the above, majority of the people in schistosomiasis prevalent areas do not seem to have correct knowledge of schistosomiasis [7]. Integrating health education and medical intervention remain a high priority for the World Health Organization's (WHO) schistosomiasis control programs. However, in many endemic areas, control programs often do not incorporate public health promotion of the target groups.

Several studies have been conducted on the prevalence of schistosomiasis in Uganda [8-11]. For example Bukenya, Nsungwa, Makanga, Salvator [11] observed that *Schistosomiasis mansoni* was emerging as a new health problem in Kibimba with a prevalence infection of 20%, and that it was closely linked to working in the rice paddies.

Similar observations have been made within the east Africa region for example in Tanzania the disease affects majority of the irrigated rice growing communities and causes a high disease burden in both health of the irrigation farming communities, and socio-economy of the country [12]. Considering that Bukenya, Nsungwa, Makanga, Salvator [11] conducted their study 20 years ago, we found it important to assess the current level of awareness of schistosomiasis and related health issues in these sites. This study aimed at assessing the number of people who had suffered from this disease at the time of our study, and the level of knowledge related to causes, symptoms, transmission, control and health-effects of schistosomiasis that may occur due to its infection at Doho and Kibimba rice schemes. Findings from this study serve to guide more specific research and future efforts in the control of schistosomiasis in Uganda considering that rice farming is becoming a very common practice.

2. MATERIALS AND METHODS

2.1 Study Sites

Two paddy rice irrigation schemes namely Doho and Kibimba which have almost similar infrastructure but differ in terms of management style were selected. Large-scale rice cultivation in Uganda began at Kibimba (33°53' E and 0° 32N) in 1966 and then Doho (34° 00'E and 0° 57' N) in 1976. Doho rice scheme covers an area of about 850 ha of irrigated rice fields, with about 3800 farmers participating on plot sizes ranging from 0.2 to 0.4 ha per farmer. However at the time of this study the scheme was undergoing rehabilitation with very few farmers present in their fields. Irrigation water for this scheme comes from river Manafwa and this has been diverted to one main big canal from which a network of smaller canals that supply water by gravity to the rice fields connect. There is minimal use of agricultural chemicals and ploughing is entirely by hand or oxen. In contrast, Kibimba scheme occupies a total area of 1,039 ha and is under the management of Tilda Uganda Limited, which is a privately owned company. Tilda employees about 500 casual laborers who spend very long hours in the rice paddies, but also own small holder farms at their homes. Unlike Doho, agrochemicals are intensively used at Kibimba and plouging is heavily mechanized. These sites were selected for this study because they are the only areas of well established intensive irrigated paddy rice cultivation in Uganda. They are also government ventures, under the management of the Ministry of Agriculture, Animal industry and Fisheries whose primary interest is rice production.

2.2 Study Design and Sampling Procedure

A cross sectional research design was used and data was collected during the month of April 2014. Data were collected at a single point in time. Farmers were interviewed at Doho while laborers were interviewed at Kibimba. Purposive sampling of respondents in each scheme was employed and interviews were held while the respondents were in the field. The researchers interviewed 50 paddy rice farmers from Doho and 40 casual laborers from Kibimba. These laborers are the ones we found in the scheme at the time of the survey. Doho rice scheme was undergoing restructuring at the time of our study making many farmers unavailable. At Kibimba, the same labourers were working on the farm the period of time we conducted our survey. In addition, much of the farm area at Kibimba was covered by mature rice, a growth stage that requires less human presence. The casual laborers also informed us that they have small holder irrigation farms ranging from 0.5 of a hectare to 3 hectares. This study partially replicated a study by Salehe, Mattee, Tarimo, Ensink, Mtambo

[12] in which a structured questionnaire was used as a method of collecting data. Information that required YES and NO responses on what causes schistosomiasis (e.g. snails), how schistosomiasis can be transmitted (e.g. through urinating and defecating in the rice scheme area), effects that can be caused by the disease (e.g. reduction on activity and death), symptoms (e.g. Blood in urine and feces), schistosomiasis predisposing factors (bathing and washing hands in drainage canals), schistosomiasis control measures (maintaining the water canals and constructing pit latrines) were sought from each respondent interviewed.

2.3 Data Analysis

The number of respondents to each knowledge item asked was expressed in percentage. Given that the nature of respondents interviewed at Doho was different from that at Kibimba, we decided to treat each sample independently. Chi square test was used to test for differences in schistosomiasis knowledge of respondents between the two schemes. SPSS (statistical package) version 14.0 was used as a tool for analyzing data.

3. RESULTS AND DISCUSSION

3.1 Results

3.1.1 Sample population characteristics

Out of 50 respondents interviewed at Doho 9 were female and 41 male, whereas 25 females and 15 males were interviewed at Kibimba. Majority of respondents were literate, for example 34% and 42.5 % had primary level of education while 62% and 35% had secondary level of education at Doho and Kibimba respectively. However 4% and 22.5% of respondents were illiterates in Doho and Kibimba schemes respectively (Table 1). Results further indicate that almost all the respondents interviewed had lived/worked in their respective schemes for more than a period of five years.

Table 1. Characteristics of farmers investigated in the surveyed irrigation schemes

Characteristics	Respondents at Doho scheme	Respondents at Kibimba scheme
Gender		
Female	9 (18)	25 (62.5)
Male	41(82)	15 (37.5)
Education level		
Illiterate	2 (4)	9 (22.5)
Primary	17 (34)	17 (42.5)
Secondary	31(62)	14 (35)
Duration at the study sites		
≤ 5 years	1 (2)	13 (32.5)
5-9 years	11 (22)	14 (35)
10-14 years	9(18)	9 (22.5)
≥15 years	29 (59)	4 (10)

Numbers in the table are the totals in each category while those in parenthesis are percentages of respondents interviewed

3.1.2 Respondents knowledge of schistosomiasis

Table 2 presents responses related to schistosomiasis knowledge among respondents interviewed in Doho and Kibimba rice schemes. Four percent (4%) of respondents in Doho indicated to have suffered from schistosomiasis at one time while 35% interviewed at Kibimba scheme had suffered from this disease. More than 50% of respondents interviewed knew about the symptoms and causes of schistosomiasis and transmission at the two schemes. In addition, 76% of respondents at Doho and 85% at Kibimba schemes were knowledgeable on the effects that can be caused by schistosomiasis. Regarding irrigators' knowledge on schistosomiasis symptoms, only 58% in both the schemes had knowledge on the disease. Moreover, less than half (14% for Doho and 20% for Kibimba) had knowledge on schistosomiasis predisposing factors. Results further show that 44% of respondents at Doho and 57.5% at Kibimba were aware of schistosomiasis control measures. We had a detailed interview with one of the medical doctors at Kabasa Memorial hospital located about 1km from Doho rice scheme and he informed us that they do receive patients with symptoms related to schistosomiasis but they have no laboratory equipment to confirm this.

Table 2. Schistosomiasis knowledge among interviewed irrigation rice growers in Doho and Kibimba schemes

Variables	Respondents at Doho scheme	Respondents at Kibimba scheme
Suffered from schistosomiasis		
Yes	2 (4)	14 (35)
No	48 (96)	26 (65)
symptoms of schistosomiasis		
Yes	26 (52)	25 (62.5)
No	24 (48)	15 (37.5)
Schistosomiasis cause		
Yes	26 (52)	24 (60)
No	24 (48)	16 (40)
Schistosomiasis transmission		
YES	27 (54)	20 (50)
NO	23 (46)	20 (50)
Schistosomiasis predisposing factors		
Yes	7 (14)	8 (20)
No	43 (86)	32 (80)
Effects of schistosomiasis		
Yes	38(76)	34 (85)
No	12 (24)	6 (15)
Schistosomiasis control measures		
Yes	22 (44)	23 (57.5)
No	28 (56)	17 (42.5)

Number in parenthesis refers to percentage of respondents interviewed

3.1.3 Knowledge about previous training on schistosomiasis

About 63% of respondents in Kibimba scheme declared to have received schistosomiasis education from the Ministry of health officers supported by USAID and ENVISION that have provided posters illustrating schistosomiasis and its causes and effects. The African Pest and Environment management Foundation (APEMAF) also held sensitization workshops for

the communities around the rice scheme from whom the laborers are sourced. On the contrary, 80% of respondents in Doho scheme indicated that they have not received any schistosomiasis training/education of any kind. Our detailed interview with one of the medical staff at Kibimba clinic revealed that schistosomiasis exists in the area. As a preventive measure, workers and communities are given periodic treatments against the disease after every six months. At the time of these surveys, the last treatment had been administered in October 2013, and they were expecting drugs by end of April 2014. Unfortunately the health facility did not have data on the number of patients with the disease because they do not have a laboratory and only carry out clinical treatments (not tested for confirmation of disease). The medical staff indicated that despite the periodic treatments, the disease still prevails, though the incidence could be low. The periodic treatments have their own challenges in that the drugs have negative side effects and as such many workers are reluctant to take them for the sake of prevention.

3.1.4 Schistosomiasis knowledge differences among respondents at Doho and Kibimba schemes

Statistically significant differences existed in the number of people who had suffered from schistosomiasis at Doho and Kibimba rice schemes (χ^2=14.610, df = 1, P< 0.001: Table 3). More people mentioned that they had suffered from this disease at Kibimba than Doho. There was however no significant differences between the two schemes on the rest of the knowledge items (P>0.05) as shown in Table 3.

Table 3. Chi square results on schistosomiasis knowledge difference between Doho and Kibimba schemes

Variables	χ^2	Df	P-value
Suffered from schistosomiasis	14.610	1	<0.001
Symptoms of schistosomiasis	0.998	1	0.318
Causes of schistosomiasis	0.576	1	0.448
Transmission of schistosomiasis	0.143	1	0.706
Predisposing factors of schistosomiasis	0.576	1	0.448
Effects of schistosomiasis	1.125	1	0.289
Control of schistosomiasis	1.620	1	0.203

3.2 Discussion

Schitosomiasis is believed to be in existence in Kibimba and Doho as evidenced by the findings of this study. In addition, oe of the long serving research managers at Kibimba infromed us that he was diagnosed with this disease in 1991. This research manager further informed us that past interventions of this disease were done through a project supported by the African Pest and Environment Management Foundation (APEMAF). This project piloted the use of *Phytolacca dodecandra*, commonly known as African soapberry, in controlling schitosomiasis in these areas. African soapberry is lethal to snails, a fact discovered by Ethiopian scientists [13]. In addition to killing the snails, it is used as a soap and shampoo. The use of this locally available and biologically effective substance helped to control this disease and the levels of infection were reported to drop very low. The use of African soapberry continued post project lifetime but this was not sustained. It is possible that the termination of the use of the African soapberry to control snails and the reluctance by many to take preventive drugs due to their side effects could be the cause of the recurrent

situation. However the higher number of those who have suffered from schitosomiasis at Kibimba could be attributed to the fact that Kibimba had a higher illiteracy rate than Doho and since the workforce at Kibimba constitutes mainly short term target workers, turnover rate of workers is high. This continually brings into the scheme new sets of workers with no prior knowledge on the dynamics of schistosomiasis transmission and infection.

On the contrary, most of the interviewed respondents at Doho had lived and worked in the scheme for over a period of ten years. The fact that farmers at Doho scheme had never received any formal sensitization on schistosomiasis infestations and yet have continuously worked on these farms for longer time, they should ordinarily have higher infections than farmers in Kibimba operating under periodic prophylaxis and schistosomiasis awareness education. The lower incidences reported could be deceptive since these results were based on interview responses and not on confirmatory laboratory tests as the health units in the area do not have laboratory services, ii) symptoms of schistosomiasis increasingly show up with increase in worm load [14,15] hence many asymptomatic infections could remain unreported. Since no prior study on schistosomiasis has been conducted in Doho, we recommend a systematic research to understand the incidence of the disease in both the indermediate vectors and human communities surrounding not only Doho but also Kibimba rice schemes. In addition, although there were no significant differences in most of the knowledge items among the respondents at the two sites, respondents at Doho seemed more Knowledgeable about schitosomiasis than those at Kibimba.

Our results revealed that the level of farmers/laborers' knowledge of schistosomiasis is not related to trainings that have been provided to farmers contrary to what has been observed elsewhere [3,7,16]. These findings could be attributed to a number of factors: i) the non randomization of sampling ii) the comparison between the actual farmers at Doho and labourers at Kibimba, ii) the sample size, iv) the local people just don't know that they are sick, iv) the large numbers of Open-billed Storks at Doho may be acting as biological controllers of schistosomiasis host snails [17]. However, all these need to be investigated.

4. CONCLUSION AND RECOMMENDATION

The findings of this study show that the level of farmers/laborers' knowledge of schistosomiasis is almost the same at Doho and Kibimba and it is not related to previous trainings that have been provided to farmers. However this result is based on a limited sample size that is of heterogeneous nature. We therefore recommend that our findings be treated with caution until a much more elaborate study is undertaken. Furthermore, our study reveals that schistosomiasis exists in both schemes but the magnitude of the disease is not known since laboratory services are not available in the two areas posing potentially huge health risks to the adjacent human populations. There is need for the Ministry of health to establish well equipped laboratories in the health centers located in these schistosomiasis endemic areas to enable the health workers carry out tests on patients showing schistosomiasis symptoms. There is also a need for the district health officers to continuously sensitize the local communities on health and safety in relation to schistosomiasis.

CONSENT

Not applicable.

ETHICAL APPROVAL

Not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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