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# ONCHOCERCIASIS IN SOME SELECTED COMMUNITIES OF GASHAKA LOCAL GOVERNMENT AREA, TARABA STATE

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**ABSTRACT**

Onchocerciasis, commonly known as river blindness, remains one of the most persistent and debilitating neglected tropical diseases (NTDs) affecting rural communities in sub-Saharan Africa. The aim of this study was to assess onchocerciasis in some selected communities of Gashaka Local Government Area, Taraba State. A descriptive cross-sectional study was conducted among 400 participants from five communities (Garbabi, Kunfan, Shinbone, Nybango, and Karamti). Participants were selected proportionally and screened for onchocerciasis using standard skin snip procedures. Data on demographics, occupation, and history of ivermectin treatment were collected via structured questionnaires. Prevalence rates were calculated, and associations with demographic variables were analyzed using chi-square tests at $p < 0.05$. The overall prevalence of onchocerciasis was 34.5%, with site-specific rates ranging from 26.3% (Kunfan) to 43.8% (Garbabi). Prevalence was slightly higher in males (36.3%) than females (32.4%), but the difference was not statistically significant. Age-specific prevalence was highest among the 11–20 years (41.3%) and 31–40 years (40.3%) groups. Individuals with tertiary education showed the highest prevalence (60%), though from a small sample. Occupation was a significant risk factor, with fishermen exhibiting an alarmingly high prevalence of 82.9% compared to farmers (29.4%) and students (16.7%) ($\chi^2 = 93.41$; $p = 0.0005$). Onchocerciasis remains endemic in Gashaka LGA, with ongoing transmission particularly among high-risk occupational groups such as fishermen. While mass drug administration remains essential, targeted interventions including community education, behavioral strategies, and vector control are needed to reduce exposure and achieve sustainable elimination. Continuous surveillance and localized public health strategies are critical to interrupt transmission and protect vulnerable populations.

## 1. Introduction

Onchocerciasis, commonly known as river blindness, remains one of the most persistent and debilitating neglected tropical diseases (NTDs) affecting rural communities in sub-Saharan Africa. The disease is a parasitic infection caused by *Onchocerca volvulus*, a filarial worm transmitted to humans through repeated bites of infected female *Simulium* blackflies that breed in fast-flowing rivers and streams (WHO, 2023). Once transmitted, the parasite develops into adult worms that form nodules in subcutaneous tissues, releasing microfilariae that migrate through the skin and ocular tissues. This causes chronic dermatological manifestations, visual impairment, and in severe cases, irreversible blindness (Coffeng *et al.*, 2019). Nigeria bears the largest global burden of onchocerciasis, accounting for more than 40% of all cases in Africa, with transmission concentrated in rural, riverine communities (Tekle *et al.*, 2016). Taraba State, located in northeastern Nigeria, is an endemic region with environmental and socioeconomic conditions favorable for blackfly breeding and disease transmission.

The global significance of onchocerciasis stems from its public health, socioeconomic, and developmental consequences. Chronic itching, dermatitis, skin disfigurement, and ocular morbidity markedly reduce quality of life and productivity among affected populations. In agrarian communities such as those found in Gashaka Local

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Government Area the disease diminishes agricultural output, increases poverty, and perpetuates structural inequalities (Brattig, 2019). Historically, onchocerciasis has prompted community displacement, with households relocating away from fertile river valleys to avoid blackfly bites, resulting in long-term socioeconomic disruption (Kim *et al.,* 2021). Although global elimination efforts have substantially reduced disease transmission in several countries, persistent foci remain in remote, underserved communities where health infrastructure is weak, vector breeding conditions remain optimal, and mass drug administration (MDA) coverage is inconsistent (WHO, 2023). Nigeria launched community-directed treatment with ivermectin (CDTI) in the 1990s under the African Programme for Onchocerciasis Control (APOC). CDTI empowered communities to coordinate the annual distribution of ivermectin, a microfilaricidal drug effective in reducing microfilarial loads, morbidity, and transmission (Orem *et al*., 2020). However, despite decades of intervention, complete interruption of transmission has remained challenging in certain ecological zones, including mountainous and riverine areas like Gashaka LGA. Inadequate treatment coverage, migration patterns, vector abundance, and program fatigue have contributed to pockets of ongoing transmission (Ibe & Igbe, 2022). Taraba State's rugged topography, extensive river networks, and limited accessibility pose substantial operational challenges for sustained MDA implementation and epidemiological monitoring.

Gashaka LGA is of particular interest because it borders the Gashaka-Gumti National Park, an ecologically rich but underserved area with numerous fast-flowing rivers ideal breeding sites for *Simulium* spp. Its communities, including Garbabi, Kunfan, Shinbone, Nybango, and Karamti, are predominantly agrarian and rely heavily on rivers for domestic and agricultural activities, increasing their exposure to blackfly bites. Studies conducted in parts of Taraba State and neighboring regions have reported moderate to high prevalence rates, underscoring the need for localized epidemiological assessments (Ojua *et al.*, 2020). Nonetheless, there has been insufficient recent, community-level data from Gashaka LGA, making it difficult for health authorities to assess progress toward elimination and identify persistent hotspots.

Understanding the epidemiology of onchocerciasis in these communities is crucial, as disease distribution varies by geographic setting, sex, age, occupation, and behavioral exposure. Men in rural Nigerian communities often exhibit higher prevalence because of occupational activities such as farming, fishing, and hunting along rivers, which increase contact with blackfly habitats (Adeniran *et al.*, 2018). However, the extent to which these sex-specific and age-specific variations persist in Gashaka LGA is unclear. Moreover, environmental changes, population movements, climate variation, and socio-economic transitions may alter local transmission dynamics, necessitating updated assessments.

Reliable data from endemic communities are essential to determine ongoing transmission, guide MDA strategies, strengthen community-based interventions, and support evidence-based policy planning. Updated prevalence data also help to determine the feasibility of shifting from control to elimination strategies, as recommended by the WHO Roadmap for NTDs 2021–2030 (WHO, 2021). In the context of Gashaka LGA where geographical isolation and uneven health outreach may lead to persistent infection reservoirs such data are particularly important.

Despite Nigeria's large-scale treatment efforts, pockets of sustained transmission highlight gaps in surveillance and the need for periodic epidemiological reassessment. Studies across Nigeria have documented varied prevalence levels ranging from low (<20%) to hyper-endemic (>50%), depending on ecological and programmatic factors (Opara *et al.*, 2018). However, there is a scarcity of recent studies focusing specifically on isolated communities in Taraba State, particularly within Gashaka LGA. Without updated and community-specific evidence, health managers risk overestimating program success or underestimating ongoing risks.

Therefore, this study was conceived to fill critical knowledge gaps by providing current epidemiological insights into onchocerciasis in selected communities of Gashaka LGA. By assessing infection prevalence across age groups and sexes, the study will contribute to understanding transmission patterns, identify high-risk sub-populations, and support targeted interventions. The findings will also help to evaluate progress toward elimination goals and strengthen disease control strategies in Taraba State and Nigeria at large.

## 2. Materials and Methods

### 2.1 Study Area

This study was conducted in selected communities of Gashaka Local Government Area (LGA), located in the southeastern part of Taraba State, Nigeria. Gashaka LGA lies between latitude 7°15′N and 8°00′N and longitude 11°30′E and 12°15′E, occupying a large landmass characterized by mountainous terrain, dense vegetation, and numerous fast-flowing rivers. It borders the Gashaka-Gumti National Park, the largest national park in Nigeria, known for its rich biodiversity and complex ecological systems.

The climate of Gashaka LGA is typically tropical with distinct rainy (April–October) and dry (November–March) seasons. Annual rainfall ranges between 1,200 mm and 1,600 mm, supporting lush vegetation and perennial rivers that create ideal breeding sites for *Simulium* blackflies the vectors of *Onchocerca volvulus*. The major rivers such as

River Kam, River Mayo Selbe, and River Gashaka flow across several rural settlements, increasing community exposure to vector bites.

The study communities Garbabi, Kunfan, Shinbone, Nybango, and Karamti are predominantly agrarian. Farming, fishing, hunting, and collection of forest products constitute the primary livelihood activities. These occupations, often carried out along riverbanks, increase the risk of contact with blackflies. Access to healthcare services is limited, with most inhabitants relying on primary health centers and periodic community-directed treatment with ivermectin (CDTI). The persistent ecological and socioeconomic conditions have contributed to ongoing onchocerciasis transmission in the region.

**2.2 Research Design**

A descriptive cross-sectional research design was employed for this study. The design enabled the assessment of the prevalence of onchocerciasis at a single point in time among individuals living in the selected communities of Gashaka LGA. This approach was appropriate because it allowed for direct observation, measurement, and comparison of infection rates across different demographic groups (sex and age categories) and across multiple communities. The cross-sectional design also facilitated the identification of current epidemiological patterns necessary for evaluating ongoing transmission and the effectiveness of existing interventions such as ivermectin distribution.

**2.3 Study Population**

The study population comprised residents of the five selected communities Garbabi, Kunfan, Shinbone, Nybango, and Karamti. These communities were purposively selected based on their proximity to fast-flowing rivers known for blackfly breeding and their history of onchocerciasis endemicity. Eligible participants included males and females aged 1 year and above who had lived in the community for at least one year. Individuals who declined consent or were critically ill at the time of sampling were excluded from the study. The population included farmers, fishermen, hunters, traders, students, and other rural dwellers routinely exposed to blackfly bites.

**2.4 Sample Size**

A total sample size of 400 participants was calculated using the Yamane (1967) formula. The formula was selected based on feasibility, statistical power, and comparability with similar epidemiological studies conducted in onchocerciasis-endemic areas of Nigeria. Using a sample of 400 ensured that the study met WHO recommendations for parasitological surveys in endemic communities while allowing distribution across multiple communities and age categories.

used for this study. The sample size was chosen to ensure adequate representation of the population across the five selected communities, allowing for reliable estimation of prevalence rates and meaningful comparisons among demographic sub-groups.

Participants were proportionally selected from each community as follows: Garbabi: 80 participants, Kunfan: 80 participants, Shinbone: 80 participants, Nybango: 80 participants and Karamti: 80 participants

This proportional allocation ensured balanced representation and minimized sampling bias.

**2.5 Data Collection**

Primary data were collected through structured questionnaires and direct parasitological examinations. The questionnaire captured demographic information such as age, sex, occupation, duration of residence, and history of ivermectin intake. The instrument was administered with the assistance of trained field workers and community health volunteers familiar with the local languages.

**2.6 Sample Collection**

Skin snip samples were collected from each participant following WHO-recommended procedures. Two skin snips were taken from the posterior iliac crest using a sterile 2 mm Holth-type disposable punch. The area was cleaned with 70% ethanol before and after the procedure to prevent infection. The snips were placed in sterile microtubes containing normal saline.

All equipment used, including punches, forceps, and microtubes, were sterilized or disposed of according to standard parasitological practice.

**2.7 Sample Analysis**

The skin snip samples were incubated at room temperature for 24 hours to allow microfilariae to emerge. After incubation, the fluid was examined under a light microscope at ×10 and ×40 objectives. The presence of moving microfilariae confirmed onchocerciasis infection.

**2.8 Data Analysis**

Data were analyzed using descriptive and inferential statistical methods in a Statistical Package for Social Sciences version 27.0. Descriptive statistics such as frequencies, percentages, and prevalence rates were computed to summarize demographic variables and infection patterns. The prevalence of onchocerciasis was calculated as the proportion of individuals with detectable microfilariae relative to the total number examined.

Chi-square ($\chi^2$) tests were used to determine associations between infection status and variables such as age group,

sex, and community. Statistical significance was set at $p < 0.05$. Results were presented using tables.

## 3. Results and Discussion

Table 1: Distribution of onchocerciasis based on community

| Community | No. Examined | No. Infected | Percentage (%) |
|---|---|---|---|
| Garbabi | 80 | 35 | 43.75 |
| Kunfan | 80 | 21 | 26.25 |
| Shinbone | 80 | 22 | 27.5 |
| Nybango | 80 | 30 | 37.5 |
| Karamti | 80 | 30 | 37.5 |
| Total | 400 | 138 | 34.5 |

**($\chi^2$= 7.81; P-value = 0.099)**

Table 2: Prevalence Of Onchocerciasis According to Sex in the Study Area

| Communities | Sex | No. Examined | No. Infected | Percentage (%) |
|---|---|---|---|---|
| Garbabi | M | 52 | 24 | 46.15 |
| | F | 28 | 11 | 39.29 |
| Kunfan | M | 42 | 10 | 23.81 |
| | F | 38 | 11 | 28.95 |
| Shinbone | M | 40 | 13 | 32.50 |
| | F | 40 | 9 | 22.50 |
| Nybango | M | 40 | 14 | 35.00 |
| | F | 40 | 16 | 40.00 |
| Karamti | M | 41 | 17 | 41.46 |
| | F | 39 | 13 | 33.33 |
| Total | M | 215 | 78 | 36.28 |
| | F | 185 | 60 | 32.43 |
| Overall Total | | 400 | 138 | 34.50 |

($\chi^2$=0.492; p-value=0.483)

Table 3: Age specific prevalences of onchocerciasis in the study area

| Age Group | No. of Males Examined | No. Infected Males | No. of Females Examined | No. Infected Females | Total Examined | Total Infected | Expected Males Infected | Expected Females Infected |
|---|---|---|---|---|---|---|---|---|
| 1-10 | 30 | 4 (18.2%) | 16 | 4 (28.6%) | 46 | 8 (22.2%) | 3.72 | 4.28 |
| 11-20 | 43 | 15 (40.0%) | 30 | 13 (42.9%) | 73 | 28 (41.3%) | 13.73 | 14.27 |
| 21-30 | 45 | 15 (31.1%) | 50 | 16 (30.0%) | 95 | 31 (30.5%) | 15.68 | 15.32 |
| 31-40 | 51 | 20 (39.0%) | 21 | 11 (42.9%) | 72 | 31 (40.3%) | 13.48 | 17.52 |
| 41-50 | 34 | 6 (16.1%) | 16 | 8 (50.0%) | 50 | 14 (26.7%) | 6.84 | 7.16 |
| >50 | 40 | 12 (35.5%) | 24 | 14 (42.9%) | 64 | 26 (39.0%) | 11.05 | 14.95 |
| **Total** | **243** | **72 (31.2%)** | **157** | **66 (38.1%)** | **400** | **138 (34.2%)** | **69.52** | **68.48** |

**($\chi^2$= 10.92; p-value =0.53)**

Table 4: Prevalences of infection based on education

| Education Level | No. Examined | No. Infected | Percentage (%) |
|---|---|---|---|
| Non-formal | 176 | 57 | 32.39 |
| Primary education | 142 | 49 | 34.51 |
| Secondary education | 72 | 26 | 36.11 |
| Tertiary education | 10 | 6 | 60.00 |
| Total | 400 | 138 | 34.50 |

($\chi^2$= 3.31; p-value =0.347)

Table 5: Occupation-related prevalence of onchocerciasis in the study area

| Occupation | No. Examined | No. Infected | Percentage (%) |
|---|---|---|---|
| Farming | 180 | 53 | 29.44 |
| Fishing | 70 | 58 | 82.86 |
| Students | 132 | 22 | 16.67 |
| Others | 18 | 5 | 27.78 |
| Total | 400 | 138 | 34.5 |

($\chi^2$= 93.41; p-value = 0.0005),

**Discussion**

This study revealed an overall onchocerciasis prevalence of 34.5% across the five communities, with site-specific rates ranging from 26.25% (Kunfan) to 43.75% (Garbabi). Such a high prevalence indicates that transmission remains robust in this study area. While chi-square test showed no significant differences in infection rates between the communities ($\chi^2 = 7.81$; $p = 0.099$), the variation in prevalence hints at localized ecological or behavioral factors (e.g., river proximity, vector density, human activities) that may differentially affect transmission intensity.

Indeed, recent studies have underscored the continued risk of onchocerciasis in certain Nigerian settings, even after long-term mass drug administration (MDA). Ekpo *et al*. (2022) conducted a community survey in Enugu and Ogun States 8–12 months after the last round of MDA and found microfilaria (Mf) prevalence as high as 51.1% in some villages, demonstrating persistence of infection despite many prior MDA rounds (Ekpo *et al*., 2022). This aligns with the findings of this study that considerable infection remains in a local context, highlighting that MDA alone may not yet have fully interrupted transmission.

There is a slightly higher prevalence among males (36.3%) than females (32.4%), though the difference was not statistically significant. This pattern is consistent with studies by Nwaorgu *et al.* (1994) which reported an almost identical prevalence in males (27.6%) and females (26.2%). However, the lack of a strong sex effect in this work suggests that gender per se might not be a dominant risk factor in this particular population or that male/female exposure patterns are more similar in these communities than in some other settings.

Age-specific prevalence in this study showed that the 11–20 and 31–40 years groups had the highest rates (41.3% and 40.3%, respectively), while children aged 1–10 years had a lower prevalence (22.2%). Although the chi-square analysis ($\chi^2 = 10.92$; $p = 0.53$) indicates no statistically significant association, the trend of increasing prevalence with age is biologically plausible and mirrors historical work by Nwaorgu *et al*. (1994) who observed a progressive increase in prevalence into the second decade of life in Enugu State, suggesting cumulative exposure over time.

Interestingly, it was observed that individuals with tertiary education had the highest infection rate (60%), albeit from a very small sample ($n = 10$). Though not statistically significant ($\chi^2 = 3.31$; $p = 0.347$), this finding is unusual because many studies suggest that higher education correlates with greater awareness and better preventive behaviors. The discrepancy may be due to the small sample size, or perhaps these tertiary-educated individuals still engage in high-risk activities (e.g., traveling to rivers, seasonal fieldwork), underscoring that education alone may not fully protect against exposure in endemic settings.

Perhaps the most striking aspect of this result is the occupation-related prevalence: fishermen had a prevalence of 82.9%, far higher than farmers (29.4%) or students (16.7%). The chi-square test clearly indicates a very significant association ($\chi^2 = 93.41$; $p = 0.0005$). This strongly supports the well-established link between onchocerciasis risk and occupations that place individuals in close proximity to blackfly breeding sites (i.e., fast-flowing waterways). Previous epidemiological work in the Upper Imo River Basin, Imo State, found that farmers (46.6%) and fishermen (28.4%) had significantly higher prevalence compared to other occupations (Onuigbo *et al*., 2004).

This results therefore reinforce the idea that targeted interventions are critically needed: MDA is necessary but may not sufficiently protect very high-risk subpopulations, such as fishermen, who face intense exposure. This is especially important now, as Nigeria continues to advance toward elimination, and micro-epidemiological "hotspot" groups could undermine broader gains.

**4. Conclusion**

This study has demonstrated that onchocerciasis remains a significant public health concern in the selected communities of Gashaka Local Government Area, Taraba State, with an overall prevalence of 34.5%. The variation in community-specific prevalence, ranging from 26.25% in Kunfan to 43.75% in Garbabi, suggests that local ecological factors and human behaviors may influence transmission intensity, even though statistical analysis did not show significant differences among communities.

Although the prevalence was slightly higher in males compared to females, the difference was not statistically significant, indicating that both sexes are similarly exposed to infection in this context. Age-specific analysis revealed higher prevalence among adolescents and adults, particularly those aged 11–20 and 31–40 years, reflecting cumulative exposure to infective blackfly bites over time.

Education level did not show a consistent protective effect, as individuals with tertiary education exhibited a higher prevalence; this may be attributed to small sample size or occupational exposure despite higher knowledge levels. Occupation was identified as the most significant risk factor, with fishermen exhibiting an alarmingly high prevalence of 82.9%, underscoring the critical role of occupational exposure near vector breeding sites.

These findings highlight the ongoing transmission of onchocerciasis in the study area and the need for targeted interventions, particularly for high-risk groups such as fishermen. While mass drug administration remains essential, complementary strategies including behavioral interventions, community education, and vector control are necessary

to reduce exposure and move toward sustainable elimination. Continuous surveillance and localized public health strategies tailored to community-specific risk profiles will be critical in achieving onchocerciasis control and eventual eradication in Gashaka LGA.

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