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Socio-cultural and environmental determinants of a proposed schistosomiasis health education intervention in Eggua, Nigeria

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ABSTRACT

Background: Central to the utility of health education in the control of schistosomiasis is an understanding of the way a community perceives, understands, and can explain how schistosomiasis occurs among them.

Methods: In order to study the environmental, social, and cultural determinants of continued schistosomiasis prevalence in Eggua, we administered semi-structured questionnaires to 372 adults between November 2012 and December 2015 which asked about the perceptions, understanding of the community and the patterns of schistosomiasis.

Results: The respondents' ages ranged from 35 to above 60 years. 44.7% had no schooling and 39.6% had at least primary education. 48.4% were farmers, 29.8% traders, and 1.6% fisher-folk. Majority (79%, 95% CI 76.5–83.0) were of a Christian denomination where members spend long periods in the river praying. Water contact was frequent with 89.5% visiting the rivers daily. Despite the research surveys taking place in Yewa since 2009, 81.5% of respondents did not know the cause of blood in urine, and self-reported hematuria was low, 4.6%. Latrine use was negligible, up to 95% of respondents did not have a latrine. Those who had heard about schistosomiasis were not well educated on prevention methods; 89.5% did not know they could be re-infected after the treatment.

Conclusion: Formal Health Education initiatives which consider these findings should be designed for the control of schistosomiasis in Eggua.

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Introduction

Urinary schistosomiasis caused by *Schistosoma haematobium* is a widespread parasitic disease of great public health concern affecting millions of people worldwide. There is an estimated 101 million Nigerians at risk of schistosomiasis and Nigeria is one of the most endemic countries in the world for the disease [1,2]. It mainly affects people who rely on natural water sources either in their profession (agriculture and fishing) or for domestic purposes (cooking, drinking, washing, etc.) and even recreational activities, such as swimming or playing in ponds [3].

In Nigeria, prevalence and incidence rates vary across the 36 states [2]. Yewa North Local Government Area (LGA) in Ogun State is highly endemic for urinary schistosomiasis, mainly because of the dependence of the inhabitants of this community on water from river bodies [4] and unhygienic practices. Reported prevalence rates in Yewa North LGA vary with the type of study and the subjects of the study; as with 20.8% in pregnant women [5], and 9.8% in pre-school children [6], 57.1% in school-aged children [7], and 25.7% in adults [8].

Morbidity due to schistosomiasis can be controlled by annual Mass Drug Administration (MDA) with praziquantel at doses of 40 mg/kg [9]. However, reinfection with the parasite is inevitable, as the factors that favor the spread of the infection

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are a complex interplay between the host (intermediate and definitive), the parasite, demographic, ecological, socioeconomic, and cultural processes [10]. Also, while MDAs are recommended in infected communities, information on treatment coverage is not certain. Therefore, anyone who was not treated during an MDA would serve as a source of reinfection to those already treated [11]. The success of an MDA program to control schistosomiasis depends greatly on the knowledge, attitude, and practices (KAP) of the inhabitants. A global effort to eliminate human schistosomiasis by 2025 with MDA has been stressed by the World Health Organization [12]. However, chemotherapy alone may never achieve transmission control or elimination [13,14], due to the potential threat of drug resistance developing in the schistosomes [15]. Thus, other interventions, such as snail control and health education among schistosomiasis endemic communities, are essential and need to be implemented in parallel with MDA [16,17]. Indeed, without adequate health education, hygiene, and behavioral changes schistosomiasis control may be unachievable.

Knowledge creates awareness and true understanding of the disease which improve health-seeking behavior [18]. The gap in knowledge, as well as general attitudes toward, and perceptions of the disease cause low compliance to eradication programs [19]. Therefore, the implementation of KAP surveys was recommended by the WHO to serve as a cornerstone for health promotion campaigns, in order to make health education messages effective to increase knowledge and awareness of at-risk groups [20].

KAP model provides an understanding of responses and analyses of behavioral patterns with respect to certain phenomena; and the relations among these three concepts have been documented, especially in health-related research [21]**.** A lot of people who claim to have knowledge about urinary schistosomiasis are actually ignorant of the real cause of the disease. A recent study in Yewa North LGA, Nigeria had recommended that health education and good water supply be integrated into the control strategies of schistosomiasis in order to reduce transmission of the disease [11].

The KAP of the people have great impact on the success of any approach to control schistosomiasis. Chemotherapy and provision of facilities, such as improved healthcare and toilets, are not enough to change their attitudes to the disease but addressing gaps in knowledge and adjusting methods of information dissemination to the target population in order to improve enlightenment on the importance of cultivating a good health seeking behavior is an important complement. This assumes that enhanced knowledge would increase ability of participants to engage in good health seeking behavior and control of the disease. In line with this, the Theory of Reasoned Action posits that behavioral intention (cognitive readiness of an individual to perform an action) is shaped by individual attitude or personal opinion, social pressure arising from other peoples' expectations and the perceived behavioral control of the individual (which deals with their ability to perform or engage in the behavior) [22]. Successive literature on Theory of Planned Behavior [23] identified two facets of perceived behavioral control which are internal (supremacy of knowledge, skills, and abilities and amount of discipline he wields in performing the act) and external control; the approval of others that determine the development of a positive attitude. Among other issues, a focus on behavior control by enhancing knowledge, skills, and abilities in order to improve health seeking behavior through adequate information dissemination would bridge the gaps in knowledge and increase the control of schistosomiasis. In this context, this study was, therefore, aimed to evaluate social, cultural and environmental factors using KAP toward schistosomiasis in Eggua, Nigeria and provide insight about how the prevention and control of the disease in this area could be organized and implemented. It is assumed that participants' positive perception and acceptance of the proposed intervention will lead to expected positive attitude and behavioral change.

Materials and Methods

The study was carried out in Eggua, a rural agrarian community, between August 2012 and December 2015. Eggua is one of the Wards that make up Yewa North LGA as previously described [8]. It consists of settlements at Sagbon, Imoto and Tata, Agbon-Ojodu, and Igan-Alade. It shares boundaries with Igbogila, Ilaro, Benin Republic and Ijoun. Eggua lies between latitude 7° 6′ 4.811″N and longitude 2°52′ 43.776″E in a derived savanna zone [8]. The area is largely dominated by the Yoruba speaking people, though there is a significant mixing with the border people of the Republic of Benin.

The major occupation in this area is farming although timber logging, trading, and fishing are also common. The Rivers Yewa, Idi, Iganokoto, and Isopa flow through the Eggua community of Yewa

North LGA. A cross-sectional study design was employed. Participants included adults aged 35 years and above who were drawn from the village as they convened at the community health Center following the initial announcement by the community leader. The sample size was calculated using the formula which was adopted from Naing et al. [24].

Ethical considerations

Ethical approval for the study was obtained from the Ogun State Ministry of Health. Informed consent was obtained from each respondent under a protocol approved by the Local Government and local health officials.

Socio-demographic data collection

A semi-structured, pre-tested questionnaire was used to obtain information about participants' knowledge, attitudes, beliefs, and practices regarding the transmission and treatment of schistosomiasis and morbidity associated with it. Questionnaires were self-administered by those who could, while others had them administered in either English or Yoruba.

Results

Socio-demographic characteristics

In total, 372 respondents with a mean age of 48 ± 12 years were recruited into this study. This was distributed into 35.2% (131/372, 95% CI 30.1–39.8) males and 64.3% (241/372, 95% CI 59.9–69.6) females. A good number of the respondents had no formal education 44.7% (166/372, 95% CI 39.5–49.5) and were mostly (97.1%, 95% CI 94.9–98.4) residents and indigenes of Yewa Local Government, Ogun State (Table 1). The most common occupation was farming 48.4% (180/372), followed by trading 29.8% (111/372). Majority 79% (294/372) of respondents were Christian, of a denomination wherein members spend long periods in the river praying. Also, most of the respondents 69.1% (257/372) had spent about 15 years and above in water-related occupations; when they were asked about the source of water consumed and frequency of visits to the source of water, 68.3% (254/372) stated that they depended solely on river water and 89.5% (333) of them went to the river on a daily basis.

Schistosomiasis oriented knowledge and practices of respondents

Majority of the respondents 65% (245/372, 95% CI 61.0–71.0) used the rivers only for domestic purposes (drinking, laundry, and bathing) and 33.1% respondents (123/372, 95% CI 26.6–36.3) used the water both for domestic and religious purposes (Table 2). Most of the respondents 81.5% (303/372, 95% CI 74.9–86.7) had no knowledge of the cause of urinary schistosomiasis, however, 9.7% (36/37295% CI 6.7–12.6) people related the

Table 1. Distribution of participants' sociodemographic features influencing urinary schistosomiasis in Eggua Nigeria.

Categories		No.	(%)	95% CI
Age (years)	35–39	73	(19.6)	15.9–23.7
	40–44	78	(21.0)	16.9–25.3
	45–49	56	(15.1)	11.6–18.8
	50–54	86	(23.1)	18.5–27.2
	60 and Above	79	(21.3)	17.2–25.3
Gender	Male	131	(35.2)	30.1–39.8
	Female	241	(64.8)	59.9–69.6
Origin	No response	3	(0.8)	0–1.9
	Yewa LGA	361	(97.1)	94.9–98.4
	Others	8	(2.2)	0.8–3.8
Education	No response	1	(0.3)	0–1.1
	Primary	110	(29.6)	25–34.1
	Secondary School	64	(17.2)	13.2–21.2
	Degree Holder	31	(8.3)	5.6–11.3
	No schooling	166	(44.7)	39.5–49.5

disease to drinking "bad" water, and 5.4% (20/372, 95% CI 3.2–7.5) mentioned the presence of snails in the river as a possible cause of infection. Also, the possibility of post-treatment reinfection of urinary schistosomiasis was known by few respondents 10.5% (39/372, 95% CI 5.6–14.1).

We found that about half of the respondents, 50.8% (189/372, 95% CI 47.8–54.4), had seen someone with macro-hematuria at one time or the other (Table 3). However, only 13.7% (51/372) of those who had seen persons with macro-haematuria indicated knowing the cause of the symptoms (Table 3). Also, most respondents 74.7% (277/372, 95% CI 69.5–78.2) reported infection in at least one family member at one point in time, especially as children (Table 4). Acknowledgement of a previous schistosomiasis infection was made by only 7.8% (29/372, 95% CI 4.9–10.5); 11.6% (43/372, 95% CI 8.4–14.8) said they had pain during urination, while 4.6% (17/372, 95% CI 2.4–6.7) were currently passing out blood in their urine. Seven percent (26/372, 95% CI 4.3–9.7) of the respondents reported receiving previous treatment for schistosomiasis and 3.8% (14/372) of them had been re-infected after treatment (Table 4).

Of those respondents who knew the cause of blood in urine, a good number 11.0% (41/372) had some form of education at least at the primary level, and correctly attributed the cause of schistosomiasis to infected water 8.7% (32/372) and the presence of snails in the river 4.8% (18/372).

Environmental influence on cause of infection

A large majority of respondents 76.0% (282/372) did not indicate how they would seek for help in case of infection. Of those 22.1% (82/372) who answered the question, 30% would visit a health facility, 4.0% (15/372) would take un-prescribed injection, and only 2.2% (8/372) knew praziquantel as a drug for schistosomiasis treatment (Table 5).

Table 2. Schistosomiasis associated- water contact activities.

Categories		No.	(%)	95% CI
Occupation	Farming	180	(48.4)	44.4–51.2
	Fishing	6	(1.6)	0.5–3.6
	Artisan	33	(8.9)	5.9–12.9
	Trading	111	(29.8)	27.0–32.1
	Others	38	(10.2)	6.9–14.0
	No response	4 (	1.1)	0.5–4.0
	Total	372	(100.0)	
Number of years in water contact-related occupation	No Response	73	(19.6)	16.6–22.8
	Above 15 years	257	(69.1)	66.1–69.2
	Below 15 years	42	(11.3)	8.3–13.1
	Total	372	(100.0)	
Sources of drinking water	Rivers Only	254	(68.3)	65.3–72.5
	Others	54	(14.5)	11.5–17.8
	Rivers and others	64	(17.2)	14.2–20.4
Frequency of visits to the river	No Response	15	(4.0)	1.5–7.0
	Daily	333	(89.5)	86.5–93.5
	Weekly	19	(5.1)	2.1–5.3
	Monthly	5	(1.4)	0.5–4.4
Uses of Water	No response	4	(1.1)	0–2.2
	Drinking Laundry Bathing	245	(65.9)	61.0–71.0
	Drinking Laundry Bathing and Religion	123	(33.1)	26.6–36.3
Religion	No response	2	(0.5)	0–2.0
	Christian	**294**	**(79.0)**	**76.5–83.0**
	Islam	**76**	**(20.5)**	**17.5–24.0**

Table 3. Awareness and knowledge of the causes of urinary schistosomiasis.

Categories		No.	(%)	95% CI
Ever seen any one with blood in urine	No Response	4	(1.1)	0.5–3.0
	Yes	189	(50.8)	47.8–54.4
	No	179	(48.1)	44.3–52.0
	Total	372	(100.0)	
Knowledge of cultural explanation of causes of schistosomiasis	No Response	18	(4.8)	1.2–7.5
	Yes	51	(13.7)	9.7–17.5
	No	303	(81.5)	74.9–86.7
	Total	372	(100.0)	
Participants' perception of the causes of blood in urine	No Idea	301	(80.9)	77.2–84.7
	Snail	20	(5.4)	3.2–7.5
	Infected water	36	(9.7)	6.7–12.6
	Mosquitoes	6	(1.6)	0.5–3.0
	Others	9	(2.4)	0.5–3.2
Knowledge of schistosomiasis re-infection	No Response	166	(44.7)	39.5–50.0
	Yes	39	(10.5)	5.6–14.1
	No	166	(44.8)	40.8–47.8
Knowledge of other Schistosomiasis related symptoms	No Response	71	(19.1)	15.1–23.2
	High fever	46	(12.4)	9.2–15.6
	Weakness	64	(17.3)	13.7–21.3
	Loss of appetite	83	(22.4)	18.3–26.9
	Headache	76	(20.5)	16.4–24.8
	Dizziness	30	(8.1)	5.4–10.8
	Abdominal pain	1	(0.3)	0–0.8

Flush toilets were seen in only three of the houses and the health centers. Up to 95% of the respondents indicated that they did not have latrines that worked and so they used the bushes or the river.

Discussion

The present study provides information about the KAP concerning schistosomiasis among adults in Eggua, Nigeria. Despite the intensive efforts to control schistosomiasis in this community, the disease is still highly prevalent among adults; our previously published work showed a 25.7% prevalence of schistosomiasis among adults in Eggua [8]. In the present study, most of the respondents lacked some form of schooling, which has previously been described as a risk factor for urinary schistosomiasis [21]. Higher education levels have been fairly consistently associated with higher levels of KAP; hence, the low risk of infection among educated persons [25,26]. Recent studies from Africa and Asia showed that the odds of having poor knowledge about schistosomiasis were significantly higher in the respondents who had a primary level education or below [27,28].

The respondents in this study showed a poor knowledge of the mode of transmission, prevention, and control of schistosomiasis, especially the role of snails and frequent contact with river water in the transmission of the disease. However most of the respondents recognized the vector snails present in the streams and ponds in communities when shown the images. This finding of a lack of knowledge of the mode of transmission of infection is peculiar to schistosomiasis endemic communities [29,30]. Corresponding to the generally low levels of correct knowledge of predisposing factors, the level of adoption of effective protective behaviors was low in the region. This was also the finding in other studies [25,27,31]. In order to eliminate schistosomiasis, interventions such as medically relevant snail control policies in schistosomiasis endemic communities are essential and should be implemented in parallel with MDA [30]. Although

Table 4. Knowledge and awareness of schistosomiasis - related symptoms among study participants.

Categories	No.	(%)	95% CI
Currently passing out blood in urine			
No response	23	(6.2)	3.8–8.9
Yes	17	(4.6)	2.4–6.7
No	331	(89.1)	85.7–92.2
Pattern of blood flow during urination			
No response	334	(90.0)	87.1–92.7
With the urine	1	(0.3)	0–0.8
Last few Drop after urination	36	(9.7)	6.7–12.1
Pain during urination			
No Response	24	(6.5)	4.0–9.2
Yes	43	(11.6)	8.4–14.8
No	304	(82.0)	77.6–85-4
Previously suffered schistosomiasis			
No Response	62	(16.7)	12.9–20.8
Yes	29	(7.8)	4.9–10.5
No	280	(75.5)	70.6–79.5
Previously treated for schistosomiasis			
No Response	273	(73.6)	68.7–78.2
Yes	26	(7.0)	4.3–9.7
No	72	(19.4)	15.1–23.5
Case of re-infection after treatment			
No Response	202	(54.4)	49.6–59.3
Yes	14	(3.8)	1.9–5.9
No	155	(41.8)	36.4–46.6
Family member with schistosomiasis			
No Response	45	12.1	9.2–15.4
No	49	13.2	10.0–16.7
Yes	277	74.7	69.5–78.2

most of the respondents admitted to having known people with haematuria, suggesting the endemicity of infection in the community, the awareness and knowledge of symptoms, mode of transmission and preventive measure among respondents was generally poor [30]. Thus, majority of the respondents did not know the causes of hematuria and had no understanding of post-treatment re-infection of schistosomiasis. Besides the lack of formal education, this could indicate a lack of health education about causes and prevention of schistosomiasis among these people and this could be provided during MDA campaign.

A lot of water contact-related activities, such as religious, domestic, and farming uses, were observed in these communities (Table 2). These could further enhance the prevalence of urinary schistosomiasis amongst residents of these communities; especially striking is the fact of people praying in the water for long periods. Since there is no campaign against open defecation in these areas, coupled with the fact that very few have or use latrines and thus do so in the river, it is no wonder that transmission is high. Monde et al. [32] had reported that activities, such as bathing, swimming, domestic chores, including washing of clothes and utensils, are important pathways of exposure to contaminated water. Very few adult respondents knew that praziquantel was the drug for treatment of schistosomiasis; this could be because MDA campaigns in the regions were targeted mostly at school children and carried out mainly in the schools. Despite the reported challenging high rate of infection among the studied population, the tendency to

Table 5. Respondents knowledge of schistosomiasis by educational level.

Categories		Academic qualificaion					Total
		No response	Primary	Secondary School	Degree Holder	No Education	
		N (%)	*N* (%)	*N* (%)	*N* (%)	*N* (%)	*N* (%)
Knowledge of blood in urine $\chi^2 = 45$, df = 15, $p = 0.001$	No response	1 (0.3)	7 (1.9)	2 (0.5)	1 (0.3)	7 (1.9)	18 (4.8)
	Yes	0 (0.0)	16 (4.3)	13 (3.5)	12 (3.2)	10 (2.7)	51 (13.7)
	No	0 (0)	87 (23.4)	49 (13.2)	18 (4.8)	149 (40.1)	303 (81.5)
Causes of Schistosomiasis $\chi^2 = 73$, df = 30, $p = 0.001$	No response	1 (0.3)	93 (25.0)	44 (11.8)	17 (4.6)	146 (39.2)	301 (80.9)
	Snail	0 (0)	3 (0.8)	3 (0.8)	12 (3.2)	2 (0.5)	20 (5.4)
	Infected water	0 (0)	8 (2.2)	14 (3.8)	10 (2.7)	5 (1.4)	37 (10.0)
	Mosquitoes	0 (0)	4 (1.1)	2 (0.5)	0 (0)	0 (0)	6 (1.6)
	Others	0 (0)	2 (0.5)	1 (0.3)	2 (0.5)	3 (0.8)	8 (2.1)
How to seek for cure in case of infection $\chi^2 = 58$, df = 30, $p = 0.001$	No Response	1 (0.3)	87 (23.5)	38 (10.2)	20 (5.4)	136 (36.7)	282 (76.0)
	Herbs	0 (0)	8 (2.2)	11 (3.0)	4 (1.1)	6 (1.6)	29 (7.8)
	Injection	0 (0)	2 (0.5)	8 (2.2)	3 (0.8)	2 (0.5)	15 (4.0)
	Praziquantel	0 (0)	5 (1.3)	2 (0.5)	1 (0.3)	0 (0)	8 (2.2)
	Hospital	0 (0)	7 (1.9)	5 (1.4)	4 (1.1)	21 (5.7)	30 (8.1)
Knowledge of post-treatment schistosomiasis re-infection $\chi^2 = 13$, df = 15, $p = 0.001$	No response	1 (0.3)	53 (14.3)	21 (5.7)	13 (3.5)	78 (21.0)	166 (44.7)
	Yes	0 (0)	16 (4.3)	7 (1.9)	8 (2.2)	8 (2.2)	39 (10.5)
	No	1 (0.3)	40 (10.8)	36 (9.7)	10 (2.7)	80 (21.6)	167 (45.1)

seek medication from a hospital is low; only very few of the respondents would visit a health facility for medical attention in case of infection. It would seem that many people have recourse to traditional remedies to cure the symptoms at least, of the disease. Their perception is that the white man's medicine frowns on their use of herbs, so they are often not very forthcoming about it. This study showed that a good number of the respondents preferred self-medication, either through consumption of herbs or by patronizing local drug hawkers, as they found this to be more accessible and cheaper. A similar behavior was reported in a recent study from Kano, Nigeria [33].

Conclusion

In this study, we showed that adults residing in schistosomiasis endemic communities in Eggua lack adequate KAP concerning the disease, which could be an obstacle toward any schistosomiasis control campaign. This study also adds to the existing limited literature exploring KAP of schistosomiasis prevention and control at the community level. With respect to the reported high prevalence of schistosomiasis in Nigeria, our findings could be useful in drawing up an adoptable policy and practice regarding schistosomiasis preventive behavior. There is an urgent need for comprehensive health education as a means of intervention along with MDA campaigns in a schistosomiasis endemic community like Eggua, in Nigeria. This will provide better knowledge concerning the transmission, prevention, and control of schistosomiasis.

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Competing interest

The authors declare no conflicts of interest.

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