



Onchocerciasis Awareness and Treatment Strategies in Rural Southeast Nigeria

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Abstract

This study investigated onchocerciasis awareness and treatment strategies in rural southeast Nigeria. Social Cognitive Theory was used as theoretical framework. The study design is mixed methods research. Questionnaire and In-depth Interview was the study data collection instruments. For the qualitative data of the study, a total of 24 In-depth Interviews were conducted. Almost all the respondents have heard of onchocerciasis disease and more than half are aware that black fly is the vector that transmits the disease into human. Over one third of people in rural southeast Nigeria utilize traditional medicine/herbs to treat onchocerciasis disease. The study also found statistical significant positive correlation between onchocerciasis awareness level and use of ivermectin as the disease best treatment method. Finally the study clearly shows that as onchocerciasis awareness level continue to increase; many people tend to adopt ivermectin as the disease best treatment method in rural southeast Nigeria.

Keywords: Awareness; Nigeria; Onchocerciasis; Treatment strategies

Background

Onchocerciasis is a chronic parasitic disease caused by the micro filarial worms called onchocerca volvulus. This parasite is transmitted from man to man through the bites of the blackfly simulium of the family simuliidae [1]. It is essentially a rural disease affecting communities sited along fast flowing rivers with manifestations particularly disturbing and incapacitating, often associated with long-term exposure to infections and this affects the social and economic activities of the occupants concerned.

The distribution of onchocerciasis is connected to the location of black flies which are normally found near fast running streams and waterways in the inter-tropical zones. Hence, huge percentage of the disease happens in Africa [2]. Onchocerciasis is also found in six countries in Latin America (Ecuador, Venezuela, Colombia, Brazil, southern Mexico, and Guatemala) and in Yemen in the Arabian Peninsula, where the disease is believed to be exported by the slave trade [2]. However, in July 2016, Guatemala became the fourth country in the world after Colombia (2013), Ecuador (2014), and Mexico (2015) was confirmed free of onchocerciasis after successful implementation of elimination activities for a considerable length of time [3]. Yet according to Okafor, Uzoka, Ajunwa, Chikezie Iyam and Dalla (2016) [4], onchocerciasis disease continue to persist in Africa and particularly in sub-Saharan; with over 99% of infected people in the world living in 31 countries in sub-Saharan Africa: Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Republic of Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Ethiopia, Gabon, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Sudan, Sudan, Togo, Uganda, and United Republic of Tanzania [3].

Nigeria has the largest number of people with onchocerciasis, accounting for about a third of the global prevalence [5]; with 7 million people infected [4] and 50 million persons in over 40, 000 communities at risk (FMOH, 2017). According to the result of a study conducted by Umeh, Mohamoud, Hagan, Wilson, Okoye, Asana, Biritwum, Ogbu-Pearce, Elhassan, Yameogo, Braide and seketeli, (2010) [6] on prevalence and distribution of visual onchocerciasis in three

ecological zones (Cross River, Taraba and Kogi) in Nigeria, onchocerciasis was the commonest single reason for visual impairment among participants; accounting for 30.2% of visual impairment in the study areas.

Unfortunately however, the level of awareness of the people about the aetiology, cause and method of transmission of the disease has consistently been a significant reason for worry in the control and prevention of onchocerciasis disease (7). In a study conducted by Mubyazi, Barongo, Kamugisha, and Njunwa (2013) [8] in Tanzania, it was discovered that numerous people were not aware of the symptoms, signs, causes, and control measures of this disease. According to Ikpeze, Iwueze, and Ngenegbo (2014) [9], locals were aware of the disease and the blackfly but were not aware of the relationship between blackfly and onchocerciasis. This low awareness according to Ikpeze et al. (2014) [10] is the reason why complete elimination of the disease has not been successful in Nigeria. It is in the light of the foregoing that this study investigated level of onchocerciasis awareness and treatment strategies in rural southeast Nigeria.

Theoretical Review

The Social Cognitive Theory

Social Cognitive Theory (SCT) started as the Social Learning Theory (SLT) in the 1960s by Albert Bandura (Glanz & Rimer, 2002) [10]. It developed into the SCT in 1986 and posits that learning occurs in a social context with a dynamic and reciprocal interaction of the person, environment, and behaviour. The unique feature of SCT is the emphasis on social influence and its emphasis on external and internal social reinforcement. SCT considers the unique way in which individuals acquire and maintain behaviour, while also considering the social environment in which individuals perform the behaviour. The theory takes into account a person's past experiences, which factor into whether behavioural action will occur. These past experiences influence reinforcements, expectations, and expectancies, all of which shape whether a person will engage in a specific behaviour and the reasons why a person engages in that behaviour.

The goal of SCT is to explain how people regulate their behaviour through control and reinforcement to achieve goal-directed behaviour that can be maintained over time. The first five constructs (Reciprocal Determinism, Behavioural Capability, Observational Learning, Reinforcements and Expectations) were developed as part of the SLT; the construct of self-efficacy was added when the theory evolved into SCT.

This theory describes a dynamic, ongoing process in which personal factors, environmental factors, and human behaviour all interact. The theory asserts that individual onchocerciasis disease awareness level not only improve based on their own experiences, but by observing the actions of others and the benefits of those actions. Therefore the choice of onchocerciasis disease treatment method that will be adopted by an individual is a product of rational evaluation

(awareness) of past implications of the disease and preventive methods.

Hypotheses

1. There is a statistical significant difference between respondents' age and awareness of onchocerciasis best treatment methods in rural southeast Nigeria.
2. There is a statistical significant relationship positive between respondents' onchocerciasis awareness level and use of Ivermectin to treat the disease.

Methods

The study design is mixed methods research and was conducted in southeast Nigeria. Southeast Nigeria, which is made-up of five states (Abia, Anambra, Ebonyi, Enugu and Imo) with 95 Local Government Areas (Abia State has 17 LGAs; Anambra, 21; Ebonyi, 13; Enugu, 17; and Imo, 27) was the study area. The area is predominantly made-up of Igbo speaking people. The culture of the people has been shaped primarily by its rainforest climate, its ancient trade, migration, and social history within its various clans and peoples, and with its ancient trading neighbours, allies and lately with Europeans.

The general population of the study is 24265421, being the projected 2018 population of southeast Nigeria. However, the target population for the study is 19,553 which were drawn from a population categories in the study area designed for an inclusive representation of relevant stakeholders in the study. They are members of: Community Farmers Cooperative, Community Men Town Union, Community Women Town Union, Community Men Youth and Community Women Youth. The study sample size is 1051. This was determined statistically using Taro Yamane formula. However, only 969 copies of questionnaire were retrieved. For the qualitative data of the study, a total of 24 In-depth Interviews were conducted. It was comprised of 3 Traditional title holders (one from each community), 3 Community men leaders (one from each LGA), 3 Community women leaders (one from each community), 3 Community youth leaders (one from each community) 3 Farmers (1 from each community), 3 Clergymen (one from each community), 3 Orthodox health practitioners (one from each community) and 3 Traditional health practitioners (one from each community). The multi stage sampling method was adopted for this study. Firstly, based on hydrological and epidemiological results, Southeast States was purposively selected due to the endemicity of onchocerciasis disease in many communities in the area. Secondly, based on the prevalence of onchocerciasis disease among States in Southeast Nigeria, purposive sampling method was adopted to select three (3) States (Enugu, Ebonyi and Imo). Thirdly, three LGAs namely, Oji-River, Ikwo and Okigwe were purposively selected from the three states based on the prevalence rate of onchocerciasis. Fourthly, purposive sampling method was used to select one community from each selected LGAs that have high onchocerciasis prevalence in the area. Thus, a total of three communities (Achi, Echia-Like and Amuru) were

selected for the study. Furthermore, five population categories were created in the selected communities for inclusiveness of all relevant respondents in the study. Finally, the actual respondents were selected from the population categories using proportionate stratified random sampling method. For the qualitative data, purposive sampling method will be used to select key interviewees.

The study instruments for data collection were structured interview questionnaire and in-depth interview (IDI). Open ended and closed ended structured questions were administered to the respondents for the quantitative data of the study, while semi structured interview guide was used for the qualitative data. Research questionnaire was administered to

respondents at their place of residents and their place of work with the help of research assistants. The in-depth interviews (IDI) were personally conducted by the researcher with the help of a research assistant who took notes. Interviewees' responses were recorded with notebooks and audio tape recorders.

The quantitative data was processed using the Statistical Package for Social Sciences (SPSS) and analysed using descriptive and inferential statistics. For the qualitative data, QDA Miner software was used in the analysis of the interview transcripts. Analysis started by transcribing the IDI data verbatim. Deductive themes and sub-themes were used as categories and sub-categories.

Results

<i>SEX</i>	<i>FREQUENCY</i>	<i>PERCENTAGE (%)</i>
Male	467	48.2
Female	502	51.8
Total	969	100.0
<i>AGE</i>		
18-29 years	268	27.7
30-41 years	237	24.5
42-53 years	199	20.5
54-65 years	158	16.3
66+	107	11.0
Total	969	100.0
<i>EDUCATIONAL LEVEL</i>		
None	141	14.6
Vocational	184	19.0
Primary/FSLC	204	21.1
Secondary	200	20.6
Higher/Tertiary	240	24.8
Total	969	100.0
<i>MARITAL STATUS</i>		
Single	286	29.5
Married	571	58.9
Divorced	24	2.5
Separated	38	3.9
Widowed	50	5.2
Total	969	100.0
<i>OCCUPATION</i>		
Retired	26	2.7
Student	104	10.7
Farming/Hunting	420	43.3
Trading	211	21.8
Artisan	89	9.2
Paid Employment/Salaried	119	12.3
Total	969	100.0
<i>RELIGION</i>		
Christianity	720	74.3
Traditional	196	20.6
Islam	53	5.5
Total	969	100.0

Table 1: Socio-Demographic Characteristics of the Respondents

The study considered variables such as respondents' Age, Sex, Education, Marital status, Religion and Occupation. Table 1 show that 502 (51.8%) of the respondents are females while 467 (48.2%) are males. The table also indicates that 268 (27.7%) of the respondents are aged between 18-29 years while only 107 (11.0%) are aged 66 years and above.

In terms of educational level, the table shows that 240 (24.8%) respondents representing a majority of the study sample size have higher/tertiary education while only 141

(14.6%) of the respondents has no formal education. The table also indicates that a majority of the respondents 571 (58.9%) were married while only 24 (2.5%) respondents were divorced. The table further show that majority of the study respondents 420 (43.3%) practice farming/hunting as their occupation while 26 (2.7%) respondents were retirees. In terms of religion, the table shows that a majority of the respondents 720 (74.3%) are Christians while 53 (5.5%) representing minority of the respondents practice Islamic religion.

Questionnaire items and Response categories	Frequency	Percentage (%)
Heard of Onchocerciasis		
Yes	804	83.0
No	165	17.0
Total	969	100.0
How can one contract onchocerciasis		
Black fly bites	483	50.8
Contact with infected person	158	16.6
Punishment from the gods	202	21.3
Poor dietary habits	49	5.2
Unknown	10	1.1
Don't know	48	5.1
Total	950	100.0
Onchocerciasis Awareness Level		
Very high	302	31.2
High	418	43.1
Don't know	220	22.7
Low	8	.8
Very low	21	2.2
Total	969	100.0
How do you know infected person		
Severe itching	216	22.3
Impaired sight	327	33.7
Rashes	112	11.6
Hanging groin	116	12.0
Swellings	180	18.6
Epilepsy	18	1.9
Total	969	100.0
Best Method of Treating Onchocerciasis		
Traditional medicine/herbs	388	40.0
Prayer	121	12.5
Banocide	19	2.0
Ivermectin	414	42.7
Don't know	27	2.8
Total	969	100.0

Table 2: Awareness level and onchocerciasis treatment methods.

Table 2 shows that the respondents were asked whether they have heard of onchocerciasis disease before, 83.0% of the respondents said yes while 17.0% said no. This shows that many people in the study area are aware of the disease. This high level of awareness may not be unconnected to the years of creating awareness and distribution of ivermectin by government and donors in onchocerciasis endemic

communities. In the IDI data, majority of the respondents also revealed that they have heard about the disease. A participant affirmed: "I have heard about it. There was a time they said that some people brought drugs for eye problem though I did not go" [Female, Age 57, Farmer, Imo State]. This was also corroborated by another participant who said: "Yes I know it. We call it "Isi anyaocha" [Male, Age 66, Farmer, Enugu

State]. The respondent demonstrates his knowledge of the diseases by mentioning the Igbo name for the disease.

To enquire if the respondents are aware how one can contract onchocerciasis disease, the respondents were asked to identify ways people contract the disease. Majority (50.8%) of the respondents revealed that it is through black fly bites, 16.6% said it is through contact with infected person, 21.3% said it is as a result of punishment from the gods, 5.2% said it is caused by poor dietary habits, 1.1% of the respondents said the cause is not known, while 5.1% said they don't know. The respondents were further asked to rate awareness level of onchocerciasis in their community. To this end, almost half of the respondents 418 (43.1%) rated high onchocerciasis awareness in their community while only 8 (.8%) respondents said it is low. This implies that many of the people are aware of onchocerciasis in their community.

With respect to how onchocerciasis infected persons can be identified, majority (33.7%) of the respondents revealed that infected persons experience visual impairment while 1.9% of the respondents said they experience epilepsy. This was corroborated in the IDI data. A respondent noted:....you have a very generic one which is sleepiness, tiredness, we know about fever, visual impairment and itching. The most prevalent symptom is the eye issue. Like I know a man who has this issue. [Male, Age 47, Clergy, Imo State]

In the words of another respondent: "Sometimes it causes body itching with white patches" [Female, Age 71, Farmer, Ebonyi State]. Another participant also identified the symptoms by saying: "I know it because any person it bites it

causes rashes on the person's body and if that person did not get treatment on time, that person may go blind later" [Male, Age 78, Herbalist, Enugu State].

Furthermore, a symptom not mention by the other participants was mentioned by one of the respondent who report some of the symptoms of onchocerciasis in these words: "The person may have severe skin itching. For some men, they may have hanging groin. Some also have visual impairment" [Female, Age 26, Student, Imo State].

The wide ranging symptoms of onchocerciasis identified by the respondents of different demographic backgrounds suggest that the rural dwellers are aware of the symptoms of the disease. In terms of awareness of best method of treating onchocerciasis infected persons, 42.7% representing majority of the respondents revealed that ivermectin is the best treatment method, 40.0% of the respondents said that it is with traditional medicine or herbs, 12.5% said prayer, 2.0% noted benocide, , while 2.8% of the respondents said they don't know.

Test of Hypotheses

Hypothesis 1

There is a statistical significant difference between respondents' age and awareness of onchocerciasis best treatment methods in rural southeast Nigeria. To determine if there is a statistical difference between age and awareness of onchocerciasis best treatment method, Mann-Whitney U was conducted.

Ranks				
	Age	N	Mean Rank	Sum of Ranks
Rating of the use of treatment methods (Traditional medicine/herbs)	18-45years	620	475.81	295001.50
	46years +	349	501.33	174963.50
	Total	969		
Rating of the use of treatment methods (Ivermectin)	18-45years	620	505.50	313412.50
	46years +	349	448.57	156552.50
	Total	969		
Rating of the use of treatment methods (Prayer)	18-45years	620	495.25	307053.50
	46years +	349	466.80	162911.50
	Total	969		
Rating of the use of treatment methods (Banocide)	18-45years	620	500.05	310030.00
	46years +	349	458.27	159935.00
	Total	969		
Test Statistics ^a	Traditional medicine/herbs	Ivermectin	Prayer	Banocide
Mann-Whitney U	102491.500	95477.500	101836.500	98860.000
Wilcoxon W	295001.500	156552.500	162911.500	159935.000
Z	-1.484	-3.281	-1.711	-2.322
Asymp. Sig. (2-tailed)	.138	.001	.087	.020

a. Grouping Variable: age

Table 3: Mann-Whitney U Test of age and respondents awareness level of onchocerciasis best treatment methods.

The data on table 3 show that there is no statistical significant difference between age and use of traditional medicine/herbs ($U= 102491.5$, $P\text{-value} =.138$) and prayer ($U= 101836.5$, $P\text{-value} =.087$). This means that there is no difference in the way those aged 18-45 years and those aged old 46 years and above use traditional medicine/herbs and prayer to treat onchocerciasis symptoms. However, the data showed a statistical significant difference between age and use of ivermectin ($U= 95477.5$, $P\text{-value} =.001$) and banocide ($U= 98860$, $P\text{-value} =.020$). This shows that there is a difference in the way those aged 18-45 years and those aged old 46 years and above use ivermectin and benocide to treat onchocerciasis disease. Furthermore from the rank section of table 3, it can be observed that Mean Rank of those aged 18-45 years who indicated ivermectin (505.50) and benocide (500.05) is higher

than that of those aged 46 years and above (ivermectin-448.57, benocide-458.27). Therefore, it can be concluded that those aged 18-45 years are more likely to use ivermectin and benocide to treat onchocerciasis than those aged between 46 years and above.

Hypothesis 2

There is a statistical significant positive relationship between respondents’ onchocerciasis awareness level and use of Ivermectin to treat the disease. To investigate the relationship between respondents’ onchocerciasis awareness level and use of ivermectin, Spearman’s rho correlation test was conducted.

Correlations				
		Heard of onchocercissis	Rating of use of Ivermectin	
Spearman's rho	Heard of onchocercissis	Correlation Coefficient	1.000	
		Sig. (2-tailed)	.	
		N	969	
	Rating of use of Ivermectin	Correlation Coefficient	.108**	1.000
		Sig. (2-tailed)	.001	.
		N	969	969

Table 4: Spearman’s rho correlation of onchocerciasis awareness and use of ivermectin.

The data on table 4 shows a statistical significant positive correlation ($P\text{-value} = .001$, $r = .108$) between respondents level of onchocerciasis disease awareness and use of

ivermectin. This means that as onchocerciasis awareness level of the people increases, they are more likely to use ivermectin to treat the disease.

Discussion

The study investigated onchocerciasis awareness and treatment strategies in rural southeast Nigeria. Findings from the study show that almost all the respondents have heard of onchocerciasis and more than half are aware that black fly is the vector that transmits the disease into human. This is an indication of high level of onchocerciasis awareness and the correlation between the disease and black flies in the study area. This was supported by data from the in-depth interview. However contrary to the findings of the research conducted on level of awareness of locals on onchocerciasis disease in Achiagu, Adani, Aguobuowa and Achi communities in Enugu State, Nigeria revealed that locals were aware of the disease and the black fly but were not aware of the association between them [8].

prayer cut across all age brackets in rural southeast Nigeria. However the study further found that there is a statistical significant difference between age and use of ivermectin ($U= 95477.5$, $P\text{-value} =.001$) and banocide ($U= 98860$, $P\text{-value} =.020$) as onchocerciasis treatment method. From the rank section of table 3, it can be observed that Mean Rank of those aged 18-45 years who indicated ivermectin (505.50) and benocide (500.05) is higher than that of those aged 46 years and above (ivermectin-448.57, benocide-458.27). Therefore, it can be concluded that those aged 18-45 years are more likely to use ivermectin and benocide to treat onchocerciasis disease than those aged between 46 years and above. This could be explained from the point of view that younger people are more susceptible to new ways of doing things due to education, globalization and technologies (phone, computer) that make information easily available and in the long run influence behaviour.

Using Mann-Whitney U test, the study established that there is no statistical significant difference between age and the choice of traditional medicine/herbs ($U= 102491.5$, $P\text{-value} =.138$) and prayer ($U= 101836.5$, $P\text{-value} =.087$). This means that there is no difference in the way those aged 18-45 years and those aged old 46 years and above use traditional medicine/herbs and prayer to treat onchocerciasis disease. This implies that the use of traditional medicine/herbs and

Though majority of the respondents favour the use of ivermectin as onchocerciasis disease best treatment method, it is observed that over one third of the people believe that traditional medicine/herbs are the disease best treatment methods. This shows that many people in rural southeast Nigeria believe in the potency of traditional medicine/herbs to cure onchocerciasis disease and this line of thought can

negatively affect the disease treatment programmes in the rural southeast Nigeria.

Using Spearman's rho correlation test, the study found statistical significant positive correlation between respondents' onchocerciasis awareness level and use of ivermectin as the disease best treatment method. This means that as onchocerciasis awareness continue to rise, people tend to adopt ivermectin as the disease best treatment method in rural southeast Nigeria.

Conclusion

The study provided insight into onchocerciasis awareness level and treatment methods adopted among rural dwellers in southeast Nigeria. While the use of traditional medicine/herbs is high in rural southeast Nigeria, this study clearly show that as onchocerciasis awareness level continue to increase, many people tend to adopt ivermectin as the disease best treatment method.

Competing Interests Statement

Article/Work Title: Onchocerciasis awareness and treatment strategies in rural Southeast Nigeria

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I declare that there is no competing financial, professional, or personal interests that might have influenced the performance or presentation of the work described in this manuscript.

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