

# 1 Perception, awareness and treatment experiences about Onchocerciasis in a 2 rural community in Cross River State, Nigeria: implications for control

## 3 4 5 **Abstract**

6 **Background:** Onchocerciasis a disease of poverty continues to place huge health, economic and  
7 social burden on communities at risk. Understanding critical factors that impact on access to  
8 treatment, acceptance and overall control measures are pivotal to the march towards its  
9 elimination.

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11 **Objective:** To assess Onchocerciasis perception and treatment experiences in a rural community  
12 in Cross River State, Nigeria

## 13 14 **Methodology:**

15 A cross-sectional descriptive study using mixed method was undertaken. Data were collected  
16 using pretested questionnaire and in-depth interview guide. Quantitative data were analysed  
17 using SPSS while the in-depth interviews were audio taped, transcribed verbatim and thematic  
18 analysis done. Findings were presented in frequencies, charts, percentages, tables and quotes.  
19 Tests of significance were determined using Chi-square ( $\chi^2$ ) at significance level of 5%

20  
21 **Results:** Ignorance, myths and negative perception about the cause of Onchocerciasis pervade  
22 in 64 (31.2%) of the respondents that did not know that the bite of infected Blackfly is the cause.  
23 Some attributed the disease to curse from the gods (45.3%) and witchcraft (23.4%). This poor  
24 knowledge is associated with lower highest attained level of education ( $p = 0.01$ ). Non-  
25 availability of drugs (23.9%) and lack of knowledge on where to access ivermectin (9.8%) were  
26 the major challenges to ivermectin uptake. Inequity in treatment access was identified from the  
27 thematic analysis.

28  
29 **Conclusion:** Poor knowledge of the cause of the disease, non-availability of ivermectin and  
30 misconceptions about cause of onchocerciasis had negative influence on health- seeking  
31 behaviors, discriminatory practices and treatment coverage. By integrating contextual knowledge  
32 awareness creation about Onchocerciasis into the design of control strategies will facilitate the  
33 vantage march towards achieving elimination target.

34  
35 **Key words:** Onchocerciasis, Access, ivermectin treatment, Perception, Awareness, Nigeria

36 **Running Title:** Perception of Onchocerciasis and ivermectin treatment experiences  
37

## 38 39 **Introduction**

40 Onchocerciasis or river blindness is a disease of poverty that continues to place huge health,  
41 economic and social burden on communities at risk. The disease is a major problem among rural

42 communities living in close proximity to rivers in sub-Saharan African countries. An estimated  
43 25 million people were infected with about 1.3 million people visually impaired or blind as a  
44 result of the disease [1, 2]. Nigeria is estimated to bear a significantly high burden of the disease  
45 with 32 endemic states including Cross River State [3, 4]. In Cross River State, almost all the 18  
46 local government areas (LGAs) are endemic for the disease and the prevalence was estimated to  
47 be 10% in 2012 [5], which may be gross underestimation given lack of credible population data.

48  
49 Community Directed Treatment with Ivermectin (CDTI) is the major control strategy adopted in  
50 African countries by the African Program for Onchocerciasis Control (APOC). CDTI primarily  
51 involves yearly mass drug administration (MDA) of Ivermectin. Despite the successes this  
52 strategy has engendered [6,7,8], meeting target goal set for elimination of Onchocerciasis seems  
53 far-fetched [9,10,11]. However, ignorance, myths and misconceptions about Onchocerciasis have  
54 been implicated in the drag to elimination. These have equally been acknowledged to lead to  
55 negligence in prevention and control measures and causes acceptance of inappropriate treatment  
56 regimen.

57  
58 It has been recognised that knowledge of history and cause of a health condition including the  
59 whole continuum of epidemiology of the disease often promotes health-seeking behaviours and  
60 encourages reduction of effects or elimination of the disease [9,11,12,13,14]). Silumbwe *et al*  
61 [14] opined that often programme implementation strategies do not take into account the  
62 contextual factors that impact on overall programme success. Some of the key factors that have  
63 been suggested by many studies include; knowledge of cause and transmission of the infection,  
64 perception of disease symptoms, socioeconomic burdens of the disease, first point of call or

65 source of treatment, factors affecting treatment regimen such as willingness to pay for treatment  
66 or otherwise, acceptance of treatment and prevention/control measures [8,11,12,13,15].

67  
68 In addition, lack of knowledge of transmission of Onchocerciasis can also manifest in  
69 discriminatory and stigmatizing attitudes towards those affected [10,15]. This in turn may  
70 negatively affect the health-seeking behaviours of those affected by Onchocerciasis [8,16]. This  
71 may further limit access to ivermectin, acceptance of treatment and overall treatment coverage  
72 [13,17].

73  
74 Another crucial factor could be lack of close monitoring of drug treatment and distribution by  
75 community –directed distributors (CDD) often occasioned by technical and logistic limitations in  
76 their ability to deliver interventions [1, 2, 5, 18]. It has been equally suggested that poor  
77 compliance to treatment may not be unrelated to long treatment duration (10 – 15 years), interval  
78 between doses (one year) that can easily be forgotten and thus missed, adverse events in  
79 ivermectin treatment often leading to rejection of treatments by communities [1,3,6]. Reinvasion  
80 caused by limited treatment coverage area has also been implicated in low CDTI programme  
81 success [15,17,19]. Perhaps this could be attributed to the inconsistent availability of ivermectin  
82 in states and government’s inability to complement the efforts of APOC leading to poor  
83 distribution and follow-up in affected communities [2,5,18].

84  
85 To attain community participation and design socially/locally acceptable control strategies,  
86 health program planners and implementers should be familiar with people’s knowledge, attitude  
87 and practice in relation to Onchocerciasis and other cultural innuendos that impact **access to**  
88 treatment, coverage and other control measures [8,10]. The successful use of ivermectin at  
89 community level requires a broad public health program designed to address barriers to

90 treatments. Understanding the peoples' knowledge and perceptions of Onchocerciasis may stand  
91 as important promoters of effective Onchocerciasis control strategies [4,16,20]; especially in  
92 gaining the community's buy-in and confidence to participate in control programme  
93 [11,12,16,19]. There is paucity of information as few studies have been carried out to understand  
94 these issues in this environment. Therefore, this study was aimed at assessing Onchocerciasis  
95 perception, awareness and ivermectin treatment experiences among residents of a rural endemic  
96 community in Cross River State, Nigeria.

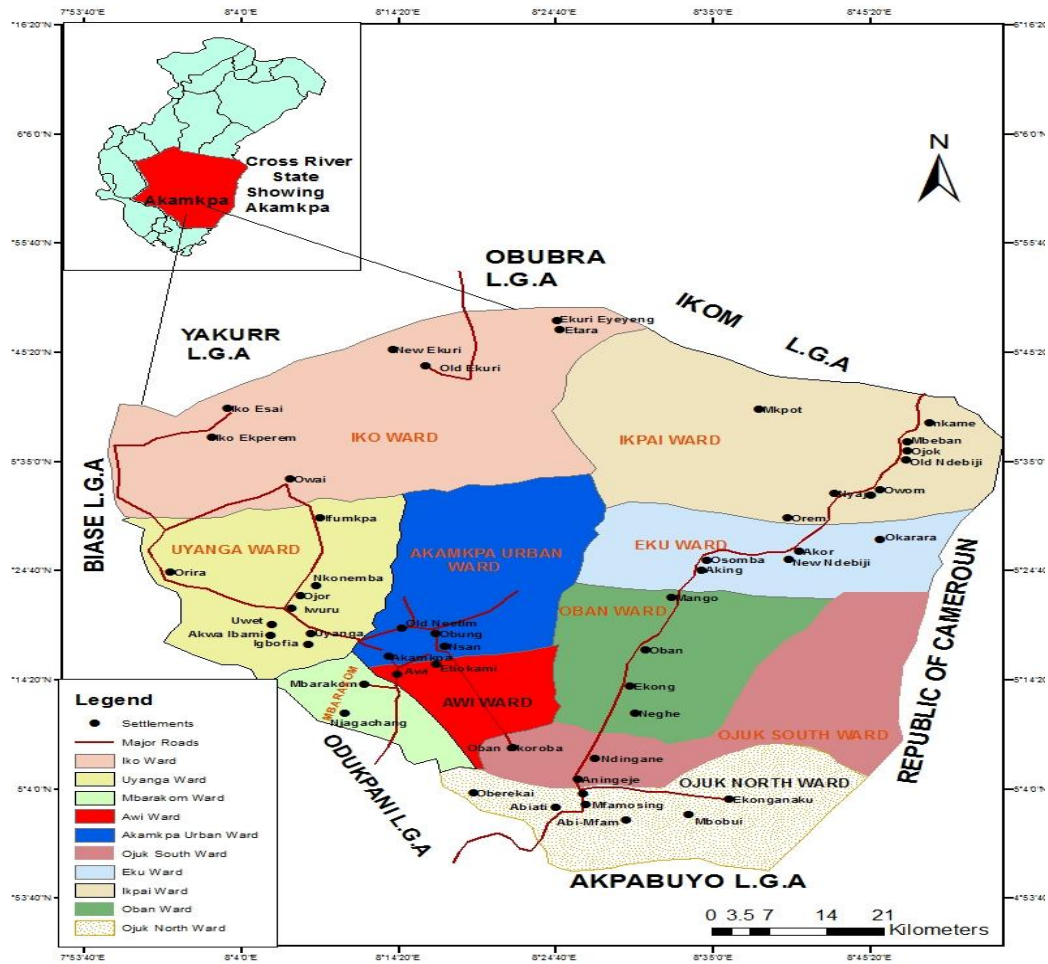
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## 98 **Research Methodology**

### 99 *Study setting*

100 The study setting was Akamkpa Local Government Area (LGA) of Cross River State in the  
101 South-South region of Nigeria (Figure 1). It is one of the Onchocerciasis endemic foci in the  
102 State. Akamkpa LGA lies within longitude 5°25', East of the Greenwich Meridian and latitude  
103 8°31' North of the equator. It has a projected population from the 2006 census figures to 2017 of  
104 about 203,705 using annual growth rate of 3.0%. The study area has the largest forest area in the  
105 state and a very fertile land, watered by many rivers, streams and springs; that serves as veritable  
106 breeding ground for blackflies.

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109 **Figure 1: Map of Akamkpa Local Government Area, Cross River State, Nigeria**

110 *Study design, sample size and sampling method*

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112 This study is a cross-sectional descriptive study using a mixed method approach comprising both  
 113 quantitative and qualitative data collection methods. The study population was limited to  
 114 individuals residing within Akamkpa LGA of Cross River State aged 15years and above. The  
 115 sample size for this study was 205 for the quantitative data. The sample size was determined  
 116 using the formula for dichotomous descriptive study [21]; employing the 10% prevalence of

117 Onchocerciasis in Cross River State estimated by Cross River State Neglected Tropical Disease  
118 (NTD) Programme [5] at 95% confidence interval and 5% precision. Simple random sampling  
119 technique was employed to select the respondents for the quantitative aspect. A total of 25  
120 respondents participated in the in-depth interviews comprising two from the NTD centre in  
121 Calabar, the Primary Healthcare Coordinator for Akamkpa LGA, Officers in-charge of the 10  
122 PHCs, two active ivermectin CDDs and 10 community leaders one from each ward.  
123 The instrument for data collection was semi-structured interviewer-administered questionnaire. It  
124 comprised of four sections. Section A elicited information on the socio-demographics of the  
125 respondent; Section B was on knowledge, perceptions and beliefs about Onchocerciasis. Both  
126 sections C and D covered Onchocerciasis treatment and factors influencing Onchocerciasis  
127 treatment respectively. In-depth Interview guide was designed to explore the experiences of  
128 participating individuals residing within Akamkpa LGA. Each interview session lasted for about  
129 90minutes.

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### 132 *Data analysis*

133 Quantitative data obtained from the study were entered, coded, cleaned and analysed using  
134 Statistical Package for the Social Sciences (SPSS version 20). Quantitative data was presented  
135 using descriptive statistics. Categorical variables were reported as frequencies (and percentages)  
136 while normally distributed continuous variables reported as means and standard deviations. Tests  
137 of significance were determined using chi-square ( $\chi^2$ ). Each in-depth interview was tape  
138 recorded. All audiotapes from the key informants interviewed were transcribed verbatim into

139 word documents. The transcripts and notes were analysed by themes described in the literature  
140 review as well as novel opinions expressed during the data collection process.

141

## 142 **RESULTS**

### 143 *Socio-demographic characteristics of respondents*

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145 A total of 205 respondents responded to all the items in the survey questionnaire; giving a  
146 response rate of 98%. There was a slight preponderance of males; 105 (51.2%) with the  
147 respondents having a mean age of  $31.9 \pm 12.3$  years. The number of respondents were married is  
148 103 (50.7%). Respondents with a household size between of 4- 6 were in the majority (104;  
149 50.7%) followed distantly by respondents with 1 – 3- member household 52 (25.4%). Most of  
150 the respondents had attained secondary level of education 113 (55.1%) with those with no formal  
151 education being the least 6 (2.9%). The highest proportion of the respondents were self-  
152 employed 65 (31.7%), followed by civil servants and farmers which were equally proportioned  
153 40 (19.5%) amongst the respondents. Most of the respondents had lived in the study area for  
154 more than 15 years 74 (36.1%). The detailed data on socio-demographic characteristics of the  
155 respondents is shown on Table 1.

156

157 **Table 1**

158 **Socio demographic characteristics of respondents, Akamkpa LGA, Cross River State**

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Variables	Frequency (n = 205)	Per cent (%)
Sex		
Male	105	51.2
Female	100	48.8
Family Size		
1 - 3	52	25.4
4 - 6	104	50.7
7- 9	35	17.1
>10	14	6.8

Marital Status		
Single	97	47.3
Married	103	50.2
Widowed	3	1.5
Divorced	2	1.0
Educational level		
No formal education	6	2.9
Primary	37	18.1
Secondary	113	55.1
Tertiary	49	23.9
Occupation		
Civil Servant	40	19.5
Farmer	40	19.5
Self-employed	65	31.7
Student	46	22.4
Others	14	6.8
Duration of stay in Akamkpa LGA		
<2 years	17	8.3
2 - 5 years	28	13.7
6 – 10 years	60	29.3
11 – 15 years	26	12.7
>15 years	74	36.1
	Mean	Standard Deviation (SD)
Age (Years)	31.9	12.3

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161 ***Knowledge and perception of onchocerciasis***

162 Ignorance, myths and negative perception about the cause of Onchocerciasis still persist as 64  
163 (31.2%) of the respondents did not know that the bite of infected Blackfly is the cause (Table 2).  
164 Most attributed it to curse from the gods (29, 45.3%) and witchcraft (15, 23.4%). **Having**  
165 **knowledge about cause of Onchocerciasis were comparatively higher in respondents who had**  
166 **attained more than primary level of education and reverse was the case for those that attained**  
167 **lower level of education** (Figure 2) was statistically significance at 0.05 critical level ( $\chi^2 =$   
168 11.32;  $p = 0.01$ ). This becomes all the more significant given that majority of the respondents  
169 (55.1%) had attained at least secondary level of education (Table 1).

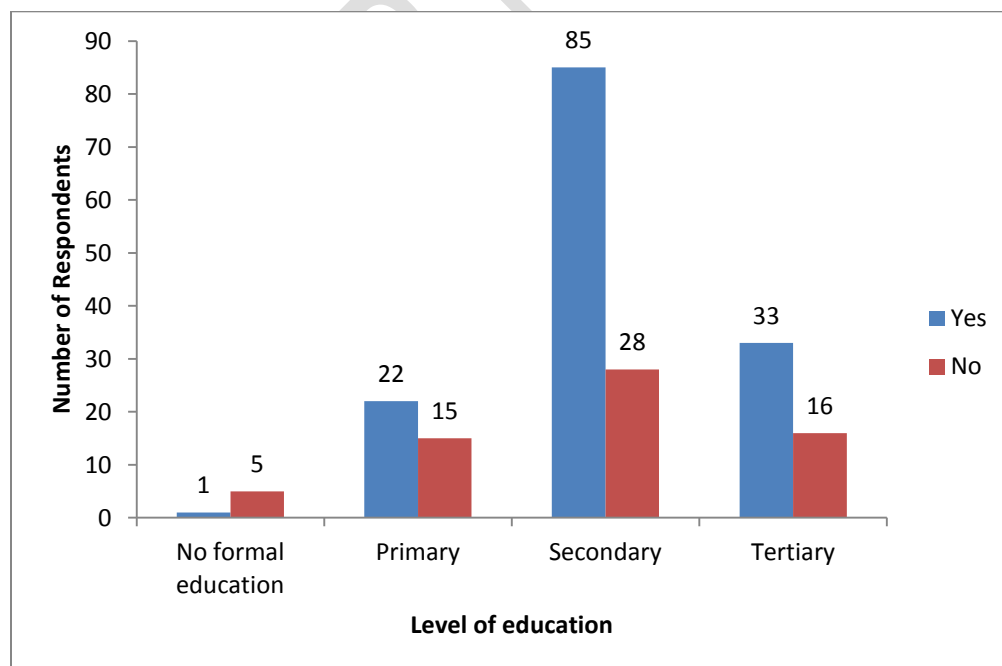
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171 Twenty four of survey respondents (11.7%) acknowledged to have suffered from Onchocerciasis.  
172 Those that were diagnosed at the health facility 16 (66.7%) and those diagnosed during mass  
173 screening exercise 8(33.3%). Having knowledge of family members suffering from the disease;  
174 only few 36 (17.6%) affirmed knowing and had one to two **infected** persons (51.3%) in the  
175 family (Table 2).

176  
177 The Onchocerciasis prevention methods suggested by respondents (Figure 3) were hinged on the  
178 knowledge and perception about the cause of the disease (Table 2). Among the respondents 133  
179 (64.9%) inferred that good sanitation and personal hygiene followed by 33 (16.1%) that were of  
180 the view that wearing of protective clothing was the viable prevention strategies. Use of  
181 metrizan by 8 (3.9%) and health education on prevention 5 (2.4%) were the key prevention  
182 strategies least mentioned by the respondents.

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**FIG 2: Knowledge about the cause of Onchocerciasis varied with educational level**

**Table 2: Respondents' onchocerciasis knowledge and treatment profile**

Variables	Frequency	Percentages
<b>Knowledge of cause of Onchocerciasis</b>		
Yes	141	68.8
No	64	31.2
<b>Total</b>	<b>205</b>	<b>100</b>
<b>Lack of knowledge of cause of Onchocerciasis (Attributions)</b>		
Animal	9	14.1
Curse from the gods	29	45.3
Kissing	2	3.1
Witchcraft	15	23.4
Don't know	9	14.1
<b>Total</b>	<b>64</b>	<b>100</b>
<b>Has Onchocerciasis</b>		
Yes	24	11.70
No	181	88.29
<b>Total</b>	<b>205</b>	<b>100</b>
<b>How Onchocerciasis was diagnosed</b>		
Visited health facility	16	66.67
Mass screening exercise	8	33.3
<b>Total</b>	<b>24</b>	<b>100</b>
<b>How long with Oncho</b>		
1 – 3 months	3	12.5
4 – 6 months	2	8.33
7 – 12 months	6	25.00
>12 – 36 months	5	20.83
>36 - 60 months	2	8.33
>60 months	6	25.00
<b>Total</b>	<b>24</b>	<b>100</b>
<b>Treatment Status (Are you on treatment?)</b>		
Yes	21	87.5
No	3	12.5
<b>Total</b>	<b>24</b>	<b>100</b>
<b>Source of treatment</b>		
Community Drug Distributors (CDDs)	18	85.7
Health Facility	2	9.5
Patent Medicine Store	1	4.8
<b>Total</b>	<b>21</b>	<b>100</b>
<b>Family member with Onchocerciasis</b>		
Yes	36	17.56
No	169	82.43
<b>Total</b>	<b>205</b>	<b>100</b>
<b>Number of family member with Onchocerciasis</b>		
1 – 2 persons	20	51.28
3 – 4 persons	8	22.22
5 – 6 persons	3	8.33

≥7 persons	4	11.11
<b>Total</b>	<b>36</b>	<b>100</b>
<b>Oncho MDA participation</b>		
Yes	138	67.3
No	67	32.9
<b>Total</b>	<b>205</b>	<b>100</b>
<b>Duration of Oncho MDA Participation</b>		
< 6 months	10	7.25
6 – 12 months	13	9.42
>12 – 36 months	51	36.96
>36 – 60 months	26	18.84
>60 months	38	27.54
<b>Total</b>	<b>138</b>	
<b>Source of Oncho MDA</b>		
Community Drug Distributors (CDDs)	100	72.5
Health Facility	35	25.4
Patent Medicine Vendor (“Chemist”)	3	2.2
<b>Total</b>	<b>138</b>	<b>100</b>
<b>Payment for treatment</b>		
Yes	8	5.8
No	130	94.2
<b>Total</b>	<b>138</b>	<b>100</b>

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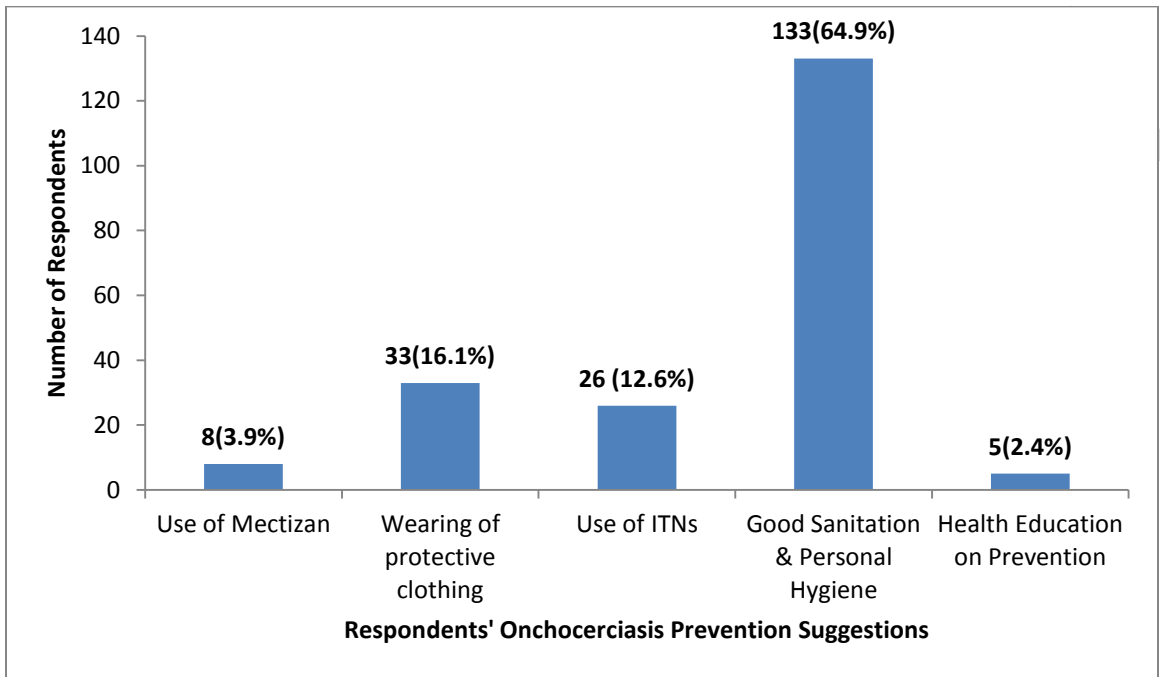
### 197 *Access and uptake of ivermectin*

198 CDDs still remain the main stay of onchocerciasis treatment (72.5%). Though health facilities  
199 (25.4%) and Patent Medicine Vendor, popularly known as “Chemist”(2.4%) were reported as the  
200 source of treatment for the rest of the respondents. A small proportion 8 (5.8%) claimed paying  
201 for the treatment (Table 2). Only very few 6(2.9%) of the respondents indicated cost of  
202 ivermectin was a challenge to its uptake (Table 3).

203

204 A significant proportion of the respondents reported having difficulties in accessing  
205 onchocerciasis treatment services (Table 3). Majority indicated that non-availability of drugs  
206 49(23.9%) followed closely by lack of knowledge of where to get ivermectin 20 (9.8%). Other

207 access hindering factors mentioned by some respondents included far distance to health facility 9  
 208 (4.4%) and poor attitude of healthcare providers 9(4.4%). Possible adverse drug reaction  
 209 12(5.9%) and rejection of ivermectin 7(3.4%) were also mentioned as affecting the uptake of  
 210 ivermectin.



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 212  
 213 **Fig 3: Respondents' perception about Onchocerciasis prevention strategies**  
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215 **Table 3**  
 216 **List of factors likely to affect to ivermectin uptake**  
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	Variables	*Frequency (n = 205)	
		Yes (%)	No (%)
a	Drugs used for treatment not available	49 (23.9)	156 (76.1)
b	Distance to the health facility is too far	9 (4.4)	196 (95.6)
c	I don't know where to get the drugs	20 (9.8)	185 (90.2)
d	Poor attitude of the health care providers	9 (4.4)	196 (96.6)
e	Cost of drugs too high	6 (2.9)	199 (97.1)
f	I don't like taking the drug	7 (3.4)	198 (96.6)

g	I always forget to take my drugs as when due	6 (2.9)	199 (97.1)
h	The drugs make me feel uncomfortable	12 (5.9)	193 (96.6)

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219 \*Multiple responses

220 (Variables a - e speak to issues of access)

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232 ***Table 4: Study Qualitative results***

UNDER PEER REVIEW

Major Theme	Sub-themes	Quote
<b>Onchocerciasis is a Huge burden</b>	Occurrence of the diseases due to the terrain, Neglected tropical diseases	<i>"Onchocerciasis is definitely a problem; it affects the larger community in the Local Government Area"</i> <i>"Yes, it a major problem as it is been called a neglected tropical disease"</i>
<b>Myths and Misconceptions</b>	Myths and Misconceptions Cause by witchcraft Curse from god Attack from enemy	<i>"The belief in witchcraft still stands, because every small thing that happens to them, they attribute it to witchcraft".</i> <i>"When people fall sick which they don't know the possible cause they will either say it an attack from their enemy or witchcraft"</i> <i>"Most people in this community still belief that onchocerciasis is caused by witchcraft due to the nature of the disease"</i>
<b>Discrimination and stigmatization</b>	Negative attitude, financial incapacitation, blindness, high social burden	<i>"You know predominantly in Akamkpa, a larger number of them are farmers, especially those in the interior, it affect them because most of them will not be able to go to Farm"</i> <i>"Family that has somebody who is affected... the economy and everything in that family will not go on well, because as a father in the family you will not be able to go and fetch out what the family will eat and it will be shame and a mocking of family and stigmatization"</i> <i>"it affects them because when it affects the eye, the eye is the mirror for everybody, if the eye is affected, it means even the family, community or the whole Nation is affected."</i> <i>"It doesn't actually kill but it gives indelible marks and some of them develop eye problem that they don't know the origin"</i> <i>"The economy and everything in that family will not go on well, because as a father in the family you will not be able to go and fetch out what the family will eat and it will be shame and a mocking family and stigmatization"</i> <i>"The disease makes people to depend on others too much"</i>
<b>Treatment of Onchocerciasis using Mectizan and Abendazole</b>	Faith-based treatment regimen (belief, prayers)	<i>"They are mostly treated during campaigns; we give them mectizan in combination with Abendazole mostly during campaign."</i> <i>"I don't belief the drugs work"</i> <i>"Due to some peoples Religious belief, they seek the face of God or look for other alternative especially if they don't know the possible causes"</i>
<b>poor community engagement/involvement</b>	Lack of incentives for volunteers,	<i>"People who work during the first phase, during the second phase, they were not be willing saying that the money given</i>

<p><b>poor programme Governance and Disillusionment</b></p>	<p>Poor political commitment, Religious belief, poor attitude, poor road network, Hard to reach area Language barrier, Lack of community cohesion</p>	<p><i>to them is not commiserate with the job.”</i>  <i>“I stopped working to give the drugs because the families were hostile”</i>  <i>“There are people who are living in very remote areas that the drugs cannot reach there, bike cannot get there, others includes language barrier and religion”</i>  <i>“Our leaders think of themselves more. They don’t care”</i>    <i>“They pay them a token at the end of their services from the donor agency...There is nothing coming from the community, or PHC”</i>    <i>“Their mentality here is quite difference, even when you take a good thing to them. They will still politicize it. Immediately they see you they will ask what have you brought for us talkless of saying how to support, they will not...”</i></p>
<p><b>Inequity in access</b></p>	<p>increase funding, community participation, poor Availability of Drugs Increasing awareness in hard to reach community</p>	<p><i>“It’s something that Government should take control because donor at a time, they may opt out. Like in other programs that we have... if it is Government own it will be sustainable”</i>    <i>“Distribution shouldn’t be only during campaign.”</i>    <i>“People should be aware; all those remote area, we should try as much as possible to reach out to them so that the people should be aware.”</i>    <i>“They can step down to the community, we have to meet the opinion leaders in the community, the elders also the religious leaders especially those churches that their religion serves as a barrier.”</i>    <i>“People from the Cameroon as they move in they should be able to access the drugs, So I think it should be drug that should be in the facility as they come they find it.”</i></p>

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## 241 Discussion

242 Improving treatment access and overall coverage are critical targets that must be vigorously  
243 pursued if the set goal of elimination of onchocerciasis by year 2025 is to be achieved. However,  
244 achieving this lofty goal should be predicated on understanding critical factors that impact on  
245 treatment access, acceptance and overall onchocerciasis control measures. This study therefore  
246 sought to understand perception, awareness and treatment experiences regarding CDTI in a rural  
247 setting in Nigeria.

248  
249 This study showed that about 68.8% of the respondents had knowledge about the cause of  
250 onchocerciasis to be from bite of infected black fly. This is in tandem with various studies of  
251 69.4% in South-East Ethiopia [10] and 70% in Guatemala [15] reported knowledge levels.  
252 However, **on the contrary** studies by [13] in Bioko Island, Equatorial Guinea and [16] in Ogun  
253 State of Nigeria reported lower percentages of 19.3% and 9.8% respectively. **This could be due**  
254 **to differences in educational level in the study communities.**

255  
256 It then follows that about 31% of the respondents in this study did not know that the bite of  
257 infected Blackfly can cause onchocerciasis. This is in spite of seemingly moderately high  
258 educational level of the respondents for most respondents (55.1%) had attained at least secondary  
259 level of education. Similarly, in a study carried out in Enugu, Nigeria, more than half of the  
260 respondents (57%) had no knowledge of the cause of onchocerciasis [12]. This thus reflects that  
261 myths and misconceptions on the cause of onchocerciasis still persist in the study area with most  
262 attributing the cause to beo curse from the gods (45.3%) and witchcraft (23.4%). This is similar  
263 to the study carried out by [10]. Hence, observed misconceptions, myths, poor attitude and



264 practices toward predisposing factors for onchocerciasis infection in the study area. Erroneous  
265 beliefs about onchocerciasis could lead to abandonment of personal protective measures and  
266 other preventive practices [5,8,9,10].

267  
268 The pervading ignorance and poor perception on onchocerciasis is evidently reflected with most  
269 (64.9%) reported that good sanitation and personal hygiene against the small proportion that  
270 suggested use of Mectizan (3.9%) and health education on prevention (2.4%) as viable  
271 onchocerciasis prevention strategies. These x-ray the intertwined effects of lack of knowledge in  
272 reinforcing inappropriate health-seeking behaviors that invariably influence treatment  
273 distribution, acceptance and coverage [8,11,13].

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275 Lack of knowledge and poor perception of onchocerciasis may equally not only manifest in  
276 discriminatory and stigmatizing attitudes and practices with the consequential drive for poor  
277 health-seeking behaviors that further limit access to mass drug (ivermectin) administration  
278 (MDA) [4,17], but may also affect overall efficacy of ivermectin treatment, treatment coverage  
279 and communities participation in onchocerciasis control programme [11,12,16,19]. These  
280 perceptions and ignorance were also re-echoed as major themes from the key-informants  
281 interviewed;

282 *“Most people in this community still belief that onchocerciasis is caused by witchcraft due to the*  
283 *nature of the disease” (Key informant)*

284 *“When people fall sick which they don’t know the possible cause they will either say it is an*  
285 *attack from their enemy or witchcraft” (Key informant)*

286  
287 It was suggested that more than formal education may be required to bring about change that can  
288 positively influence onchocerciasis elimination target [7,11,13,16]. More importantly, the

289 respondents are relatively young with a mean age of  $31.9 \pm 12.3$  years and ought to have access  
290 to general information often facilitated by modern technology that should be of benefit to  
291 onchocerciasis prevention and control. This therefore becomes quite pivotal in the whole scheme  
292 of onchocerciasis control, if sustained efforts at its elimination is to yield great results, the youths  
293 as special group and this generation's successors must be appropriately targeted with basic  
294 factual knowledge about onchocerciasis.

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296 The few respondents that affirmed having onchocerciasis symptoms (11.1%) or family members  
297 with such symptoms (17.6%) indicated the public health burden of the disease in the study area.  
298 When the sample size ( $n = 205$ ) is matched against the population ( $N = 203,705$ ) for Akamkpa  
299 LGA as at 2017, then, the extrapolation of onchocerciasis prevalence may be far above the  
300 prevalence estimates of 10% reported in 2012 [5]. This is despite the fact that MDA of  
301 ivermectin had been on in the study area for over seven years. Thematic analysis of the  
302 qualitative aspect of this study strengthens the **observation that onchocerciasis is a huge problem;**

303  
304 *“Onchocerciasis is definitely a problem; it affects the larger community in the Local Government*  
305 *Area” (Key Informant)*

306 *“Yes, it's a major problem; as it is been called a neglected tropical disease” (Key Informant).*

307 Stigmatization, financial incapacitation and blindness were major socioeconomic variables that  
308 can have negative effects on the family, community and society from onchocerciasis. These thus  
309 strengthen the fact that onchocerciasis entrenches the vicious cycle of poverty and increases  
310 dependency. The aforementioned were listed by [4,9,12,20], that opined the association of  
311 onchocerciasis with poverty, unemployment and other social and economic consequences.

312

313 *“You know predominantly in Akamkpa, a larger number of them are farmers, especially those in*  
314 *the interior, it affects them because most of them will not be able to go to Farm”*

315 *“Family that has somebody who is affected... the economy and everything in that family will not*  
316 *go on well, because as a father in the family you will not be able to go and fetch out what the*  
317 *family will eat and it will be shame and a mocking of family and stigmatization”*

318 *“it affects them because when it affects the eye, the eye is the mirror for everybody, if the eye is*  
319 *affected, it means even the family, community or the whole Nation is affected.”*

320  
321 Respondents’ indicated challenges to ivermectin uptake; non-availability of drugs (23.9%)  
322 followed by lack of knowledge of where to get the drugs (9.8%) demonstrated inequity in access  
323 to treatment. These observations are in consonance with [2,16,17,18] that inconsistent  
324 availability of ivermectin has been implicated in low Community-directed treatment with  
325 ivermectin (CDTI) programme success. It is more critical in areas with increased influx of  
326 displaced and refugee populations as was experienced in Cross River State, Nigeria.

327  
328 Other factors reported by respondents include dislike for the drugs (3.4%) and fear of  
329 ivermectin-related adverse reactions (9.3%) were in agreement with [15,16] that reported fear of  
330 adverse reaction as reason for non-compliance with intake of the drugs. Adverse events in  
331 ivermectin treatment have also been acknowledged to lead to rejection of treatments by  
332 communities [1,3,6]. Thus this could limit treatment coverage and impact on possible reinvasion  
333 and perpetuate onchocerciasis endemic status of the study community.

334  
335 The issue of payment for treatment (5.8%) and that oft high cost of treatment (2.9%) should be  
336 source of concern in attaining elimination targets, given that CDTI are made almost entirely free-  
337 of- charge to recipients in communities at risk. Made possible by multiple source donations,  
338 coordination and collaborations [1,6,9,14,18].

339

## 340 **Conclusion**

341 Inconsistent availability of ivermectin, myths and misconceptions about cause of onchocerciasis  
342 still pervades with the dangerous consequential drive for poor health- seeking behaviours,  
343 discriminatory practices and poor treatment coverage. These findings may not be typical of the  
344 study area. The awareness of treatment and knowledge about onchocerciasis is a prerequisite for  
345 any disease control efforts. Better knowledge is shown to have a positive effect on prevention,  
346 treatment seeking and adherence to treatment, hence facilitates reductions in the socioeconomic  
347 burden of the disease. Moreover, integrating contextual knowledge about onchocerciasis in the  
348 design of control strategies could be considered as a vantage point in the march towards  
349 achieving elimination target.

## 350 **Ethics approval and consent to participate**

351 Ethical clearance to conduct this study was obtained from the Health Research Ethics Committee  
352 of Cross River State Ministry of Health. The participants were briefed on the purpose of the  
353 study and verbal consent obtained from them to enroll into the study. Participants who did not  
354 wish to be included in the research were excluded. Participants were assured of strict handling of  
355 data in confidentiality and anonymity.

## 356 **Competing interest**

357 The authors declare that we have no conflict of interest.

358

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