LIFE SCIENCE REVIEW

Original Research Article Journal homepage: https://lsr.crcjournals.org/

p-ISSN 3117-3535
e-ISSN 3117-3543

Check for updates

Assessment of Knowledge, Attitudes and Practices of Indigenous Population about Onchocerciasis in Endemic Communities of Kogi West, Kogi State, Nigeria

Hajara Zakari*[1,2], Patrick Amidu Audu[1], Adang Kombe Lucas[1], and Joy Cecilia Atawodi[1]

[1]*Department of Biology, Faculty of Life Sciences, Federal University Lokoja, Kogi State, Nigeria*
[2]*Department of Biological Sciences, Faculty of Sciences, National Open University of Jabi, FCT-Abuja, Nigeria*

Received 21 April 2026 | Revised 18 May 2026 | Accepted 17 June 2026 | Available Online 19 July 2026

*Corresponding Author: **Hajara Zakari** | Email Address: **naokings86@gmail.com**

Citation: Hajara Zakari, Patrick Amidu Audu, Adang Kombe Lucas, and Joy Cecilia Atawodi (2026). Assessment of Knowledge, Attitudes and Practices of Indigenous Population about Onchocerciasis in Endemic Communities of Kogi West, Kogi State, Nigeria. ***Life Science Review***. **DOI: https://doi.org/10.51470/LSR.2026.10.02.56**

Abstract

Onchocerciasis is a parasitic disease caused by the filarial worm, Onchocerca volvulus. Despite more than twenty years of ivermectin mass administration in Kogi State for the control of Onchocerciasis, existence of pathological indices such as ocular and skin burden in endemic foci of Kogi West are observed.This study therefore assessed the community's Knowledge, Attitudes and Practices (KAP) about onchocerciasis in selected communities of Kabba, Ijumu, Mopa-muro and Yagba-east Local Government Area of Kogi. A crosssectional questionnaire survey which involved 1399 respondents were carried out to assess the Knowledge, attitudes and practices of the people. Data obtained were presented in frequency tables, percentages and binary logistic regression carried out using SPSS version 21. The demographic data revealed more males 62.0% (n = 868) than females 36.7% (n = 513), age group (35–44year) accounted for 34.5% (n = 482),farming constituted the dominant occupation at 53.3% (n = 745), 46.0%, (n = 644) of the respondents had achieved secondary school education while 38.9%, (n = 544) had no formal education, 22.9%, (n = 320)had lived in their respective communities for 20–30 years, followed closely by shorter-term residents with 0–10 years of residency (20.8%, n = 291).The survey revealed poor knowledge, cultural practices, attitudes of respondents onaetiology, disease transmission dynamics, adherence to preventive measures and ivermectin compliance.Majority of respondents, 76.1% (n = 1064) reported to have never heard of Onchocerciasis, 76.5%, (n = 1070) possessed no knowledge regarding the causative agent, 20.6% (n = 288) correctly recognized a parasite as the causative agent, 1.6% (n = 22) and 1.2% (n = 17) attributed the disease to viral and bacterial origins respectively. 69.7% (n = 975) of respondents are unaware how transmission occurs, only 21.8% (n = 305) accurately identified the bites of blackflies (Simulium spp.) as the vector pathway. Assessments of the clinical manifestations of onchocerciasis revealed76.5% (n = 1070)are unaware of its symptoms. Perceptions regarding the preventability of onchocerciasis varied widely; 55.4%, (n = 775) were unsure whether the disease could be prevented, 23.4% (n = 328) reported no knowledge of prevention, 17.1% (n = 239) affirmed that the disease is preventable.62.7% (n = 877)viewed the disease as a "very serious" condition, 69.6% (n = 974) of respondents believed that they and their family members were not at risk of contracting the disease, 83.1%, (n = 1163) expressed explicit willingness to participate in mass treatment programs, social stigmatization emerged as a near-universal concern within the surveyed communities;92.4% (n = 1293) reported individuals suffering from onchocerciasis face social stigma.66.9% (n = 936) of respondents stated that superstitious beliefs were viewed as the primary cause of onchocerciasis within their respective communities.More than half of the participants, 57.3% (n = 801), reported that they had never taken the medication. Conversely, 32.5% (n = 455) affirmed a history of drug utilization, 50.0% (n = 700), expressed explicit trust in the community drug distributors, 11.2% (n = 157) reported a distinct lack of trust, and 30.7% (n = 429) remained undecided on the matter. 38.7% (n = 542) of respondents affirmed that traditional beliefs actively competed with the acceptance of modern orthodox medicine.

The limited understanding on the aetiology, transmission and prevention of Onchocerciasis among residents, poor practices of stigmatization, communal superstitious beliefs, traditional medicine preference and household poor ivermectin compliance might be responsible for the persistence of the disease in these communities and might therefore leads to raising risk of disease transmission. Strategic public health education that takes into consideration local language input, community attitudes and culture of the indigenous people becomes mandatory in order to eliminate this disease in these high risk communities.

Keywords: *Knowledge, Culture, socio-cultural factors, attitudes, MDA Compliance.*

Introduction

Onchocerciasis, also known as River blindness is a parasitic disease caused by the filarial worm *Onchocerca volvulus*. It is transmitted through the repeated bites of female infective blackfly species of the genus *Simulium*during a bloodmeal. The subcutaneous nodules located underneath the skin of infected humans are active sites for the adult worms. The female adult worms hatches millions of immature microscopic larval forms; the microfilariae which normally last for an active lifespan of 9-14 years[1]. These Microfilariae are picked up from the skin during a blood meal and transmitted to another person by female*Simulium* flies[1, 2].The disease is known to be associated with dreadful clinical and pathological conditions as onchocercal skin disease (OSD) (onchodermatitis), lymphadenitis (resulting in hanging groin), ocular lesions (impaired vision and blindness) and systemic manifestations. Blindness and severe skin manifestations are the commonest symptoms of the disease [2].The disease often leads to severe itching, skin diseases and disfiguration, which frequently leads to stigmatization[3]. According to estimates, onchocerciasis is the second most common infectious cause of blindness, right after trachoma[4,2].

Sibling species within the *S. damnosum* complex namely *S. damnosums.s.*, *S. sirbanum*, *S. squamosum*, *S. yahense*, *S. sanctipauli*and*S. soubrense*are known to transmit Onchocerciasis in Nigeria. These flies are known to breed in fast-flowing, highly oxygenated water with nutrients[2]. These flies are known to exhibit habitat preference which limits them mainly to communities around these breeding sites and this preference in turndetermines the distribution of Onchocerciasis within a given region [2].

Africa, most especially the Sub-saharan region and among all the continents of the world,has been established to record the greatest burden of the disease, with over 96% of the its burden[5, 2].Nigeria is the most endemic country in the world and accounts for about 40% of the global prevalence[6, 7]. About 32 million Nigerians living in 36,000 communities in 413 LGAs of 32 States and FCT were estimated to be at risk of the disease [7]. An estimated 15% of this population were children less than 5 years, while 26.3% were between the ages of 5 and 15 years. By 2002, all States except Lagos, Sokoto, Bayelsa and Rivers were endemic for Onchocerciasis [7].

In a bid to control Onchocerciasis in West Africa since 1974, vector control was employed as the main strategy during the Onchocerciasis Control Program (OCP). This was achieved by regular spray of aerial herbicides overall *simulium* larval breeding sites and this was maintained for at least 14 years until the infection was ascertained completely eliminated from human populations [5].This strategy was used in combination with annual mass drug administration of Invermectin[5] and the two strategies had provedeffective in Onchocerciasis control which eventually led to the elimination of the disease in seven OCP countries and the end of the OCP in 2002.With the shift of control programme focus from disease morbidity reduction to complete elimination, the World Health Organisation had set an elimination timeline by 2030[5].Considerable progress had beenmade inthe control of the disease because of the over two decades of intervention majorly through the annual mass administration of Mectizan in endemic communities[5]. Despite progress made over time, disease elimination within these endemic foci is yet to be achieved inKogi State and Nigeria at large.

Kogi state beenmesoendemic for Onchocerciasis based on the Rapid Epidemiological Mapping of Onchocerciasis (REMO) mapping surveys conducted from 1995–1996 [9], have been on mass administration withivermectin treatment 2000[10]. The state is also considered to be on track for disease elimination still with existence of endemic foci within the communities[9]. However, there is paucity of evidence-based information on the infectivity status of both humans and blackflies breeding within these endemic communities in Kogi West in the state.The absence of data on Onchocerciasis prevalence in these selected study regions, despite the observed blackfly activity, raises concerns about potential transmission dynamics, given the vector's role in the epidemiology of the disease. This study was designed as an epidemiological survey to evaluate community knowledge, attitudes, practices, beliefs and determine level of participation in ivermectin mass drug administration (MDA) to assess the Onchocerciasis transmission risk in the region. As Nigeria transitions from control to elimination of Onchocerciasis, this data will be a vital too for the Federal, State Ministries of Health, the National Onchocerciasis Elimination Committee (NOEC), non-governmental organizations and treatment implementing partners in developing targeted strategies to ensure optimal therapeutic coverage and achieve disease elimination.

Materials and Methods

Study Areas

Selected communities within Kabba, Ijumu, Mopa-muro and Yagba-east LGA of Kogi west senatorial districts were selected.

These LGAs are known to share border with certain south west states that constitutes endemic foci for Onchocerciasis and study areas were selected based on the availability of fast flowing rivers typical of *Simulium*species and an ambient climatic conditions with crowded shady forest distribution supportive of *Simulim*vectors. The available aquatic environment within the LGAs which includes marshes, vast bodies of water including creeks, rivers, dams and lagoons, as well as forests, shaped its significance.Four villages from Kabba LGA namely Ohe (7.8222222, 6.057222222), Akefe (7.8254827, 6.0727886), Otowo (7.8491767, 6.0821343) and River side (7.8257068, 6.0788653), three from Yagba-east: Illafin (8.326, 5.831), IsanluItedo(8.302033, 5.842098), Isanluijowa (8.261613, 5.856425), two villages from Ijumu LGA: Iyara (7.8437792, 5.9679932), Ogidi (7.7772, 6.019)and two villages from Mopa-muro LGA; Orekere (8.1730, 5.968), Okagi (8.1340, 5.942) were specifically selected for the study. These communities were specifically selected based on certain epidemiological and hydrological factors. They were selected based on information obtained from local NTD coordinators, local health officials and populace as these communities had been previously classified as endemic for Onchocerciasis. The major occupation of the populace is trade, agriculture and fishing, although a sizeable fraction also works as artisans in industries like carpentry, clothing manufacturing, and hair styling. Males and females between the ages of 18 and 60 who had lived in the study communities for at least a year and provided their consent to participate in the study were the inclusion criteria for the research.

Study design

A community-based cross-sectional questionnaire survey was conducted from March, 2025 to September, 2025 in selected communities of Kabba,Ijumu, Mopa-muro and Yagba-east Local Government Area (LGA) to assess the knowledge, attitude and practices of the local residents toward Onchocerciasis.

Variables

Outcome: knowledge, attitude, preventive practice, beliefs, MDA compliance

Exposure: age, gender, education, occupation, marital status, length of residence

Predictors: age, occupation, good knowledge, positive attitude

Potential confounders: age

Sample size determination and sampling technique

The sample size was calculated using Cochran's formula for studying proportions:

$n= Z^2pq/d^2$[12].

Since there was no prior data on Onchocerciasis in these study sites, a conservative prevalence of p=50% was assumed. Using this formula and considering z=1.96 and d=0.05, n=385 participants were recruited into the study.

Considering a 20% non-response rate, the final minimal sample size was 462 per LGA. Therefore, the overall required minimal sample size was calculated as: N=462×4=1848. Hence 462 participants were randomly selected from each LGA [12].Local neglected tropical disease coordinators (LNTDs), facility health workers from the community primary health centers (PHCs) and local mobilizers facilitated community sensitization and mobilization efforts. A total of 1399 questionaires were retrieved, as 449 were unaccounted for by the local mobilisers and health workers used as assistants for the survey; automatically 1399 became the sample size.

Ethics statement

The ethical approval for this study was granted by the Ethics Review Committees of the Kogi State Ministry of Health (reference number KSMoH/PRS/334).The research adhered to international ethical standards, including the 1964 Helsinki Declaration and its subsequent amendments. Written informed consent was first obtained from community leaders and religious heads of the communities. For participants aged 10 and below 18 years, recruitment was conducted with the written consent of their parents or guardians after explaining the study's objectives in English and in the local language (Yoruba). Written informed consent was also obtained from participants above 18 years. All participants were informed that participation was voluntary and that they could withdraw at any point without any negative consequences to them.

Data Collection and Statistical Analysis

Study participants were interviewed using a standardized questionnaire adapted from a study by [12]. The questionnaire included questions about socio-demographic characteristics and structured close-ended questions relating to knowledgeincluding causes, symptoms, modes of transmission, prevention and management, and knowledge of Community Mass drug Administration with Ivermectin; respondents' attitudes and preventive practices regarding onchocerciasis; and self-report on the disease.Data were entered into Microsoft Excel and analyzed using the 2021 version of the Statistical Package for the Social Sciences (SPSS). Frequency tables, percentages, charts were performed and relationships between variables were assessed using logistic regression analysis with proportions analyzed at a 95% confidence interval.

Results and Discussion

Socio-demographic characteristics of respondents

The demographic profile of the study population showed similar presentation across the selected study areas and spans a broad spectrum of age, occupation, education, marital status, and community residency (Table 1-3).

Age and Gender Distribution

The age of the respondents ranged from 18 to 84 years(Figure 1). The most heavily represented age group was the 35–44year age group, accounting for 34.5% (n = 482) of the total sample. Conversely, the advanced age bracket of 75–84 years constituted the smallest proportion of participants at 0.1% (n = 2). In terms of gender distribution(Figure 2), male respondents comprised the majority of the study population at 62.0% (n = 868), while female respondents accounted for 36.7% (n = 513).The high representation of male respondents (62.0%, n = 868) compared to females (36.7%, n = 513) may reflect localized socio-cultural divisions of labor, where men are predominantly tasked with clearing dense vegetation or farming closer to riverbanks during peak blackfly biting hours.

Occupational Profile

The study population engaged in a wide array of livelihoods, including farming, trading, artisanal crafts, teaching, civil service, tailoring, mechanical work, healthcare, and driving (Table 2). farming constitutes the dominant occupation at 53.3% (n = 745), followed by trading at 21.9% (n = 306). Occupations in the banking sector and professional art represented the lowest engagement, with each accounting for just 0.1% (n = 2) of the sample.A defining characteristic of this study population is its overwhelming engagement in agrarian labor, with farming emerging as the predominant occupation at 53.3% (n = 745), complemented by trading at 21.9% (n = 306). This high concentration of agrarian workers is in agreement with classic epidemiological profiles of onchocerciasis-endemic foci across sub-Saharan Africa. Studies within Nigeria according to [14, 13]have consistently documented that subsistence farming places individuals in direct, prolonged contact with the breeding sites of the *Simuliumdamnosum* vector,specifically fast-flowing river systems.This occupational exposure establishes farming communities as structural hyper-endemic reservoirs, making their specific behavioral choices critical to breaking the transmission cycle.

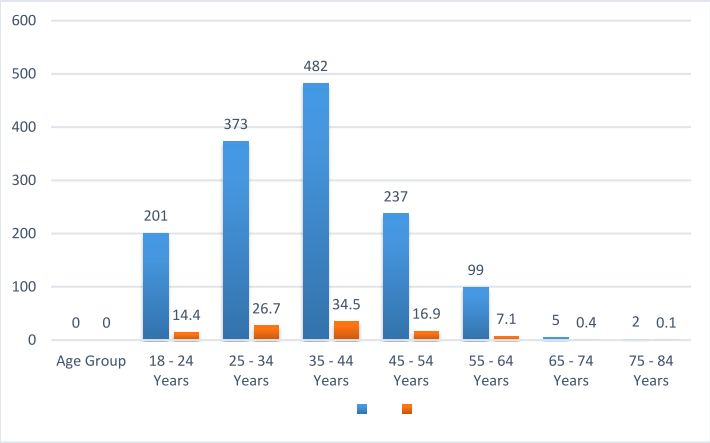

Figure 1: showing the various Age Category of Respondents in the Survey

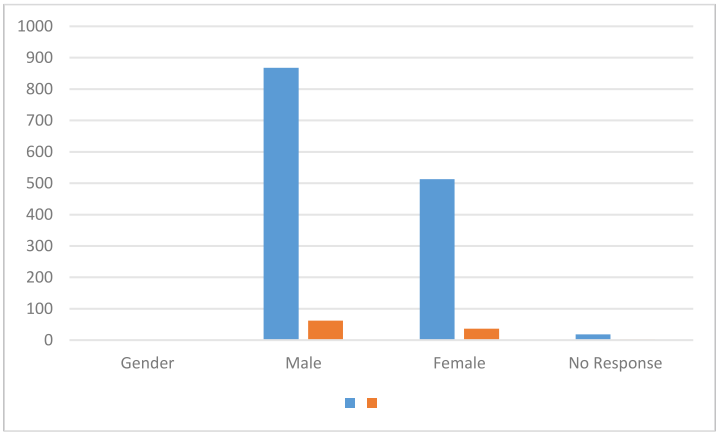

Figure 2: showing the Gender distribution of the study population

Table 2: Occupational Distribution of Study Participants across the endemic Communities

Occupation	Frequency	Percent (%)
Artisan	8	0.6
Artist	2	0.1
Banking	2	0.1
Trading	306	21.9
Civil Servant	30	2.1
Clergy	1	0.1
Driving	46	3.3
Farming	745	53.3
Health Worker	22	1.6
Mechanic	3	0.2
No response	14	1.0
Retired Civil Servant	4	0.3
Self Employed	18	1.3
Student	171	12.2
Tailoring	7	0.5
Teaching	13	0.9
No response	7	0.5
Total	**1399**	**100.0**

Educational Attainment and Marital Status

Analysis of educational backgrounds revealed the largest segment of the population had achieved a secondary school level of education (46.0%, n = 644)(Table 3). Notably, a high proportion of respondents had no formal education (38.9%, n = 544), while those with only a primary education formed the smallest formal schooling tier at 5.8% (n = 81).The educational profile of the cohort reveals a stark polarity. While a substantial segment achieved a secondary education (46.0%, n = 644), a major proportion of the sample had no formal education whatsoever (38.9%, n = 544). This substantial illiteracy barrier (nearly 40%) mirrors findings by[17] in South-Western Nigeria, who identified a direct correlation between lack of formal schooling and the persistent subscription to superstitious or non-scientific etiologies of river blindness (such as attributing the disease to witchcraft or ancestral curses). Conversely, the presence of an educated secondary-school tier provides a vital community asset. As noted by standard community-directed treatment with ivermectin (CDTI) frameworks, individuals with basic literacy are crucial for serving as Community-Directed Distributors (CDDs), executing accurate dosing metrics, keeping records, and translating health-education messages for their non-formal counterparts.

Regarding marital status, a substantial majority of the participants were married (70.4%, n = 985), 26.4% (n = 369) were separated, and 0.3% (n = 4)were divorced(Table 3).

Length of Residency

The duration of community residency varied across the cohort (Table 4). The largest single group consisted of individuals who had lived in their respective communities for 20–30 years (22.9%, n = 320), followed closely by shorter-term residents with 0–10 years of residency (20.8%, n = 291). Long-term multi-generational residency spanning 70–80 years was rare, observed in only 0.1% (n = 2) of the sample population. The length of residency data demonstrates a deeply rooted, stable population, with the largest segment having inhabited these specific communities for 20 to 40 years (42.8% combined).

Table 3: Education and Marital Status of Study Participants across the Study areas

Education	Frequency	Percent (%)
No Formal Education	544	38.9
Primary	81	5.8
Secondary	644	46.0
Tertiary	113	8.1
No Response	17	1.2
Total	**1399**	**100.0**
Marital Status	**Frequency**	**Percent (%)**
Divorced	4	.3
Married	985	70.4
Separated	369	26.4
Widowed	5	.4
No Response	36	2.6
Total	**1399**	**100.0**

Binary logistic regression was conducted to identify independent predictors of onchocerciasis infection (Table 5). The regression model was statistically significant (χ^2 = 34.042, df = 7, p< 0.001), indicating that the included predictors collectively explained variation in the Knowledge, attitudes and practices (KAP) survey. The Nagelkerke R^2 value of 0.360 suggests that approximately 36.0% of the variability in the KAP was explained by the model, which is considered substantial for epidemiological studies involving behavioural and environmental variables. Age group emerged as a strong predictor (B = *1.139, p = 0.001*). The odds ratio (Exp(B) = *3.125*) indicates that individuals in higher age categories were over three times more likely to be infected compared to younger respondents. This reinforces the test findings and underscores the role of cumulative exposure. Length of residence in the community was also statistically significant (B = *−1.030, p = 0.002*). The odds ratio (Exp(B) = *0.357*) suggests a protective effect of longer residence, possibly reflecting greater familiarity with local health interventions, better adaptation to preventive measures or a higher likelihood of prior ivermectin exposure.

LGA, sex, occupation, education, and marital status did not retain statistical significance in the multivariate model(Table 5). This indicates that while some of these factors were associated with the KAP at the bivariate level, their effects were attenuated after controlling for age and length of residence, highlighting the importance of these two variables as primary drivers of infection risk.

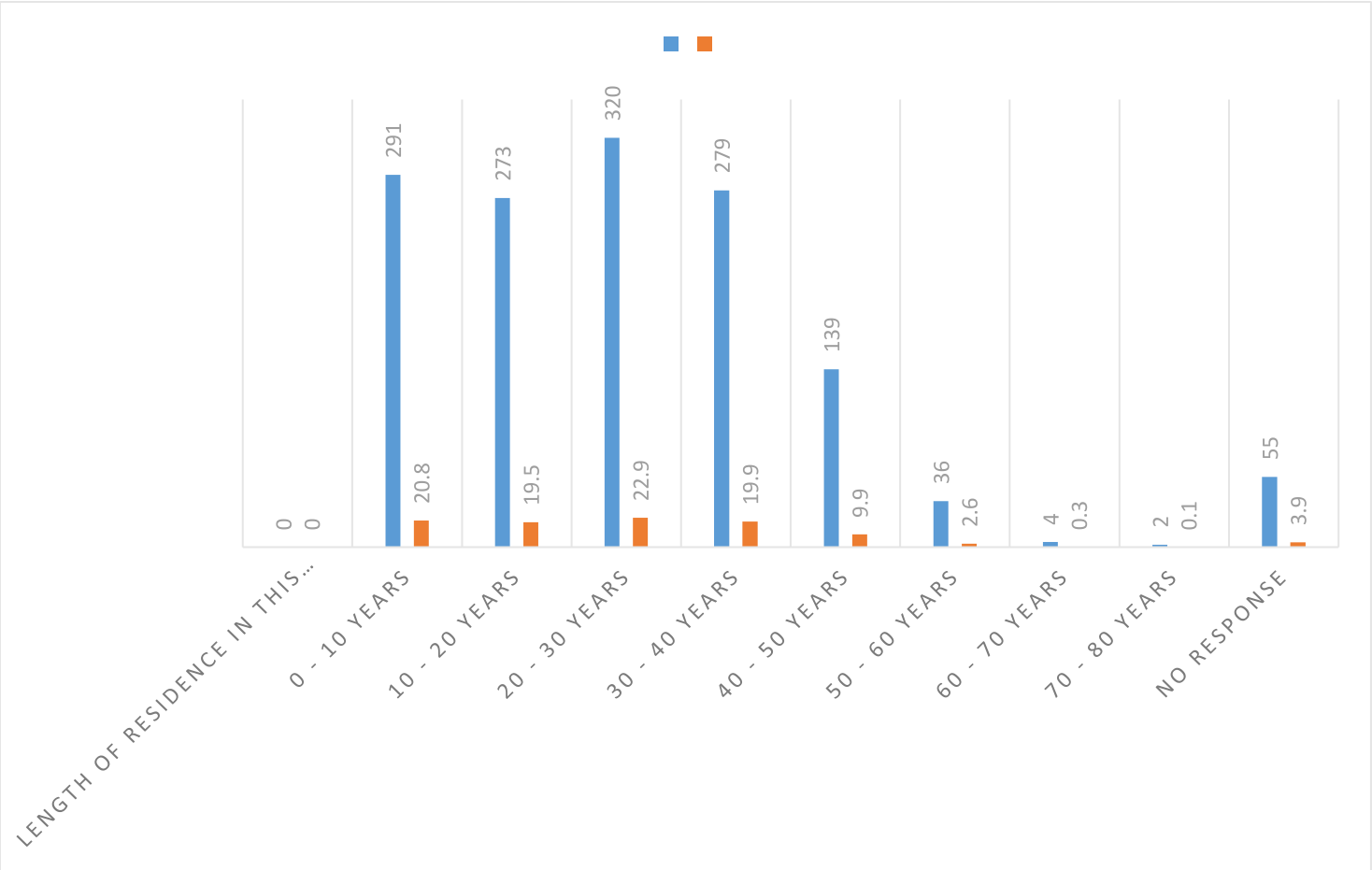

Figure 3: Distribution of Length of Residency of Respondents across study Locations

REGRESSION

Table 5: Model Summary of Demographic Data of Respondents

Model	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square	Chi-square	Df	Sig.
1	66.285[a]	.059	.360	34.042	7	.000

Variable	B	S.E.	Wald	Df	Sig.	Exp(B)
LGA	.121	.089	1.830	1	.176	1.128
AGEGROUP	1.139	.330	11.934	1	.001	3.125
SEX	1.363	.869	2.458	1	.117	3.907
OCCUPATION	.168	.143	1.386	1	.239	1.183
EDUCATION	-.098	.426	.053	1	.818	.907
MARITALSTATUS	-.201	.672	.089	1	.765	.818
LENGTH0FRESIDENCEINCOMMUNITY	-1.030	.334	9.513	1	.002	.357
Constant	-8.907	3.397	6.875	1	.009	.000

3.2 Knowledge, Attitudes and Practices of Study Participants across Selected Endemic Areas of Kogi West.

The study evaluated the knowledge, attitudes, practices and MDA compliance of an indigenous population across communities of Kabba, Ijumu, Mopa-muro and Yagba-east of Kogi west district, Kogi State. The assessment of these parameters revealed a similiarity in the response of the study participants without variations as observed in their responses. This could be traceable to their close proximity, shares similar culture, traditions, beliefs and speaks the same language/dialect. Also the similiarity in the environmental settings cannot be left out.

3.2.1 Knowledge and Awareness of Onchocerciasis

The distribution of respondents' knowledge regarding the awareness, etiology, transmission pathways, clinical manifestations and preventive strategies of Onchocerciasis reveals significant gaps across the study population (Table 6). A substantial majority of the survey population had low baseline awareness of the disease; 76.1% (n = 1064) of respondents reported that they had never heard of Onchocerciasis. Conversely, less than a fifth of the cohort (19.7%, n = 275) indicated prior awareness of the condition, while 4.3% (n = 60) did not provide a response. This trend was mirrored in the assessments of etiological knowledge. The majority of participants (76.5%, n = 1070) possessed no knowledge regarding the causative agent of Onchocerciasis. Among the remaining respondents who attempted to identify the etiology, 20.6% (n = 288) correctly recognized a parasite as the causative agent. Misconceptions were present, with 1.6% (n = 22) and 1.2% (n = 17) attributing the disease to viral and bacterial origins, respectively, while 0.1% (n = 2) declined to respond. The mechanisms dictating disease transmission were poorly understood across the communities; 69.7% (n = 975) of respondents stated that they did not know how transmission occurs. Only 21.8% (n = 305) accurately identified the bites of blackflies (*Simulium* spp.) as the vector pathway. Erroneous modes of transmission were identified by some participants, including person-to-person contact (4.5%, n = 63) and the consumption of contaminated water (3.5%, n = 49), while 0.5% (n = 7)did not respond.

Assessments of the clinical manifestations of onchocerciasis revealed that 76.5% (n = 1070) had no knowledge of the symptoms and 1.9% (n = 26) did not respond. Among those aware of the clinical signs, the specific symptoms reported included: Blindness: 9.4% (n = 132), Pruritus/Itching: 4.4% (n = 62), Skin nodules combined with itching: 2.9% (n = 40), Cutaneous bumps or rashes: 2.1% (n = 30), Limb swelling (lymphedema): 1.4% (n = 19), General visual impairment: 0.6% (n = 8), Systemic constitutional symptoms (cold, fever, or headache): 0.6% (n = 8), Other unspecified clinical symptoms: 0.3% (n = 4). When asked specifically about ocular complications, 76.1% (n = 1065) of the total sample could not link the disease to blindness. Meanwhile, 20.2% (n = 282) recognized it as a major cause of vision loss, and 3.7% lacked prior knowledge to form an association. Perceptions regarding the preventability of onchocerciasis varied widely. More than half of the sample population (55.4%, n = 775) were unsure whether the disease could be prevented. Furthermore, 23.4% (n = 328) reported no knowledge of prevention, 17.1% (n = 239) affirmed that the disease is preventable and 4.1% (n = 57) provided no response. When evaluating specific preventive measures among those who believed the disease could be mitigated, the responses were distributed as follows: General medication/chemotherapy: 11.4% (n = 160), environmental and personal cleanliness: 2.6% (n = 36), avoidance of blackfly vector bites: 1.6% (n = 22), combined use of chemotherapeutic drugs and protective clothing: 0.5% (n = 7), vaccination or sole use of protective clothing: 0.3% (n = 4). Finally, a large majority of the sample (83.0%, n = 1161) yielded no response regarding specific preventive interventions and 0.6% (n = 9) explicitly stated they lacked any functional knowledge concerning preventive measures.

A striking 76.1% (n = 1064) of respondents reported that they had never even heard of the term "onchocerciasis." This baseline deficit directly corresponds with the 76.5% of the population who possessed no functional knowledge regarding its causative agent. This profound information vacuum is in sharp consonance with findings by[13] in deep forest-savannah mosaic communities of Nigeria, where structural gaps in localized health sensitization left over 70% of rural workforces unaware of the formal scientific nomenclature and parasitic nature of river blindness.

The mechanisms dictating how *Onchocerca volvulus* spreads were poorly understood across the surveyed districts. Nearly 70% of participants stated they did not know how transmission occurs and only a small minority (21.8%, n = 305) accurately identified the bites of blackflies (*Simulium spp.*) as the vector pathway. Instead, erroneous transmission beliefs persisted, including person-to-person contact (4.5%) and the consumption of contaminated water (3.5%).This biological ignorance is deeply anchored in local cultural frameworks.

Table 6: Study Participants Responses on Knowledge about Onchocerciasis

Question	Responses	Frequency	Percent (%)
Have you ever heard of onchocerciasis	No response	60	4.3
	No	1064	76.1
	Yes	275	19.7
What do you think causes onchocerciasis	No response	2	0.1
	Bacteria	17	1.2
	Don't Know	1070	76.5
	Parasite	288	20.6
	Virus	22	1.6
How is onchocerciasis transmitted	No response	7	0.5
	Bites by Blackflies	305	21.8
	Don't know	975	69.7
	Drinking Dirty Water	49	3.5
	Person-Person Contact	63	4.5
What are the symptoms of Oncho.	No response	26	1.9
	Blindness	132	9.4
	Bumps/Rashes	30	2.1
	Cold/Fever/Headache	8	0.6
	Don't Know	1070	76.5
	Itching	62	4.4
	Skin Discoloration	4	0.3
	Skin Nodules/Itching	40	2.9
	Swelling Limbs	19	1.4
	Vision Problem	8	0.6
Do you know that onchocerciasis can cause blindness	No response	52	3.7
	No	1065	76.1
	Yes	282	20.2
Can onchocerciasis be prevented	No response	57	4.1
	No	328	23.4
	Yes	239	17.1
	Maybe	775	55.4
How can it be prevented	No response	1161	83.0
	Don't Know	9	0.6
	Use of Drugs/Protective Clothes	7	0.5
	Medication	160	11.4
	Avoid being bitten by black flies	22	1.6
	Cleanliness and Vaccination	36	2.6
	Wearing Protective Clothes	4	0.3

3.3.2 Perceived Severity and Personal Risk

The majority of participants viewed the disease as a significant public health threat with 62.7% (n = 877) classification onchocerciasis as a "very serious" condition. Conversely, 24.4% (n = 342) considered it "somewhat serious," 12.5% (n = 175) viewed it as "not serious," and 0.4% (n = 5) declined to respond (Table 7). Despite recognizing its clinical severity, a substantial portion of the population demonstrated a low sense of personal vulnerability. Specifically, 69.6% (n = 974) of respondents believed that they and their family members were not at risk of contracting the disease. In contrast, 24.7% (n = 345) acknowledged being at risk, while 5.4% (n = 76) lacked functional knowledge of their risk status and 0.3% (n = 4)did not respond. Public acceptance of intervention initiatives was remarkably high.

A substantial majority of respondents (83.1%, n = 1163) expressed explicit willingness to participate in mass treatment programs. However, 12.0% (n = 168) indicated an unwillingness to engage in available treatment options, while 4.4% (n = 61) remained unsure and 0.5% (n = 7) gave no response. Social stigmatization emerged as a near-universal concern within the surveyed communities. An overwhelming 92.4% (n = 1293) of respondents believed that individuals suffering from onchocerciasis face social stigma. Only a minor fraction (3.1%, n = 43) stated that victims do not experience stigmatization, while 4.1% (n = 58) were unsure and 0.4% (n = 5) did not provide a response.Crucially, social stigmatization remains a near-universal burden within these communities, with 92.4% (n = 1293) of respondents affirming that individuals suffering from visible onchocerciasis manifestations face severe social exclusion. The intense dread of being stigmatized, isolated from communal markets, or deemed unfit for marriage forces individuals to hide their symptoms. This fear of exclusion likely explains why 73.1% of the wider population refused to provide a specific response when asked about their active symptom experiences, retreating into defensive silence to evade community labeling. The evaluation of personal protective behaviors against blackfly bites reveals a complete absence of defensive practices across the districts.

A profound cognitive dissonance emerged when analyzing how communities perceive personal risk versus public health severity. On one hand, 62.7% (n = 877) of the population correctly classified onchocerciasis as a "very serious" condition, showing an understanding of its historical capacity to cause blindness and permanent skin damage. On the other hand, a substantial 69.6% (n = 974) of these exact same individuals believed that they and their immediate family members were at zero personal risk of contracting the disease. This dangerous "vulnerability paradox" can be explained using the Health Belief Model (HBM). Because decades of ivermectin distribution have successfully collapsed microfilarial loadspreventing the highly visible, catastrophic ocular blindness valleys of the past,the community visually perceives that the danger has vanished. Consequently, their perceived susceptibility has dropped to near zero, even though their daily occupational exposures as farmers (53.3%) keep them in constant contact with active *Simulium* vector biting zones.

Table 7: Attitudes of Participants about Perceived Risk and Severity of the Disease

How serious do you think onchocerciasis is	No response	5	0.4
	Not Serious	175	12.5
	Somewhat Serious	342	24.4
	Very Serious	877	62.7
Do you believe you or family are at risk	No response	4	0.3
	No	974	69.6
	Yes	345	24.7
	Don't Know	76	5.4
Would you be willing to participate in treatment programs	No response	7	0.5
	No	168	12.0
	Yes	1163	83.1
	Maybe	61	4.4
Do you think people with Onchocerciasis are stigmatized	No response	5	0.4
	No	43	3.1
	Yes	1293	92.4
	Not Sure	58	4.1

3.3.3 Behavioral Practices Regarding Vector Control and Mass Drug Administration

The evaluation of community-level preventive practices against blackfly (*Simulium* spp.) bites, historical participation in screening or treatment and household advocacy for Mass Drug Administration (MDA) programs reveals a distinct gap between personal protective behaviors and community intervention support (Table 8). An overwhelming majority of the study population reported a total lack of personal behavioral interventions against the primary vector; 84.9% (n = 1188) of respondents indicated they did not engage in any preventive measures against blackfly bites. Conversely, only a minor fraction (11.8%, n = 165) actively employed protective strategies, while 0.4% (n = 6) did not provide a response. Among the small cohort utilizing personal protective measures, specific practices reported across the total sample population included: Insecticide-treated nets and protective clothing: 2.0% (n = 28), Chemotherapeutic drugs combined with protective clothing: 0.6% (n = 8), Sole reliance on medications/drugs: 0.1% (n = 2), Perceived or reported regular vaccination: 0.1% (n = 2).An overwhelming 84.9% (n = 1188) of respondents explicitly stated that they engaged in absolutely no preventive measures against *Simulium* bites. Only a negligible 2.0% utilized a combination of insecticide-treated nets (ITNs) and protective clothing. This passive behavioral stance agrees with[14], who noted that standard vector control measures like ITNs are structurally ineffective against *Simulium* species because blackflies are diurnal, outdoor-biting vectors that strike while farmers are actively clearing land, far away from evening bed nets. Because 53.3% of the population are farmers who spend their peak hours outdoors without long-sleeved thick clothing or topical repellents, they remain entirely defenseless hosts to residual vector populations. The final, and perhaps most critical, threat to the verification of elimination in these districts lies in the documented ivermectin ingestion patterns.

Adherence to personal clinical surveillance and therapeutic options was remarkably low. A substantial majority of participants (80.0%, n = 1119) declared that they had never participated in any onchocerciasis screening or treatment programs. In contrast, less than a fifth of the population (18.2%, n = 254) reported prior participation in these clinical interventions. The remaining segments of the sample were either unsure of their historical participation (0.6%, n = 9) or declined to respond (1.2%, n = 17). Despite low personal participation in vector prevention and clinical screening, a strong positive trend emerged regarding public health advocacy within domestic units. A substantial majority of respondents (87.8%, n = 1229) actively encouraged other members of their household to participate in MDA campaigns. Conversely, only 9.6% (n = 135) stated that they did not promote household participation, while 2.5% (n = 35) provided no response on the matter.

Table 8: Practices of Participants about Onchocerciasis

Do you take any preventive actions against blackfly bites	No response	6	0.4
	No	1188	84.9
	Yes	165	11.8
	Yes: Drugs, Protective Clothing	8	0.6
	Yes: Regular Vaccination	2	0.1
	Yes: Use of Drugs	2	0.1
	Yes: Use of Nets/Protective Clothes	28	2.0
Have you ever participated in any onchocerciasis treatment or screening	No response	17	1.2
	No	1119	80.0
	Yes	254	18.2
	Not Sure	9	0.6
Do you encourage others in your household to participate in MDA	No response	35	2.5
	No	135	9.6
	Yes	1229	87.8

3.3.4 Sociocultural and Communal Beliefs Surrounding Onchocerciasis

The evaluation of communal perceptions, traditional belief frameworks, and the utilization of indigenous healing systems reveals the cultural context influencing health-seeking behaviors within the study areas (Table 9). A significant proportion of the study population identified deeply entrenched sociocultural frameworks as the primary drivers of local disease understanding. Specifically, 66.9% (n = 936) of respondents stated that superstitious beliefs were viewed as the primary cause of onchocerciasis within their respective communities. Conversely, 10.8% (n = 151) of participants were unaware of their community's localized beliefs regarding the disease and 2.7% (n = 38) provided no response. When respondents outlined the specific communal or traditional etiologies recognized by their communities, the responses were distributed as follows: Blackfly bites: 8.5% (n = 119) (representing an accurate epidemiological alignment), Hereditary transmission: 7.9% (n = 110), General cultural beliefs: 1.0% (n = 14), Community influence: 0.8% (n = 11), Poor personal hygiene: 0.4% (n = 5), Agrarian labor / Farming: 0.3% (n = 4), General active infection: 0.3% (n = 4), Demonic or diabolical forces ("the devil"): 0.2% (n = 3),Inadequate vaccination or awareness campaigns: 0.1% (n = 2), Mosquito bites: 0.1% (n = 2). The interaction between traditional practices and modern healthcare systems varied across the cohort. The majority of participants, 59.7% (n = 835), stated that their communities did not harbor traditional beliefs that discouraged individuals from seeking modern medical interventions, while 1.6% (n = 22) held no opinion on the matter. However, a notable segment comprising 38.7% (n = 542) of respondents affirmed that traditional beliefs actively competed with or affected the acceptance of modern orthodox medicine. Within this group, the primary cultural barriers identified were a distinct preference for traditional medicine over orthodox healthcare (34.5%) and the communal practice of indirect family planning (0.2%, n = 3). The structural availability and community reliance on traditional healers for managing onchocerciasis symptoms were also evaluated. Less than half of the respondents (44.1%, n = 617) reported a total absence of traditional healers specializing in onchocerciasis within their localities.

Only a small minority (6.4%, n = 90) confirmed that such traditional healers were actively available. Notably, a substantial proportion of the population lacked clear insights into this therapeutic sector, with 48.5% (n = 678) reporting no information regarding traditional healer availability and 1.0% (n = 14) declining to respond. Regarding actual therapeutic choices, the data indicates high trust in modern programs over indigenous remedies. An overwhelming majority of participants, 89.6% (n = 1254), stated that they did not use traditional medicine to manage or treat the symptoms of onchocerciasis. In contrast, only 6.8% (n = 95) admitted to using traditional remedies for symptom management, while 3.6% (n = 50)did not respond to the subject.

An overwhelming 66.9% (n = 936) of respondents stated that superstitious beliefs were viewed as the primary cause of onchocerciasis within their communities, with some explicitly attributing it to hereditary causes or diabolical forces ("the devil").This heavy subscription to metaphysical etiologies aligns closely with behavioral studies by[17] in South-Western Nigeria and [18]in similar sub-Saharan contexts. These researchers observed that when a parasitic infection causes highly distressing, invisible cutaneous symptoms (like intense, unyielding pruritus), rural populations frequently bypass rational germ theories in favor of spiritual explanations. This is not merely an academic concern; it directly warps health-seeking behaviors. While 59.7% of the cohort denied that traditional beliefs actively stopped them from accessing orthodox care, a notable 38.7% (n = 542) affirmed that traditional belief systems actively competed with modern medical interventions. This competition manifested primarily as a distinct behavioral preference for traditional herbalists and indigenous healers over formal primary healthcare centers.

Table 9: Sociocultural and Communal Beliefs Surrounding Onchocerciasis

What do people in your community believe causes Oncho.	No response	38	2.7
	Black flies	119	8.5
	Community Influence	11	0.8
	Cultural Belief	14	1.0
	Devil	3	0.2
	Don't Know	151	10.8
	Farming	4	0.3
	Hereditary Transfer	110	7.9
	Inadequate Vaccination or Awareness	2	0.1
	Infection	4	0.3
	Mosquito Bites	2	0.1
	Poor Hygiene	5	0.4
	Superstitious Belief	936	66.9
Are there traditional beliefs that discourage people from taking modern medicine for Onch.	No response	22	1.6
	No	835	59.7
	Yes	56	4.0
	Don't Know	0	0.0
	Yes: Indirect Family Planning	3	0.2
	Yes: Traditional Medicine Preferences	483	34.5
Are there traditional healers who treat Oncho. In this comm.	No response	14	1.0
	No	617	44.1
	Yes	90	6.4
	Don't Know	678	48.5
Have you or someone you know used traditional medicine for symptoms of Oncho	No response	50	3.6
	No	1254	89.6
	Yes	95	6.8%

3.3.5 Ivermectin Coverage and Longitudinal Compliance Patterns

More than half of the participants, 57.3% (n = 801), reported that they had never taken the medication. Conversely, 32.5% (n = 455) affirmed a history of drug utilization, while 7.8% (n = 109) were unsure of their usage history and 2.4% (n = 34) provided no response (Table 10). When evaluating the specific timeline of the last received dose, the data shows that: 1–2 years ago: 18.6% (n = 260) of respondents received treatment, more than 2 years ago: 17.0% (n = 238) of respondents received treatment, never ingested: 60.3% (n = 843) of the sample pool reaffirmed a complete lack of therapeutic history. Data regarding the tolerability profile of the drug indicates that 37.2% (n = 521) of the participants experienced no side effects during treatment. However, an active group comprising 10.6% (n = 148) of the population documented post-treatment complications. The specific manifestations reported among the cohort included: Swellings (edema): 2.0% (n = 28), Pruritus (itching): 1.5% (n = 21), Cutaneous rashes: 0.1% (n = 2). Uncertainty regarding physical reactions to the drug was common, with 52.2% (n = 730) reporting they were unsure of their symptoms. Additionally, 96.4% (n = 1348) of the wider sample did not offer a specific response within the detailed side-effect categories. An analysis of the behavioral and structural factors influencing community integration into Mass Drug Administration (MDA) frameworks identified several key variables driving compliance or non-compliance: Programmatic Trust: Identified as a primary motivator by 29.4% (n = 411) of participants, information deficits: 22.1% (n = 309) reported that a lack of adequate program communication hindered engagement, fear of adverse effects 17.3% (n = 242) avoided participation due to concerns over side effects, Social and Communal Pressure: 11.7% (n = 163) indicated that community influence shaped their involvement, alternative Factors; 1.2% (n = 170) linked their choices to unspecified reasons, while 17.0% (n = 238) declined to provide feedback. Public perceptions regarding the credibility of frontline distribution personnel were heavily skewed toward programmatic acceptance. Exactly half of the sample pool, 50.0% (n = 700), expressed explicit trust in the community drug distributors. In contrast, 11.2% (n = 157) reported a distinct lack of trust, 30.7% (n = 429) remained undecided on the matter, and 8.1% (n = 113) gave no response regarding distributor credibility.

According to the WHO guidelines for verifying the elimination of human onchocerciasis, a minimum therapeutic coverage of 80% must be sustained annually across all endemic communities for at least 10–12 years to successfully interrupt transmission. These findings revealed a substantial failure to meet this standard: 60.3% (n = 843) of the total sample pool reaffirmed a complete lack of therapeutic history with ivermectin, while more than half (57.3%) stated they had never taken the medication under any programmatic layout. Only 18.6% had taken a dose within the past 1–2 years.

This finding stands in sharp, dramatic contrast to the high community ivermectin compliance rates routinely claimed in administrative supervisor reports. It also directly contrasts with contemporary micro-level studies, such as the[15], assessment inUbanlu, Olamaboro LGA of Kogi East, Kogi State, Nigeria, which reported localized compliance hitting 90.8%. This massive discrepancy indicates a major operational gap: while macro-level drug delivery metrics may show high distribution numbers, the actual ingestion of the tablet at the household level is heavily compromised. The results of this findings provides clear insights into the behavioral and structural mechanics driving this non-compliance; this was attributed to Information deficits, fear of adverse effects, distributor trust split. Information Deficits (22.1%, n = 309); Nearly a quarter of the population avoided the drug simply because of poor communication and a lack of programmatic information from community distributors, Fear of adverse effects (17.3%, n = 242); Apprehension regarding post-treatment systemic complications was a powerful barrier. This fear is somewhat grounded in clinical reality; 10.6% (n = 148) of the study cohort documented active post-treatment complications, including localized edema (2.0%) and intense reactive pruritus (1.5%). As microfilariae die under ivermectin pressure, they trigger severe localized inflammatory cascades. Without proper community counseling to explain that this itching is a positive sign of the drug actively killing the parasite, loops of fear quickly spread, driving mass non-compliance, Distributor Trust Split: While 50.0% (n = 700) expressed explicit trust in their frontline Community-Directed Distributors (CDDs), a large combined fraction was either openly distrustful (11.2%) or completely undecided (30.7%). This trust deficit undermines the core philosophy of the CDTI strategy, which relies on absolute communal ownership to achieve high treatment coverage.

Table 10: Ivermectin Coverage and Longitudinal Compliance Patterns

Have you ever received ivermectin	No response	34	2.4
	No	801	57.3
	Yes	455	32.5
	Not Sure	109	7.8
When was the last time you received ivermectin	No response	0	0.0
	Within the last year	58	4.1
	1 - 2 Years ago	260	18.6
	More than 2 years ago	238	17.0
	Never	843	60.3
Did you experience any side effects after taking the drugs	No response	730	52.2
	No	521	37.2
	Yes	148	10.6
If yes specify	No response	1348	96.4
	Itching	21	1.5
	Rashes	2	0.1
	Swellings	28	2.0
What influences your decision to participate or not in MDA campaigns	No response	238	17.0
	Trust in the program	411	29.4
	Fear of side effects	242	17.3
	Religious Beliefs	19	1.4
	Lack of Information	309	22.1
	Community Influence	163	11.7
	Others	17	1.2
Do you trust the people who administer the drugs	No response	113	8.1
	No	157	11.2
	Yes	700	50.0
	Not Sure	429	30.7

3.3.6 Clinical Manifestations and Health-Seeking Behaviors

The distribution of self-reported symptoms, chronicity of clinical manifestations, and subsequent health-seeking pathways outlines the morbidity burden and therapeutic choices within the surveyed communities (Table 11). A notable segment of the study population reported experiencing classical clinical signs associated with onchocerciasis. Pruritus emerged as the most widely recognized manifestation, with 20.9% (n = 292) of respondents experiencing intense itching. Other dermatological and ocular pathologies identified across the cohort included: Vision-related problems or blindness: 3.6% (n = 50), skin discoloration: 1.5% (n = 21), subcutaneous nodules: 0.6% (n = 9), skin thickening or roughness: 0.3% (n = 4), a substantial majority of the participants (73.1%, n = 1023) did not provide a specific response regarding active symptom experiences. Regarding the duration of these reported symptoms, the data show that the onset was primarily recent for most affected individuals. Specifically, 20.1% (n = 281) of respondents had experienced these symptoms for less than one year. In terms of more prolonged morbidity, 3.1% (n = 43) reported symptom persistence for more than two years, while 2.4% (n = 34) had experienced them for a period of one to two years. Notably, 74.4% (n = 1041) of the total sample population lacked awareness regarding the precise duration of their symptoms. The analysis of health-seeking dynamics indicated that 20.7% (n = 289) of the total respondents actively sought intervention to manage their symptoms. Conversely, 4.0% (n = 56) did not seek any form of therapeutic remedy, and 75.3% (n = 1054) provided no response regarding their treatment-seeking actions. Among the participants who accessed healthcare options, formal and informal treatment channels were utilized in the following proportions: Local Health Clinics: 12.4% (n = 173), traditional Healers: 4.4% (n = 61), pharmacies or Patent Medicine vendors: 2.4% (n = 33), general or Tertiary Hospitals: 0.5% (n = 7). Finally, 80.4% (n = 1125) of the total study population did not provide a response specifying their utilized healthcare facility or treatment provider.

Table 11: Clinical Manifestations and Health-Seeking Behaviors

Have you ever experienced any of the following	No response	1023	73.1
	Intense Itching	292	20.9
	Skin Discoloration	21	1.5
	Skin Thickening or Roughness	4	0.3
	Nodules under the Skin	9	0.6
	Vision Problem or Blindness	50	3.6
If yes to any, for how long have you had these symptoms	No response	1041	74.4
	< 1 Year	281	20.1
	1 - 2 Years	34	2.4
	More than 2 Years	43	3.1
Did you seek treatment for these symptoms	No response	1054	75.3
	No	56	4.0
	Yes	289	20.7
If yes where	No response	1125	80.4
	Clinic	173	12.4
	Traditional Healer	61	4.4
	Pharmacy	33	2.4
	Hospital	7	0.5

References

1. Nwoke B. E. B. (1987). Studies on the field epidemiology of human onchocerciasis on the Jos Plateau, Nigeria. PhD Thesis, University of Jos Nigeria pp 343.
2. Nwoke B. E. B., Akpan, N. M., Cama V., Ekpo, U. F., Idyorough A. E., Mafe M. A., Mafuyai H. B., Makata E., Miri E., Opara K. N. and Richards F. (2023). Onchocerciasis in Nigeria 2: appraisal of seven years (May 2015 – May 2022) of onchocerciasis elimination programme. *Niger J Parasitol 2023; (1): 1–17. 10.60787/ms49-5d44* [DOI]
3. Ibrahim L., Andrew T. and Kugama M.A. (2019). Knowledge, attitude and practice of people towards onchocerciasis among local people living in Tafa Local Government Area of Niger State, Nigeria. *J Adv Med Med Res*, 31(1): 1–9. [Google Scholar]
4. Sommer A. (1988). Avoidable blindness. *Aust N Z J Ophthalmol*. 16(1): 31–35. [DOI] [PubMed] [Google Scholar]
5. Etya'ale D. (2001). Vision 2020: Update on onchocerciasis. Prevention of Blindness Unit, World Health Organization, Geneva, Switzerland; [PMC free article] [PubMed] [Google Scholar]
6. WHO (1987). WHO Expert Committee on Onchocerciasis. WHO Tech. Report Series. No. 752, WHO Geneva.
7. Anon (2009). Exit Strategy of APOC from Nigeria, National Onchocerciasis Task Force, Nigeria. Federal Ministry of Health, Abuja, Nigeria.
8. Anon (2002). Second National Plan of Action for the Control of Onchocerciasis in Nigeria, 2003-2013. Federal Ministry of Health, Abuja, Nigeria
9. Federal Ministry of Health FM. Nigeria onchocerciasis elimination plan. Abuja: FMoH. (2017). ttps://www.cartercenter.org/resources/pdfs/news/health_publications/river_blindness/nigeria-onchocerciasis-elimination-plan-feb2017.pdf
10. Ojurongbe O., Akindele A.A., Adeleke M.A., Oyedeji M.O., Adedokun S.A. and Ojo J.F. (2015). Co-endemicity of loiasis and onchocerciasis in rain forest communities in southwestern Nigeria. PLoS*Neglected Tropical Disease*, 9(3):e0003633. https://doi.org/10.1371/journal.pntd.0003633 PMID: 25812086
11. Taiwo M.J., Adewale A. S., Tajudeen T.T., Samuel A.K., Esther O. T., John A.O., Elizabeth T. A. and Ekerette E.U. (2025). Knowledge, attitude and preventive practices towards onchocerciasis among residents of Ogun Waterside Local Government, IJEBU South-West, Nigeria: A cross-sectional study. *J Public Health Res*. 14;14(3):22 799 036251376882. doi: 10.1177/22799036251376882
12. Colebunders R., Sube K.L.L., Lako J.D.W., Tongun J.B. and Alier K. (2024). Knowledge, Attitudes and Practices Regarding Onchocerciasis and Community-Directed Treatment with Ivermectin: A Cross-Sectional Study in South Sudan. *Epidemiol Public Health*. 2(2): 1043.
13. Opara, K. N., Atting, I. A. and Ukpong, I. G. (2021). Spatial distribution, occupational risks, and community perceptions of onchocerciasis transmission in highly endemic forest-savannah mosaics of Nigeria. *ActaTropica*, 219, 105922.
14. Evans, T. G., Renz, A., &Enyong, P. (2014). Agricultural practices and blackfly vector dynamics: Implications for the elimination of river blindness in the West African savannah. *Parasites & Vectors*, 7(1), 312–324.
15. Gordon E. M., Dibal D. M., Alhaji A. I., Dikwa, K. B., Alex-Abedo J., Bala S. I., Abdullahi T. S., Shuaibu Y., Ali H., and Musa H. (2025). Post-Decade Ivermectin Compliance and Entomological Assessment of Onchocerciasis in Inyele District, Olamaboro LGA, Kogi State, Nigeria. *Faculty of Natural and Applied Sciences Journal of Health, Sports Science and Recreation*, *2*(4), 27–37. https://fnasjournals.com/index.php/FNAS-JHSSR/article/view/1107
16. Weldegebreal F., Medhin G., Weldegebriel Z. and Legesse M. (2014). Assessment of community's knowledge, attitude and practice about onchocerciasis and community directed treatment with Ivermectin in Quara District, north western Ethiopia. *Parasit Vectors*. 7: 98. doi:10.1186/1756-3305-7-98.
17. Adeoye O. A., Joshua O. A. and Samuel, S. O. (2020). Socio-cultural perception and knowledge of onchocerciasis in endemic rural communities of South-Western Nigeria. *Nigerian Journal of Parasitology*, 41(2), 188–196.
18. Yirga D., Deribe K., and AmberbirA. (2020). Health belief model and socio-demographic determinants of mass drug administration compliance for elimination of neglected tropical diseases in sub-Saharan Africa: A systematic review. *PLOS Neglected Tropical Diseases*, 14(8), e0008590.