Perception and awareness of~~Understanding~~ onchocerciasis ~~perception~~ treatment ~~experiences~~ in a rural community in Cross River State, Nigeria: i~~I~~mplications for control

Abstract

Background: Onchocerciasis is a disease of poverty that had~~continues to~~ placed huge health, economic and social burdens on communities at risk. Understanding critical factors that impact on access to treatment ~~access~~, acceptance and overall control measures are pivotal to the march towards its elimination.

Objective: T~~t~~o assess the ~~Onchocerciasis~~ perception of onchocerciasis and level of treatment ~~experiences~~ in a rural community in Cross River State, Nigeria.

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

Results: Ignorance, myths and negative perception about the cause of onchocerciasisas pervade ~~in still persist as~~ n=? (31.2%) of the respondents did not know that the bite of infected Blackfly is the cause. Some a~~A~~ttributed the disease~~ion~~ to a curse from the gods (45.3%) and witchcraft (23.4%) ~~are common~~. This poor knowledge is associated with level of education (p =0.01). Non-availability of drugs (23.9%) and lack of knowledge on where to access ivermectin (9.8%) were the major challenges to ivermectin uptake. Inequity in Unequal access to treatment was identified from the thematic analysis.

Conclusion: Poor knowledge of the disease, non-~~Inconsistent~~ availability of ivermectin~~, myths~~ and misconceptions about cause of onchocerciasis had negatively influenced~~still pervades with the dangerous consequential drive for poor~~ health--seeking behaviours, discriminatory practices and poor treatment coverage. By ~~Appropriately~~ integrating contextual knowledge awareness creation about onchocerciasis into the design of control strategies will facilitate the~~may present a~~ vantage march towards achieving elimination target.

Key words: I~~O~~nchocerciasis; ivermectin treatment; Knowledge; Onchocerciasis; P~~p~~erception; Unqual~~inequity in~~ access.

Running Title: Perception of o~~O~~nchocerciasis ~~perception~~ and ivermectin treatment in a village~~treatment experiences~~

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Introduction

Onchocerciasis or ~~(~~river blindness~~)~~ is a disease of poverty that had~~continues to~~ placed huge health, economic and social burden on communities at risk. The disease is a major problem among rural communities living in close proximity to rivers in sub-Saharan African countries. An estimated 25 million people we~~a~~re infected with about 1.2~~3~~ million people visually impaired or blind as a result of the disease [1, 2]. Nigeria wa~~i~~s estimated to bear a significantly high burden of the disease with 32 endemic states including Cross River State [3, 4]. In Cross River State, almost all the 18 local government areas (LGAs) are endemic for the disease and the ~~onchocerciasis~~ prevalence was estimated to be 10% in 2012 [5], which may be gross underestimation given lack of credible population data~~ in this environment~~.

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

It has been recognised that knowledge of history and cause of a health condition including the whole continuum of epidemiology of the disease often promotes health-seeking behaviours and

encourages reduction of effects or elimination of the disease [9,11,12,13,14]). Silumbwe *et al* [14] opined that often programme implementation strategies do not take into account the contextual factors that impact on overall programme success. Some of the key factors that have been suggested by many studies include; knowledge of cause and transmission of the infection, perception of disease symptoms, socioeconomic burdens of the disease, first point of call or source of treatment, factors affecting treatment regimen such as willingness to pay for treatment or otherwise, acceptance of treatment and prevention/control measures [8,11,12,13,15].

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

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

To attain community participation and design socially/locally acceptable control strategies, health program planners and implementers should be familiar with people's knowledge, attitude and practice in relation to onchocerciasis and other cultural innuendos that impact on~~onchocerciasis treatment~~ access to treatment, coverage and other control measures [8,10]. The successful use of ivermectin at community level requires a broad public health program designed to address barriers to treatments. Understanding the peoples' knowledge and perceptions of onchocerciasis may stand as important promoters of effective onchocerciasis control strategies [4,16,20]; especially in gaining the community's buy-in and confidence to participate in control programme [11,12,16,19]. There is paucity of information as few studies have been carried out to understand these issues in this environment. Therefore, this study was aimed at assessing the perception about ~~O~~onchocerciasis ~~perception~~ and ivermectin treatment among residence ~~experiences~~ in a rural endemic community in Cross River State, Nigeria. The specific objective was to generate up to date information on level of compliance~~that could upwardly drive demand for~~ to ivermectin treatment and the implication~~to push uptake of~~ on overall onchocerciasis control measures.

Research Methodology

Study setting

The study setting was Akamkpa L~~l~~ocal G~~g~~overnment A~~a~~rea (LGA) of ~~in~~ Cross River State (Figure 1) ~~located~~ in the South-South geopolitical zone~~region~~ of Nigeria. It is one of the ~~foci points of~~ o~~O~~nchocerciasis endemic foci~~ity~~ in the State. Akamkpa LGA lies within longitude 5^{o} 25′~~,~~ East of the Greenwich Meridian and latitude 8^{o} 31′ North of the equator. It has ~~10 political wards (Akamkpa Urban, Awi, Eku, Iko, Ikpai, Mbarakom, Oban, Ojuk North, Ojuk South and Uyanya) and~~ a projected population from the 2006 census figures to 2017 of about 203,705 using

annual growth rate of 3.0%. The study area has the largest forest area in the state and a very fertile land, watered by many rivers, streams and springs that serve as~~;~~ veritable breeding ground for blackflies.

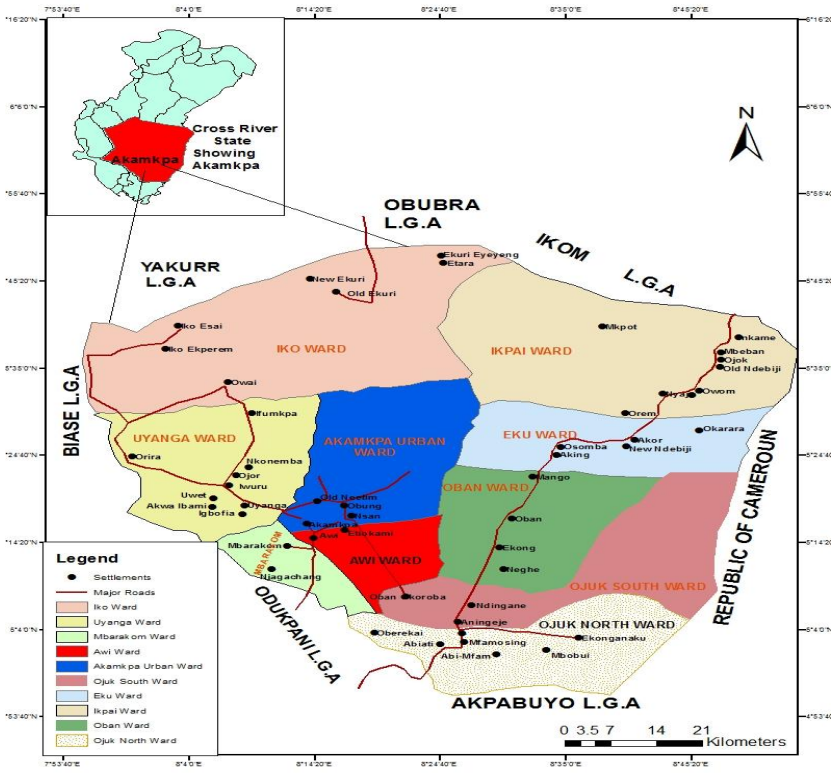

Figure 1: Map of Akamkpa Local Government Area, Cross River State, Nigeria

Study design, sample size and sampling method

This study was~~is~~ a cross-sectional descriptive study using a mixed method approach comprising both quantitative and qualitative data collection methods. The study population was limited to individuals residing within Akamkpa Local Governmennt Area of Cross River State aged 15years and above. The sample size for this study was 205 for the quantitative data. The sample size was determined using the formula for dichotomous descriptive study [21]; employing the 10% prevalence of Onchocerciasis in Cross River State estimated by Cross River State NTD Centre (Eyo, 2016) at 95% confidence interval and 5% precision. Simple random sampling technique was employed to select the respondents. A total of 25 respondents participated in the in-depth interviews comprising two from the NTD centre in Calabar, the Primary Healthcare Coordinator for Akamkpa LGA, the Officers in-charge~~ in each~~ of the 10 PHCs, two active ivermectin CDDs~~Community directed Distributors (CDDs)~~ and 10 community leaders; one from each ~~across all the~~ ward~~s~~.

The instrument for data collection was semi-structured interviewer-administered questionnaire. It comprised of four sections. Section A elicited information on the socio-demographics of the respondent~~:~~. Section B is on knowledge, perceptions and beliefs about Onchocerciasis.~~; while~~ Both sections C and D covered Onchocerciasis treatment and factors influencing Onchocerciasis treatment respectively. In-depth i~~I~~nterview guide was designed to explore the experiences of participating individuals residing within Akamkpa LGA. Each interview session lasted for about 90 minutes.

Data analysis

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Quantitative data obtained from the study were entered, coded, cleaned and analysed using Statistical Package for the Social Sciences (SPSS version 20). Quantitative data was presented using descriptive statistics. Categorical variables were reported as frequencies (and percentages) while normally distributed continuous variables reported as means and standard deviations. Tests of significance were determined using chi-square (χ^2). Each i~~I~~n-depth interview was tape recorded. All audiotapes from the key informants interviewed~~s~~ were transcribed verbatim into word documents. The transcripts and notes were analysed by themes described in the literature review as well as novel opinions expressed during the data collection process.

Ethical considerations

Ethical clearance for conduct of this study was obtained from the Cross River State Ministry of Health, Health Research Ethics Committee. The research participants were briefed on the purpose of the study and verbal consent was obtained from those who volunteered~~them~~ to be enrolled in~~to~~ the study. Participants who did not wish to participate ~~be included~~ in the research were excluded~~excused~~ from the study. Participants were provided all the necessary information about the research and were assured of strict confidentiality and anonymity of data to be collected.

RESULTS

Socio-demographic characteristics of respondents

A total of 205 respondents responded to all the items in the survey questionnaire; giving a response rate of 98%. There was a slight preponderance of males; 105 (51.2%) with the

respondents (n=205) had~~ving~~ a mean age of 31.9 ± 12.3 years (?). The number of ~~Almost a half of the~~ respondents that were married is~~;~~ 103 (50.7%). Respondents with a household size of between 4 - 6~~,~~ were in the majority (?) followed distantly by respondents with 1 – 3- member household (?). Most of the respondents had attained secondary level of education ~~(~~113~~;~~ (55.1%) and ~~with~~ those with no formal education being the least ~~(~~6~~,;~~ (2.9%). The highest proportion of the respondents were self-employed ~~(~~65~~;~~ (31.7%), followed by civil servants and farmers which were equally proportioned ~~(~~40~~;~~ (19.5%) amongst the respondents. Most of the respondents had lived in the study area ~~(Akamkpa LGA)~~ for more than 15 years ~~(~~74~~;~~ (36.1%). The detailed data on socio-demographic characteristics of the respondents is shown o~~i~~n Table 1.

Table 1:
Socio demographic characteristics of respondents, Akamkpa LGA, Cross River State

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		

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Comment [H6]: (?) Insert the Mean $age \pm SD$ of Males and Mean $age \pm SD$ of Females, respectively.

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LGA	17	8.3
<2 years	28	13.7
2 - 5 years	60	29.3
6 – 10 years	26	12.7
11 – 15 years	74	36.1
>15 years		
	~~Mean~~	~~Standard Deviation (SD)~~
~~Age (Years)~~	~~31.9~~	~~12.3~~

Knowledge and perception o~~n~~f onchocerciasis

Ignorance, myths and negative perception about the cause of onchocerciasisas still persist as 64 (31.2%) of the respondents did not know that the bite of infected b~~B~~lackfly is the cause (Table 2). Most attributed~~s~~ the disease~~it~~ to curse from the gods (29, 45.3%) and witchcraft (15, 23.4%). Having~~Cross tabulation of~~ knowledge about cause of onchocerciasis were comparatively higher in those with ~~against~~ level of education (at primary, secondary and tertiary) and the reverse was the case in ~~of survey~~ respondents without education (F~~f~~igure 2) was ~~indicated~~ statistically significant~~ce~~ at 0.5% critical level (χ^2 = 11.32; p =0.01). This becomes all the more significant given that majority of the respondents (55.1%) had attained at least secondary level of education (Table 1).

Twenty four~~Of the 205 survey~~ respondents~~,~~ ~~24~~ (11.7%) acknowledged to have ~~that they~~ suffered from onchocerciasis. Thoese that were diagnosed at the health facility ? (66.7%) and others ?~~;~~ (~~while~~ 33.3%) ~~of those with onchocerciasis~~ were diagnose during mass screening exercise. Having ~~There was also a reported~~ knowledge of family members suffering from the disease~~onchocerciasis~~ only few ~~with~~ 36 (17.6%) affirmeding knowing and ~~to that. Majority of those~~ had one to two infected persons (51.3%) in the family ~~with onchocerciasis~~ (Table 2). This could be an indication of how wide-spread onchocerciasis burden is in the study area.

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The onchocerciasis prevention methods suggested by thesurvey respondents (Figure 3) were hinged onplays into the knowledge and perception about the cause of the disease (Table 2). High proportion ofAmong the the respondents 133, (64.9%) inferred that good sanitation and personal hygiene (133; 64.9%) followed by (33,; (16.1%) were of the view that indicated that wearing of protective clothing waswere the viable onchocerciasis prevention strategies. Use of mectizan by (8; (3.9%) and health education on prevention (5; (2.4%) were the key onchocerciasis prevention strategies were the least mentioned by the respondents.

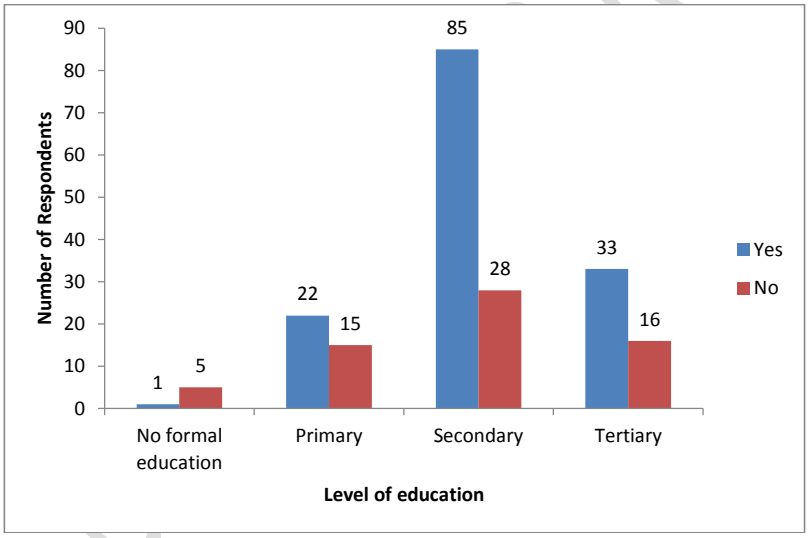

FIG 2: Knowledge about theof cause of oOnchocerciasis varied with by Eeducational lLevel

Table 2: Respondents' onchocerciasis knowledge and treatment profile

Variables	Frequency	Percentages
Knowledge of cause of Onchocerciasis		
Yes	141	68.8

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No	64	31.2
Total	**205**	**100**
Lack of knowledge of cause of Onchocerciasis (Attributions)		
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
Total	**64**	**100**
Has Onchocerciasis		
Yes	24	11.70
No	181	88.29
Total	**205**	**100**
How Onchocerciasis was diagnosed		
Visited health facility	16	66.67
Mass screening exercise	8	33.3
Total	**24**	**100**
How long with Oncho		
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
Total	**24**	**100**
Treatment Status (Are you on treatment?)		
Yes	21	87.5
No	3	12.5
Total	**24**	**100**
Source of treatment		
Community Drug Distributors (CDDs)	18	85.7
Health Facility	2	9.5
Patent Medicine Store	1	4.8
Total	**21**	**100**
Family member with Onchocerciasis		
Yes	36	17.56
No	169	82.43
Total	**205**	100
Number of family member with Onchocerciasis		
1 – 2 persons	20	51.28
3 – 4 persons	8	22.22
5 – 6 persons	3	8.33
≥7 persons	4	11.11
Total	**36**	**100**
Oncho MDA participation		
Yes	138	67.3
No	67	32.9
Total	**205**	100
Duration of Oncho MDA Participation		
< 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
Total	**138**	
Source of Oncho MDA		
Community Drug Distributors (CDDs)	100	72.5
Health Facility	35	25.4
Patent Medicine Vendor ("Chemist")	3	2.2
Total	**138**	**100**
Payment for treatment		
Yes	8	5.8
No	130	94.2
Total	**138**	**100**

Access and uptake of ivermectin

The CDDs~~Community directed distributors (CDDs)~~ still remain the main stay of onchocerciasis treatment (72.5%). Though health facilities (25.4%) and Patent Medicine Vendor, popularly known as "Chemist" (2.4%) were reported as the source of treatment for the rest of the respondents. A small proportion, ? (5.8%) ~~of the surveyed respondents~~ claimed~~reported~~ paying for the treatment (Table 2). The use of CDTI~~This is significant as the Community directed treatment with Ivermectin (CDTI)~~ strategy ~~is~~was designed as entirely free-of charge for the recipients. ~~When this is tied to about~~Only very few ? (2.9%) ~~of the~~ respondents had~~that~~ indicated ~~that~~ cost of ~~the~~ ivermectin was a challenge to its uptake (Table 3)~~,~~, it becomes noteworthy with respect to increasing treatment coverage and ultimately elimination targets.

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Comment [H9]: Move to discussion

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

(9.8%). Other access hindering factors mentioned~~reported~~ by some~~survey~~ respondents included far distance to health facility ~~(~~9~~;~~ (4.4%) and poor attitude of healthcare providers ~~(~~9~~;~~ (4.4%). Possible adverse drug reaction ~~(~~12~~;~~ (5.9%) and rejection of ivermectin ~~(~~7~~;~~ (3.4%) were also mentioned ~~by survey respondents~~ as affecting the uptake of ivermectin.

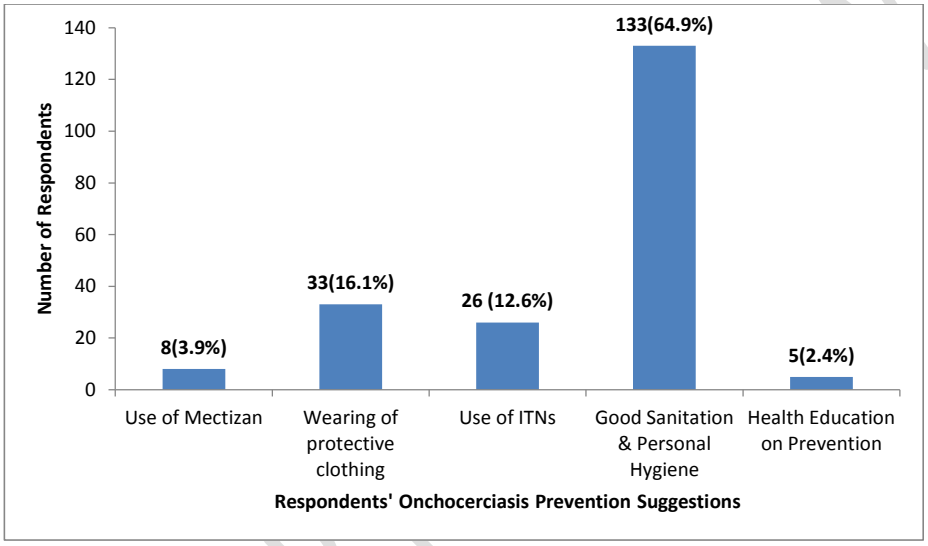

Fig 3: ~~Reported~~ Respondents' perception about o~~O~~nchocerciasis p~~P~~revention strategies

Table 3: List of ~~C~~challenges likely to affect ivermectin uptake

S/No.	Variables	*Overall Sample population~~Frequency~~ (n = 205)	
		Sample size (n)~~Yes (%)~~	Percentage ~~No~~ (%)
a	Drug used forTreatment was ~~drugs~~ not available	49 (23.9)	156 (76.1)
b	Distance to the health facility ~~is~~was 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 drug was~~is~~ too high	6 (2.9)	199 (97.1)

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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)

*Multiple responses

(Variables a - e speak to issues of access)

	Major Theme	Sub-themes	Quote

Table 4: Study Qualitative results

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Onchocerciasis is a Huge burden	occurrence of the diseases due to the terrain, Neglected tropical diseases	*"Onchocerciasis is definitely a problem; it affects the larger community in the Local Government Area"* *"Yes, it a major problem as it is been called a neglected tropical disease"*
Myths and Misconceptions	Myths and Misconceptions Cause by witchcraft Curse from god Attack from enemy	*"The belief in witchcraft still stands, because every small thing that happens to them, they attribute it to witchcraft".* *"When people fall sick which they don't know the possible cause they will either say it an attack from their enemy or witchcraft* *Most people in this community still belief that onchocerciasis is caused by witchcraft due to the nature of the disease*
Discrimination and stigmatization	Negative attitude, financial incapacitation, blindness, high social burden	*"You know predominantly in Akamkpa, a larger number them are farmers, especially those in the interior, it affect them because most of them will not be able to go to Farm"* *"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"* *"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."* *it doesn't actually kill but it gives indelible marks and some of them develop eye problem that they don't know the origin* *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* *The disease makes people to depend on others too much*
Treatment of Onchocerciasis using Mectizan and Abendazole	Treatment by faith, belief, prayers	*They are mostly treated during campaigns; we give them mectizan in combination with Abendazole mostly during campaign.* *I don't belief the drugs work* *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*
poor community engagement/involvement **poor programme Governance and Disillusionment**	Lack of incentives for volunteers, Poor political commitment, Religious belief, poor attitude,	*People who work during the first phase, during the second phase, they were not be willing saying that the money given to them is not commiserate with the job.* *I stopped working to give the drugs because the families were hostile*

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		poor road network, Hard to reach area Language barrier, Lack of community cohesion	*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* *Our leaders think of themselves more. They don't care* *They pay them a token at the end of their services from the donor agency…There is nothing coming from the community, or PHC* *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….*
Inequity in access		increase funding, community participation, poor Availability of Drugs Increasing awareness in hard to reach community	*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* *Distribution shouldn't be only during campaign.* *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* *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.* *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.*

Comment [H11]: Table 4 seems to be repetition of what has already been presented in other Tables and in the text of your results. Delete

Discussion

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

T~~he findings of t~~his study show~~ed~~ that a high number ? ~~about~~ (68.8%) of the respondents had knowledge about~~that~~ the cause of onchocerciasis to be from the ~~is by~~ bite of an infected black flies. This is in tandem with~~Such knowledge~~ vari~~e~~ous ~~across~~ studies of ~~with~~ 69.4% in South-East Ethiopia [10] and 70% in Guatemala [15] report~~eding similar~~ knowledge levels. However, on the contrary, studies by [13] in Bioko Island, Equatorial Guinea and [16] in Ogun state of Nigeria reported ~~even~~ lower percentages of 19.3% and 9.8% respectively. This could be due to differences in educational levels in the study communities

With ~~It then follows that about 31% of the respondents in this study did not know that the bite of infected Blackfly can cause onchocerciasis. This is in spite of~~ seemingly moderately high educational level ~~of the respondents. Most of the survey~~ of respondents (55.1%) had ~~had~~ attained at least secondary level of education. Unlike i~~Similarly, i~~n a study carried out in Enugu, Nigeria, more than half of the respondents (57%) had no knowledge of the cause of onchocerciasis [12]. This thus reflects that myths and misconceptions on the causes of onchocerciasis still persist ~~in~~ and ~~the study area as most of the respondents in this study~~ attributed the cause of onchocerciasis to curse from the gods ~~(~~29~~,~~ (45.3%) and witchcraft ~~(~~15~~,~~ (23.4%) ~~, this is similar to~~beliefs had

been reported in the study carried out by [10]. Hence, ~~among other consequences, this~~the observed~~ation of ongoing~~ misconceptions~~, and~~ myths, ~~from our survey may lead to the poor~~ attitude, and practices toward predisposing factors for onchocerciasis infection in the study area. Erroneous beliefs about onchocerciasis could lead to abandonment of personal protective measures and other preventive practices [5,8,9,10].

The pervading ignorance and poor perception on onchocerciasis is evidently reflected with m~~in the respondents suggested prevention strategies. M~~ost (64.9%) reported that good sanitation and personal hygiene ~~were best for onchocerciasis prevention and control. This is~~as against the small proportion that suggested use of Mectizan (3.9%) and health education on prevention (2.4%) as viable onchocerciasis prevention strategies. These x-ray the intertwined effects of lack of knowledge in reinforcing inappropriate health-seeking behaviours that invariably influence treatment distribution, acceptance and coverage [8,11,13].

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

> ~~*"Most people in this community still belief that onchocerciasis is caused by witchcraft due to the nature of the disease" (Key informant)*~~
>
> ~~*"When people fall sick which they don't know the possible cause they will either say it is an attack from their enemy or witchcraft" (Key informant)*~~

~~In addition to the foregoing, the fact that the respondents' level of knowledge on the transmission of onchocerciasis had a~~ statistical significance (χ^2 = 11.32; p =0.01) ~~with their highest attained level of education~~ It was suggested~~s~~ that more than formal education may be required to bring about change that can positively influence onchocerciasis elimination target [7,11,13,16]. More importantly,~~This also significantly ties to~~ the ~~fact that this study's~~ respondents are relatively young with a mean age of 31.9 ± 12.3 years and ought to have access to general information often facilitated by modern technology ~~that~~ should ~~be of~~ benefit ~~to~~ onchocerciasis prevention and control strategy. ~~This therefore becomes quite pivotal in the whole scheme of onchocerciasis control, if sustained efforts at its elimination is to yield great results, the youths as special group and this generation's successors must be appropriately targeted with basic factual knowledge about onchocerciasis.~~

The few~~proportion of study~~ respondents that affirmed having~~reported experiencing~~ onchocerciasis symptoms (11.1%) or ~~having~~ family members with such symptoms (17.6%) indicated~~provides insight to~~ the ~~magnitude of onchocerciasis as a~~ public health burden of the disease in the study area~~environment~~. When the sample size ~~(~~n=205~~) used in this survey~~ was~~is~~ matched against that of the study~~total~~ population ~~(~~N=203,705~~)~~ for~~of~~ Akamkpa LGA as at 2017, ~~then,~~ with the extrapolation of onchocerciasis prevalence ~~may be far above the prevalence~~ estimates of over 10% reported in 2012 [5] will very high number of infected persons. This is despite the fact that MDA of ivermectin has been on~~-~~ in the study area for over seven years. ~~Findings of the qualitative aspect of this study supports that onchocerciasis is a problem;~~

Comment [H12]: Move to result

~~*"Onchocerciasis is definitely a problem; it affects the larger community in the Local Government Area"*~~

~~*(Key Informant)*~~

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

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Stigmatization, financial incapacitation and blindness were major socioeconomic variables that may~~themes acknowledged from qualitative analysis of this study. The~~ have negative effects ~~of~~ ~~Onchocerciasis~~ on the family, community and society~~ were also identified by the respondents. These findings not only buttress the health burden posed by onchocerciasis but also~~ strengthen the fact that ~~O~~onchocerciasis entrenches a~~the~~ vicious cycle of poverty~~, incapacitates~~ and increases dependency. The aforementioned ~~are~~were listed ~~supported~~ by [4,9,12,20] ~~,~~ that opined the association of onchocerciasis with~~ poverty, stigmatization,~~ discrimination, unemployment and other social and economic consequences.

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

~~*"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"*~~

~~*"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."*~~

~~The preceding statements may thus be suggestive of ongoing~~ challenges to ivermectin uptake, a ~~experienced by respondents. re~~~~Significant proportion of respondents indicated that lack of~~ non-availability of drugs (23.9%) followed by lack of knowledge of where to get the drugs (9.8%) demonstrated~~were the chief ivermectin uptake drag. These could be a proxy of~~ inequali~~t~~y of~~in~~ access to treatment, which is~~. These findings are~~ in consonance with [2,16,17,18] that inconsistent availability of ivermectin has been implicated in low Community-directed treatment

with ivermectin (CDTI) programme success. ~~This~~It is ~~all the~~ more critical in areas with~~experiencing~~ increased influx of displaced and refugee populations as it was~~s~~ being experienced in Cross River State, Nigeria.

Other factors reported by respondents include dislike for the drugs (3.4%) and fear of ivermectin-related adverse reactions (9.3%)~~. These are~~ were in agreements with [15,16] that reported fear of adverse reaction as reason for non-compliance with intake of the drugs. Adverse events in ivermectin treatment have also been acknowledged to lead to rejection of treatments by communities [1,3,6]. Thus, ~~is~~ th~~i~~s could limit~~s~~ treatment coverage and impacts on possible reinvasion and perpetuat~~eion of~~ onchocerciasis endemic status of the study community~~ity~~.

~~Another onchocerciasis treatment experience reported by respondents is t~~The issue of payment for treatment (5.8%) and~~with small proportion but s ignificant number of respondents indicating~~ that of high cost of treatment (2.9%) should be a source of concern ~~was a challenge to ivermectin uptake. This becomes a concerning finding as regards o~~in attaining~~nchocerciasis~~ elimination targets, given that CDTI are made almost entirely free-of- charge to recipients in communities at risk. Made possible by multiple source donations, coordination and collaborations [1,6,9,14,18].

Conclusion

Inconsistent in availability of ivermectin, myths and misconceptions about cause of onchocerciasis still pervades with the dangerous consequential drive for poor health-seeking behaviour~~s~~, discriminatory practices and poor treatment coverage. These findings may not be typical of the study area. The awareness of~~us these~~ treatment ~~experiences~~ and knowledge ~~level~~

about onchocerciasis may be wide spread among communities at risk~~. Therefore, improved consumer knowledge of disease causation~~ is considered a prerequisite for any disease control efforts. Better knowledge is shown to have a positive effect on prevention, treatment seeking and adherence to treatment, hence facilitates reductions in the socioeconomic burden of the disease. Moreover, ~~appropriately~~ integrating contextual knowledge about onchocerciasis into the design of control strategies could be considered as ~~may present~~ a vantage point in the march towards achieving elimination targets.

Ethics approval and consent to participate

Ethical clearance to ~~for~~ conduct ~~of~~ this study was obtained from the ~~Cross River State Ministry of Health,~~ Health Research Ethics Committee of Cross River State Ministry of Health,. The ~~research~~ participants were briefed on the purpose of the study and verbal consent ~~was~~ obtained from them to enroll into the study. Participants who did not wish to be included in the research were excluded~~excused~~ from the study. Participants were ~~provided all the necessary information about the research and were~~ assured of handling of data in strict confidentiality and anonymity.

Competing interest

The authors declared that is~~we have~~ no conflict of~~competing~~ interest whatsoever.

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