

Ten years of onchocerciasis elimination in Nigeria, 2015– 2025: a national programme case study

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Abstract

In 2015, the Federal Ministry of Health of Nigeria established the National Onchocerciasis Elimination Committee to guide the transition from onchocerciasis control to elimination and coordinate implementation with partners. This case study describes the programme processes and assesses progress from 2015 to 2025 using state-level transmission classifications, epidemiological and entomological surveillance, and programme outcomes. At programme inception, 11 states had limited or no epidemiological information, nine had ongoing transmission, 11 were considered on track for interruption, and six were suspected to have interrupted transmission; no state had achieved interruption or elimination. By May 2025, transmission had been reported as eliminated in two states (Plateau and Nasarawa), while nine states had achieved interruption of transmission. Nineteen transmission zones (18 states and the Federal Capital Territory) were classified as having suspected interruption and were undergoing entomological evaluation, three transmission zones were considered on track for elimination of transmission by 2030, Lagos was confirmed non-endemic, and three states had limited information because of insecurity and restricted field access. A total of 66,000 dried blood spot samples had been processed using Ov16 ELISA, and more than 37,000 blackfly heads had been examined by PCR. Ivermectin mass drug administration had been stopped in 140 local government areas, covering approximately 30.59 million people. Operational research using LoaScope in rainforest areas addressed concerns about ivermectin-associated central nervous system adverse events in areas co-endemic with *Loa loa*. The Nigerian experience illustrates how national coordination, standardised surveillance, laboratory capacity, partnerships, and evidence-based treatment decisions can support progressive interruption of onchocerciasis transmission. Sustaining progress will require continued entomological and post-treatment surveillance, improved access to insecure areas, resolution of specimen-processing backlogs, cross-border coordination, and domestic financing for surveillance.

Introduction

Onchocerciasis, commonly known as *river blindness*, is a parasitic disease caused by the filarial worm *Onchocerca volvulus*. The infection is transmitted to humans through the bite of infected female *Simulium* blackflies, primarily *Simulium damnosum* in Nigeria. These vectors breed in fast-flowing, well-oxygenated rivers and streams. Adult worms reside in subcutaneous nodules known as onchocercomata, which are often located around joints and other bony prominences (1, 2). Fertile female worms release microfilariae that migrate through the skin, where they can be ingested by blackflies during blood meals, thus perpetuating the transmission cycle. No animal or environmental reservoirs of infection are known.

Clinically, onchocerciasis manifests as chronic skin disease (onchodermatitis), characterised by intense itching, papular eruptions, skin thickening, scarring, and patchy depigmentation—commonly referred to as “leopard skin.” Long-term infection leads to skin atrophy and laxity, particularly in the groin, resulting in the characteristic “hanging groin.” Onchocerciasis can also cause severe visual impairment and blindness. In hyperendemic areas, onchocerciasis has been associated with growth retardation

(Nakalanga syndrome) and a high prevalence of epilepsy(3), including nodding syndrome, both recognised as forms of onchocerciasis-associated epilepsy (4, 5). The social and economic burden of the disease is extensive, contributing to poverty, reduced agricultural productivity, and community displacement (6).

Previous reports have documented the history, epidemiology, and control efforts against onchocerciasis in Nigeria, including the evolution of the national elimination programme (7, 8). By 2009, evidence from several countries demonstrated that sustained MDA could interrupt transmission (9). Consequently, in 2014, APOC shifted its strategy from control to elimination, which is defined as the irreversible cessation of transmission such that continued ivermectin distribution is no longer required in affected zones. To guide this transition, WHO issued criteria and procedures for safely stopping MDA (10).

This case study describes the first ten years (2015–2025) of Nigeria’s National Onchocerciasis Elimination Programme, focusing on programme organisation, surveillance and verification processes, treatment decisions, documented outcomes, operational adaptations, and lessons for sustaining elimination.

Case study context: programme baseline in 2015

The National Onchocerciasis Elimination Committee (NOEC), inaugurated in 2015, served as an advisory body that provided evidence-based recommendations to the Federal Ministry of Health (FMoH) and implementing partners. It met twice a year, in May and December, to review programme data, determine treatment decisions, and recommend areas eligible for mass drug administration (MDA) cessation. At inception, NOEC developed a national map of pre-control nodule endemicity and compiled available epidemiological and entomological information as shown in Fig. 1 (11). Because most baseline and impact-assessment data from the former African Programme for Onchocerciasis Control were aggregated at state level, and for administrative and logistical reasons, each state and the Federal Capital Territory (FCT) was treated as a transmission zone as shown in Fig. 2. (12). This framework was supported by the state-level operational structure of non-governmental development organisations providing technical and logistical assistance. NOEC then classified each transmission zone and designed implementation strategies appropriate to its status (Table 1 and Fig.. 2).

Case study approach

This retrospective national programme case study synthesises information on Nigeria’s onchocerciasis elimination programme from 2015 to 2025. The assessment uses the state/FCT transmission classifications established at programme inception and updated to May 2025, together with epidemiological and entomological surveillance findings and documented programme outcomes. The processes examined were national coordination through NOEC, application of the national elimination guideline, epidemiological and entomological surveillance, laboratory capacity, MDA continuation or cessation decisions, operational research addressing ivermectin safety, and post-treatment surveillance.

Programme impact was described using changes in transmission status and the number of local government areas and people no longer requiring ivermectin MDA. The case study reports programme-level results and previously documented surveillance findings rather than individual-level analyses. An LLM was used to assist with manuscript organisation and language editing; all scientific content, data, interpretations, and the final manuscript were reviewed and approved by the authors.

Table 1

Onchocerciasis transmission status of each state/FCT in Nigeria at the beginning of NOEC in 2015.

S/N	Classification of transmission status	Name(s) of State/FCT	Number
1.	Non-endemic	0	0
2.	Limited or no epidemiological information	Borno, Bauchi, Gombe, Yobe, Akwa Ibom, Jigawa, Sokoto, Lagos, Rivers, Bayelsa and Katsina	11
3.	Transmission ongoing	Cross River, Abia, Imo, Enugu, Anambra, Edo, Ondo, Ogun, and Benue	9
4.	Interruption of transmission on track	Ekiti, Osun, Oyo, Adamawa, Delta, Taraba, FCT, Kwara, Kogi, Niger and Kano	11
5.	Interruption of transmission suspected	Plateau, Ebonyi, Nasarawa, Kaduna, Kebbi and Zamfara	6
6	Achieved interruption of transmission	0	0
7.	Achieved elimination of transmission	0	0

Programme implementation and surveillance framework

The programme was implemented in accordance with the national elimination guidelines developed by NOEC and aligned with WHO recommendations. For each transmission zone, elimination strategies were tailored to the prevailing epidemiological status. Progress towards interruption or elimination was assessed using epidemiological, serological and entomological evaluations, including Ov16 ELISA among children aged 5–9 years and O-150 PCR-based assessment of female blackflies. In accordance with WHO criteria, Ov16 seroprevalence should be < 0.1% with the upper bound of the 95% confidence interval below 0.1%, while the prevalence of infective flies should be < 1/2,000 (0.05%) among all flies, assuming a 50% parous rate, with the upper bound of the 95% confidence interval below 0.05% (10). Four laboratories were accredited by NOEC for molecular diagnostics: The Carter Centre, Jos; Ahmadu Bello University, Zaria; the Nigerian Institute for Medical Research, Lagos; and Osun State University, Osogbo. Findings from these evaluations were synthesised to assess changes between 2015 and 2025 and to inform evidence-based decisions on continuation or cessation of MDA.

Surveillance outputs and changes in transmission status

The National Guidelines for the Elimination of Onchocerciasis, developed by NOEC in alignment with WHO recommendations, provided the framework for surveillance, verification, and cessation of MDA. The guidelines were approved by the Federal Ministry of Health and published in 2017 (13). By May 2025, 66,000 dried blood spot samples had been collected and processed using Ov16 ELISA, and more than 37,000 *Simulium damnosum* fly heads had been screened by PCR for *Onchocerca volvulus* DNA.

Programme status in 2025

By May 2025 as shown in Fig. 3., two states, Plateau and Nasarawa, had been reported to have eliminated transmission following application of WHO criteria (14), while nine states had achieved interruption of transmission (15, 16). Nineteen transmission zones (18 states and the Federal Capital Territory) were classified as having suspected interruption and were undergoing entomological evaluation; three were considered on track for elimination of transmission by 2030; Lagos was confirmed as non-endemic; and three states had limited epidemiological information because of insecurity and restricted field access (Table 2). In total, ivermectin MDA was stopped in 140 local government areas, covering approximately 30.59 million people (Table 3). Fig.. 3 presents the state/FCT-level transmission status as of May 2025.

Table 2
Status of onchocerciasis transmission by state and Federal Capital Territory, as of May 2025

S/N	Classification	Number of Transmission zone	Current programme activity	State/FCT
1.	Non-endemic	1	None	Lagos
2.	Limited or no epidemiological information	3	Operational epidemiological monitoring	Bayelsa, Borno, Katsina
3.	Transmission ongoing	0	None	None reported
4	On track for elimination of transmission by 2030	3	MDA / epidemiological evaluation	Edo, Niger, Ogun
5.	Interruption of transmission suspected	19	Entomological evaluation	Adamawa, Akwa Ibom, Bauchi, Benue, Cross River, Ebonyi, FCT, Ekiti, Jigawa, Kano, Kogi, Kwara, Ondo, Osun, Oyo, Rivers, Sokoto, Taraba, Yobe
6.	Reported interruption of transmission	9	Post-Treatment surveillance	Abia, Anambra, Delta, Enugu, Gombe, Imo, Kaduna, Kebbi, Zamfara
7.	Reported elimination of transmission	2	Post-Elimination surveillance	Plateau, Nasarawa
Total				37 transmission zones (36 states + FCT)

Table 3

States where transmission interruption or elimination had been achieved and ivermectin MDA had been stopped, as of May 2025.

S/N	States	Transmission Status	Number of Local Government Areas where onchocerciasis has been interrupted or eliminated	Number of people who are no longer in need of MDA for onchocerciasis (Million)
1.	Plateau	Eliminated	5	1.07
2.	Nasarawa	Eliminated	7	1.55
3.	Kaduna	Interrupted	16	2.20
4.	Zamfara	Interrupted	6	1.78
5.	Kebbi	Interrupted	9	1.71
6.	Delta State	Interrupted	15	2.00
7.	Gombe	Interrupted	10	1.39
8.	Abia	Interrupted	17	4.21
9.	Anambra	Interrupted	16	5.01
10.	Enugu	Interrupted	17	4.84
11.	Imo	Interrupted	22	4.83
TOTAL			140	30.59 million

Operational research and programme adaptation

Operational research to address the potential risk of central nervous system adverse events associated with Loa loa in ivermectin-naïve areas of Nigeria

According to the programme account, sustained annual ivermectin MDA was central to elimination, but concerns arose because severe, sometimes fatal, encephalopathic adverse reactions have been reported after ivermectin treatment in individuals with high Loa loa microfilarial densities in co-endemic areas (17, 18). To guide the assessment and management of the risk of adverse events associated with ivermectin MDA in Loa loa co-endemic areas, WHO developed guidelines for the rapid assessment of Loa loa (19). However, Operational research using LoaScope™ in the rainforest regions of Nigeria which is co-endemic with Loa loa found uniformly low Loa loa microfilarial loads, with no readings exceeding 20,000 mf/mL (20, 21). These findings informed the programme's assessment that the risk of ivermectin-associated central nervous system adverse events was low in the surveyed areas. As a precautionary measure, NOEC recommended LoaScope assessment in any newly identified ivermectin-naïve areas before MDA expansion (22). The programme reports that no additional onchocerciasis-endemic areas requiring MDA had been identified by the time of the case-study assessment.

Lessons learned and policy implications

The programme experience highlights several implementation lessons. Government ownership and coordination through the NOEC provided a mechanism for reviewing evidence and making treatment decisions across transmission zones. Partnerships with non-governmental development organisations and sustained support from the Mectizan Donation Program and The Carter Centre contributed to the implementation. Laboratory capacity for molecular surveillance enabled entomological assessment and supported decisions regarding MDA cessation. The experience also identified persistent operational constraints, particularly restricted access to security-compromised states and backlogs in specimen processing. Continued entomological surveillance after MDA cessation and the development of domestic financing for post-elimination monitoring are therefore important for maintaining programme gains.

Policy implications

The Nigerian experience has implications for other large onchocerciasis-endemic programmes. First, national coordination mechanisms can help integrate evidence from epidemiological, serological, and entomological surveillance into treatment decisions. Second, laboratory capacity and standardised verification procedures are important when programmes move from repeated MDA towards interruption and elimination. Third, cessation of MDA does not remove the need for surveillance, particularly where transmission has only been classified as interrupted or where entomological verification is still pending. Finally, programmes operating in insecure areas require approaches that can maintain epidemiological information when routine field access is restricted, alongside sustainable financing for surveillance and post-elimination activities. These programme achievements contribute to Nigeria's progress towards the elimination objectives of the WHO NTD Road Map 2021–2030 (23).

Strengths and limitations

This case study brings together a decade of national programme experience and combines epidemiological, serological, and entomological evidence with programme-level implementation information. Its main limitation is that the analysis is descriptive and relies on aggregated programme classifications rather than individual-level data or formal counterfactual evaluations. In addition, three states had limited information because of insecurity and restricted access, and several states classified as having suspected interruption were still undergoing entomological verification. These limitations should be considered when interpreting the national transmission-status picture.

Conclusions

Over the decade assessed, Nigeria progressed from a programme in which no state had achieved interruption or elimination to reported elimination of transmission in two states and interruption of

transmission in nine states, with ivermectin MDA stopped in 140 local government areas covering approximately 30.59 million people. This case demonstrates the value of coordinated national decision-making, standardised surveillance, molecular diagnostic capacity, partnerships, and operational research in supporting evidence-based MDA cessation. Continued post-treatment and entomological surveillance, improved access to areas affected by insecurity, resolution of specimen-processing backlogs, cross-border coordination, and sustainable financing will be important for consolidating these gains and progressing towards national elimination.

Abbreviations

FCT
Federal Capital Territory
FMoH
Federal Ministry of Health
LGA
local government area
MDA
mass drug administration
NGDO
non-governmental development organisation
NOEC
National Onchocerciasis Elimination Committee
NTD
neglected tropical disease
PCR
polymerase chain reaction.

Declarations

Ethics approval and consent to participate

This manuscript reports a retrospective synthesis of aggregated programme-level information and previously documented surveillance findings; no individual-level dataset was analysed. Ethical approval for the underlying surveillance activities was obtained from the Federal Ministry of Health Ethics Committee.

Consent for publication

Not applicable. The manuscript does not contain individual-level personal data, images, or case-report information.

Competing interests

The authors declare no conflicts of interest.

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Author Contribution

B.E.B.N conceptualised the manuscript. U.F.E and B.E.B.N drafted the manuscript. M.A.A, V.A.C., A.E.I., M.A.M., H.B.M., E.M., K.N.O., C.M., F.O., and F.R.J. reviewed the manuscript and contributed intellectual content in relation to the national onchocerciasis elimination programme. All authors read and approved the final manuscript

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Data Availability

This manuscript uses aggregated programme-level data and previously documented epidemiological and entomological surveillance data from Nigeria's National Onchocerciasis Elimination Programme for the period 2015–2025. No new individual-level dataset was generated or analysed.

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Figures

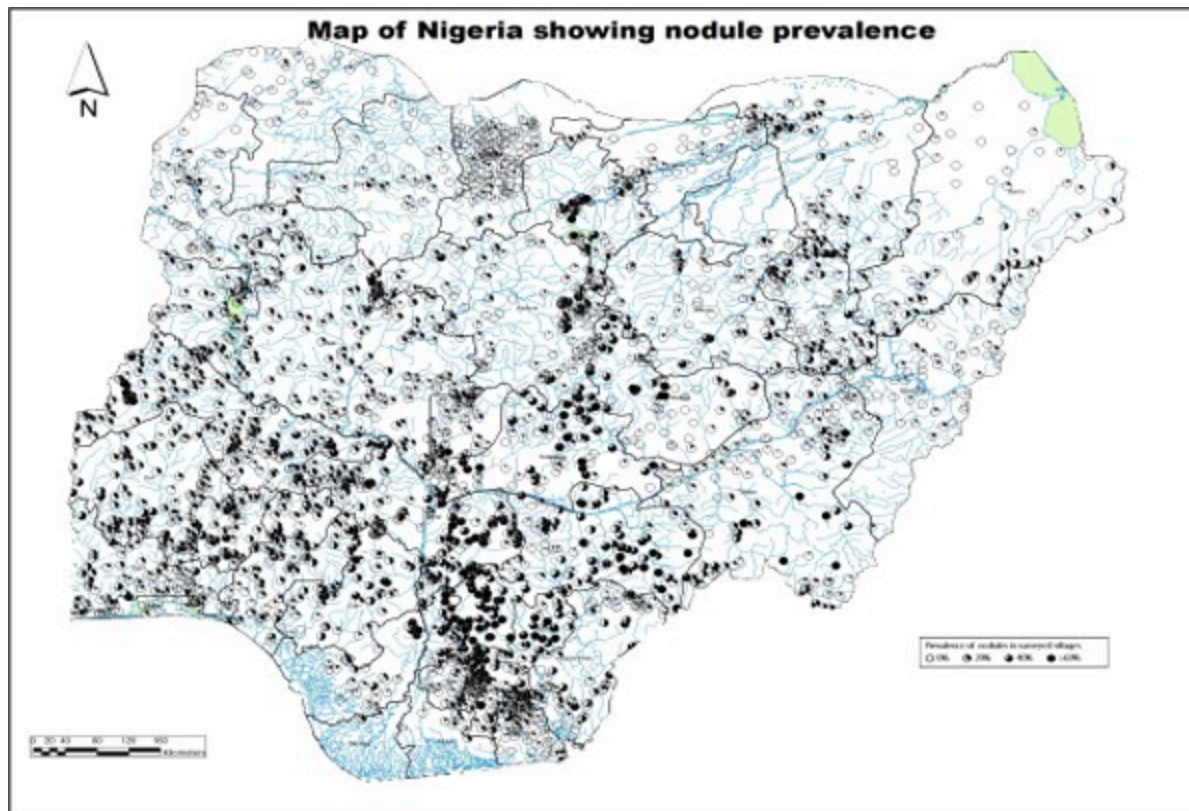


Figure 1

Map of Nigeria showing pre-control nodule prevalence from 2,716 surveyed communities. Adapted from WHO/APOC (11).

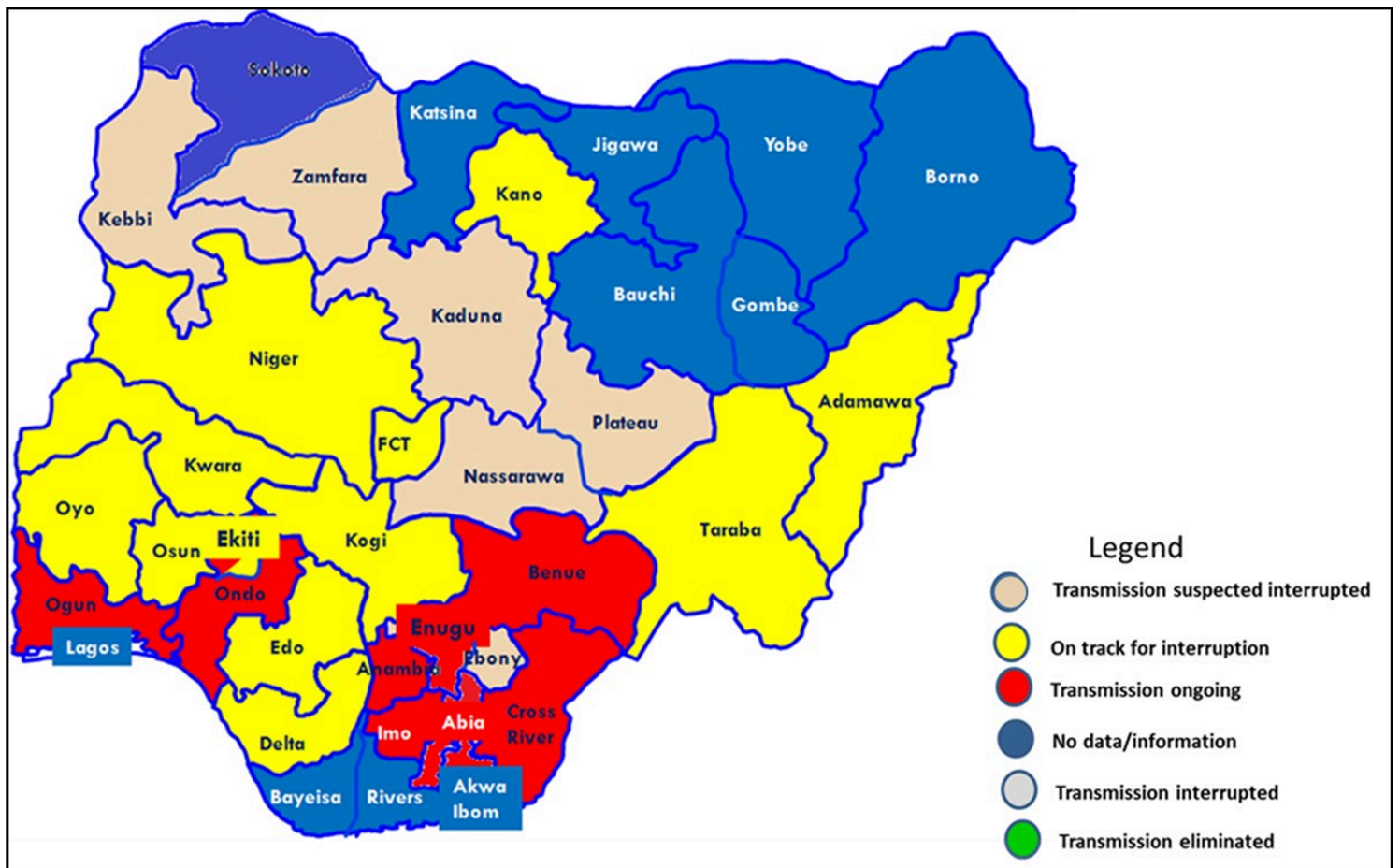


Figure 2

Map of Nigeria showing transmission status for each state and the Federal Capital Territory at the inception of NOEC in 2015. Reproduced from NOEC (12).

NIGERIA ONCHOCERCIASIS TRANSMISSION STATUS, MAY 2025

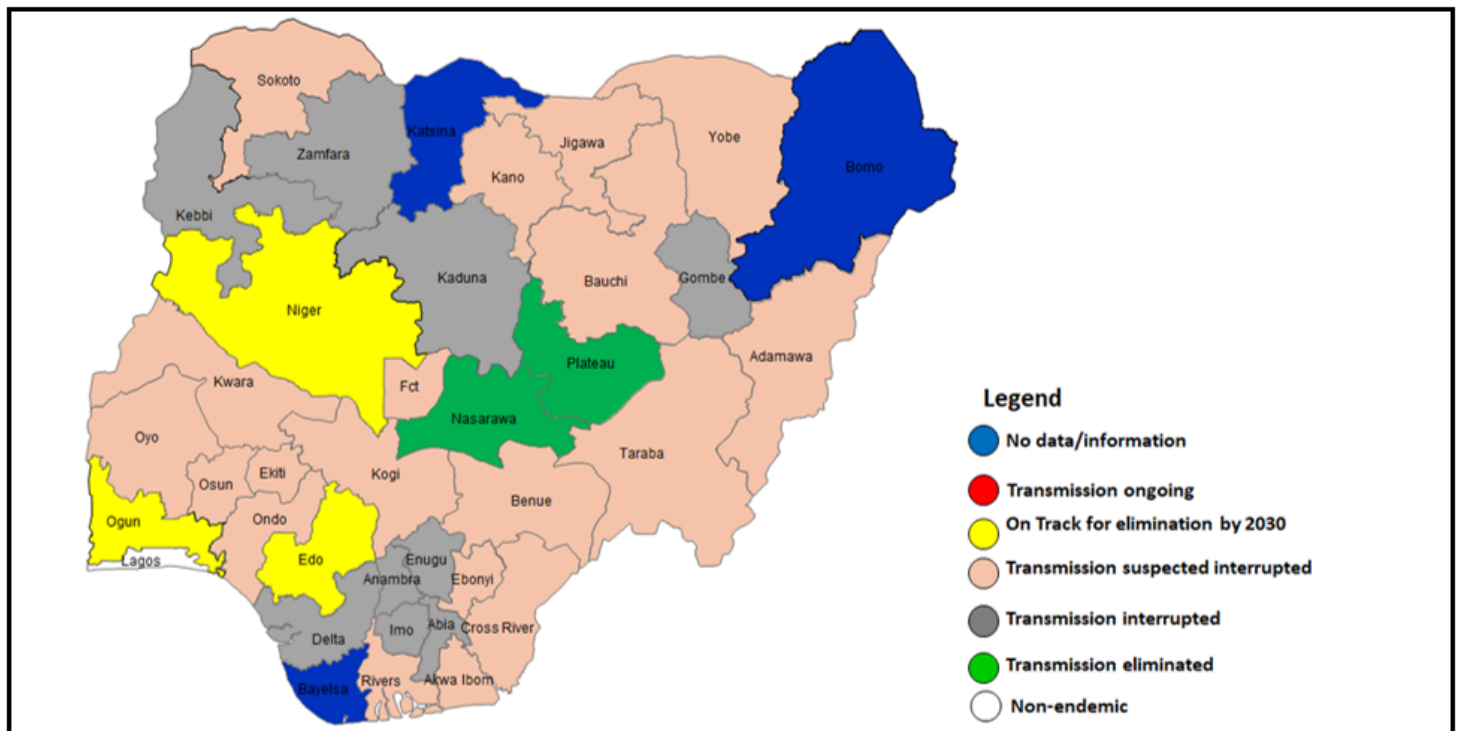


Figure 3

Map of Nigeria showing state/FCT-level onchocerciasis transmission status as of May 2025. Source: National Onchocerciasis Elimination Programme records.