ACT TO END NTDS | EAST TECHNICAL BRIEF SERIES

Reaching the Criteria to Stop Onchocerciasis Mass Drug Administration:

Ethiopia, Nigeria, and Uganda Pave the Way

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CONTEXT

To eliminate human onchocerciasis transmission of the filarial parasite Onchocerca volvulus (OV), endemic countries undertake a multi-step process[i] to:

1. **Identify** focus areas with endemic onchocerciasis transmission,
2. **Treat** people at risk of OV infection within endemic 'foci' using mass drug administration (MDA) for at least 13 years of annual treatment with the microfilaricide ivermectin to suppress transmission,
3. **Conduct post-treatment surveillance (PTS)** after stopping MDA for a minimum of 3–5 years to confirm the interruption of transmission, and
4. **Conduct post-elimination surveillance** to confirm that transmission has been permanently interrupted.

One of the most challenging steps for endemic countries is breaking the cycle of transmission to the point where MDA can be stopped. In the World Health Organization's (WHO's) 2016 guidelines[ii], WHO recommends stopping MDA only if <0.1% of larvae in parous vector Simulium black flies are found to be infective (or <0.05% of all black flies tested in pools) and <0.1 % of children under the age of 10 years test positive for antibody to the OV-16 recombinant antigen in enzyme-linked immunosorbent assays (ELISA). For a country to be declared free of human onchocerciasis, all endemic foci must demonstrate this evidence with 95% statistical confidence before stopping MDA.

This brief describes how Ethiopia, Nigeria, and Uganda addressed these steps, providing examples for other country programs working to stop OV MDA.

Onchocerciasis

Commonly known as river blindness, Onchocerciasis is a neglected tropical disease (NTD) spread by black flies that breed in fast-flowing rivers and streams.

Left untreated, a person may develop a severe itching, rashes, depigmentation of the skin. The filarial parasite can also migrate to the eye, which can lead to visual impairment or blindness.

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CHALLENGES

Given the complexity of human onchocerciasis elimination, national programs face significant challenges getting to a point where it is possible to stop MDA. While the circumstances of each country are unique, many national programs encounter difficulties with the following:

- Reducing transmission to the point of being able to stop treatment
- Refining surveillance methods to ensure that they are capable to both implement effective programs and provide accurate assessments of human and vector infection levels
- Ensuring required financial resources, political support, and community participation.

Students at a primary school in Cross River State, Nigeria receive medicines for NTDs during a mass drug administration.

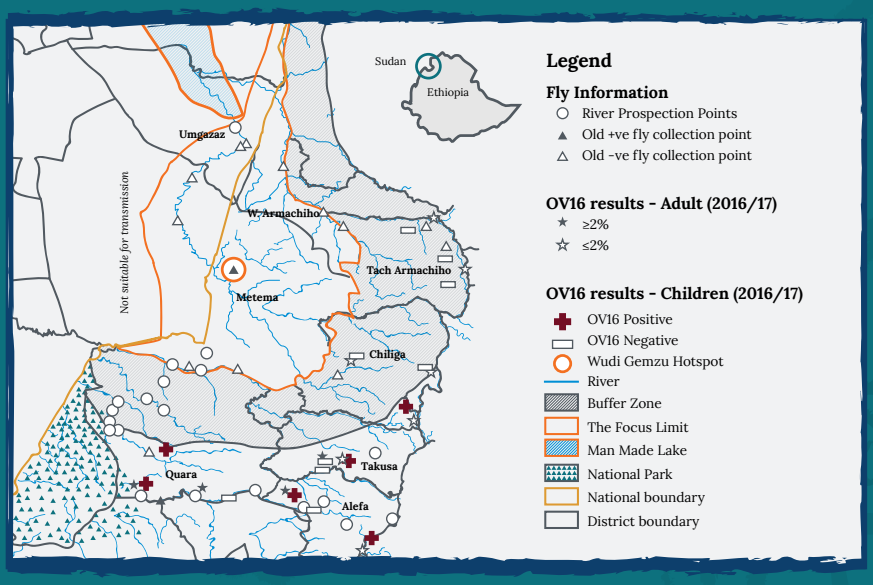
LESSONS FROM THE FIELD

The following country examples from Ethiopia, Nigeria, and Uganda are provided to help other programs working to stop OV MDA by operationalizing the WHO guidelines.

A. ETHIOPIA

The Galabat-Metema cross-border focus between Ethiopia and Sudan has met the WHO criteria for interruption of OV transmission. This was accomplished by a combination of annual and semiannual ivermectin MDA and coordinated cross-border efforts. MDA was halted for about 1 million persons at the end of 2017 through a process of close collaboration and communication between the governments of both countries. Several lessons were learned from this experience, which has been reported by Katabarwa et al[iii]:

1. Ethiopia and Sudan established the Galabat-Metema focus as a cross border transmission area, also known as a "Special Intervention Zone", with a unique need for binational coordination of program activities. This structure provided a foundation on which trust was built that enabled data sharing between the two countries and alignment on the interpretation of results.
2. In Ethiopia, a buffer zone around the focus was included for data collection in the survey. A buffer zone is at least 20 km wide because this is the maximum distance that vectors are likely to disperse from their breeding sites and thus move from one foci to another. This ensures the area where MDA is being halted is separated from neighboring areas with ongoing transmission. This is also where cross border collaboration was very useful.
3. MDA was ultimately stopped despite the presence of a small entomological "hotspot" of continued transmission in Metema. Intensive MDA (four times per year) was ramped up for the roughly 15,000 residents in this hotspot, while comprehensive PTS is being conducted for recrudescence in the remainder of the focus. The concept of hotspot areas of residual transmission has also become an important concept in lymphatic filariasis, trachoma, and schistosomiasis MDA programs.



A map showing the buffer zone around the Galabat-Metema focus between Ethiopia and Sudan.
iii Katabarwa MN, Zarroug IMA, Negussu N, Aziz NM, Tadesse Z, Elmubark WA, et al. (2020)

BUFFER ZONE

A buffer zone is often created at least 20 km wide around the known areas of onchocerciasis endemicity because this is the maximum distance that vectors are likely to disperse from their breeding sites and thus move from one foci to another.

Participants gather at the Nigeria National Onchocerciasis Elimination Committee meeting

National Onchocerciasis Expert Committees (NOECs)

National onchocerciasis expert committees (NOECs) assist ministries of health in achieving verification of elimination of onchocerciasis, in line with World Health Organization guidelines, providing guidance and support for planning, programming and assessments to reach their elimination goals.

B. NIGERIA

After 25 years of annual ivermectin MDA, Nigeria, the country with the largest population at risk for human onchocerciasis in the world, made the decision to stop treatment in 2017 in two of its states with an estimated 7 million residents. The 2.2 million treatments that were stopped represent the largest stop MDA event for OV reported to date.[iv] It was the first stop OV MDA decision that used a black fly trap technology to collect the number of blackflies required to provide the evidence needed to make the decision. The Nigeria Onchocerciasis Elimination Committee approved the use of this trapping approach because vector densities were so low that programs were having trouble catching enough flies using traditional human landing capture methods. Further guidance on the use of traps is pending review for an upcoming WHO manual on entomology.

Another strategy employed by Nigeria is that in addition to evaluating the meso- and hyper-endemic areas, they also assessed bordering areas that might have had low-level transmission (hypo-endemic transmission) traditionally left untreated by the OV program. In this case, these hypo-endemic areas had been treated for lymphatic filariasis (LF) with annual ivermectin for a shorter period. As countries consider their potential OV transmission foci, co-endemic areas with hypo-endemic transmission and LF MDA may provide key opportunities in future OV and LF coordinated stop MDA assessments.

C. UGANDA

Uganda's OV elimination policy, overseen by a NOEC, used the strategy of including hypo-endemic communities in its MDA program. It also established cross border collaboration in foci sharing the border with DRC and South Sudan.

Additionally, in the 15 foci that have reached the criteria to stop OV MDA in Uganda, intervention focused on high treatment coverage (>85%) in every round of MDA, complimented by two other strategies: using ground larviciding where feasible and the 'slash and clear strategy'. Ground larvicide with Abate® was used in 9 foci, some of which were deemed hard-to-reach areas in which to achieve elimination of transmission by MDA alone due to protected national parks, poor infrastructure, and extreme weather conditions. 'Slash and clear' involves clearing trailing vegetation from rivers in order to reduce black fly breeding sites. This strategy has been shown to reduce the incidence of fly bites by at least 90%, effectively reducing transmission of the parasite, while the twice yearly ivermectin treatment accelerates the death of remaining adult worms in the humans. The utility of the 'slash and clear' strategy for villages situated within 2 kms of the river was demonstrated in operation research done by the Uganda national NTD program in collaboration with the University of South Florida, and will be rolled out in northern Uganda's Madi Mid North focus.

Finally, the Uganda program excelled at celebrating success as each focus reached key milestones in order to maintain community enthusiasm and political engagement. Marking these achievements has had the effect of motivating leaders in neighboring foci and has supported national OV advocacy.

'SLASH AND CLEAR' STRATEGY

'Slash and clear' involves clearing trailing vegetation from rivers in order to reduce black fly breeding sites.[v]

A breeding site where 'slash and clear' could be used to reduce black flies.

KEY TAKEAWAYS

Country programs working to stop OV MDA can apply lessons learnt from these examples from Ethiopia, Nigeria, and Uganda.

TAKEAWAY 1: SOLICIT EXPERTISE FROM A NATIONAL OV ELIMINATION COMMITTEE

A key recommendation from the WHO 2016 guidelines is to establish a national independent onchocerciasis oversight committee comprising national and international members to advise the country program on the OV elimination process. The committee can be highly responsive to the contextual needs of a country program and should convene at least annually to assess OV elimination progress and recommend enhanced interventions or stop MDA activities. Data is critical to this process and it is important to note that the committee needs results of routine field studies (especially mapping, O-150 PCR and OV16 ELISA surveys). OV elimination committees can also be established at a sub-national, focus-level, or cross-border level to encourage community engagement and provide insights on the elimination process. The examples above illustrate how these committees can provide strategic support and empower national programs to actively respond to their unique challenges. These committees play an essential role in OV elimination. A more comprehensive guide to the role of national committees in eliminating OV is available in a 2018 review by *Griswold et al*.[vi]

Students at a primary school in Cross River State, Nigeria receive medicines for NTDs during a mass drug administration.

Ministry of Health Vector Control Officer Vector Control Officer Mr. Ephraim Tukesiga examines black flies using a temporary field lab in Aura district, Uganda.

TAKEAWAY 2: RECOGNIZE THAT EVERY FOCUS IS UNIQUE AND INNOVATION MAY BE NEEDED

Every endemic focus will have different ecologic, geologic, and social conditions. These differences can result in unique transmission, behavioral, legal, financial, and security policies with implications for OV programs. At a technical level, a focus may be adjacent to unpopulated areas such as national parks or forest reserves, or on international borders with one or more OV-endemic countries. These situations require flexibility and broad collaboration in the approaches for unimpeded progress toward OV elimination. The examples provided above show how countries utilized innovative and individually creative approaches including ground larviciding, and 'slash and clear', cross border collaboration, buffer zones, identification of small hotspots for continued treatment at a micro level, and black fly traps to address challenges they were faced with.

TAKEAWAY 3: CELEBRATE PROGRESS AT THE SUBNATIONAL LEVEL

Celebrating progress, even at a focus level, reinforces the success of programs and reminds affected communities and their leaders that they are no longer at risk of acquiring the disease and can plan their future with confidence. This can motivate leaders in neighboring foci, provide national advocacy for continued support, and help reduce rumors and hearsay associated with OV programs because celebration activities can include information that negates unsubstantiated transmission reports.

CONCLUSION

The experiences outlined in this brief provide evidence that OV elimination is feasible in African settings. Focal context, monitoring, and unique implementation of OV elimination strategies are paramount. Evidenced-based decisions can be facilitated by the existence of NOECs as country programs approach Stop OV MDA status. It is also important to acknowledge and advocate for elimination milestones that allow program managers to plan the future of OV elimination with confidence.

ACKNOWLEDGMENTS

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