

The role of national committees in eliminating onchocerciasis

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National onchocerciasis elimination committees (NOECs) serve to help ministries of health complete the pathway to successful verification of elimination of onchocerciasis (river blindness), as outlined in the 2016 World Health Organization guidelines. These guidelines, however, only take effect when the country believes it has reached a point that elimination can be demonstrated, and do not address the preceding milestones. Therefore, NOECs can be of great help with guiding and tailoring earlier planning, programming and assessments to empower national programs to aggressively move toward their countries' elimination goals. In this article, we provide suggestions for organizing NOECs and examples of four such committees that have successfully operated in Africa and the Americas.

Keywords: Disease elimination, Ethiopia, Guatemala, Nigeria, Onchocerciasis, Uganda

Introduction

The World Health Organization's (WHO's) 2016 guidelines for elimination of onchocerciasis describe three major phases of the elimination process: Phase 1, identifying, treating and demonstrating interruption of transmission of onchocerciasis, eventually stopping mass drug administration (MDA), followed by Phase 2, the 3–5-year post-treatment surveillance (PTS) period, and ending with Phase 3, the preparation of the national dossier to submit to WHO and hosting an international verification team (Figure 1).¹ The guidelines deal almost exclusively with the end-phase of the elimination process; therefore, countries may struggle to determine when elimination is imminent. For many years, such technical guidance and expertise were provided to many African countries through the WHO/World Bank African Program for Onchocerciasis Control (APOC), largely through its Joint Action Forum and Technical Consultative Committee.² APOC ended in 2015, just before WHO's new guidelines were released.

The WHO guidelines also call for countries to establish 'an oversight committee independent from the national program to address matters concerning onchocerciasis elimination.'¹ These national onchocerciasis elimination committees (NOECs) could fill the gap left by the closure of APOC, and steer national programs through

the milestones and strategies needed to reach the end-phase of the elimination process, where the guidelines become most useful. However, there is no guidance on how these committees function with respect to national onchocerciasis programs, what their composition might be or in what way they are independent; nor does it give examples of successful NOECs that could be of help in forming new committees. In this article, we describe our insights from nearly a decade's experience developing and supporting four NOECs, specifically those in countries assisted by the Carter Center and its partners, in the hope that other countries will benefit from their experiences when establishing their own committees.

The terms of reference for the national onchocerciasis elimination committee

The first task for the Ministry of Health is to establish the terms of reference (TOR) for the committee. The TOR address the primary tasks of the NOEC, as well as administrative, technical and other functions. Although independent from the national program, the committee should be positioned to constructively fit into the ministry's structures, and should report its findings and

recommendations to the appropriate levels of government leadership. The ministry’s guidance is essential for determining the appropriate structure, size and role of the committee to effectively accomplish its TOR. Partners, WHO, and international experts often collaborate when developing the TOR. A list of elements that could be part of a NOEC’s TOR are included in Box 1.

A key feature of the TOR is a clear definition of the committee’s roles and responsibilities. For instance, NOECs could assess the status of and provide guidance for subnational (state or district) programming. The NOEC could recommend more frequent rounds of MDA, or investment in the WHO-stipulated serological and entomological assessments needed for the stop MDA decision. To help direct the program, the

committee may describe how it would want to see data organized and analyzed. The NOEC should feel at liberty to recommend additional surveys and programmatic adjustments where necessary to supplement existing data.

The TOR should cover the frequency of the meetings, disposition of reports, press releases, administrative responsibilities for arranging committee members’ travel, per diem and honorarium policies, and financing. The TOR is also critical in establishing the secretariat of the committee, and maintaining institutional memory and reporting channels even when personnel change over time.

Composition of NOECs

The composition of the committee requires careful thought and the TOR should indicate the constellation of membership (national, international, at-large, institutional), the roles of the members and observers, voting rights and procedures, terms of service and renewal, and obligations of the parties related to attendance. Members may be named outright in the TOR, or remain unnamed and appointed later. There should be a strong presence of technical staff from the ministry who are actively involved in the program, but NOECs are an excellent way to build relationships and improve dialogue between the national program, ministry leadership, the research community, and the various non-governmental organization (NGO) partners working on onchocerciasis elimination in the country. NGO partners and researchers enhance the discussion through their diverse perspectives and relative independence from the established government bureaucracy.³ However, such a broad composition of members—ministry of health (MoH) federal-, state- or district-level personnel, and local university staff with an interest in NTDs—while valuable, can sometimes make the committee too large and unwieldy. One compromise is to broadly offer an observer status to encourage

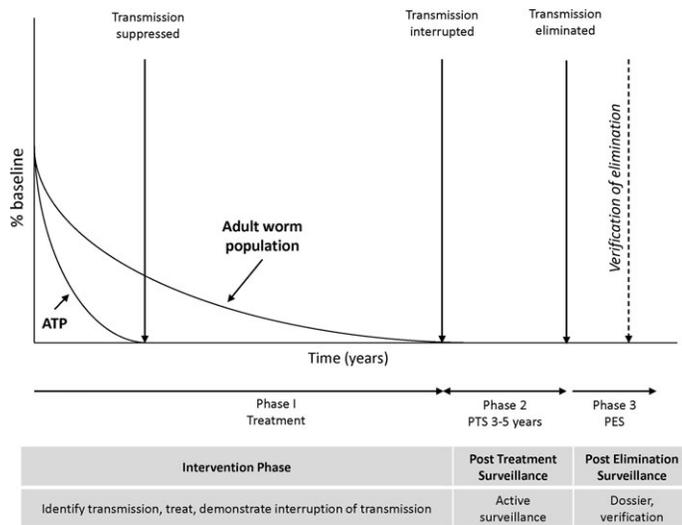


Figure 1. Phases of onchocerciasis elimination from 2016 WHO Guidelines.¹

Box 1. Example of core ‘terms of reference’ for a National Onchocerciasis Elimination Committee

Possible obligations of a NOEC to be described in its terms of reference:

- Provide technical advice on onchocerciasis elimination to the Federal Ministry of Health (FMOH), including recommending enhanced interventions (twice-per-year treatment, vector control), where deemed necessary to accelerate progress towards the target date for elimination.
- Develop a national guideline and roadmap document for onchocerciasis elimination prepared with careful consideration to the WHO guidelines. Create a color-coded ‘oncho flag’ and national map that helps visualize the challenges.
- Meet at least annually to assess the national program and transmission focus by focus (or district by district), review new data and recommend programmatic adjustments.
- Recommend to the FMOH those subnational areas where stop MDA assessments should be conducted, as described in the WHO guidelines.
- Recommend post-treatment surveillance (PTS) activities during the 3- to 5-year PTS period as described in the WHO guidelines.
- Be familiar with the activities of national lymphatic filariasis elimination program if it is also using ivermectin MDA and, if possible, coordinate assessments and PTS activities where there is overlap in endemicity.
- Prioritize specimen collections and laboratory work to have key data available for consideration by NOEC at its scheduled meetings.
- Help the FMOH maintain a data repository necessary for the preparation of the country dossier for WHO verification of interruption of onchocerciasis transmission nationwide. Encourage and assist in the publication of papers that document progress in peer-reviewed journals and issue press releases when major NOEC recommendations are made.
- Be an advocate for the national program and help seek financing to support it.

participation, but limit the number of voting members. The ability of the committee to invite expert observers is paramount, but generally only the MoH should have the authority to appoint new voting members.

The experience and knowledge of other, more mature NOECs are a wealth of information for new committees. If possible, members from other NOECs should attend early meetings as observers and be invited to make presentations describing their own experiences. For the committees supported by the Carter Center, a key feature has been the presence of observers from the WHO country office and the Mectizan® Donation Program. This allows international bodies to contribute to recommendations and understand new requests in drug applications (especially reasoning for twice-per-year treatment). WHO, as the verifying agency, often (but not always) prefers to be a non-voting observer to avoid any appearance of conflict of interest when it, hopefully, independently verifies elimination in the future.

Reporting mechanisms and action on NOEC recommendations

All countries have different hierarchies in their ministries of health, and these must be respected if recommendations are to be positively received and acted on by decision-makers. How the ministry interacts with the committee must be determined on a country-by-country basis. Early engagement with senior ministry personnel is crucial and their early buy-in is key to rapid uptake of committee recommendations. Having senior MoH officials open, attend, and close the meetings can help build such buy-in and raise the NOEC's profile. At the same time, the independence and technical versatility of the committee should be preserved so that it is not seen as a 'rubber stamp' for MoH positions that may run counter to the onchocerciasis elimination agenda. In all cases, however, staff from all levels of the ministry serve as voting members and MoH officials should always serve as secretary or co-secretary to the NOEC. These arrangements help to ensure committee recommendations are drafted with national sensitivities in mind, considered helpful and ultimately implemented.

Establishing a committee culture

In our experience, it generally takes two meetings (of several days each) for the NOEC to both understand the scope of its TOR and develop the trust needed amongst members to establish frank and honest debate. Generally, the initial discussions focus on 'safer' topics, such as developing a scientific and technical understanding of the WHO guidelines, and its roadmap to verification of elimination and the experiences of other committees. The NOEC will quickly note that the WHO guidelines only come into play at the point of the decision to stop MDA. The guidelines are silent on initial signals that transmission may be ending or on the criteria for deciding where treatment should begin in hypoendemic transmission situations. Therefore, the committee must establish how it will go about classifying parts of the country on the WHO continuum (Figure 1) with respect to 'active transmission,' 'suppression of transmission' and 'suspected interruption,' in which case a recommendation could be made for conducting a full 'stop MDA'

survey (at which point WHO guidelines stipulate the required course of action). Essentially, a task for the NOEC is to interpret all the onchocerciasis data that are available. The committee could, in response to treatment coverage figures and epidemiological data, call for increased interventions (such as twice-per-year treatment) in areas that are performing poorly, or call for rapid mapping in potential transmission areas that are untreated. In other words, the committee culture is established as one of great urgency and flexibility in its scientific, strategic and programmatic decisions. Recommendations need to be realistically prioritized, based on the resources that are available from donors and the country itself for surveys, laboratory testing and heightened interventions.

National committees offer a richness of 'place', i.e., highly contextual knowledge and experience, which regional or international committees do not enjoy. NOEC meetings allow field workers to come from far and wide to participate, and allow them to present not only highly detailed data, but personal experiences from their programs ('lessons from the field'). These are supplemented by the 'at large' national and international members, who are often able to more clearly point out the strategic challenges to and global perspective on the path towards onchocerciasis elimination. The committee culture then becomes one of cross-fertilization of perspectives that leads to invaluable synergistic and creative approaches. International experts can re-examine their own positions when faced with a country's unique circumstances and epidemiology, and take those experiences forward to enhance regional and global deliberations.

A national guideline with classification of endemic areas

Reviewing national guideline documents generated by other committees (such as Uganda, Ethiopia and Nigeria) can stimulate the new NOEC to 'domesticate' the WHO guidelines to its own country's context. Some NOEC TORs stipulate that the committee should write or rewrite their national guidelines structured around a categorized listing of endemic areas. The national guideline would indicate the kinds of assessments (mapping, impact, stop MDA, PTS) and/or interventions (once-per-year MDA, twice-per-year MDA, supplemental vector control, etc.) needed for each category. Sometimes referred to as 'the oncho flag,' the line listing is usually color coded (Figure 2). A color-coded map of all transmission areas in the country is another useful tool (Figure 3). The NOEC may need to develop a working definition of a transmission zone that is relevant to its country's context and data sets, which will facilitate where and when interventions are deployed. A review of all available data for these operational areas should allow the committee to create such tools and to track the sub-national status of the program. Such an analysis, especially when conducted early on, can avoid duplication or premature surveys.

As the NOEC matures, a portion of each meeting focuses on updating the map and flag (in fact, an annual update of these may be stipulated in the TOR). This is done by requiring standardized presentations for each endemic area or focus at each NOEC meeting. The presentations should ideally be made by MOH personnel working on onchocerciasis in those areas and should contain the latest treatment coverage, the results of recent assessments, reports on co-endemicity with *Loa loa* and lymphatic filariasis

**Status of Onchocerciasis Transmission by Focus in Uganda
The Uganda "Oncho Flag"**

2008

Dark Green = Eliminated
Light Green =Transmission Interrupted
Greyish Green =Interruption Suspected
Red =Transmission Ongoing

No.	Focus	Vector	District	# MDA annual rounds	# of MDA semi annual	Total Pop	Planned Annual Tx's 2008	Planned Semi-Annual Tx's 2008	Status of Transmission	Yr of elimination	Plan for MDA	Plan for Larviciding	Larviciding Start/End
1	Victoria	S.damnosum	Jinja	N/A	N/A	198,160			Eliminated	1973	No need	No need	
			Mukono	N/A	N/A	387,707			Eliminated	1973	No need	No need	
			Kamuli	N/A	N/A	268,046			Eliminated	1973	No need	No need	
			Mayuge	N/A	N/A	156,714			Eliminated	1973	No need	No need	
			Kayunga	N/A	N/A	142,565			Eliminated	1973	No need	No need	
2	Itwara	S.neavei	Kabarole	18	N/A	23,881	23,881		Interrupted		Annual	Status post	/2003
			Kyenjojo	18	N/A	58,382	50,788		Interrupted		Annual	Status post	/2003
3	Mpamba-Nkusi	S.neavei	Kibale	15	N/A	128,456	124,655		Interrupted		Annual	Status post	/2006
4	Wadelai	S.neavei	Nebbi	13	5	15,300	12,838	25,676	Interrupted		Semi-Annual	not done	No need
5	Imaramagambo	S.neavei(?)***	Bushenyi	16	N/A	84,119	65,408		Interrupted		Annual	not done	No need
6	Kashoya-Kitomi	S.neavei	Bushenyi	14	3	120,697	99,860	199,720	uncertain		Semi-Annual	Vector Elimination	2007/
			Ibanda	14	3	21,218	17,857	35,714	uncertain		Semi-Annual	Vector Elimination	2007/
			Kamwenge	16	3	28,294	31,582	63,164	uncertain		Semi-Annual	Vector Elimination	2007/
7	Mt. Elgon	S.neavei	Manafwa	13	3	36,622	30,393	60,786	uncertain		Semi-Annual	Vector Elimination	2008/
			Mbale	13	3	42,880	34,991	68,074	uncertain		Semi-Annual	Vector Elimination	2008/
			Sironko	13	3	68,212	57,810	115,620	uncertain		Semi-Annual	Vector Elimination	2008/
			Bududa	13	3	139,996	115,666	231,372	uncertain		Semi-Annual	Vector Elimination	2008/
8	Wambabya-Rwamonyi	S.neavei	Holima	14	3	67,285	56,868	113,736	ongoing		Semi-Annual	Vector Elimination	pending
			Masindi	14	3	41,786	34,752	69,504	ongoing		Semi-Annual	Vector Elimination	pending
9	Budongo	S.neavei	Bullisa	14	3	23,468	20,159	40,318	ongoing		Semi-Annual	Vector Elimination	pending
			Holima	14	3	68,211	57,248	114,496	ongoing		Semi-Annual	Vector Elimination	pending
10	Kigezi-Bwindi	S.neavei/ S.damnosum	Kabale	13	3	26,121	21,294	42,588	ongoing		Semi-Annual	Vector Control	pending
			Kanungu	13	3	50,798	41,300	82,600	ongoing		Semi-Annual	Vector Control	pending
			Kisoro	13	3	32,504	26,618	53,236	ongoing		Semi-Annual	Vector Control	pending
11	Maracha-Terego	S.neavei/S.damnosum	Maracha-Terego	16	N/A	170,377	136,302		ongoing		Annual		
12	Okoro/Nyagak	S.neavei	Nebbi	15	N/A	218,891	175,145		ongoing		Annual		
13	Bondo /Arua	S.neavei/S.damnosum	Arua	16	N/A	314,948	307,266		ongoing		Annual		
14	Oboongi / Moyo	S.neavei	Moyo	15	N/A	17,349	13,778		ongoing		Annual		
15	Lubilla	S.damnosum	Kasese	15	N/A	105,253	94,303		ongoing		Annual		
16	Nyamugasani	S.damnosum	Kasese	15	N/A	9,221	8,436		ongoing		Annual		
17	Madi	S.damnosum	Moyo	15	N/A	172,882	134,188		ongoing		Annual		
			Adjumani	15	N/A	179,791	153,983		ongoing		Annual		
18	West Nile	S.neavei/S.damnosum	Yumbe	16	N/A	286,615	229,292		ongoing		Annual		
			Koboko	16	N/A	167,076	133,661		ongoing		Annual		
			Arua	16	N/A	138,063	134,696		ongoing		Annual		
			Nebbi (Padyere)	15	N/A	89,574	71,660		ongoing		Annual		
19	Mid-North	S.damnosum	Oyam	15	N/A	16,466	13,467		ongoing		Annual		
			Gulu	15	N/A	99,898	82,678		ongoing		Annual		
			Amuru	15	N/A	102,236	84,163		ongoing		Annual		
			Pader	N/A	N/A	????	????		ongoing		Annual		
			Kiigum	N/A	N/A	????	????		ongoing		Annual		
Total						4,320,262	2,696,986	1,316,604					

N.B: Population figures as of August 2008

* Pending Evaluation

???? Population figures still unknown

*** No crab found

Figure 2. The Uganda 'Oncho Flag.' Progress of 17 foci from 2008 to 2016. Each row represents a discrete entity within the numbered foci. Note the change from a preponderance of red to green over time as progress toward elimination gains momentum.

(when present), relevant national or international cross-border issues, and any pertinent extraordinary considerations (e.g., research, security, migration, staffing, culture or geography). Committee recommendations are grouped into the general and the specific, the latter concerning subnational, even district-level, details. As the program progresses, flag colors evolve to reflect progress from active transmission (for example, red) toward elimination (here, green—see Figure 2). The NOEC may recommend the program focuses on areas where 'quick wins' can be achieved to build confidence and enthusiasm, while not ignoring the most difficult scenarios.

Operational research and laboratory support

Discussion amongst NOEC members and observers can identify what operational research is needed and prioritize specific areas for these special activities. In such circumstances, ministry buy-in will be essential to ensuring that the work is completed in a timely fashion. Presentation of results at future committee meetings is a valuable learning opportunity and provides motivational experience for local staff. Some of the operational research proposed by the committee may address matters relevant to other countries, or to WHO scientific committees developing regional or international policy. The international representatives on NOECs

2016

Dark Green = Eliminated
 Light Green = Transmission Interrupted
 Greyish Green = Interruption Suspected
 Red = Transmission Ongoing

No.	Focus	Vector	District	# MDA annual rounds	# of MDA semi annual rounds	Total Pop (original-2011)	Total Pop 2016	Planned Annual Tx 2016	Planned Semi-Annual Tx 2016	Status of Transmission	Yr of elimination	Plan for MDA treatment	Larviciding (years)	LF Status	TAS1 date	Date of PTS start	Cross border	
1	Victoria	<i>S.damnosum</i>	Jinja	N/A	N/A	198,160	539,498			Eliminated	1973	None	Vec elim (??-??)		NA			
			Mukono	N/A	N/A	387,707	595,236			Eliminated	1973	None	Vec elim (??-??)		NA			
			Kamuli	N/A	N/A	268,046	542,173			Eliminated	1973	None	Vec elim (??-??)		NA			
			Mayuge	N/A	N/A	156,714	502,881			Eliminated	1973	None	Vec elim (??-??)		NA			
			Kayunga	N/A	N/A	142,565	370,254			Eliminated	1973	None	Vec elim (??-??)		NA			
3	Mpamba-Nkusi	<i>S.neavei</i>	Kibale	17	8	190,305	216,275			Eliminated	2016	PTS	Vector Elimination		NA	Nov 2012		
4	Itwara	<i>S.neavei</i>	Kabarole	20	2	30,689	37,361			Eliminated	2016	PTS	Vector Elimination		NA	?? (2011)		
			Kyenjojo	20	2	63,850	77,731			Eliminated	2016	PTS	Vector Elimination		NA	?? (2011)		
5	Mt. Elgon	<i>S.neavei</i>	Manafwa	15	8	40,604	46,145			Eliminated	2016	PTS	Vector Elimination		NA	Nov 2011		
			Mbale	15	8	50,253	57,111			Eliminated	2016	PTS	Vector Elimination		NA	Nov 2011		
			Stronko	15	8	76,375	86,797			Eliminated	2016	PTS	Vector Elimination		NA	Nov 2011		
			Bududa	15	8	161,630	183,686			Eliminated	2016	PTS	Vector Elimination		NA	Nov 2011		
6	Imaramagambo	<i>S.neavei</i>	Bushenyi	18	0	102,180	116,124			Eliminated	2016	PTS	Not done		NA	?? (2012)		
2	Wadefai	<i>S.neavei</i>	Nebbi	15	8	17,739	22,351			Interrupted (2010)		LF treatment	Not done		NA	2016	Nov 2010	
7	Kashoya-Kitomi	<i>S.neavei</i>	Buhweju	16	13	60,255	63,925			Interrupted (2013)		PTS	Vector Elimination		NA	Nov 2013		
			Rubirizi	16	13	77,250	81,955			Interrupted (2013)		PTS	Vector Elimination		NA	Nov 2013		
			Ibanda	16	13	26,144	27,736			Interrupted (2013)		PTS	Vector Elimination		NA	Nov 2013		
			Kamwenge	18	13	45,626	48,405			Interrupted (2013)		PTS	Vector Elimination		NA	Nov 2013		
8	Wambabya-Rwamara	<i>S.neavei</i>	Hoima	16	13	75,733	80,345			Interrupted (2013)		PTS	Vector Elimination		NA	Nov 2013		
11	Maracha-Terego	<i>S.neavei/S.damnosum</i>	Maracha-Terego	19	0	170,377	193,582			Interrupted (2012)		LF treatment	Not done		NA	2015		
13	Obongi / Moyo	<i>S.neavei/S.damnosum</i>	Moyo	20	0	37,392	39,825			Interrupted (2014)		PTS	Not done		NA	2015	May 2014	
15	Nyamugasani	<i>S.sebwe</i>	Kasese	21	0	10,664	11,709			Interrupted (2015)		PTS	Not done		NA	May 2015		
9	Budongo	<i>S.neavei</i>	Masindi	17	19	47,747	52,428		85,710	Interruption Suspected		Semi-Annual	Vector Elimination		NA			
			Bullisa	17	19	27,123	33,375		57,700	Interruption Suspected		Semi-Annual	Vector Elimination		NA			
			Hoima	17	19	75,325	80,115		132,586	Interruption Suspected		Semi-Annual	Vector Elimination		NA			
10	Bwindi	<i>S.neavei/S.damnosum</i>	Kabale	17	19	29,428	32,313		51,456	Interruption Suspected		Semi-Annual	Vector Control		NA		Yes (DRC)	
			Kanungu	17	19	56,735	62,297		100,880	Interruption Suspected		Semi-Annual	Vector Control		NA		Yes (DRC)	
			Kisoro	17	19	36,273	39,829		64,244	Interruption Suspected		Semi-Annual	Vector Control		NA		Yes (DRC)	
12	Nyagak Bondo	<i>S.neavei</i>	Nebbi	20	9	125,148	137,416		224,084	Interruption Suspected		Semi-Annual	Vector Control		LF		Yes (DRC)	
			Zombo	20	9	242,494	244,755		404,212	Interruption Suspected		Semi-Annual	Vector Control		LF		Yes (DRC)	
			Arua	20	9	160,844	180,868		307,402	Interruption Suspected		Semi-Annual	Vector Control		LF		Yes (DRC)	
17	West Nile	<i>S.neavei/S.damnosum</i>	Yumbe	22	0	286,615	304,070	258,459		Interruption Suspected		Annual	Not done		LF		Yes (RSS)	
			Koboko	22	0	167,076	177,251	150,663		Interruption Suspected		Annual	Not done		LF		Yes (DRC & RSS)	
14	Lhubitha	<i>S.sebwe & S.alibaram</i>	Kasese	20	5	119,407	131,113		216,618	ongoing		Semi-Annual	Vector Control		NA		Yes (DRC)	
18	Madi Mid North	<i>S.damnosum</i>	Pader	6	7	239,990	186,756		312,546	ongoing		Semi-Annual	Vector Control Feasibility		LF			Yes (RSS)
			Kiigung	6	7	132,748	104,626		175,984	ongoing		Semi-Annual	Vector Control Feasibility		LF			Yes (RSS)
			Lanwo	6	7	126,457	142,560		234,988	ongoing		Semi-Annual	Vector Control Feasibility		LF			Yes (RSS)
			Gulu	19	7	190,580	332,570		570,640	ongoing		Semi-Annual	Vector Control Feasibility		LF			Yes (RSS)
			Amuru	19	7	62,293	231,476		370,880	ongoing		Semi-Annual	Vector Control Feasibility		LF			Yes (RSS)
			Nwoya	19	7	96,465	149,467		253,930	ongoing		Semi-Annual	Vector Control Feasibility		LF			Yes (RSS)
			Oyam	19	7	21,388	23,147		39,680	ongoing		Semi-Annual	Vector Control Feasibility		LF			Yes (RSS)
			Lira	3	7	35,166	75,614		131,240	ongoing		Semi-Annual	Vector Control Feasibility		LF			Yes (RSS)
			Moyo	20	5	86,017	88,086		153,794	ongoing		Semi-Annual	Vector Control Feasibility		LF			Yes (RSS)
			Adjumani	20	5	17,896	27,756		45,842	ongoing		Semi-Annual	Vector Control Feasibility		LF			Yes (RSS)
			Total				655	329	4,773,273	6,778,993	409,123	3,934,376						

N.B: Population figures as of August 2016
 DRC = Democratic Republic of Congo
 RSS = Republic of South Sudan

Figure 2. Continued

can convey these methods and findings to the broader community, as well as bring back useful insights to their NOEC from other contexts.

Laboratory-based tests are essential for making the decision to stop MDA and for verification. Ensuring access to reliable and quality laboratory services for PCR and ELISA should be considered early on by the NOEC.⁴ While regional and international reference laboratories are crucial for quality control and expertise, they cannot be expected to be at the beck and call of each country's NOEC schedule or NTD work plan. Furthermore, samples cannot always be shipped internationally. The Carter Center has helped Uganda, Ethiopia, Nigeria, and Guatemala establish laboratories capable of conducting the WHO-required tests for their onchocerciasis elimination programs. NOECs in those countries are at liberty to establish priorities for specimen testing to ensure that laboratory reports are available for the appropriate NOEC meetings for rapid, efficient decision making. Committees

that are established soon after the switch from control to elimination strategies are better able to prioritize testing needs in the short and long term, as countries progress from understanding their status to planning to stop MDA and confirming elimination.

The role of the secretariat to the NOEC

The role of the secretariat in preparing for the NOEC's meetings is vital. Given the critical need for information and the limited time available for meetings, the data presented to the NOEC must be understandable, accurate and current. Collating, analyzing and cleaning data so that it stands up to scrutiny from an expert audience is a strenuous yet valuable growth opportunity for all involved. The secretariat and the NOEC chair will need to take active roles in requesting data, presentations and other

Table 1. Four examples of national onchocerciasis elimination committees

	Ethiopia	Guatemala	Nigeria	Uganda
Meeting frequency	Annually	Every trimester	Semi-annually	Annually
Year established	2014	2014	2015	2008
Leadership	<ul style="list-style-type: none"> Chair is non-Ethiopian and an international expert. Co-secretaries are NTD coordinator and the country representative from the Carter Center (who is responsible for funding, in-country travel, meeting logistics); both are non-voting members. Supporting NGOs (the Carter Center and Lions) are responsible for funding the committee meetings. 	<ul style="list-style-type: none"> Chair is Guatemalan and the director of vector-borne diseases of the MoH. Secretary is from the MoH Vector Borne Disease Section. Supporting NGO (the Carter Center/OEPA) assists in logistical support for the committee meetings. 	<ul style="list-style-type: none"> Chair is Nigerian and an international expert. Secretary is from the FMOH onchocerciasis program. Supporting NGOs (the Carter Center, RTI/ENVISION and Sightsavers) are responsible for co-funding and travel related to the meeting. The Carter Center and FMOH are responsible for logistics in support of the committee meetings. 	<ul style="list-style-type: none"> Chairs have been non-Ugandan international experts. Co-secretaries are national onchocerciasis program coordinator (who has voting power in some cases) and the country representative from the Carter Center (responsible for funding, in-country travel and meeting logistics). Supporting NGOs (The Carter Center, Sightsavers and RTI/ENVISION) are responsible for funding and international travel.
Membership	<ul style="list-style-type: none"> One representative from each of the five endemic regions. Representatives from other EPHI and FMOH. Representatives from Ethiopian academia with experience in onchocerciasis. Representatives from implementing NGOs. Four at-large members. LF coordinator as an observer. Broadly open to observers, including donors and WHO. 	<ul style="list-style-type: none"> Eight government members representing different national and district health entities. Observer status for OEPA, WHO/PAHO and two universities with previous research work in onchocerciasis. 	<ul style="list-style-type: none"> Members appointed by the MoH include primarily university professors with technical experience and supporting NGO implementing partners. Two international representatives, one with experience on other committees, the other with laboratory experience. Broadly open to observers, including donors and WHO. 	<ul style="list-style-type: none"> Ten voting members, including two from endemic districts. Representatives of NGOs assisting the national program. LF coordinator as an observer. Broadly open to observers, including donors and WHO.
Role within MoH	<ul style="list-style-type: none"> Makes recommendations to the Disease Prevention and Control Directorate and the FMOH NTD case team. 	<ul style="list-style-type: none"> A MoH <i>ad hoc</i> committee with non-government observers. Makes recommendations directly to the Minister of Health and Social Welfare to support the WHO verification of elimination of onchocerciasis in Guatemala. 	<ul style="list-style-type: none"> Makes recommendations directly to the Minister of Health. 	<ul style="list-style-type: none"> Makes recommendations to the national elimination committee, which then advises the Commissioner of the National Disease Control program.
Examples of major activities to date	<ul style="list-style-type: none"> Developed national onchocerciasis elimination guidelines. Recommended scale up to twice per year MDA. Developed standard operating procedures for mapping, epidemiological 	<ul style="list-style-type: none"> Prepared dossier for WHO. Point of contact for the WHO International verification team and played major role in the logistics of the IVT visit. 	<ul style="list-style-type: none"> Developed national onchocerciasis elimination guidelines. Categorized states by endemicity using data available and ONCHOSIM modeling results.⁵ 	<ul style="list-style-type: none"> Developed national onchocerciasis elimination guidelines, including new entomological guidelines for <i>S. neavei</i> vector elimination areas. Established 'oncho flag' that was updated annually

Continued

Table 1. Continued

Ethiopia	Guatemala	Nigeria	Uganda
and entomological studies. • Recommended new mapping studies. • Prioritized laboratory studies to be conducted.	• Helped the MoH coordinate national celebrations of elimination.	• Made recommendations for twice per year treatment in many areas. • Established a plan for a five-state, coordinated stop-MDA study. • Established nationwide sampling sites for entomology and OV16 surveys.	to monitor progress of the 17 foci. • Recommendations to stop treatment made as indicated by data. ^{6,7} • Prioritized lab studies to be conducted. • Coordinating stop MDA and post-treatment surveillance with the LF program.

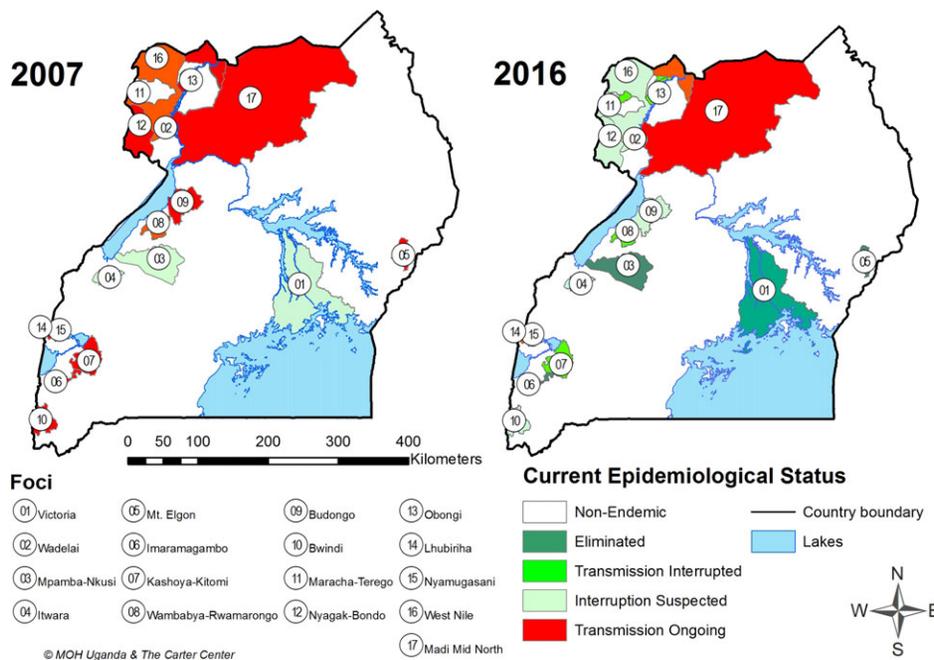


Figure 3. The Uganda ‘Oncho Map.’ Progress of Ugandan foci from 2007 (left) to 2016 (right). Note the shift from red to green as foci suppress, then interrupt transmission and enter post-treatment surveillance.

documentation well in advance, and coaching the presenters when necessary. Carter Center staff often assist the MoH in this process. Although challenging, the result is an efficient and effective meeting that generates meaningful recommendations.

Interaction of the NOEC with other programs and partners

The NOEC agendas frequently include time for ‘updates from partners’, during which concise, but informative presentations can be made by WHO, NGO partners, researchers, donors and the Mectizan Donation Program. Important updates from the MoH focal person for lymphatic filariasis (LF) should be made concentrating on where LF and onchocerciasis are co-endemic, since both programs

use the same medicine (ivermectin for onchocerciasis, ivermectin +albendazole for LF).^{8,9} The interaction between the onchocerciasis and LF programs is essential since historically these programs have been poorly coordinated,¹⁰ and the PTS period for onchocerciasis is affected by LF MDA. The NOEC should be an important forum for the development of plans to schedule LF and onchocerciasis assessments efficiently and in a coordinated manner. Transmission of onchocerciasis may cross international borders and NOECs may wish to invite MoH officials from other countries to its meeting to describe activities on their side of the border.

Four examples of established NOECs

Many countries have or are in the process of establishing a NOEC. The Carter Center’s country offices have supported and

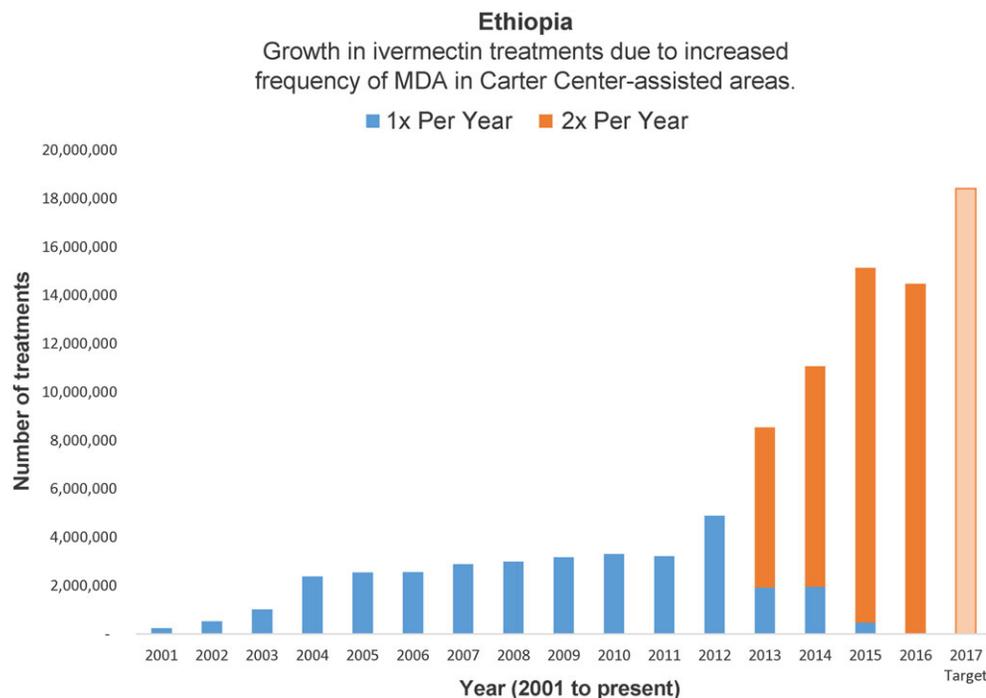


Figure 4. Growth in ivermectin treatments in the Carter Center Ethiopia's program following change to elimination strategy and widespread twice-per-year treatment. The value for year 2017 is only a target.

engaged with NOECs in four countries by providing important co-secretariat, financial and logistical support for the committee meetings. A summary of key features of these four countries' committees is provided in Table 1.

Uganda

Uganda's President Yoweri Museveni launched the nationwide onchocerciasis elimination strategy in 2007, which was immediately followed in 2008 by the inauguration of the Uganda Onchocerciasis Elimination Expert Advisory Committee (UOEEAC). The UOEEAC advises the Uganda Ministry of Health (UMOH) and sends its recommendations to the UMOH's National Certification Committee, which was originally established to oversee the guinea worm and polio eradication programs. Members include independent national and international experts; WHO observers have included representatives from the WHO Uganda office, WHO Geneva Headquarters and APOC. The UOEEAC's major responsibility is to evaluate the status of the 17 transmission zones (foci) of onchocerciasis in Uganda.

The hallmark from the first meetings was agreement on key criteria related to PTS activities in areas where the vector had been eliminated. In 2009, the committee drafted a national guideline that addressed *Simulium neavei* transmission zones; the committee found that the 2001 WHO guidelines (which focused on *S. damnosum* s.l.) were inadequate for this task.¹¹ The committee also broke new ground in recommending vector control activities in many areas to supplement MDA.

As one of the first NOECs formally established in Africa, the committee had to deliberate, and unify various early criteria

and norms proposed in several key WHO and APOC documents and reports of successful elimination.^{11–15} Each focus was then reviewed by the UOEEAC based on the most recent entomological, parasitological and serological data, as well as the history of vector elimination/control and MDA against these diverse criteria. A national onchocerciasis molecular lab established within the UMOH played a key role in this effort.⁴ A color-coded 'oncho flag' and corresponding map were then developed (Figures 2 and 3). Each year the committee reviews and updates the 'flag' and the map, focus by focus. At the ninth UOEEAC meeting, held in August 2016, the committee reviewed post-treatment surveillance reports and recommended that the UMOH classify four foci as having met the WHO criteria for elimination. These areas, with an estimated population of over 800,000, represent the largest number of persons in any country in the world to be so declared based on WHO guidelines.

The UOEEAC has paid attention to cross-border transmission issues and invited MoH officials from the Democratic Republic of Congo (DRC) and the Republic of South Sudan to several of its meetings. The forum provided by UOEEAC for cross-border cooperation enabled a successful binational assessment by Ugandan and DRC health professionals in April 2016.

Ethiopia

The Ethiopia Onchocerciasis Elimination Expert Advisory Committee (EOEEAC), an official advisory group to the Federal Ministry of Health of Ethiopia (FMOHE), held its first meeting in 2014. The Honorable State Minister of Health presided over the first EOEEAC

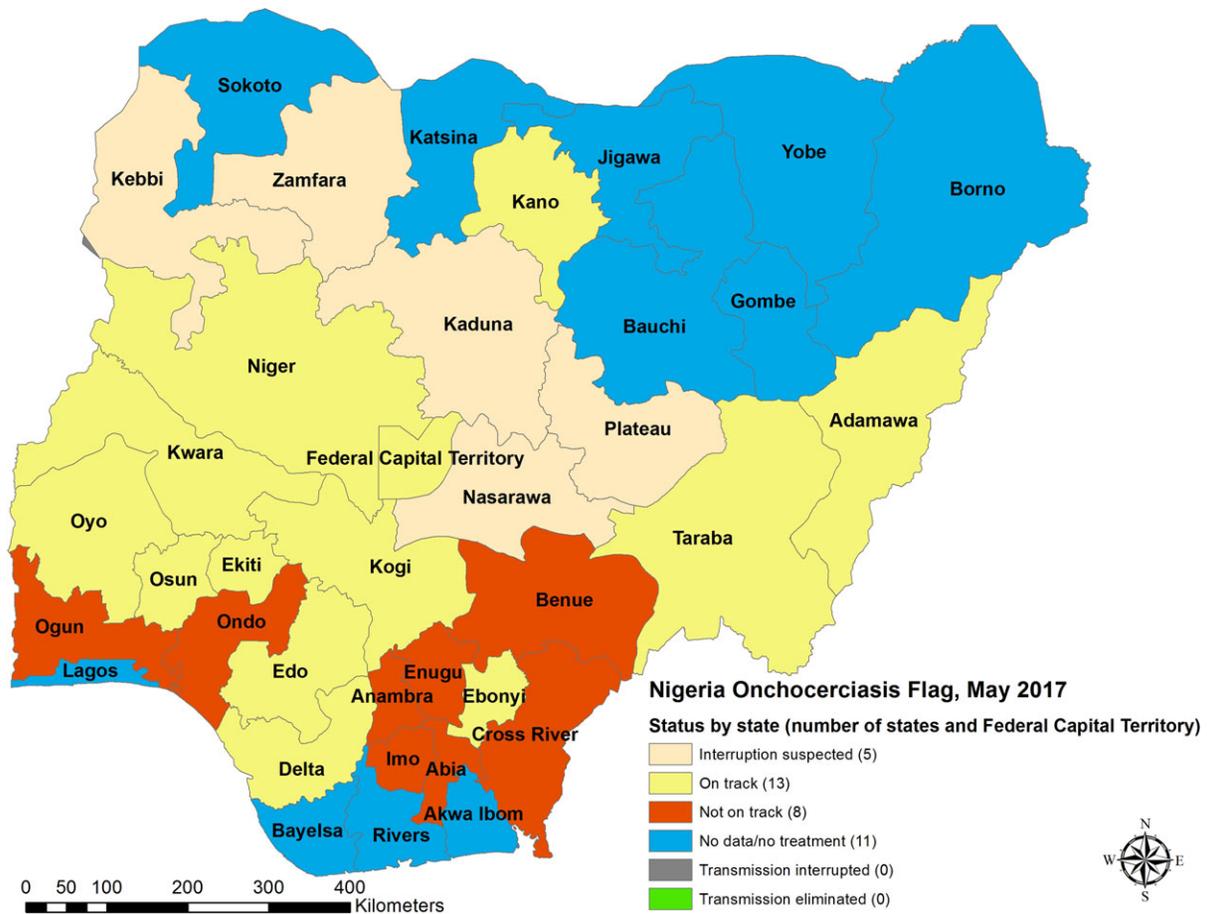


Figure 5. Status of Nigerian states as recommended by the Nigerian Onchocerciasis Elimination Committee, 2017.

meeting. The EOEAC is tasked with providing the FMOHE with a roadmap to nationwide interruption of onchocerciasis transmission by 2020. In its first three meetings, the EOEAC:

- developed national guidelines for rapid assessments using Ov16 antibody testing for the phases leading up to stopping MDA, per WHO elimination guidelines;
- recommended that Ethiopia broadly institute twice-per-year MDA in all newly discovered and untreated areas with active transmission;
- advised that the program switch from annual to twice-per-year treatments in all areas where slow progress will preclude reaching the goal of elimination by 2020.

The second two recommendations resulted in a dramatic transition from once- to twice-per-year MDA for onchocerciasis in Ethiopia (Figure 4).¹⁶ The committee also helped develop standard operating procedures using Ov16 antibody testing in order to complete nationwide mapping in hypoendemic areas of the country.⁴ The EOEAC recommended entomological surveillance to identify areas that might require pilot vector control studies. Lastly, the EOEAC helped the Ministry establish the work stream for the new onchocerciasis molecular laboratory at the Ethiopian Public Health Institute by developing priorities for

specimen collection and testing based on the urgency of decisions to be made.

Nigeria

The Nigeria Onchocerciasis Elimination Committee was launched by the Federal Ministry of Health of Nigeria (FMOHN) in 2014. It currently meets twice per year. The Nigeria NOEC reports directly to the Honorable Minister of Health and its secretariat is the FMOHN NTD Department. The TOR of the committee are as follows:

- Provide technical advice on onchocerciasis elimination to the Federal Ministry of Health.
- Support the development of a national guideline and roadmap for onchocerciasis elimination in Nigeria.
- Assess where and when breakpoints have been reached and recommend areas where ivermectin treatment can be safely stopped.
- Support the preparation of Nigeria’s dossier for WHO verification.

In its first meetings the NOEC reviewed published studies, original REMO (rapid epidemiological mapping of onchocerciasis) results, data

from APOC (especially the most recent skin snip-based monitoring data as analyzed by ONCHOSIM modeling results)¹⁷ and treatment coverage reports. The committee decided that classifying each district (total of 774) based on defined transmission zones would ultimately be needed, but accomplishing that task could not be done quickly. Therefore, the NOEC recommended that each of the 36 Nigerian states be considered an ‘operational’ transmission zone, and proceeded to classify them into stages (Figure 5). Published papers for Plateau, Nasarawa and Kaduna states,^{18,19} and unpublished data for Zamfara and Kebbi states, led the committee to recommend that the WHO 2016 guidelines for stopping MDA be immediately applied. The NOEC recognized six states where transmission was ongoing that required implementation of twice-per-year treatment, 13 states as being on-track to achieve elimination with annual treatment and 11 states for which more data were urgently needed to allow classification. The Committee also discussed serious central nervous system events associated with *Loa loa* and ivermectin MDA in Nigeria, and found that there had been only one reported.²⁰ It concluded that the risk of central nervous system events in Nigeria was low to non-existent. The committee has completed its work on the ‘National Guideline for Onchocerciasis Elimination in Nigeria,’ which was signed by the Honorable Minister of Health in February 2017.

Guatemala

Unlike the examples of NOECs described for Uganda, Ethiopia and Nigeria, the Guatemalan NOEC was established late in the elimination process, after all its four foci had completed their PTS periods.^{15,21–23} At that point, in 2014, the Guatemalan government formally constituted its NOEC specifically to oversee preparing a dossier for WHO. The committee critically reviewed a draft written by a consultant, requested changes, and then reviewed and approved the final dossier that ultimately was sent to WHO. The NOEC then played an important role in helping the ministry prepare for the visit of the international verification team (IVT) in 2015. The IVT met with the Minister of Health, the national onchocerciasis program and the NOEC, before traveling to formerly endemic communities throughout the country. The IVT’s visit was positive, and it recommended that Guatemala be verified free of onchocerciasis transmission.²¹ The lesson learned is that the verification process represents a significant administrative and clerical burden for countries; these burdens can be effectively shared by the MoH with its NOEC.

Development of committees in other countries

At the time of writing, 17 of the 34 onchocerciasis-endemic countries worldwide are represented by a committee that has met at least once (P. T. Cantey, personal communication). Support for these committees has been provided by the Carter Center; USAID’s ENVISION project, led by RTI International; USAID’s END in Africa program, led by FHI360; Sightsavers; and others. Members from established committees, like Uganda’s, have participated in initial meetings in countries like Tanzania to help launch new NOECs. Active exchanges are also occurring across francophone West Africa.

Conclusion

National onchocerciasis elimination committees have a track record of empowering national programs to take independent action and make rapid progress toward achieving the WHO elimination criteria. They enhance flexibility in response to the realities on the ground and, in doing so, affect significant positive change in the strategy and district-level tactics of the national elimination program. NOECs rely on the independent perspective of a group of committed national and multinational experts who volunteer their time to support elimination of onchocerciasis transmission. National-level laboratory support is crucial, as is funding from the country and from committed donors to carry forward the recommendations of the NOEC. Integrated discussions and coordinated activities with other MDA-based NTD programs, especially LF, are essential where there is co-endemicity. NOECs are important avenues for ‘domesticating’ WHO’s guidelines for eliminating onchocerciasis and provide a way to empower countries to embrace their national programs, develop tailored policies and procedures, and make timely decisions.

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