2024

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Summary

2024 Program Review

RIVER BLINDNESS ELIMINATION PROGRAM
Chad, Ethiopia, Madagascar, Nigeria, OEPA, South Sudan, Sudan, and Uganda

February 17–20, 2025
The Carter Center, Atlanta, GA

Printed: April 2026

Donors to The Carter Center River Blindness Elimination Program

Robert and Joan Blackman Family Foundation

The Clarke Cares Foundation

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The ELMA Foundation

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Mectizan Donation Program

Merck & Co, Inc. (known as MSD outside the United States of America and Canada)

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Pan American Health Organization and World Health Organization

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Reaching the Last Mile Fund

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United Kingdom Foreign, Commonwealth & Development Office

USAID's Act to End NTDs | East Program, led by RTI International

USAID's Achieve Onchocerciasis Elimination in the Americas Project

U.S. Centers for Disease Control and Prevention

And to many others, our sincere gratitude.

Table of Contents

ACRONYMS

APOC	African Program for Onchocerciasis Control
CBM	Christian Blind Mission
CDD	Community Directed Distributors / Community Drug Distributors / Community-Directed Drug Distributors
CDTI	Community Directed Treatment with Ivermectin
COVID-19	2019 novel coronavirus disease
CS	Community Supervisor
DA	diethylcarbamazine – albendazole
DBS	Dried Blood Spots
DMDI	Disease Management, Disability and Inclusion
DRC	Democratic Republic of the Congo
EOEEAC	Ethiopia Onchocerciasis Elimination Expert Advisory Committee
ELISA	Enzyme-linked immunosorbent assay
FMOH	Federal Ministry of Health
FTS	Filarial Test Strip
GIS	Geographical Information System
GONE	Global Onchocerciasis Network for Elimination
GPELF	Global Programme to Eliminate LF
HDA	Health Development Army
HEW	Health Extension Worker
HQ	Headquarters
HW	Health Worker
IACO	InterAmerican Conference on Onchocerciasis
IDA	ivermectin - diethylcarbamazine – albendazole
IHA	Indigenous Health Agent
IRB	Institutional Review Board
ITFDE	International Task Force for Disease Eradication
IU	Implementation Unit
LF	Lymphatic Filariasis
LGA	Local Government Areas
LLIN	Long-lasting Insecticidal (Bed) Nets
MDA	Mass Drug Administration
MDP	Mectizan Donation Program
MMDP	Morbidity Management and Disability Prevention
MMN	Madi-Mid North
MOH	Ministry of Health

NGDO	Non-Governmental Development Organization
NGO	Non-Governmental Organization
NOEC	Nigeria Onchocerciasis Elimination Committee
NTD	Neglected Tropical Disease
OEM	Onchocerciasis Elimination Mapping
OEPA	Onchocerciasis Elimination Program for the Americas
OR	Operational Research
OTS	Onchocerciasis Technical Subgroup
OV16	*Onchocerca volvulus* antigen
PAHO	Pan American Health Organization
PCC	Program Coordinating Committee of OEPA
PCR	Polymerase Chain Reaction
PES	Post Elimination Surveillance
PTS	Post-Treatment Surveillance
RB	River Blindness
RBEP	River Blindness Elimination Program
RBF	River Blindness Foundation
REMO	Rapid Epidemiological Mapping of Onchocerciasis
RLMF	Reaching the Last Mile Fund
RPRG	Regional Program Review Group
RoSS	Republic of South Sudan
RTI	Research Triangle Institute
S&C	Slash and Clear
SE/SS	South East/South South
SCH	Schistosomiasis
SIZ	Special Intervention Zone
STH	Soil-Transmitted Helminths
TAS	Transmission Assessment Survey
TCC	The Carter Center
UAE	The United Arab Emirates
UOEEAC	Uganda Onchocerciasis Elimination Expert Advisory Committee
USAID	United States Agency for International Development
USF	University of South Florida
UTG	Ultimate Treatment Goal
WER	Weekly Epidemiological Record
WHO	World Health Organization
YFA	Yanomami Focus Area

GLOSSARY

Definitions of Eradication, Elimination, and Control for Neglected Tropical Diseases (NTDs)[1]

Eradication: The permanent reduction to zero of a specific pathogen, as a result of deliberate efforts, with no more risk of reintroduction. The WHO process of documenting eradication is called ***certification***.

Elimination of transmission: The reduction to zero of the incidence of infection caused by a specific pathogen in a defined geographical area, with minimal risk of reintroduction, as a result of deliberate efforts; continued actions to prevent re-establishment of transmission may be required. The WHO process of documenting country-wide elimination of transmission is called ***verification***.

Elimination as a public health problem: Reduction of disease incidence, prevalence, morbidity and/or mortality defined by achievement of measurable global targets set by WHO in relation to a specific disease or pathogen. When reached, continued actions are required to maintain the targets, and additional interventions or assessments are required (if an infectious agent) to achieve zero transmission. The WHO process of documenting country-wide elimination as a public health problem is called ***validation***.

Control: Reduction of disease incidence, prevalence, morbidity, and/or mortality to a locally acceptable level as a result of deliberate efforts; continued intervention measures are required to maintain the reduction. Control may or may not be related to global targets set by WHO.

Phases of Onchocerciasis Transmission[2]

Transmission Suppressed: The absence of infective larvae (L3s) in the *Simulium* vector population. Infectivity can be suppressed through drug (ivermectin) pressure, despite the potential for re-initiation of transmission through the presence of a population of adult worms capable of producing microfilariae if the drug pressure is removed.

Transmission Interrupted: The permanent reduction of transmission in a defined geographical area after all the adult worms (and microfilariae) in the human population in that area have died, been exterminated by some other intervention, or become sterile and infertile. At this point, ivermectin drug pressure may be removed.

Transmission Eliminated: The demonstration through 3-5 years of post (ivermectin) treatment surveillance that onchocerciasis transmission remains interrupted. Continued (post elimination) surveillance is required.

[1] World Health Organization (2016). Generic Framework for Control, Elimination and Eradication of Neglected Tropical Diseases.
[2] World Health Organization (2016). Guidelines for Stopping Mass Drug Administration and Verifying Elimination of Human Onchocerciasis.

EXECUTIVE SUMMARY

The 29th Annual Review Meeting of the Carter Center's (TCC) River Blindness Elimination Program (RBEP) was held February 17–20, 2025, at the Cecil B. Day Chapel at The Carter Center in Atlanta, Georgia. This was the first in-person program review meeting since the COVID-19 pandemic began. The RBEP Atlanta and country-based staff, Ministry of Health (MOH) officials, partners, and donors discussed achievements, challenges, and operational research conducted in 2024, and made recommendations for 2025 activities.

The RBEP currently assists the ministries of health in seven countries[3] to eliminate river blindness (RB) transmission. The strategy for elimination is mass drug administration (MDA) with ivermectin (Mectizan®, donated by Merck & Co, Inc. [known as MSD outside the United States of America and Canada]) generally given twice per year, although in certain areas, it is given annually or four times per year. This strategy has been highly successful in the Americas, resulting in the elimination of RB transmission from Colombia (2013), Ecuador (2014), Mexico (2015), and Guatemala (2016) as verified by the World Health Organization (WHO)—the first four countries to achieve this goal[4]. The approach to RB elimination follows the three programmatic phases as defined by WHO guidelines (Figure 1): 1) the **treatment** phase, consisting of regular community-wide treatment with ivermectin to alleviate disease symptoms in infected individuals and to suppress transmission; 2) after epidemiological and entomological surveys demonstrate *transmission interruption* is achieved, MDA can be stopped and a 3–5 years **post-treatment surveillance (PTS)** phase commences; 3) after further surveys confirm *transmission elimination*; **post-elimination surveillance (PES)** phase begins, which continues until all transmission zones in a country complete PTS and the country requests WHO verification of transmission elimination.

The meeting was chaired by Dr. Gregory Noland, Director of the Carter Center's River Blindness, Lymphatic Filariasis, Schistosomiasis, and Malaria programs. The meeting opened with welcoming remarks from Paige Alexander, Chief Executive Officer of the Carter Center, and Dr. Kashef Ijaz, Vice President of the Center's Health Programs. Dr. Noland paid tribute to former U.S. President and Carter Center co-founder, Jimmy Carter, who passed away in December 2024. Heartfelt remarks honoring President Carter were also made by Carter Center staff and meeting participants.

In his introductory remarks, Noland contrasted the defunding and dismantling of the United States Agency for International Development (USAID), and similar threats to the U.S. Centers for Disease Control and Prevention (CDC), with the opportunities afforded by an expansion of the Reaching the Last Mile Fund (RLMF), a multi-year initiative funded by His Highness Sheikh Mohamed bin Zayed Al Nahyan, president of the United Arab Emirates (UAE), the Gates Foundation and other donors. The expansion of RLMF was announced in December 2023 at the inaugural Health Day of the COP28 United Nations Climate Change Conference in Dubai, UAE and seeks to dedicate $500 million to river blindness and lymphatic filariasis elimination programs in Africa and Yemen, with the ultimate goal of eliminating both diseases from those regions.

Through the RLMF partnership, which includes national ministries of health, the World Health

[3] Brazil, Chad, Ethiopia, Nigeria, Sudan, Uganda, and Venezuela.
[4] *Editor's note*: In January 2025, WHO verified onchocerciasis elimination in Niger.

Organization, pharmaceutical companies, donors, and other partners, TCC will intensify its assistance for river blindness and lymphatic filariasis elimination work in Ethiopia, Sudan, Nigeria, and Uganda, while expanding collaboration with the ministries of health in South Sudan in 2024, and Madagascar and Chad in 2025.[5]

The Carter Center RBEP will seek to replicate its "FLECZI" approach, characterized by:

- **F**lexible programs that follow WHO guidelines, while also recognizing that there's no such thing as a 'one size fits all approach'.
- Establishing national onchocerciasis **L**aboratories in each TCC-assisted country.
- **E**valuations and Monitoring, following WHO guidelines.
- **C**ountries (country ownership), **C**ommunities (community orientation and community engagement) and national elimination **C**ommittees.
- Special Intervention **Z**ones (SIZs): promoting program coordination in cross-border areas of TCC-assisted countries in East Africa (Figure 18) and the Brazil-Venezuela border in the Americas.
- **I**nnovation to hasten program operations and impact.

In 2024, TCC assisted with 42,168,792 Mectizan treatments for RB in the Americas, Ethiopia, Nigeria, South Sudan, Sudan, and Uganda (Figure 2). This represents 95% of the 2024 treatment target of 44 million. Country-specific coverage ranged from 0% in Sudan to 99% in Nigeria (Figure 3). RBEP aims to exceed 90% treatment coverage of the eligible population (which excludes children under five years of age and pregnant women) in each treatment round, except in the Americas, where the goal is at least 85% coverage. RBEP's cumulative treatments since 1996 now total 607 million (Figure 4). Figures 5 and 6 show annual TCC-assisted treatments by country, and coverage is shown in Figure 7. A goal of 58.1 million treatments has been set for 2025. In 2024, the Lhubiriha focus of Uganda (encompassing 158,313 people) qualified to stop MDA for RB (Figure 8). Cumulatively, 32 million people no longer need treatment for RB in Carter Center-assisted areas (Figures 9 and 10).

RBEP is an integrated program that in 2024 included LF elimination work in Ethiopia, Nigeria, South Sudan, and Sudan, and schistosomiasis (SCH) and soil-transmitted helminthiasis (STH) control in Nigeria. In 2024, TCC assisted with the distribution of 3,314,015 Mectizan and albendazole treatments (donated by GSK) for LF, representing 57% of the treatment target (Figures 11 and 12); this brought the program's cumulative total to 207,872,522 LF treatments assisted (Figure 4). In 2024, more than 8.5 million people qualified to stop MDA for LF: 8.1 million in Nigeria and 472,559 in Ethiopia (Figure 13). Cumulatively, 37 million people in Ethiopia and Nigeria no longer need treatment for LF (Figure 14).

In 2024, the Center assisted 1,336,948 praziquantel (donated by Merck KGaA, Darmstadt, Germany) treatments for SCH (84% of the treatment target, Figure 15) and 3,037,447 albendazole or mebendazole (donated by Johnson & Johnson) treatments for STH (44% of the treatment target) in Nigeria (Figure 16). Cumulatively, TCC has assisted in 33,585,590 SCH treatments and 72,490,881 STH treatments (Figure 4). RB treatments represented 78% of the 54 million MDA treatments for RB, LF, SCH, STH, and trachoma assisted by TCC in 2024 (Figure 17).

[5] *Editor's note*: Angola and Burundi were invited to participate in this meeting on the basis of their inclusion in initial RLMF funding plans. Subsequently, they were among a group of countries deferred for RLMF funding until further notice.

Our work would not be possible without ministry partnership at all levels and a grassroots network of health workers and community-directed drug distributors (CDDs) who provide treatments and health education for their communities. A combined 526,772 CDDs were trained in 2024 – a 34% increase from 2023 (Figure 19).

2024 Treatment Performance:

	2024 Treatment Targets	2024 Treatments	%
RB	44,194,123	42,168,792	95%
LF	5,792,245	3,314,015	57%
SCH	1,595,617	1,336,498	84%
STH	6,959,742	3,037,447	44%

GENERAL RECOMMENDATIONS 2025
RIVER BLINDNESS ELIMINATION PROGRAMS

Overview of the RBEP mission: In collaboration with the host governments, RBEP aims to eliminate RB and LF transmission in TCC-assisted areas in Africa and the Americas. RBEP work includes:

- Assisting with health education and mass drug administration (MDA). Treatment targets are at least 90% of the treatment-eligible population (called "therapeutic coverage") in Africa and 85% in the Americas for RB, at least 65% of the total population (called "epidemiological coverage" for LF per treatment round, and various WHO targets for controlling schistosomiasis and soil-transmitted helminths.
- Helping to empower national onchocerciasis elimination committees to review their data and inform national decisions that demonstrate progress toward elimination, such as enhancing interventions, expanding treatment, stopping interventions, and conducting PTS/PES. Decisions should be guided by (but not restricted to) the WHO guidelines.
- Conducting new assessments to help delimit the precise borders of African RB transmission zones ('foci') and buffer zones between transmission zones that can assist our elimination agenda in RBEP-assisted areas.
- Identifying areas with active RB transmission, including those classified as "hypo-endemic" areas, historically excluded from Mectizan treatment under prior WHO/African Programme for Onchocerciasis Control (APOC) disease control policies.
- Enhancing interventions (two- or four-times-per-year Mectizan treatment, vector control, etc.) where RB transmission persists or in new foci where treatments have never been given.
- Where active RB transmission spans borders, working with authorities on both sides of internal or international boundaries to establish 'Special Intervention Zones' (SIZs) (Figure 18) to encourage collaboration and coordination on both sides to stop transmission.
- Monitoring the impact of interventions using sensitive and specific tools. Consider integrated monitoring, especially in RB-LF overlap areas, when "stop-MDA" or other impact evaluations are needed.
- Work with national programs, partners and donors to maintain priority elimination activities in response to the US Government's funding withdrawal.
- Work with national programs and RLMF
- to plan for expanded RB/LF elimination activities in Africa.
- If external funding is secured, expand TCC assistance for RB and LF elimination to Angola, Burundi, Chad, Madagascar and South Sudan.
- Countries should prioritize surveys in areas that have historically received multiple rounds of treatment to assess and inform the current endemicity status.
- Countries are encouraged to use mobile data collection platforms for surveys.
- RBEP program staff at all levels are encouraged to develop innovative solutions to address local challenges. Stay informed of pilot funding opportunities available through the TCC Innovation Hub. Engage program managers and TCC/Atlanta early in the process to ensure

support.

- RBEP encourages MOHs to submit drug applications to the WHO and Mectizan Donation Program (MDP) as early as possible, ideally by April 30, with drug inventories, to ensure timely delivery, especially in twice-yearly treatment areas. RBEP country offices should actively collaborate with MOHs throughout the application process, stay informed on drug supply updates, keep RBEP staff updated, and promptly escalate any concerns to the Atlanta office.
- Any adverse event associated with MDA must be reported to the Atlanta office within 24 hours.
- Programs should investigate and address reasons for persistent low treatment coverage.
- TCC country offices should conduct treatment coverage surveys in at least two districts in two subregions/states/zones annually, in consultation with Headquarters (HQ) and Ministries of Health (MOH).
- Include details on activities among refugees, internally displaced persons and migrants, as well as by gender, in annual reports and presentations.
- Seek to increase training, supervision, involvement of kinship groups, and gender balance among CDDs and CSs. In areas where MDA has stopped, encourage the Ministry of Health to maintain engagement with this valuable network for other public health programs. Countries should establish a database of former and current CDDs and supervisors.
- The TCC website should house key public-domain documents from the national onchocerciasis elimination committees of Ethiopia, Nigeria, South Sudan, Sudan, and Uganda.
- TCC/RBEP will support national laboratories for RB and LF activities with technical support from the University of South Florida (USF). Reagent and supply orders from these labs must be fulfilled promptly by USF. TCC will continue to use the 'OEPA' Ov16 enzyme-linked immunosorbent assay (ELISA) and standard (qualitative) polymerase chain reaction (PCR) for routine Ov16 serological and O-150 entomological testing, respectively.
- Country laboratories should coordinate with USF to obtain and maintain accreditation for quality assurance and quality control.
- Work with national programs to implement and optimize RB post-elimination entomological surveillance strategies. Report results to the WHO and publish them in the peer-reviewed literature.
- Assist in distributing the Arabic translation of the WHO LF Disability Management, Disability and Inclusion (DMDI) materials to where they are needed.
- Review and consider, both internally and in consultation with National Onchocerciasis Elimination Committees, how to apply new guidelines for RB elimination mapping in a cost-effective manner.
- Carter Center offices should monitor government financial contributions for elimination efforts in TCC-assisted areas.
- RBEP program staff must complete or renew their Emory Institutional Review Board (IRB) certification if they are to be involved with work that is considered human subjects' research. Coordinate with HQ staff regarding all IRB determinations and compliance.

- In fulfillment of the second pillar of the Global Programme to Eliminate LF (GPELF), ensure that programs collect and report LF morbidity data in the LF-endemic areas The Carter Center assists.
- Once published, help national programs incorporate changes described in the new GPELF monitoring and evaluation guidelines.

2025 Treatments and Training Objectives:

UTG = Ultimate (annual) Treatment Goal
UTG2 = Twice-per-year Treatment Goal
UTG4 = Four-times-per-year Treatment Goal

	RB	LF	SCH	STH
Annual (UTG)	12,271,350	9,824,143	4,346,676	6,293,748
Biannual (UTG2)	46,286,136	6,278,238	-	5,554,248
Quarterly (UTG4)	878,104	-	-	-
Total	**59,435,590**	**16,102,381**	**4,346,676**	**11,847,997**

2025 Training Objectives	
CDDs	**481,549**
CSs	**128,079**
HWs	**15,335**
Teachers	**2,203**

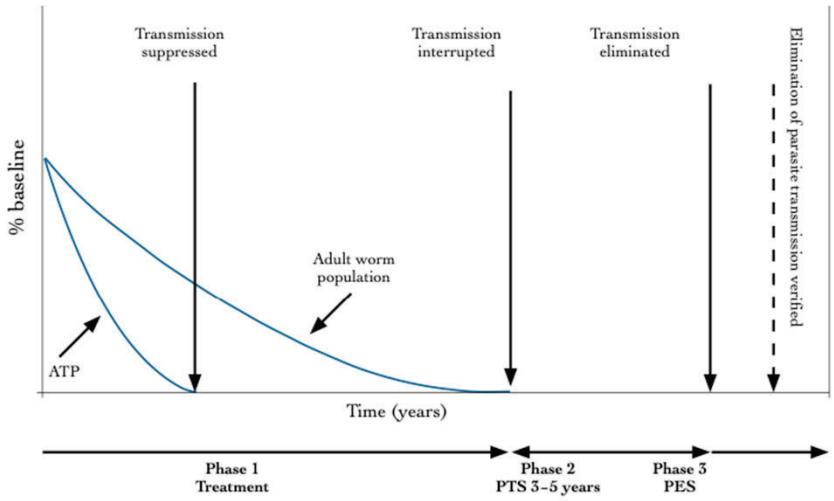
FRONTISPIECE A

The Carter Center's 29th Annual Review Meeting of the River Blindness Elimination Program (RBEP), held February 17–20, 2025, at the Cecil B. Day Chapel at The Carter Center in Atlanta, Georgia.

FIGURES

Figure 1

Phases of Onchocerciasis Elimination

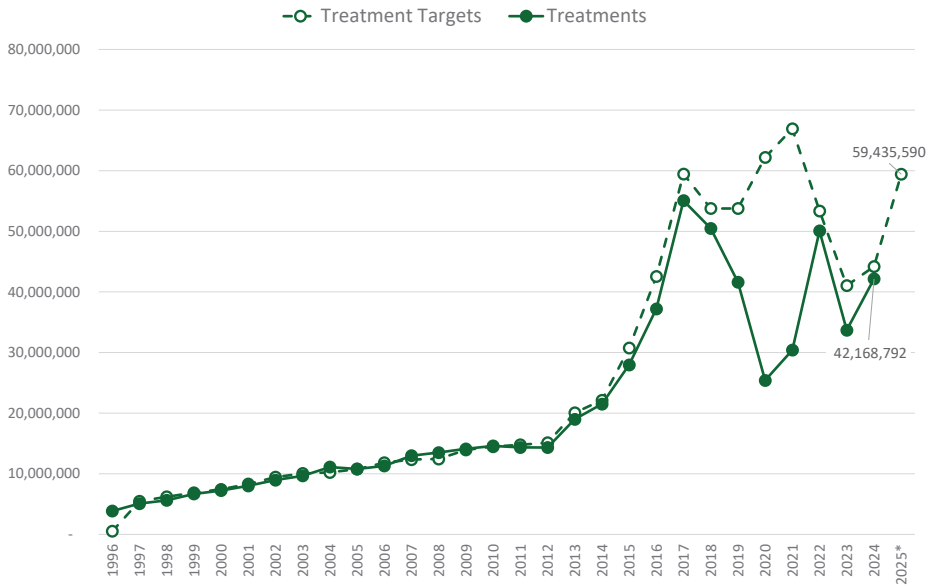


ATP, annual transmission potential; PES, post-elimination surveillance; PTS, post-treatment surveillance

WHO (2016). Guidelines for stopping mass drug administration and verifying elimination of human onchocerciasis: criteria and procedures (document WHO/HTM/NTD/PCT/2016.1). Geneva, World Health Organization. http://www.who.int/onchocerciasis/resources/9789241510011/en/

Figure 2

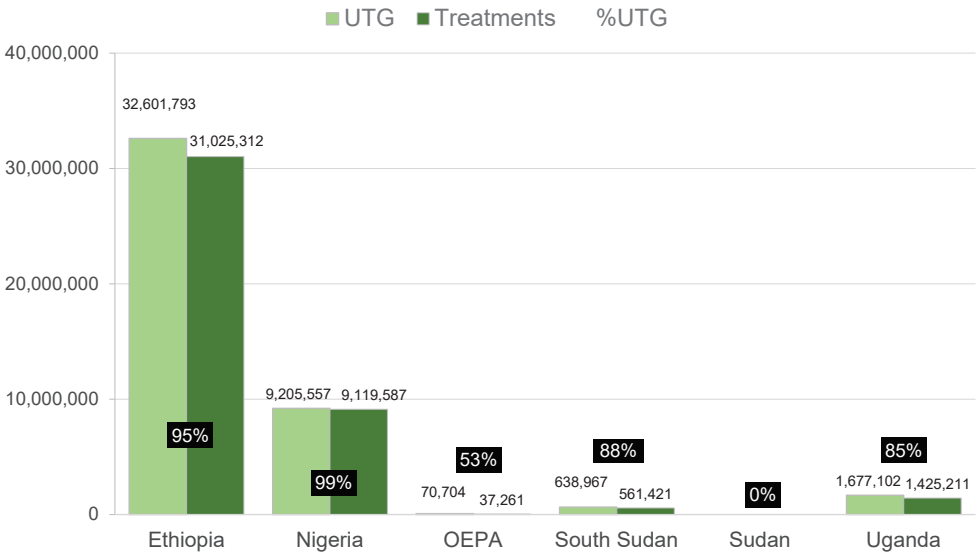
Carter Center-Assisted River Blindness Treatments and Targets 1996–2024 and 2025 Target



*Target

Figure 3

2024 Mectizan® Ultimate Treatment Goals (UTG) and Treatments for River Blindness in Carter Center-Assisted Areas



OEPA: Represents Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela.
Uganda: Treatment totals include passive (95,806) and refugee (164,498) treatments.

Figure 4

Cumulative Carter Center-Assisted River Blindness, Lymphatic Filariasis, Schistosomiasis and Soil-transmitted Helminth Programs Treatments, 1996–2024

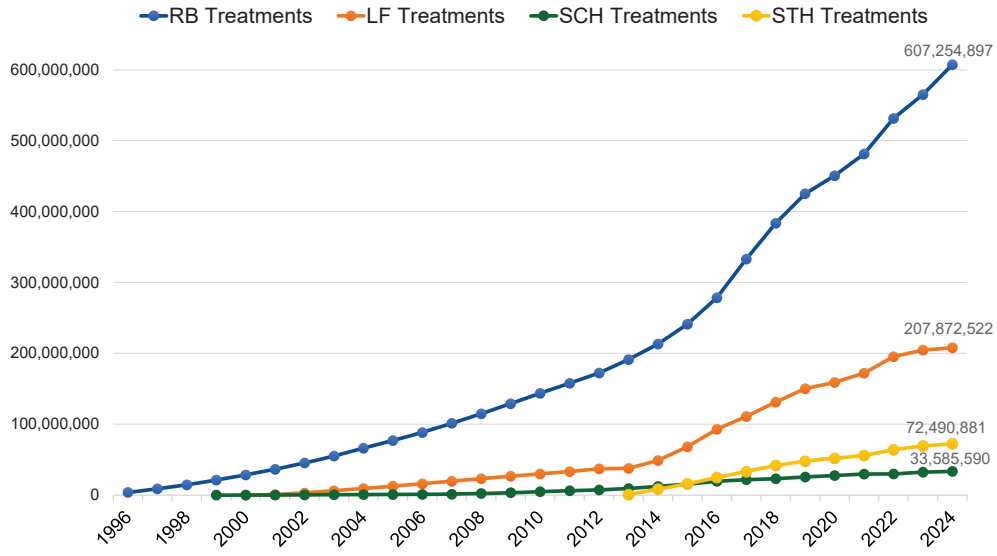


Figure 5

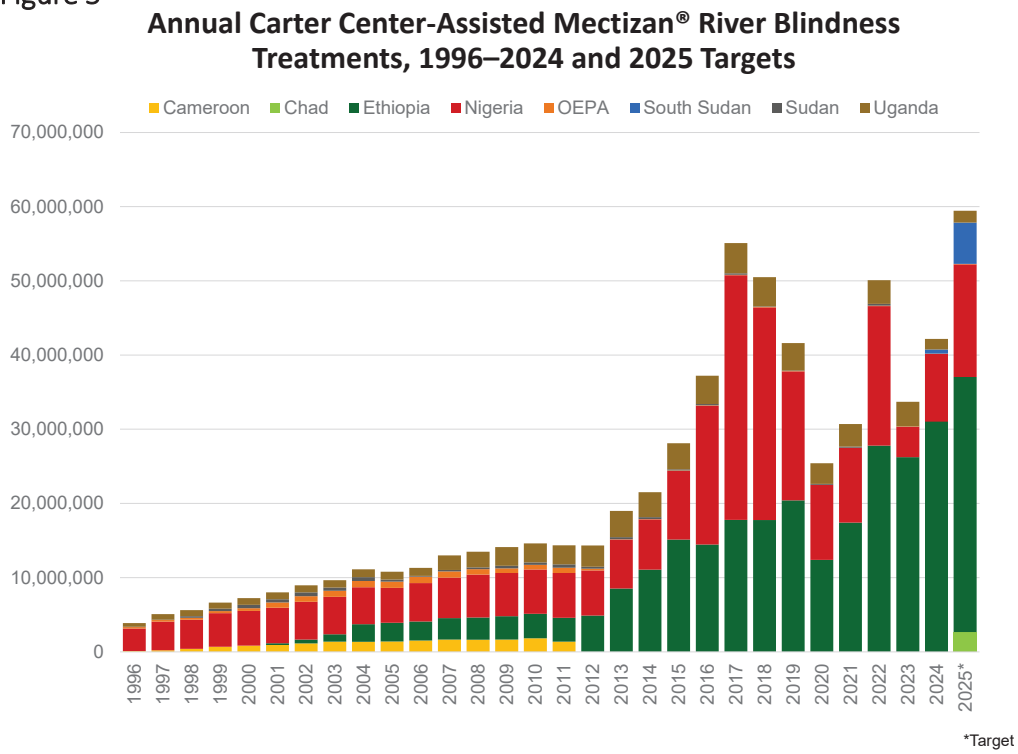


Figure 6

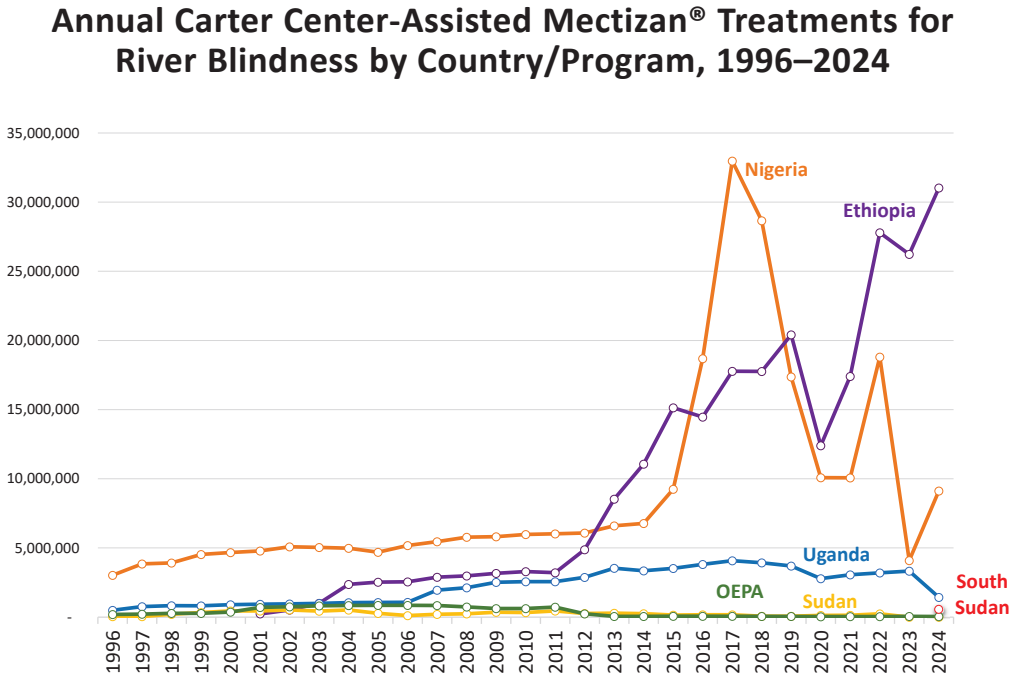
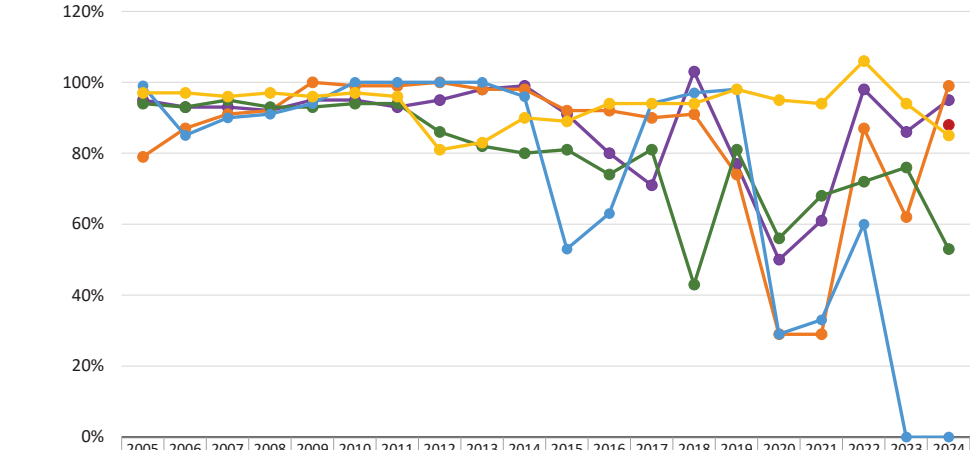


Figure 7

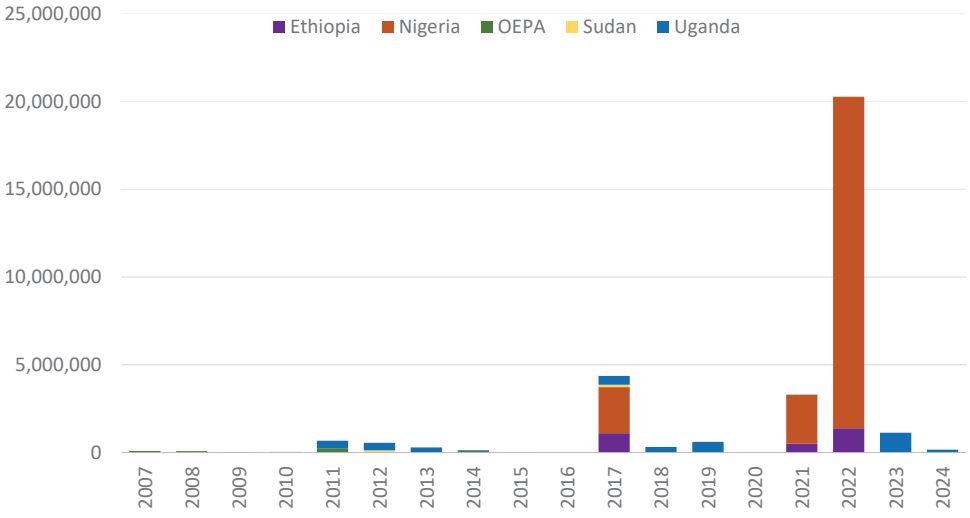
Reported Mectizan® Treatment Coverage (of Eligible Pop.) for River Blindness by Country/Program, 2005–2024



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Ethiopia	95%	93%	93%	92%	95%	95%	93%	95%	98%	99%	91%	80%	71%	103%	77%	50%	61%	98%	86%	95%
Nigeria	79%	87%	91%	92%	100%	99%	99%	100%	98%	98%	92%	92%	90%	91%	74%	29%	29%	87%	62%	99%
OEPA	94%	93%	95%	93%	93%	94%	94%	86%	82%	80%	81%	74%	81%	43%	81%	56%	68%	72%	76%	53%
South Sudan																				88%
Sudan	99%	85%	90%	91%	94%	100%	100%	100%	100%	96%	53%	63%	94%	97%	98%	29%	33%	60%	0%	0%
Uganda	97%	97%	96%	97%	96%	97%	96%	81%	83%	90%	89%	94%	94%	94%	98%	95%	94%	106%	94%	85%

Figure 8

Stopped River Blindness Treatments in Carter Center-Assisted Areas by Country and Year, 2007–2024

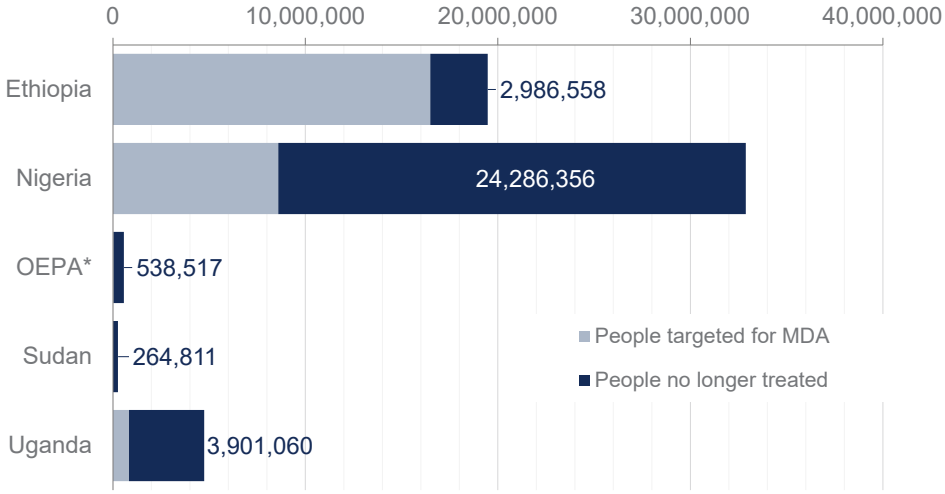


OEPA: Represents Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela.
UGANDA: Excludes the eliminated Victoria focus (not Carter Center-assisted, eliminated in the 1970s with estimated population of 2.6 million).

Figure 9

Population Currently and Previously Targeted for River Blindness Treatment with Mectizan®, 2024

31.8 million people in nine Carter Center-assisted countries no longer need treatment as a result of our river blindness elimination partnership



**OEPA: Representing Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela*
Approximately 35,000 persons are still being treated in the Yanomami Focus Area on the border with Brazil and Venezuela

Figure 10

Inventory of 'Stop MDA' for River Blindness and Lymphatic Filariasis in Carter Center-Assisted Areas

RIVER BLINDNESS		
Country	Total Population residing in areas where MDA stopped 2007–2024	Stopped MDA in 2024
ETHIOPIA	2,986,558	0
NIGERIA	24,286,356	0
OEPA[1]	538,517	0
SUDAN	264,811	0
UGANDA[2]	3,901,060	158,313
TOTAL	**31,977,302**	**158,313**

[1]Representing Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela.
[2]Excludes the Victoria Nile focus, which achieved elimination in the 1970s with est. pop. 2.6 million

LYMPHATIC FILARIASIS		
Country	Total Population residing in areas where MDA stopped 2016–2024	Stopped MDA in 2024
ETHIOPIA	2,510,231	472,559
NIGERIA	34,308,637	8,081,753
TOTAL	**36,818,868**	**8,554,312**

Figure 11

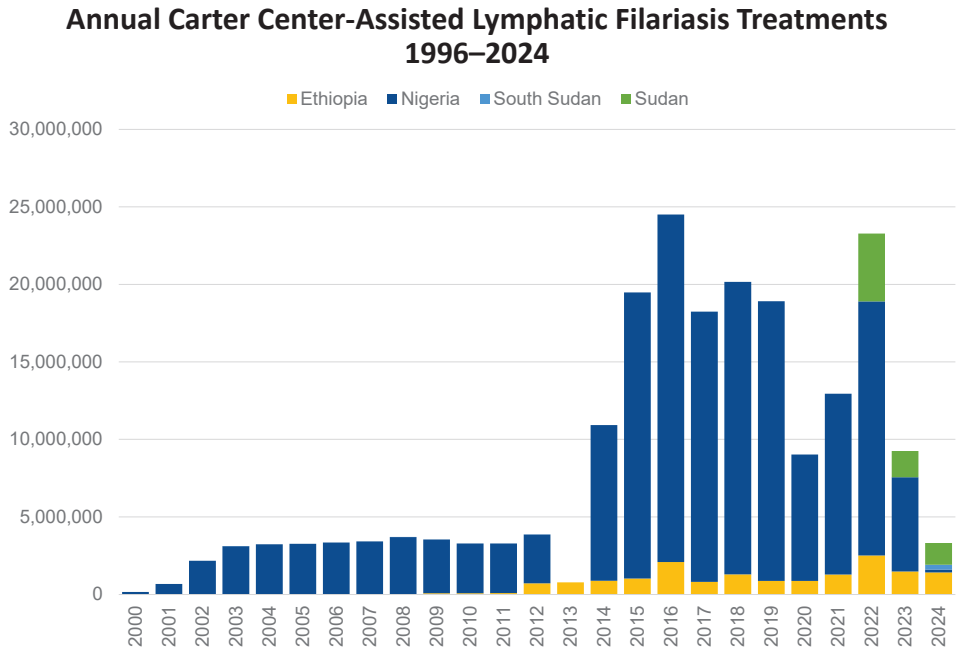


Figure 12

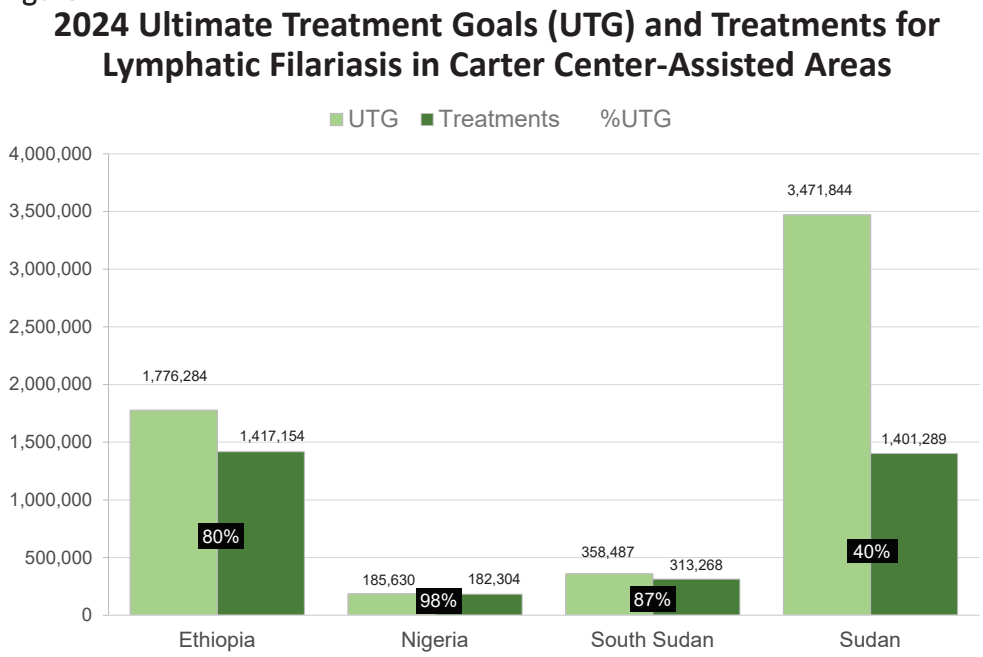


Figure 13

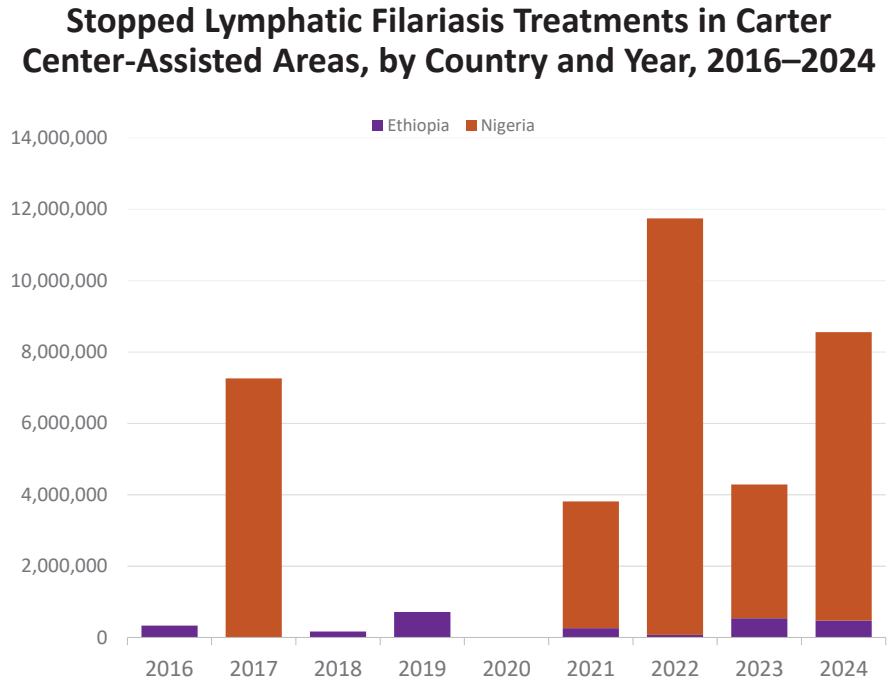


Figure 14

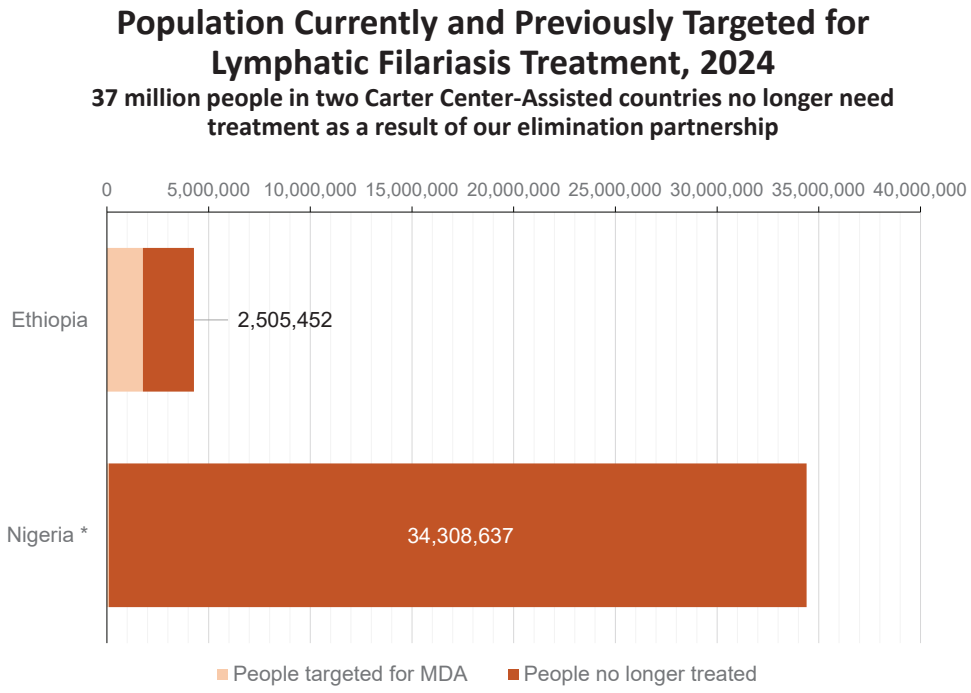


Figure 15

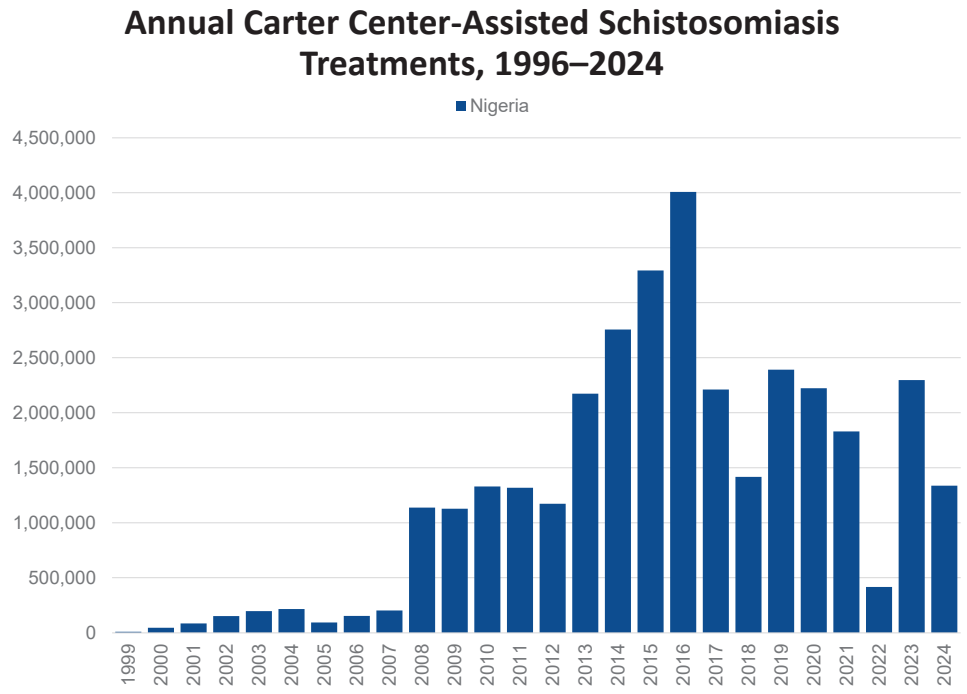


Figure 16

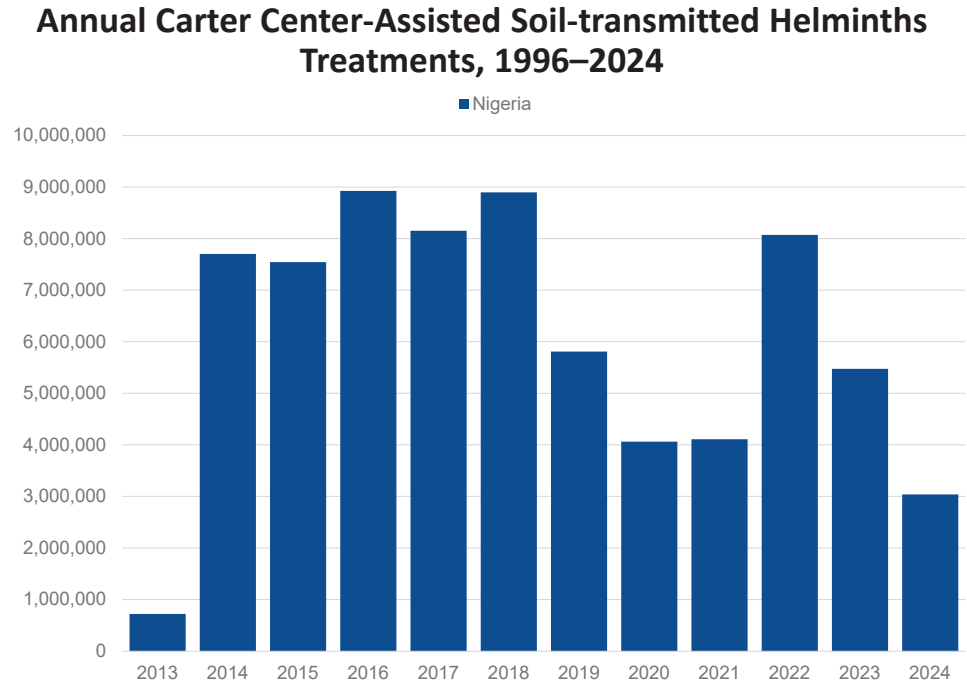
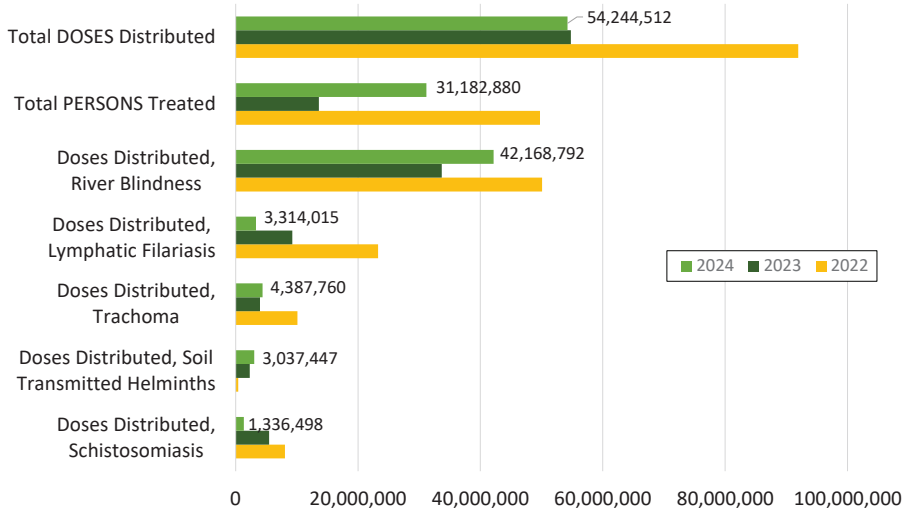


Figure 17

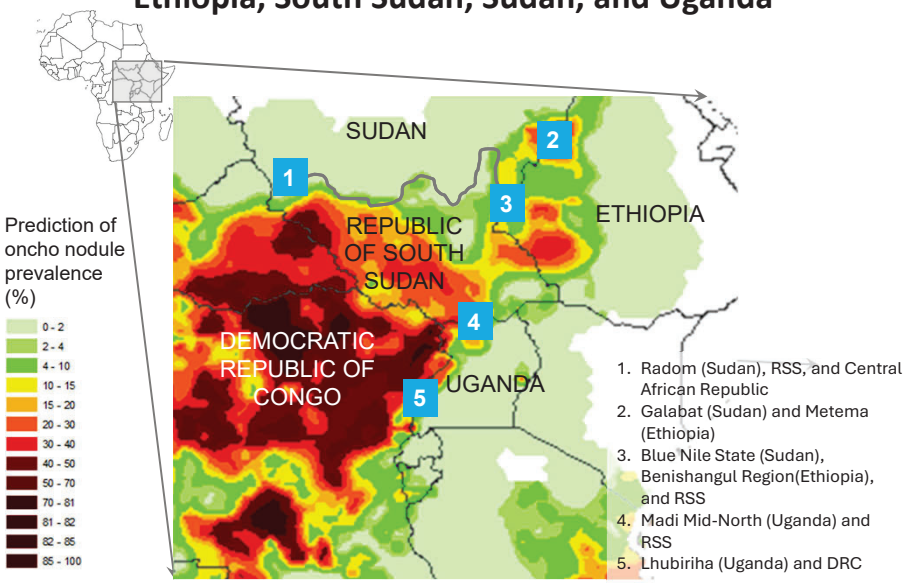
Carter Center-Assisted Treatment Doses and Persons Treated for Neglected Tropical Diseases, 2022–2024



The Carter Center is grateful for our Ministry of Health partners and the many donors and pharmaceutical companies who have made financial and in-kind contributions to make these treatments possible.

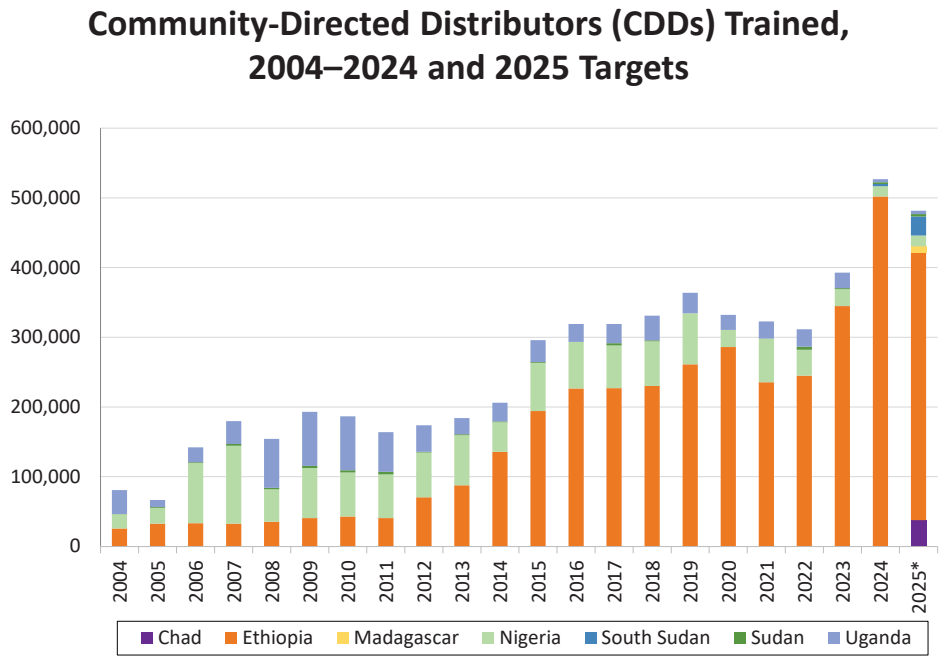
Figure 18

Carter Center-Assisted Special Intervention Zones in Ethiopia, South Sudan, Sudan, and Uganda



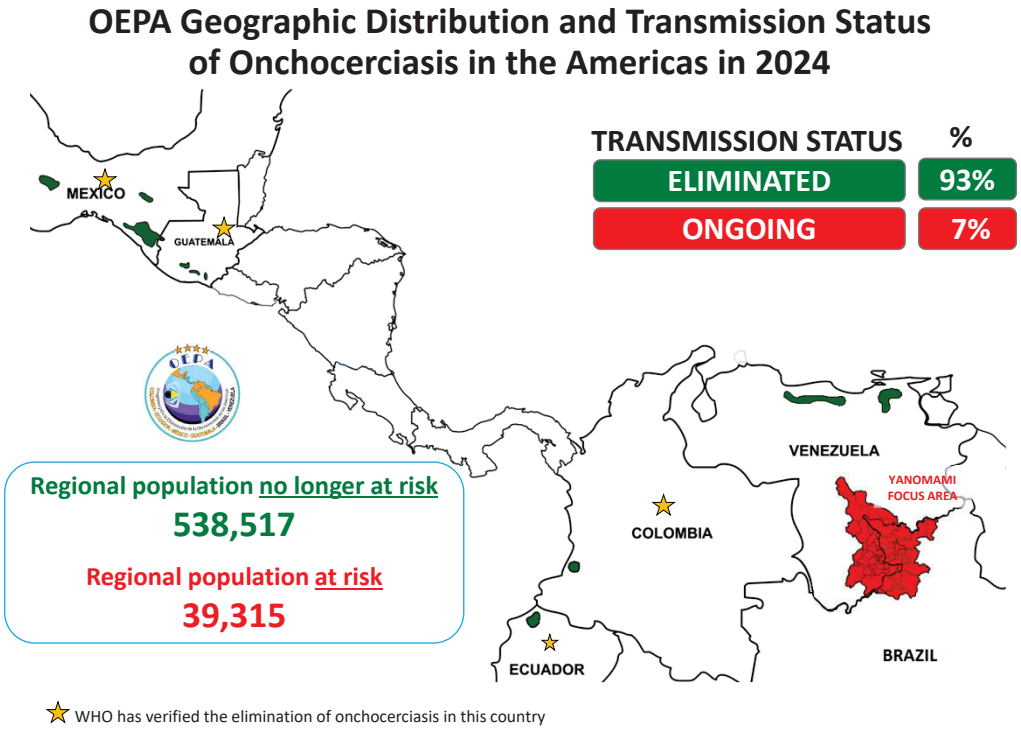
Map source: APOC

Figure 19



*Target

Figure 20



★ WHO has verified the elimination of onchocerciasis in this country

Figure 21

OEPA: Mectizan® Treatment for Onchocerciasis in the Americas 1989–2024 and 2025 target

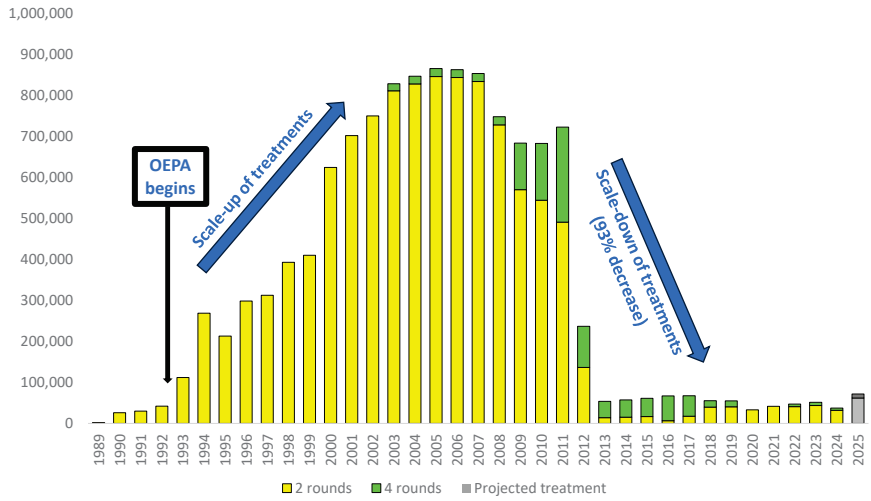


Figure 22

OEPA: Regional Population at Risk, No Longer at Risk and Eligible for Treatment in 2024

Country	Focus	Number of communities	Population at risk	Population out of risk	Transmission Eliminated	WHO Verification
Colombia	Lopez de Micay	1		1,366	2010	2013 ★
Ecuador	Esmeraldas	119		25,863	2012	2014 ★
Mexico	North Chiapas	13		7,125	2010	
Mexico	Oaxaca	98		44,919	2011	2015 ★
Mexico	South Chiapas	559		117,825	2014	
Guatemala	Escuintla	117		62,590	2010	
Guatemala	Santa Rosa	37		12,208	2010	2016 ★
Guatemala	Huehuetenango	43		30,239	2011	
Guatemala	Central	321		126,430	2014	
Venezuela	Northcentral	45		14,385	2013	
Venezuela	Northeast	465		95,567	2017	
Venezuela	South	428	18,741		ONGOING	
Brazil	Amazonas	273	20,574		ONGOING	
		2,519	39,315	538,517		

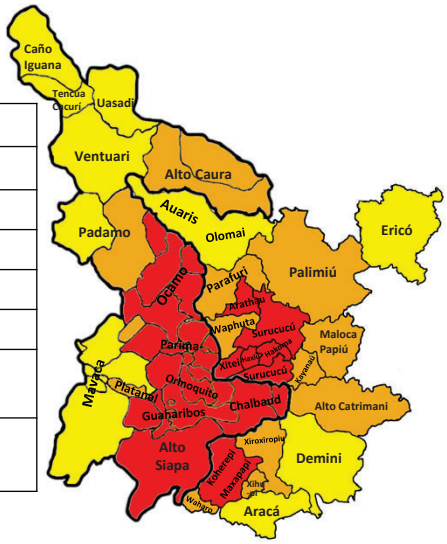
★ WHO has verified elimination in the country.

Figure 23

OEPA: Subareas of the Yanomami Focus Area (YFA) in 2024

Venezuela

428 communities	
Hyper	275
Meso	47
Hypo	106
Pop. at risk	18,741
Pop. eligible	16,071
UTG2: 27,264	
UTG4: 9,756	



Brazil

273 communities	
Hyper	122
Meso	75
Hypo	76
Pop. at risk	20,574
Pop. eligible	16,842
UTG2: 33,684	

UTG2 & UTG4 for the YFA in 2024: 70,704 in 701 communities

Figure 24

OEPA: Scorecard Method of Community Prioritization

	Score Range	Color	Priority	2023 communities		2024 communities		Change in number of communities *
				Number	%	Number	%	
Brazil	≤ 10		Low	140	51%	139	51%	-1
	11-15		Medium	114	42%	115	42%	1
	≥ 16		High	18	7%	18	7%	0
	Total			272	100%	272	100%	
Venezuela	≤ 4		Low	117	30%	302	71%	185
	5-8		Medium	193	49%	95	22%	-98
	≥ 9		High	84	21%	31	7%	-53
	Total			394	100%	428	100%	

Note: Total community numbers each year vary due to the splitting and merging of them.

Figure 25

Treatments distributed in 2024, twice-per-year approach

Focus	Communities targeted	Population at risk	Eligible for treatment	Treatment goal (UTG2)	Treated First Round & Coverage	Treated Second Round & Coverage	Total treated and UTG2 Coverage	Treatments by gender & percentage			
								Female		Male	
								1st Round	2nd Round	1st Round	2nd Round
Amazonas Brazil	273	20,574	16,842	33,684	11,514	11,438	22,952	5,692	5,671	5,822	5,767
					68%	68%	68%	49%	50%	51%	50%
South Venezuela	360	15,917	13,632	27,264	2,196	6,692	8,888	1,029	3,265	1,167	3,427
					16%	49%	33%	47%	49%	53%	51%
Total	633	36,491	30,474	60,948	13,710	18,130	31,840	6,721	8,936	6,989	9,194
					45%	59%	52%	49%	49%	51%	51%

Source: OEPA Country Programs

Figure 26

Treatments distributed in 2024, four-times-per-year approach Venezuela South Focus Program

Communities	Pop. at risk	Eligible for Treatment (UTG)	UTG(4) Treatment Goal	Total treated	% Coverage of UTG(4)
68	2,824	2,439	9,756	5,421	56%

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Population treated	1,672	294	1,587	1,868
Coverage	69%	12%	65%	77%
Communities Reached	54	12	60	57

Source: OEPA Country Programs

Figure 27

Ov16 serology results in the Yanomami Focus Area, 2021–2024

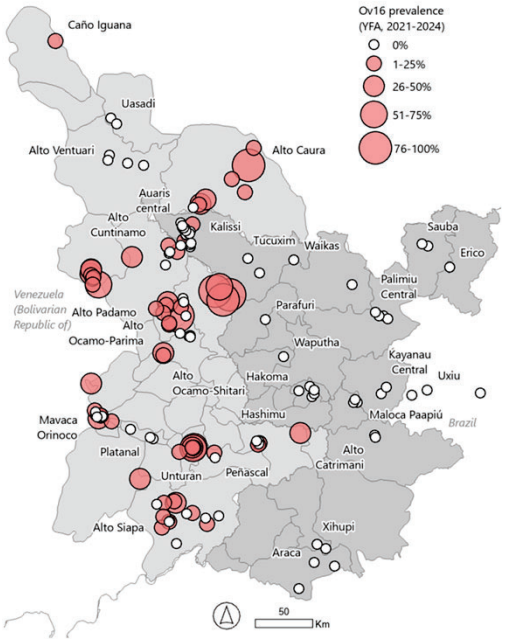


Figure 28

Ethiopia: Status of River Blindness Elimination, by District (Woreda), 2024

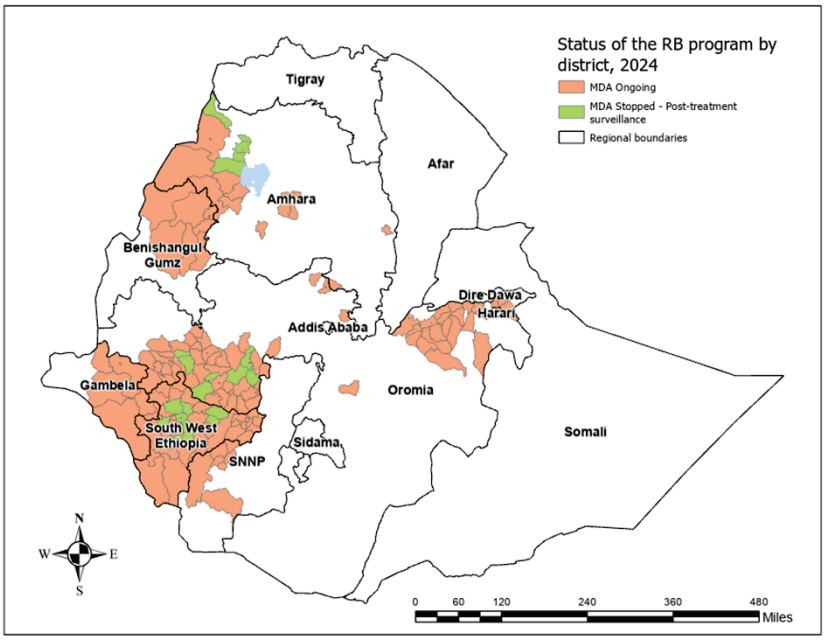


Figure 29

Ethiopia: Status of Lymphatic Filariasis Elimination, by District (Woreda), 2024

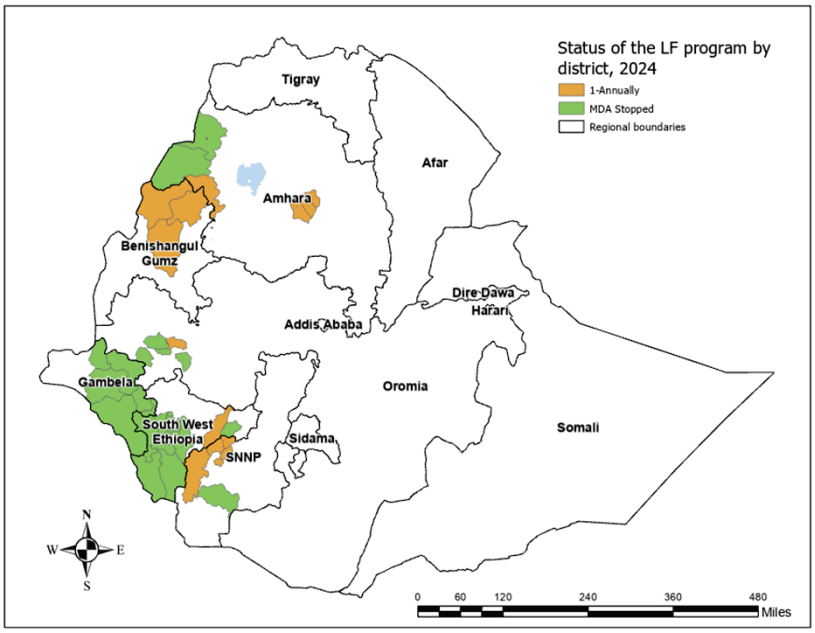
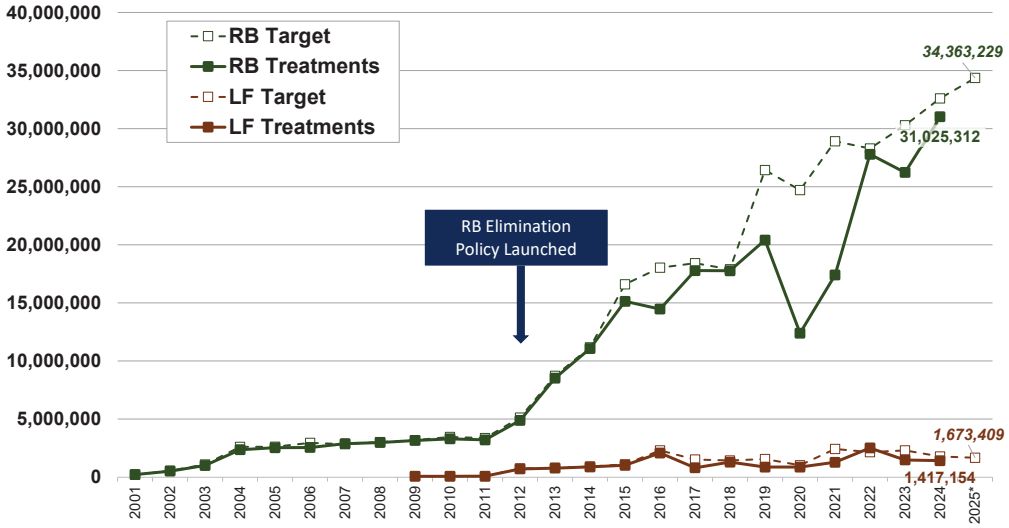


Figure 30

Ethiopia: Carter Center-Assisted River Blindness (RB) and Lymphatic Filariasis (LF) Treatments 2001–2024 and 2001–2025 Targets



*Target

Figure 31

Ethiopia: Annual, Semiannual, and Quarterly Mectizan® Treatments for Onchocerciasis in RBEP-Assisted Areas

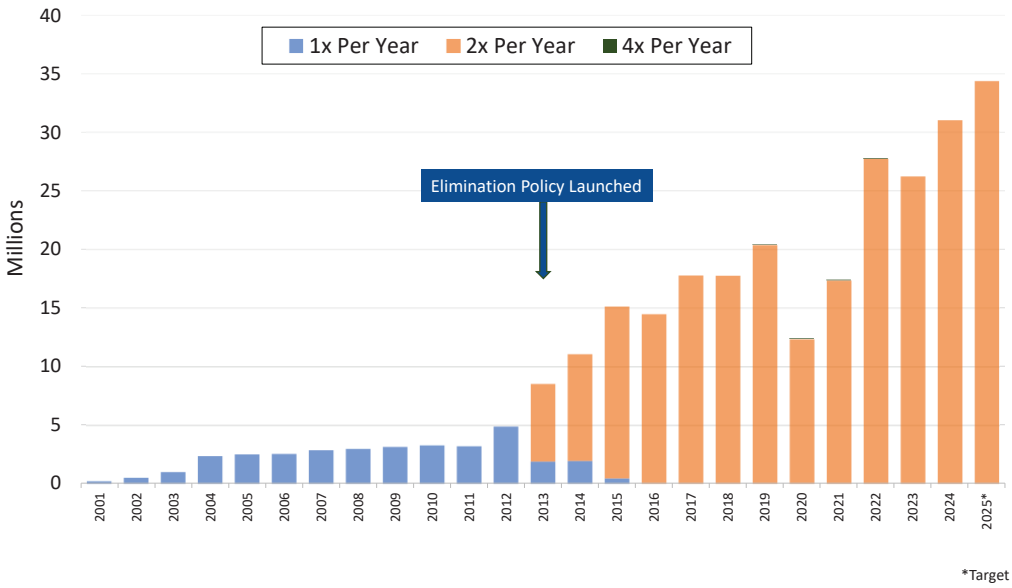
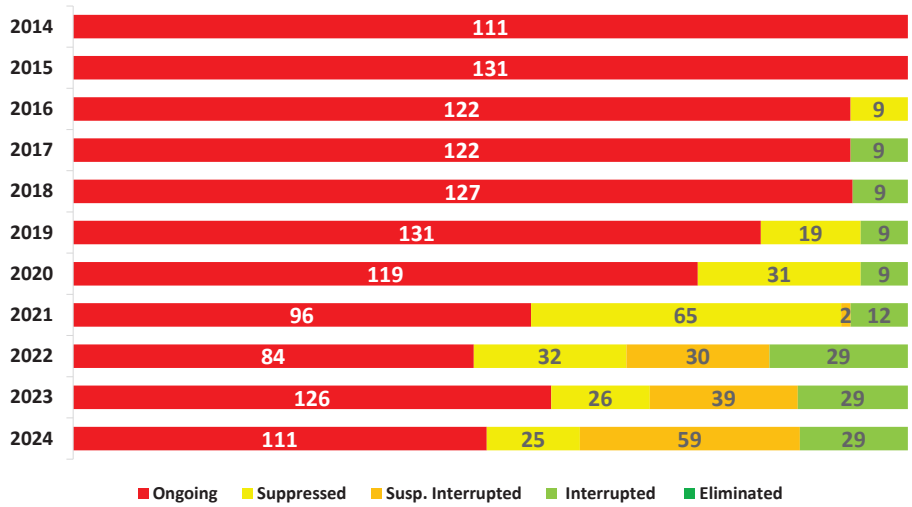


Figure 32

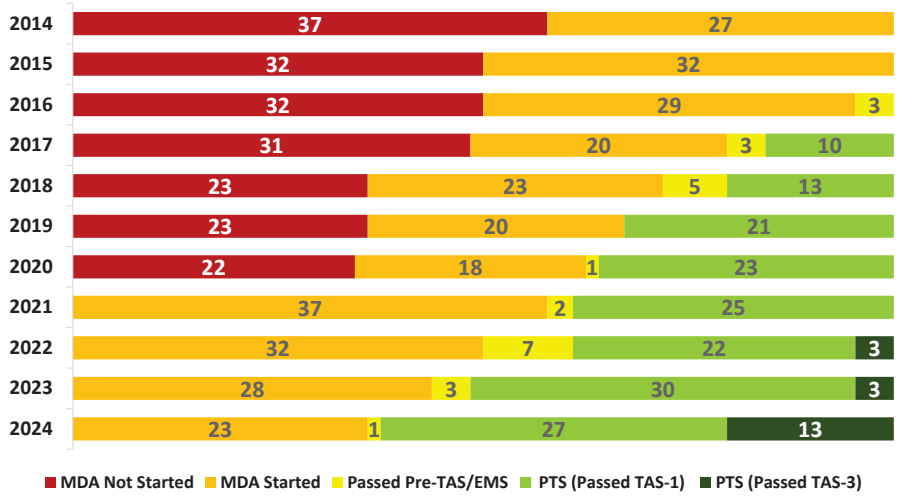
Ethiopia: Progress in Onchocerciasis Elimination, Transmission Status by Woreda (District) in Carter Center-Assisted Areas, 2014–2024



Note: The increase in total woredas over time reflects administrative splitting and expansion of program areas.

Figure 33

Ethiopia: Progress in Lymphatic Filariasis Elimination, Transmission Status by Woreda (District) in Carter Center-Assisted Areas, 2014–2024



Note: Counts reflect Carter Center-assisted woreda administrative divisions as of end of 2024, n=64.

Figure 34

Nigeria: Status of Onchocerciasis Elimination, December 2024

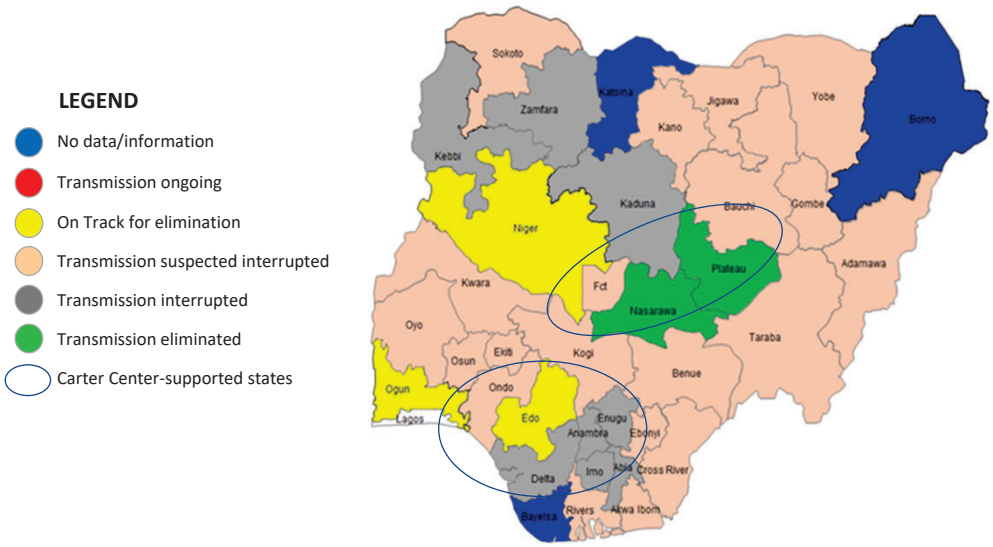


Figure 35

Nigeria: Progress in Onchocerciasis Elimination, Transmission Status by State in Carter Center-Assisted Areas, 2014–2024

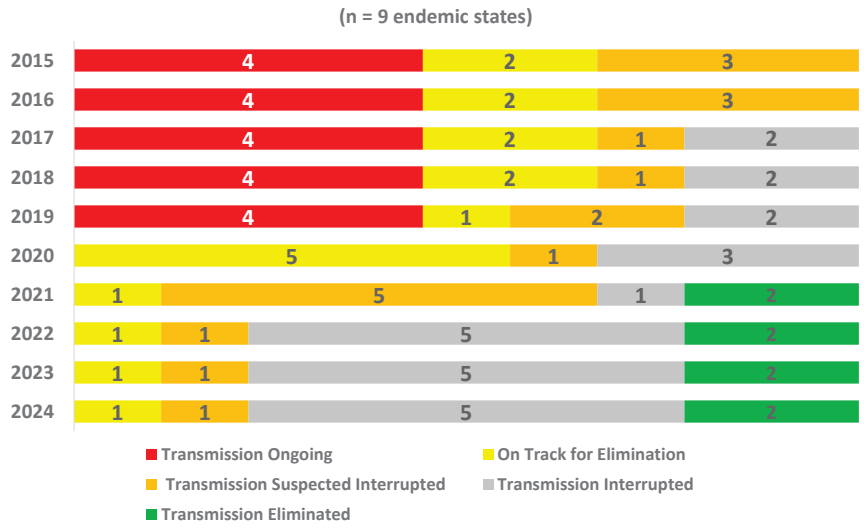


Figure 36

Nigeria: Progress in Lymphatic Filariasis Elimination: Transmission Status by Local Government Area in Carter Center-Assisted Areas, 2015–2024

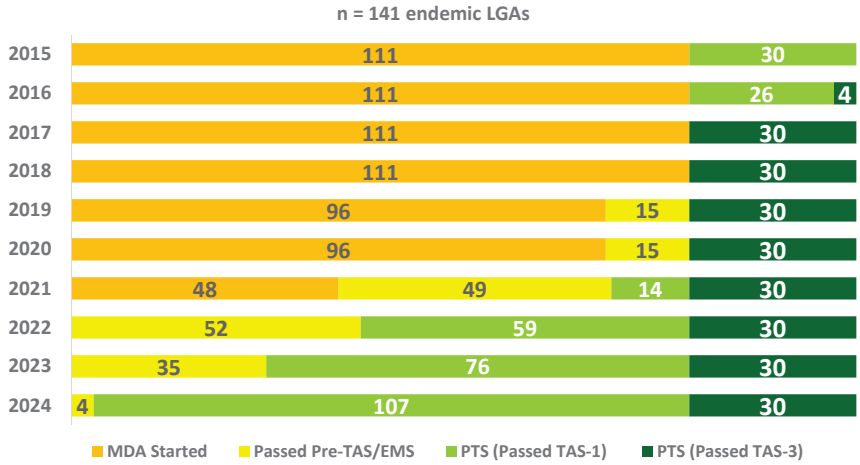
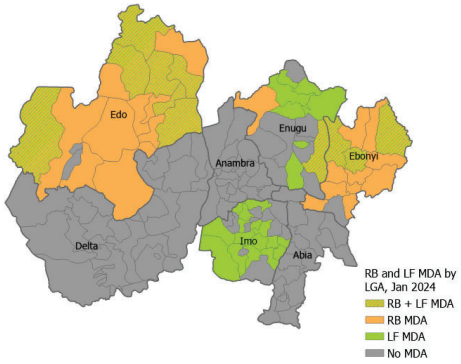


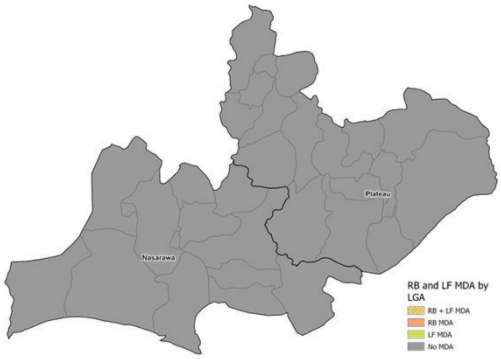
Figure 37

Nigeria: RB and LF Treatment Status in Carter Center-Assisted States in 2024

Southeast and South-South States



Plateau and Nasarawa

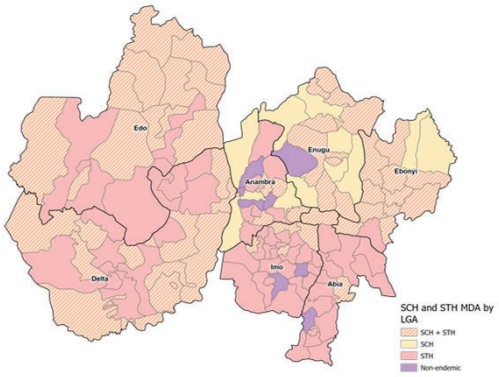


All LGAs in Plateau and Nasarawa have stopped MDA for both RB and LF.

Figure 38

Nigeria: Schistosomiasis and STH MDA Endemicity in Carter Center-Assisted States, from most recent surveys (2013–2024)

SCH/STH MDA Status, SE/SS States



SCH/STH MDA Status, Plateau and Nasarawa States

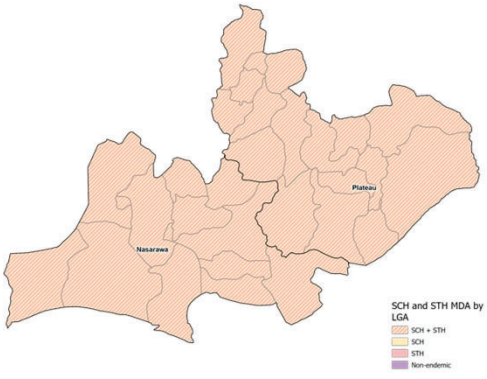
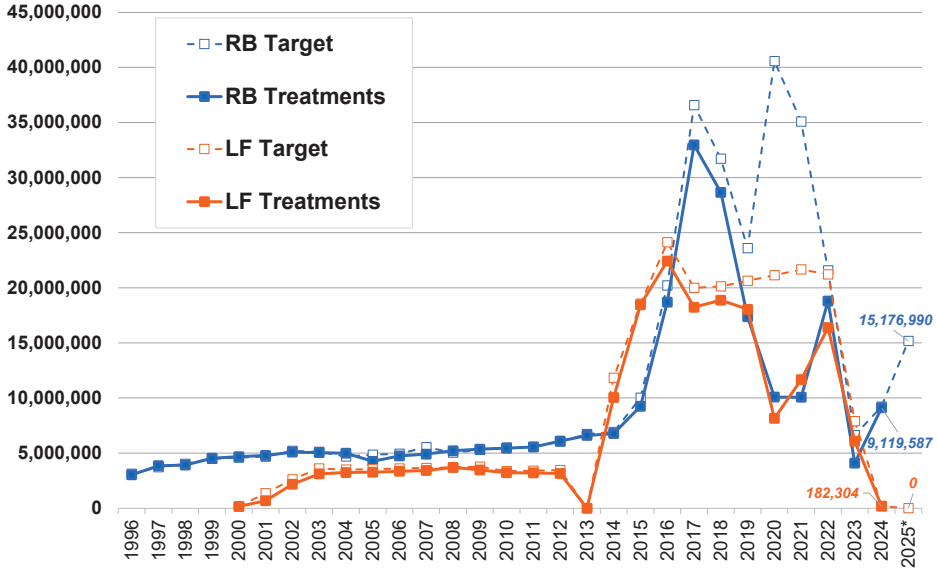


Figure 39

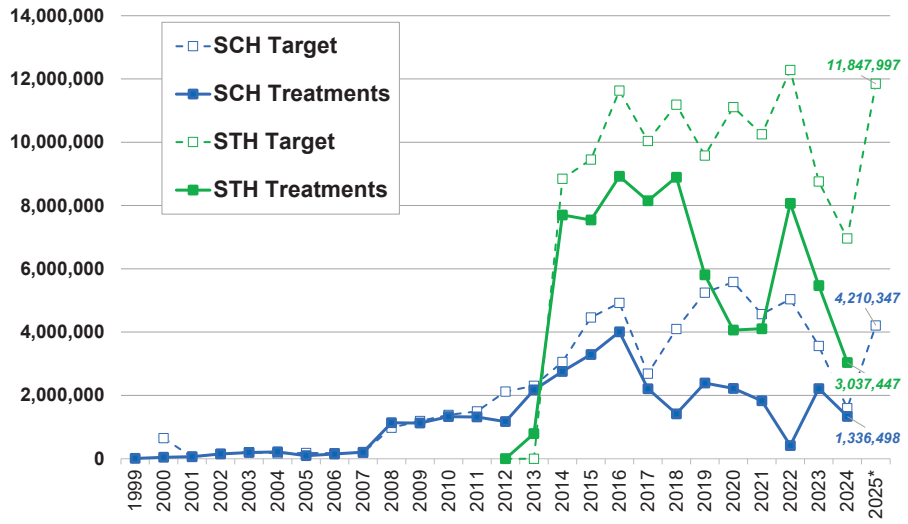
Nigeria: Carter Center Assisted River Blindness (RB) and Lymphatic Filariasis (LF) 1996–2024 Annual Treatments and 1996–2025 Targets



*Target

Figure 40

Nigeria: Carter Center-Assisted Annual Treatments and Targets for Soil Transmitted Helminths (STH) and Schistosomiasis (SCH)†

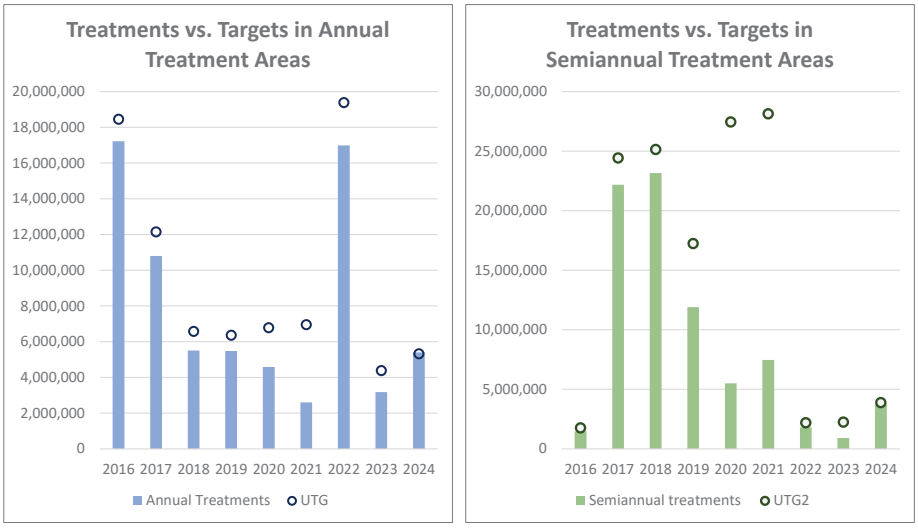


†Treatment targets vary by year based on updates in WHO and national guidelines.

*Target

Figure 41

Nigeria: Carter Center-Assisted Annual and Semiannual Mectizan® Treatments versus Targets for Onchocerciasis*



**Graphs begin at onset of semiannual treatments for RBEP. The decrease in annual treatment in 2018 is due to Plateau and Nasarawa halting treatment due to transmission interruption. Decrease in 2019 is due to delayed arrival of Mectizan, in 2020 is due to COVID-19 pandemic, and in 2021 is due to drug delays and COVID-19 pandemic. Decrease in 2023 is due to insufficient and late drug supply.*

Figure 42

South Sudan: Progression of River Blindness and Lymphatic Filariasis Elimination

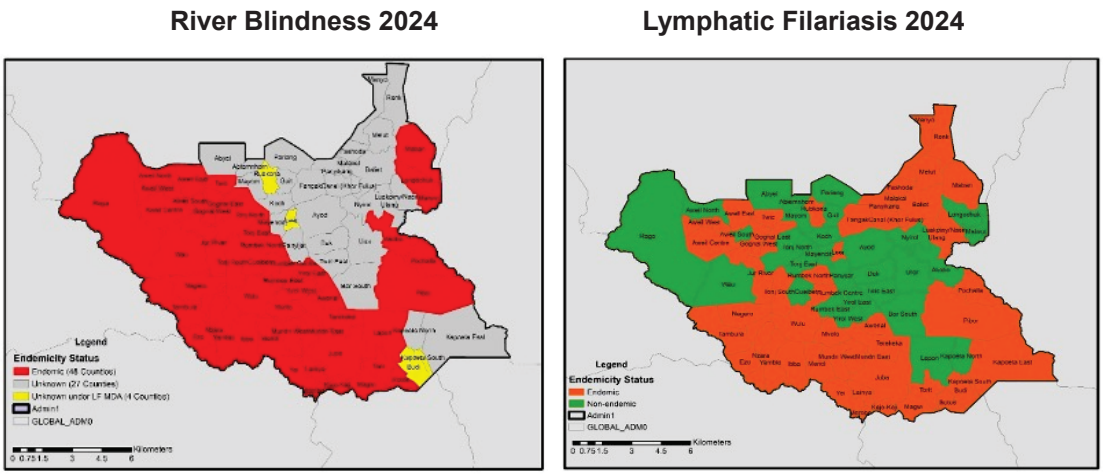


Figure 43

South Sudan: Carter Center-Assisted River Blindness and Lymphatic Filariasis Treatments and Targets, 2024

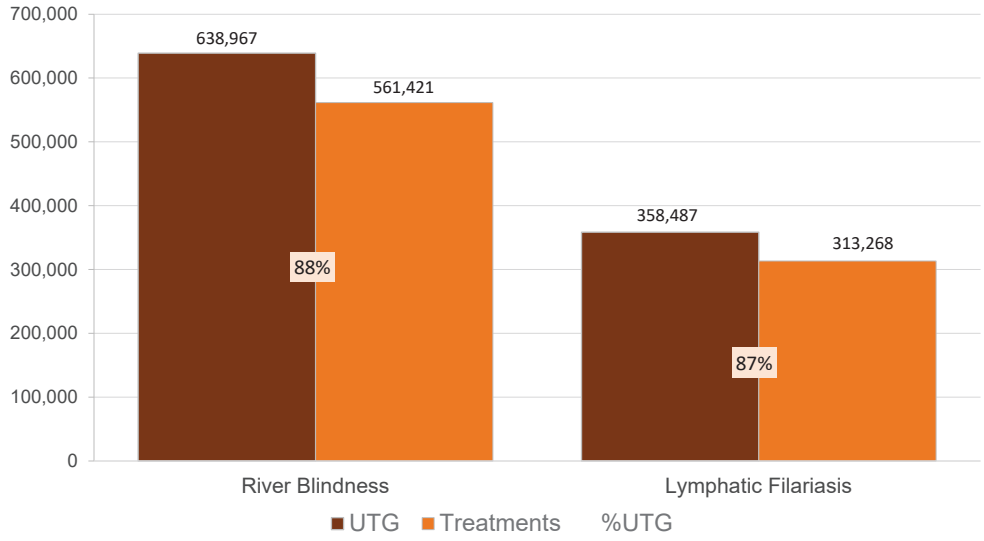
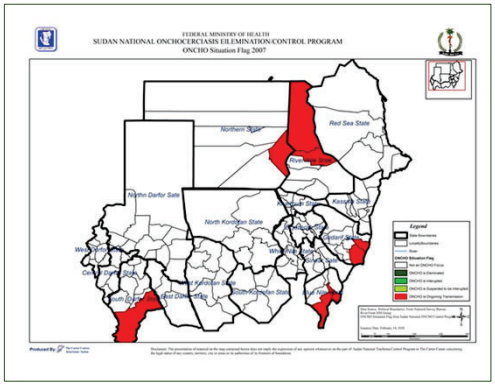


Figure 44

Sudan: Progression of River Blindness Elimination

2007



2024

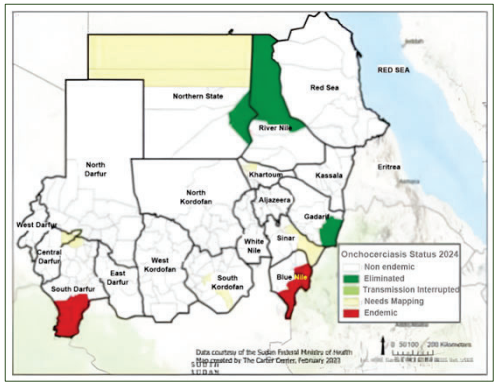


Figure 45

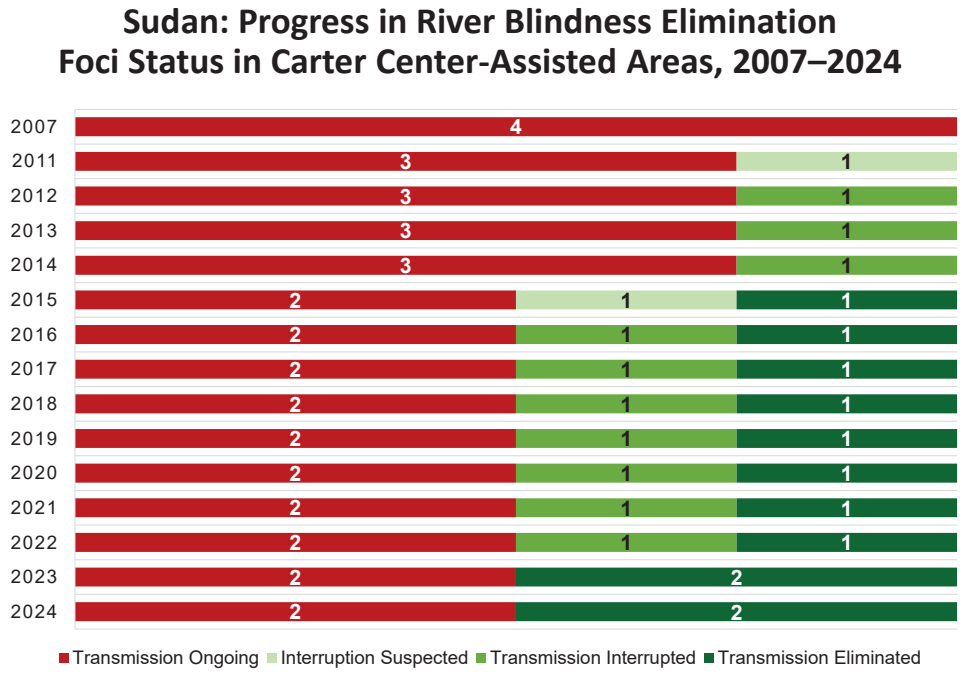


Figure 46

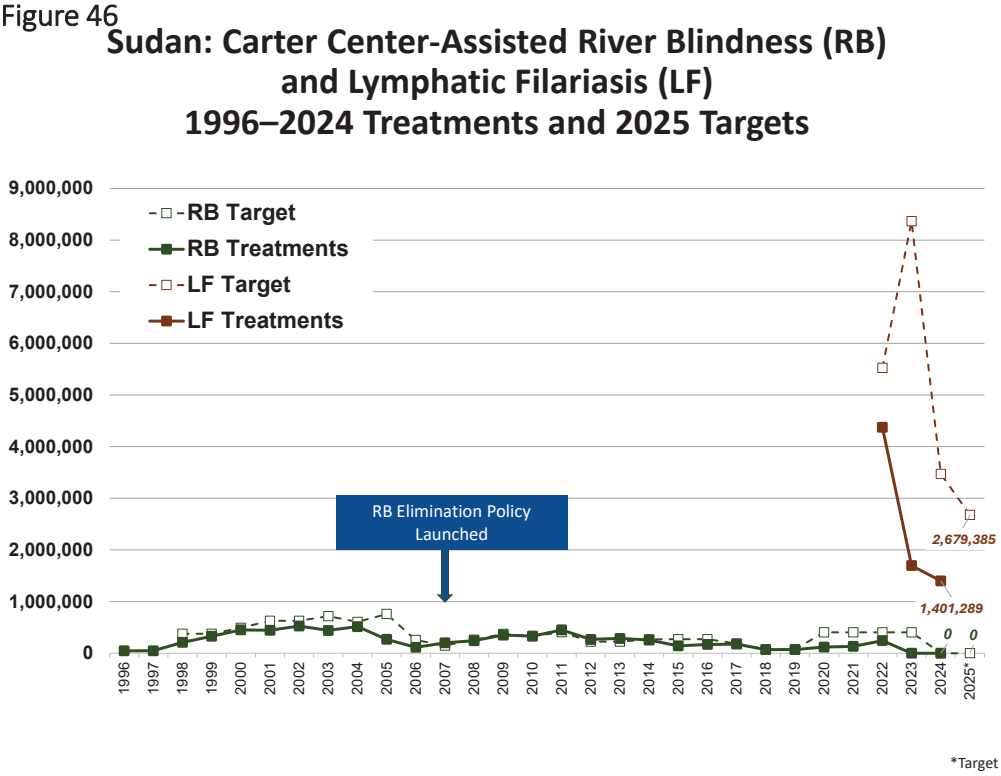
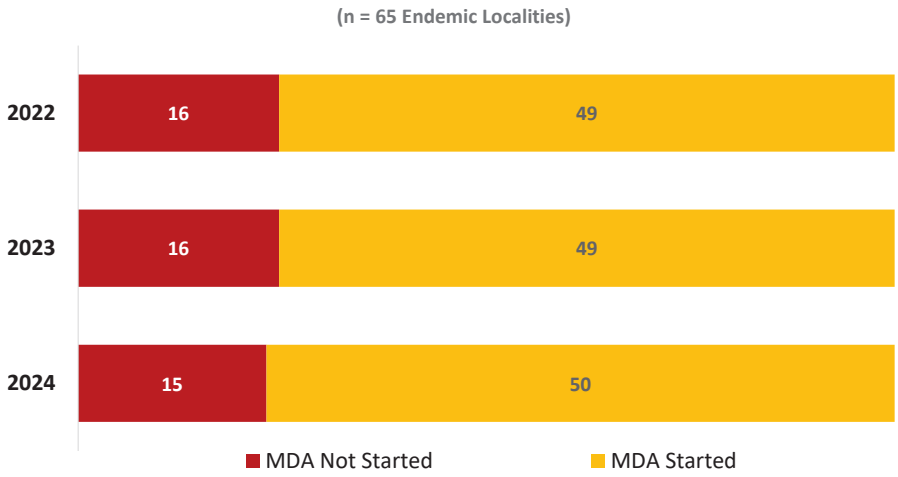


Figure 47

Sudan: Progress of Lymphatic Filariasis Elimination in Carter Center-Assisted Areas, 2022–2024



The 2022–2023 figures were revised to reflect the most current available data.

Figure 48

Uganda: Progress of River Blindness Elimination

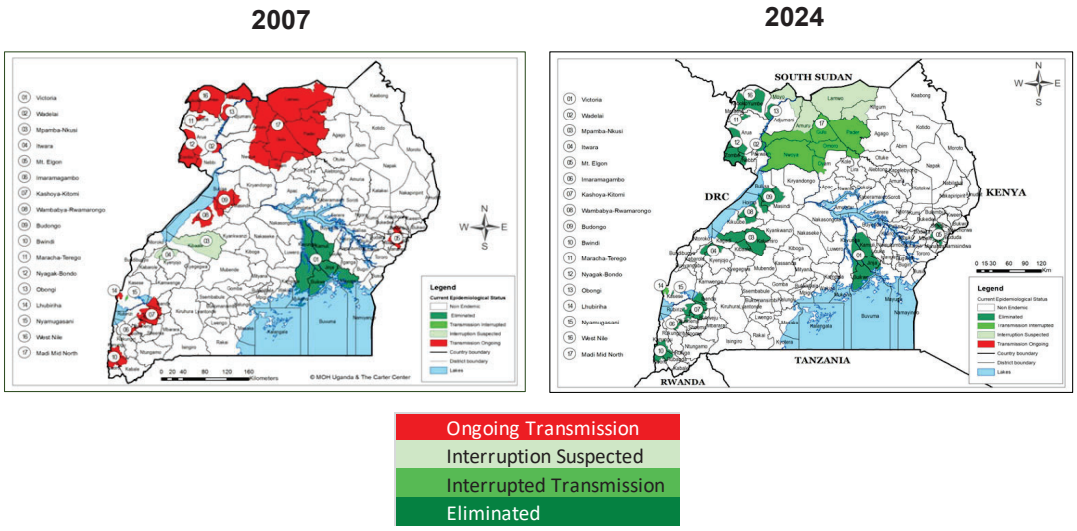


Figure 49

Uganda: Progress of River Blindness Elimination Foci Status in Carter Center-Assisted Areas, 2007–2024

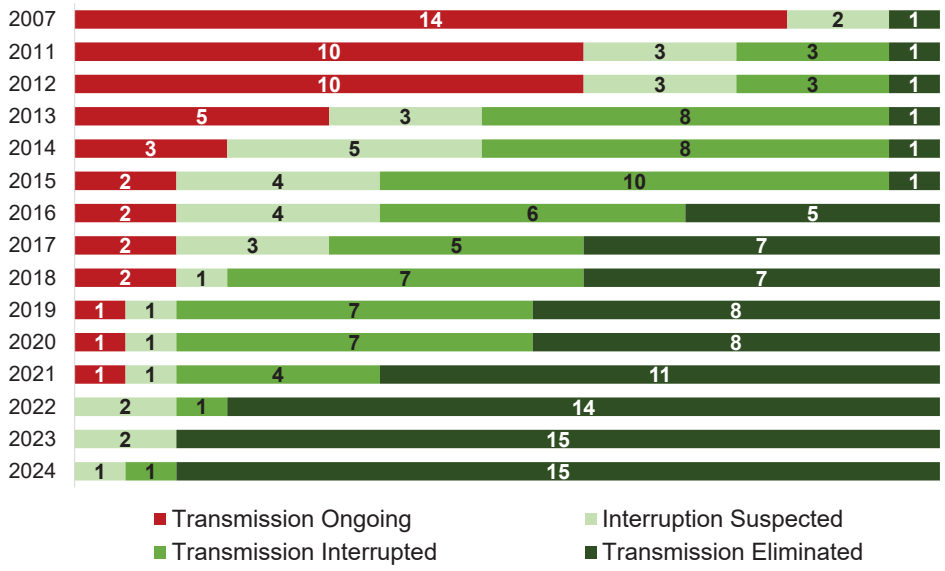
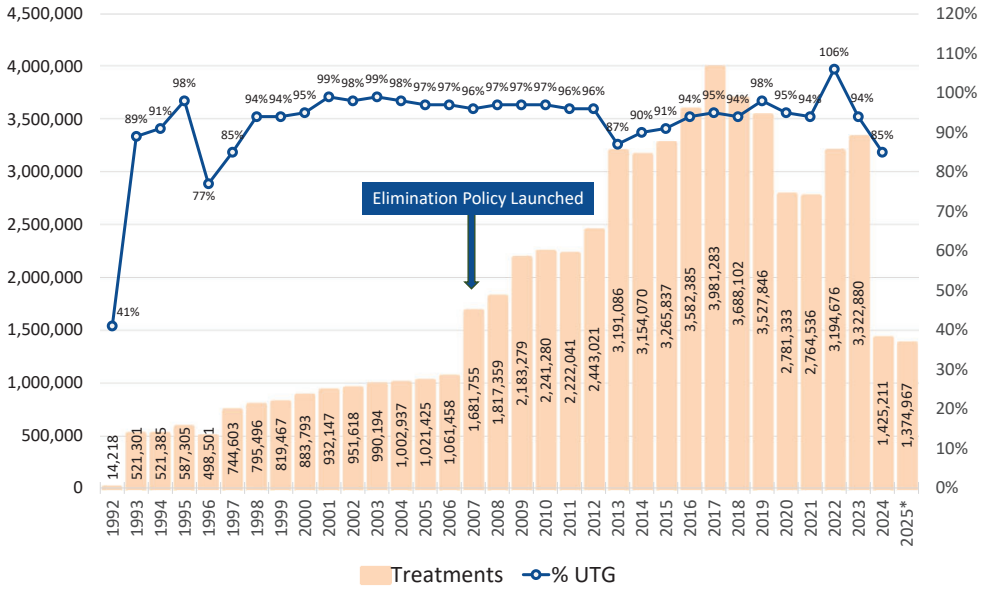


Figure 50

Uganda Carter Center-Assisted Mectizan® Treatments* 1992–2024 and 2025 Target



Note: 2022–2024 Includes passive and refugee treatments

*Target

Figure 51

Angola: Status of River Blindness and Lymphatic Filariasis Endemicity, 2024

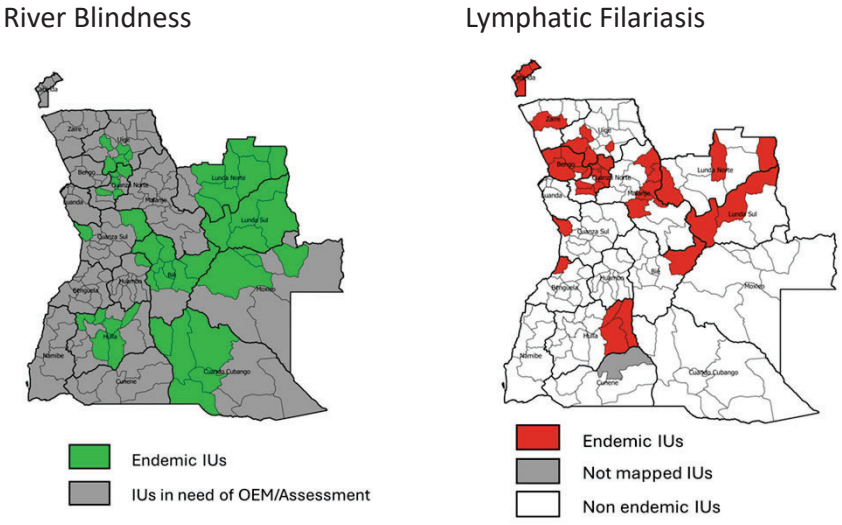


Figure 52

Burundi: River Blindness Endemicity Status, based on REMO Surveys, 2001–2005

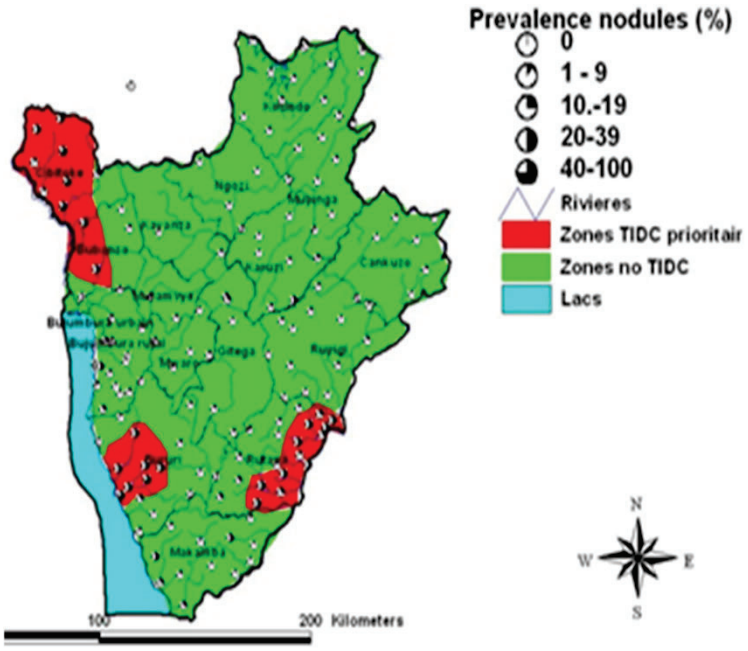
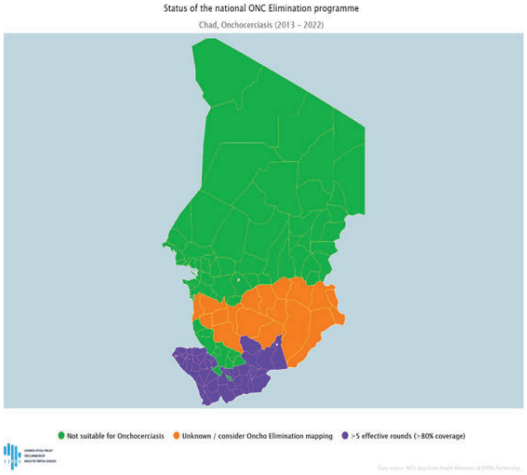


Figure 53

Chad Status of River Blindness and Lymphatic Filariasis Endemicity as of most recent mapping exercise (2022)

River Blindness



Lymphatic Filariasis

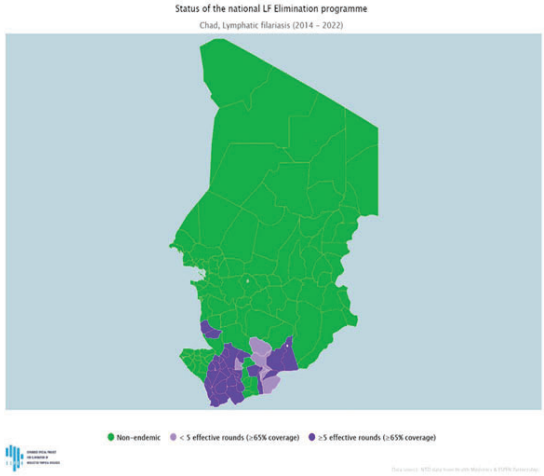


Figure 54

Madagascar: Status of Lymphatic Filariasis Endemicity, 2024

THE AMERICAS

Presenters: Dalila Rios and Regina Garcia (The Carter Center-OEPA), Dr. Oscar Noya (Consultant, South Focus Venezuela), and Ciro Martins (Ministry of Health, Brazil).

Summary:

The Onchocerciasis Elimination Program for the Americas (OEPA) is a coalition led by TCC that includes the ministries of health of the affected countries in the Americas, the Pan American Health Organization (PAHO)/WHO, and other partners. The OEPA initiative has stopped treatments in 93% of the population once endemic for RB (Figure 20), and four countries have received WHO verification of elimination: Colombia (2013), Ecuador (2014), Mexico (2015), and Guatemala (2016). In 2017, PTS was completed in the Northeast Focus of Venezuela, once the third-largest transmission zone of the region in terms of population. The OEPA treatment history over two decades shows a scaling up of MDA treatments followed by a scaling down of treatments as elimination was achieved in an increasing number of areas (Figure 21).

The status of the original and current transmission zones of the Americas is shown in Figure 22. The last active transmission zone is in the Amazon rainforest bordering Brazil and Venezuela, called the 'Yanomami Focus Area' (YFA) after the indigenous people residing there (Figure 23). A population of 39,315 people living in 701 communities in 65 subareas are believed to be at risk of RB in the YFA. Notable challenges include the remoteness of the YFA, its nomadic populations, the lack of high-level involvement of the governments of Brazil and Venezuela, and Venezuela's political, humanitarian, and health crises. Brazil and Venezuela have developed "scorecards" to help prioritize resources to communities with the most ground to cover to reach elimination. Scores are based on initial infection intensity, number of high coverage treatment rounds, recent assessment results, security, and several other indicators, some of which are unique to each country (Figure 24).

A hybrid mid-year PCC meeting was held July 24 – 25, 2024. The annual IACO meeting was held in person in Brasilia, Brazil (in hybrid format), preceded by a one-day Program Coordinating Committee (PCC) meeting from November 20 – 22, 2024. Embracing the ethos "nothing about us without us," two Indigenous Health Agents serving endemic communities of Brazil attended the conference and participated in a session dedicated to indigenous agent empowerment.

The OEPA program received financial support in 2024 from the United States Agency for International Development's (USAID) *Achieve Onchocerciasis Elimination in the Americas* and other donors.

Treatments:

In 2024, OEPA assisted Brazil and Venezuela with 37,261 Mectizan treatments, representing 53% of the 2024 treatment target of 70,704. Brazil achieved 68% of its goal, while Venezuela achieved 39% of its goal.

In Brazil, semiannual Mectizan treatments continued to be offered primarily alongside essential health services. In 2024, the Brazil program faced staffing shortages. Continued policy barriers in Brazil prohibit Indigenous Health Agents (IHAs) from administering treatment.

The Venezuelan program offered standalone semiannual treatments and continued four times-per-

year treatment in 68 priority communities. The program encountered difficulties related to community absence during visits, insufficient IHA coverage in priority areas, and delays in administrative processes.

Both countries' programs experienced issues with insecurity due to illegal mining and conflict between communities. Figures 25-26 show detailed treatment information from 2024.

The 2025 treatment target for OEPA is 71,566 treatments and includes a four-times-per-year treatment approach in three priority sub-areas of Venezuela.

Training:

Some Yanomami people from endemic communities of both Brazil and Venezuela are trained to serve as Indigenous Health Agents (IHAs), who provide health services in the YFA. IHAs oversee treatment in 60% of endemic communities in Venezuela; there, 197 IHAs served the program in 2024, and 24 (12%) of these are women. In Brazil, 148 Yanomami people assist with health efforts in the endemic area, 8 (5%) of whom are women. Both countries conducted training and retraining exercises for IHAs. In Brazil, these were primarily led by Ministry of Health staff; In Venezuela, health staff conducted some IHA trainings directly and also continued to train Yanomami Educators, who in turn train Yanomami IHAs.

Special Topics:

OEPA Epidemiologist, Regina Garcia, presented a dashboard that she and the OEPA team have developed in consultation with the Brazil and Venezuela programs. This dashboard allows the programs to visualize and more efficiently track common indicators by giving rapid access to relevant data by geographic unit, year, or type of assessment. Importantly, the dashboard provides cross-border perspectives like the map in Figure 27, which compiles the most recent OV-16 serology results across the YFA.

OEPA Treatment objectives and achievements

Country	2024 Treatment Targets	2024 Treatments (%)	2025 Treatment Targets
Brazil (UTG2)	33,684	22,952 (68%)	34,178
Venezuela (UTG2)	27,264	8,888(33%)	27,508
Venezuela (UTG4)	9,756	5,421 (56%)	9,880
Total	**70,704**	**37,261 (53%)**	**71,566**

THE AMERICAS RECOMMENDATIONS 2025

GENERAL:

- Deliver a minimum of two effective (≥85% coverage) rounds in all communities of the YFA, maintaining COVID-19 precautions as stipulated by the governments.
- Interrupt transmission and stop MDA in the YFA as soon as possible, followed by 3 – 5 years of PTS and pursuit of formal WHO verification.
- Continue work to increase involvement of IHAs, Yanomami Educators, and Yanomami women. The IHA experience in both countries should be published in a peer-reviewed journal.
- Complete report on the Innovation Hub-funded project evaluating the impact of smart devices on health workers' performance in Venezuela and prepare a publication on the results.
- Conduct epidemiological assessments (serology, entomology) in non-sentinel areas.
- Continue work to compile previous monitoring results (particularly time-stamped serology and entomology results) into subregion- or community-specific graphs and tables to better track progress over time.
- The community-level scoring system ("score card") has evolved into a strong tool that should be continually updated and refined. Seek a common scoring system that would allow a map of the YFA with community scores based on common data variables, such as effective (≥85%) treatment rounds, baseline endemicity, most recent assessment results, and prevailing vector species.
- Further develop the binational treatment registration of moving or migratory populations that reflects with more accuracy the movement patterns and possible ramifications of these movements with disease transmission.
- Hold two in-person PCC meetings: the standalone mid-year PCC meeting, as well as a PCC in tandem with the IACO meeting later in the year.
- Hold the IACO meeting in late 2025. Promote the highest level of political representation at IACO from PAHO, Venezuela, and Brazil.

VENEZUELA:

- Continue four-times-per-year treatment in the 68 communities deemed highest priority due to low number of effective treatment rounds (<10).
- Seek increased involvement of Yanomami women as educators and IHAs who will take part in treatment activities. Track the number and gender of IHAs in each program and establish common indices to monitor their performance (such as IHAs per persons treated, IHAs per community, ancillary program benefits, etc.). Document the participation of each group and track the impact on program treatment coverage.
- Report any "new" communities that are unknown to the health system and have not yet had

a site visit for skin snip assessments and OV-16 serology. If the village is confirmed to be RB endemic, quarterly Mectizan treatment should be started immediately.

BRAZIL:

- Conduct high-level advocacy meetings with Brazilian Ministry of Health and United States Government representatives in Brazil to further RB elimination efforts there.
- Improve treatment coverage in 2025 with increased field supervision and advocacy.
- Continue work to compile historical community-level treatment data to assist in scorecard community prioritization.
- Complete the Ov-16 serology assessment in children aged 1-9 in all endemic communities and complete DBS processing within three months of having collected the samples.
- Complete the PCR analysis of 2022 – 2023 entomological collections and actively seek to complete processing of future fly collections within six months of having captured them. Follow USF's recommendation to limit the size of fly pools for PCR to a maximum of 100 fly heads per pool.

ETHIOPIA

Presenters: Mr. Anley Haile, Mr. Aderajew Mohammed, and Mr. Yohannes Eshetu (The Carter Center-Ethiopia)

Summary:

Since 2001, TCC has assisted the Ethiopian MOH in eliminating transmission of RB in the country. Around 31 million people are at risk of the disease in at least 318 *woredas* (districts) – approximately one-quarter of the country (Figure 28). The RBEP currently supports activities in 224 woredas, around 70% of the nationwide burden, providing primarily twice-per-year treatments to accelerate progress toward the FMOH's goal of RB elimination by 2030. RBEP first provided semiannual treatment in 2013, supplemented with quarterly treatment in select areas since 2018. Ethiopia is home to the first cross-border focus to interrupt transmission of RB – the Metema-Galabat focus in northwestern Ethiopia and eastern Sudan. TCC also serves as the co-secretariat of the Ethiopia Onchocerciasis Elimination Expert Advisory Committee, which met twice in 2024: January 16 – 18 and August 26 – 28.

TCC has assisted the Ethiopian LF elimination program since 2009. Approximately 7.8 million people in at least 131 (~10%) woredas are at risk of LF nationwide (Figure 29). TCC supports 64 (47%) of these woredas, home to about 4.3 million people.

TCC's work in Ethiopia is based on a longstanding partnership with the FMOH and receives support from the Lions Clubs International Foundation, the Lions-Carter Center SightFirst Program, and RLMF.

Treatment:

In 2024, TCC assisted with the delivery of 31,025,312 Mectizan treatments for river blindness, representing 95% of the 2024 treatment target (Figure 30). The program conducted quarterly treatments in portions of Metema district between 2019 and 2022, but resumed solely semiannual treatment in 2023 – 2024 because transmission has resumed across the broader district (Figure 31). The TCC-assisted LF program provided 1,417,154 annual treatments with Mectizan and albendazole representing 80% of the 2024 treatment target (Figures 30). More than 87,000 villages were reached. The program aims to deliver 34,363,229 semiannual treatments for RB and 1,673,409 for LF in 2025 (Figure 30).

Training:

A total of 501,976 CDDs were trained in 2024, 141% of the annual goal. Additionally, 189,518 (133%) CSs and 13,707 (114%) health extension workers (HEWs) received training. The goals for 2025 are 384,125 CDDs, 122,965 CSs, and 11,913 HEWs. Most areas are successfully meeting target ratios of community-directed treatment with ivermectin (CDTI) volunteers per community.

Impact:

No districts met WHO criteria to stop MDA for RB in 2024. The total number of woredas in PTS remains 29 (Figure 32) and the total number of people no longer treated is still about 3 million (Figure 10). In 2024, 7 woredas passed LF TAS-1 and can stop MDA, while 13 woredas successfully completed PTS TAS-2 and TAS-3 demonstrating that transmission remains interrupted in those areas (Figure 33).

Special Topics:

Aderajew Mohammed (The Carter Center) presented results from PTS evaluations in the Metema sub-focus. PCR testing of black fly vectors from three distinct sites showed evidence of *O. volvulus* infectivity. This represents the first reported PTS failure in The Carter Center's supported programs. The program undertook a comprehensive evaluation of the area to determine if transmission has been reestablished, following WHO guidelines. This part of Ethiopia has seen significant migration due to conflict and for commercial agriculture. Serological results from children demonstrated that transmission has indeed restarted, but it is unclear if this is due to migration or whether MDA was stopped too soon. Mr. Mohammed also presented the extensive activities occurring elsewhere in Ethiopia to explain the PTS process and document any findings for future dossiers.

The second special topic presenter expanded on previous analyses from Metema. Professor Warwick Grant of LaTrobe University in Australia shared the results of ongoing genomic studies in Ethiopia and beyond. By examining flies at the genetic level, Prof. Grant and his group – which includes Mr. Sindew Feleke of the Ethiopia Public Health Institute – demonstrated that there are two broad groups of flies in northwestern Ethiopia, but that there is some mixing of populations. These results mean that there may not be a clear delineation between the Metema focus and its neighbor to the south, the Metekel focus, where RB transmission remains ongoing. Prof. Grant's group also looked for genetic evidence from parasites. They found evidence of an unknown *Onchocerca* species, which may trigger positive results on various diagnostic tests.

River Blindness Treatment Objectives and Achievements, Ethiopia			
	2024 Treatment Targets	2024 Treatments (%)	2025 Treatment Targets
UTG2	32,601,793	31,025,312 (95%)	34,363,229

Lymphatic Filariasis Treatment Objectives and Achievements, Ethiopia			
	2024 Treatment Targets	2024 Treatments (%)	2025 Treatment Targets
UTG	1,776,284	1,417,154 (80%)	1,673,409

Training Objectives and Achievements, Ethiopia			
	2024 Training Targets	2024 Training (%)	2025 Training Targets
CDDs	355,569	501,976 (141%)	384,125
CSs	142,944	189,518 (133%)	122,965
HWs	12,009	13,707 (114%)	11,913

ETHIOPIA RECOMMENDATIONS 2025

GENERAL:

- Work toward a target ratio of at least 1 CDD:50 people, 1 CS:5 CDDs, and 1 CS per village nationwide.
- Mobilize domestic resources and/or solicit more funding from existing donors and/or identify new donors to address the resource gap in cross-border districts which might otherwise skip MDA and other essential program interventions

RIVER BLINDNESS

- Study results from PTS and stop MDA failure investigations to generate ideas for program improvements.
- Complete mapping in Ethiopia.
    - Consider integrated surveys or operational research to elucidate indeterminate results from OEM.
    - The Ethiopia program, in consultation with HQs, should resolve the issue of OEM approaches (WHO vs Ethiopian SOP) by conducting operational research in selected districts.
    - Meanwhile, continue to follow EOEEAC guidance for starting MDA that relies on a mean OV16 seroprevalence of ≥2% in adults across a *woreda*, in contrast to OTS guidance of ≥2% seroprevalence in any single village in the woreda, which considerably expands the number of districts requiring MDA.
    - Work with HQ to resolve issues among donors who are not willing to support district-level expansion under the EOEEAC guidelines.
- Provide financial and administrative support for the annual EOEEAC meeting.
- Encourage EOEEAC to issue a press release following each meeting and the Lead Executive Officer of Disease Prevention and Control to organize a debriefing meeting after each in-person committee meeting. This will allow the chair to brief the Minister of Health.
- Invite representatives from Sudan and South Sudan to EOEEAC meetings and seek invitation for Ethiopian staff to their national RB/LF elimination committee meetings. Involve representatives from neighboring zones and implementing partners.
- Develop enhanced mobilization strategies for MDA in areas with consistently poor MDA coverage. Enhance interventions in areas failing impact assessments. Study the impact of these enhancements in coverage surveys.
- Strengthen inter-regional cross-border collaboration to synchronize MDA and surveys as much as possible.
- Expand the number of entomologic surveillance sites in candidate stop MDA areas.
- Stop MDA and begin PTS in TCC-assisted areas that met stop-MDA criteria in 2023 and were approved by FMOH.
- Conduct stop MDA assessments in accordance with EOEEAC recommendations.
- Investigate potential hotspots of persistent transmission and propose these for quarterly

MDA.

- Carry out coverage surveys per WHO guidelines and use the results for improvements. Consider continuing the use of rapid coverage surveys on a large scale during each round of MDA.
- The Ethiopia lab should continue analyzing samples based on EOEEAC and the program's priority needs.
- Establish a unified data management system that is comprehensive, easy to use, and accessible to the program.
- Form a steering committee comprising members from the Country office and HQs team to review, comment on, and approve innovative ideas, survey proposals, and standardizations on RB/LF abstracts, manuscripts, publications, and surveys.
- Continue testing the validity and utility of existing Operational Transmission Zones as units for stopping MDA.
- Pause introduction of ND5 PCR testing until more is known about its precision in this context.
- Continue supporting efforts in genomic testing of fly samples.
- Mobilize domestic, solicit more funding from existing donors, or identify new donors to address the resource gap in cross-border districts which might otherwise skip MDA and other essential program interventions.

LYMPHATIC FILARIASIS

- Investigate MDA coverage, community perception, migration patterns, and long-lasting insecticidal bed net (LLIN) ownership where antigen positives are found. Use findings to develop recommendations to increase the impact of interventions on LF elimination.
- Propose investigations, consider focal MDA, or other responses to areas seeing consistent positives but still below the cutoff in TAS2 and TAS3 studies.
- In consultation with HQ and FMOH, conduct pre-TAS and TAS studies in eligible areas. Work with FMOH to coordinate the order and delivery of filarial test strip (FTS) test kits and positive control.
- Obtain DBS for OV16 testing during TAS-1 studies if the area is co-endemic with RB and a data gap exists.
- Await direction from FMOH (preferably after consultation with LF Regional Program Review Group [RPRG]) before conducting further LF remapping/reassessments.
- If the necessary funding can be secured, expand LF MDA to new zones in concert with RB support.
- Support the scale-up of MMDP/DMDI services for LF.
    - Revise MDA household registers to collect information on LF morbidity.
    - Establish designated care facilities in endemic areas in line with WHO guidelines.
    - Train health care workers on MMDP/DMDI.

NIGERIA

Presenters: Mr. Fatai Oyediran (Ministry of Health, Nigeria); Dr. Abel Eigege, Dr. Emmanuel Emukah, Dr. Cephas Ityonzughul and Dr. Adamu Sallau (The Carter Center-Nigeria); Dr. Jenna Coalson (The Carter Center).

Summary:

Since 1996, TCC has assisted the Nigerian FMOH to eliminate RB transmission in the country. In Nigeria, the RBEP is an integrated NTD program that also works towards LF elimination and control of SCH and STH. TCC assists nine (24%) of the 36 Nigerian states and Federal Capital Territory, comprising 168 districts called local government areas (LGAs). After more than a decade of an RB control approach, Nigeria launched a national RB elimination policy in 2013, and the FMOH established the Nigeria Onchocerciasis Elimination Committee (NOEC) in 2015. Two hybrid NOEC meetings were held in 2024 (May 15 – 17 and December 11 – 13) with support from TCC and RTI; Figure 34 reflects the outcomes of each of the meetings with regard to state transmission status. No Carter Center-assisted states experienced a statewide change in status in 2024.

The Carter Center assisted RB treatments in 2024 in three southern states in Nigeria (Ebonyi, Edo and Enugu). Two states stopped treatment in 2018 (Plateau and Nasarawa), one in 2021 (Delta) and four in 2023 (Abia, Anambra, Enugu, and Imo). However, operational research conducted in 2023 revealed a potential reservoir of transmission in Enugu, resulting in resumed MDA in two of the state's LGAs. Figure 35 shows national RB progress since 2015.

The LF Program assisted treatments in 2024 in five states. For LF, the implementation unit (IU) is the LGA; 31 LGAs passed stop-MDA TAS-1 and stopped MDA in 2024, bringing the total that has done so to 137 (97%) of the original 141 LGAs under treatment in TCC-assisted areas. Eight of the nine states have stopped treatment statewide due to all LGAs passing TAS, in 2013 (Plateau and Nasarawa), 2022 (Abia and Anambra), 2023 (Delta), and Ebonyi, Edo, and Enugu in 2024; only Imo remains. Figure 36 shows progress in TCC-assisted areas since 2015.

All nine states still have active schistosomiasis and soil-transmitted helminth control programs, and the program has begun to transition to full government ownership when an RB and/or LF platform is no longer present. It is expected that this "mainstreaming" process will be completed by the end of FY26. See Figures 37 and 38 for maps showing ongoing treatments by state for each of the four NTDs.

Plateau, Nasarawa, and Ebonyi states also work to strengthen the health care system to provide care for those suffering from chronic LF (lymphedema and hydrocele), which persists after LF transmission has been eliminated. Our objective is to meet or exceed WHO's required level of MMDP work that would support the states' claims to have 'eliminated LF as a public health problem.'

TCC's work in Nigeria is based on a longstanding partnership with the FMOH and receives support from USAID's Act to End NTD's | East project, led by RTI International; The Gates Foundation; IZUMI Foundation; The Task Force for Global Health; Clarke Mosquito Control and the Clarke Cares Foundation; and other generous donors.

Treatments:

The program assisted 13,675,836 total treatments for RB (9,119,587), LF (182,304), SCH (1,336,498), and STH (3,037,447) in 2024, representing 99%, 98%, 84%, and 44% of the treatment targets, respectively. Figures 39 and 40 show annual treatments and targets by disease since 1996. Figure 41 shows RB annual and semiannual treatments versus targets since the program began semiannual treatments in 2016.

The primary reasons for low treatment were delays in receipt of drugs and insufficient provision of drugs, related to FMOH policy as well as inflated reverse supply chain reports that showed more existing inventory at the state and LGA level than was accurate. The TCC Nigeria office makes every effort to provide the FMOH with accurate drug inventory reports and drug orders for our assisted areas and to be available to support the drug supply chain process however possible.

The 2025 targets for the three diseases total 31.2 million, a significant increase over 2024 due to the fluctuation of SCH and STH targets by year based on WHO guidelines and TCC's offer to support RB treatment in Cross River State following the withdrawal of USAID support. There are no targeted treatments for LF in 2025 as TAS1 is planned in the 4 remaining TCC-assisted LGAs in Imo state.

Training:

The Nigeria program trained 14,781 CDDs, 1,953 CSs, 1,284 HWs, and 550 teachers in 2024. Training targets in 2025 for CDDs, CSs, HWs and teachers are 15,522, 902, 1,380 and 2,203, respectively.

Impact:

Plateau and Nasarawa states in central Nigeria are in PES after stopping MDA for LF and RB in 2013 and 2018, respectively. Delta state stopped MDA for RB in 2021. Abia, Anambra, Enugu, and Imo did so in 2023, in response to 2022 assessment results endorsed by the NOEC. This brought the total to seven of nine Carter Center-assisted states that have met WHO criteria to stop Mectizan treatment for RB, protecting about 24 million people. Operational research conducted in 2023 revealed a potential reservoir of transmission in Enugu, resulting in resumed MDA in two of the state's districts, targeting about 340,000 people. Including those two districts, just 7.5 million remain under treatment in three RBEP-assisted states. Figure 35 shows RB progress in TCC-assisted states since 2015.

For LF, 8.1 million people in 30 LGAs in Edo, Ebonyi, Enugu, and Imo states passed TAS-1 and qualified to stop LF MDA in 2024. Of 32,760 children tested for LF antigen using FTS, only 7 children tested positive. Cumulatively, 34.3 million people in the nine TCC-assisted states of Nigeria no longer need MDA for LF (Figure 10); only 4 more LGAs need to complete TAS1. The country is making considerable progress towards elimination (Figure 36).

Special Topics:

Dr. Adamu Sallau (The Carter Center) gave an update on the RB hotspot in Enugu. Although Enugu state met the criteria in 2022 to stop treatment based on NOEC guidelines, and did so in 2023, a paper by Ekpo et al.[6] reported that 225 skin snips from 6 villages in 3 LGAs - Ezeagu, Nkanu East

[6] Ekpo UF, Eneanya OA, Nwankwo EN, Soneye IY, Weil GJ, Fischer PU, Nwaorgu OC. Persistence of onchocerciasis in

and Uzo-Uwani, collected Sept. 2020 - May 2021, showed microfilaria prevalence of 32% to 51%. At the recommendation of the NOEC, TCC conducted epidemiology (OV-16 serology followed by skin snip PCRs of positives) and entomology (black fly PCR) to verify these findings, sampling 1,434 children and 9,555 flies. Results showed that Nkanu East had positive OV-16 (0.39%) and skin snip PCR results but no positive fly pools; Uzo-Uwani had positive OV-16 (0.42%), skin snip PCR, and entomology results (1 of 6 pools of 100 flies was positive); and Ezeagu had positive entomology results (3 out of 45 pools of 100 flies were positive) but no OV-16 positive results. Due to these indications that the LGAs comprise a hot spot, the program is continuing twice-annual treatment in Nkannu East and Uzo-Uwani and expanding this treatment to Ezeagu as well.

Dr. Cephas Ityonzughul (The Carter Center) presented the results of the TAS-1 conducted in 2024, discussed in the impact section above.

Dr. Abel Eigege presented LF MMDP work and related mental health work. In 2024, MMDP continued in Ebonyi, Nasarawa and Plateau States, including LF case identification, training health workers to lead support "Hope Group" meetings, hydrocele surgery support, and health system strengthening. Further, the program began case searches in the other six assisted states, and continued work with TCC's Mental Health Program to incorporate additional mental health treatment training for Hope Group leaders. A total of 116 Hope Group leaders were trained in 2024, bring the total to 260 leaders serving a membership that grew to 1,327, an increase of 324 since 2023. The program also supported 103 hydrocele surgeries in 2024 in Ebonyi, Nasarawa and Plateau. The expanded case search confirmed 1,526 lymphedema cases and 1,044 hydrocele cases across the nine states, with service expansion planned for the coming year.

Dr. Emmanuel Emukah (The Carter Center) presented on SCH/STH mainstreaming plans as well as an integrated TAS1/SCH/STH survey in Ohaukwu LGA. The program is continuing to support a transition to full funding of SCH/STH by national programs in all areas where the RB or LF community-wide platform is being lost due to stop-MDA, with an expectation to complete the process by the end of FY2026. Mainstreaming looks different across LGAs and states as there are various platforms that can assume SCH/STH responsibilities. Ideally, the program will help form transition committees in each state, helping affected governments in planning and budgeting for SCH/STH, and to conduct a coverage survey before and after transition in 2 LGAs in each state. Integrated impact surveys are also immensely informative during mainstreaming, despite different approaches and target populations. For example, the LF TAS1 conducted in Ohaukwu LGA in 2024 used WHO Survey sample builder (SSB) for the EU, Sampling Primary 1 – 2 Pupils ages 6-7, while the SCH-STH survey employed random selection of 50 pupils aged 5-14 years per selected primary school (7 sentinel Schools and 7 extra Schools). For community studies, 50 adults 18+ years were randomly selected. Tests included urine dipstick and urine microscopy (filtration) for *Schistosoma haematobium*, Kato Katz for STH and *S. mansoni*, and LF CFA antigen with filarial test strip (FTS). SCH results showed increasing SCH prevalence in 4 of the 7 sentinel sites, and reinforced that SCH is a focal disease, and suggested ward-level MDA may miss some "Hot Spots." STH results showed a general declining trend. Despite LF MDA in this LGA, spot-check sites still indicated low-level STH prevalence.

Finally, Dr. Jenna Coalson (The Carter Center) presented on Gates-supported work to develop a remote sensing model to identify sites for entomology assessment with high probability of finding

villages in Enugu and Ogun states in Nigeria following many rounds of mass distribution of ivermectin. *BMC Infect Dis*. 2022 Nov 10;22(1):832.

black flies distributed across transmission zones, standardize entomology data collection tools to allow monthly uploading of data agile review and decision-making, and to standardize entomology field data feeds back into the model for continuous training and improvement of prediction accuracy. Next steps recommended were to present the version 1 model field validation results with data from 7 states at the May 2025 NOEC, as well as the plan for the FMOH to host the Nigeria Blackfly Model; to launch the version 2 model that had been adapted based on version 1 learnings, and; to explore possibility of use of the model in other countries.

Treatment Objectives and Achievements, Nigeria			
	2024 Treatment Targets	2024 Treatments (%)	2025 Treatment Targets
RB	9,205,557	9,119,587 (99%)	15,176,990
LF	185,630	182,304 (98%)	0
SCH	1,595,617	1,336,498 (84%)	4,210,347
STH	6,959,742	3,037,447 (44%)	11,847,997

Training Objectives and Achievements, Nigeria			
	2024 Training Targets	2024 Training (%)	2025 Training Targets
CDDs	14,819	14,781 (100%)	15,522
CSs	1,953	1953 (100%)	902
HWs	1,290	1284 (100%)	1,380
Teachers	5,394	550 (10%)	2,203

NIGERIA 2025 RECOMMENDATIONS

GENERAL:

- In preparation for ultimate application to WHO for elimination verification/validation, begin work on RB/LF dossiers, state by state.
- Attend the drug application package preparation meeting held with partners by the FMOH, and work with the different levels of government to effectively track drug supply, including reverse supply logistics.
- Maintain strong focus on communication and security awareness with State MOH, local officials, and community leaders before commencement of community-based activities. Continue "hit and run" treatment strategy in communities with insecurity.
- Conduct coverage surveys by FMOH protocol in two LGAs of Ebonyi, Edo and Enugu States, and ongoing monitoring in two LGAs in Ebonyi, Edo and Enugu States. Use results to better understand missed and/or excluded populations, improve MDA implementation, and make programmatic decisions.
- Where MDA continues, target at least 1 CDD:250 people, 1 CS:5 CDDs and 1 CS per village. Track urban populations served by health workers separately.
- Expand the CDD visibility study as a means of strengthening primary health system in areas where community-wide MDAs and stop-MDA assessments have stopped in TCC-assisted states in Nigeria. Develop a database and identify other roles CDDs could play post elimination.
- Advocate for other programs to find innovative ways of retaining and utilizing CDDs for community and health service delivery post-MDA.
- Look for opportunities to transition from paper to electronic data reporting to ease work of HWs, CDDs, and others involved with report submission. Improve quality and timeliness of existing electronic data reporting, such as ensuring line-listing of all villages in the DHIS2 platform.
- Continue to monitor, register and treat all migrant farmers, herders and traders, and identify CDDs from among the migrant groups to better reach them.
- Consider establishing sentinel site evaluations for river blindness and lymphatic filariasis, focusing on xenomonitoring, especially in SIZs or identified hot spots, as a means of early detection of signals of reinfection in PTS areas or stop MDA areas. This may be quarterly evaluations.

RIVER BLINDNESS:

- Prioritize reaching good MDA coverage in every round for all remaining treatment areas in Ebonyi, Edo and Enugu States. Conduct quarterly treatment in Ezeagu LGA and semiannual treatment to Uzo-Uwani and Nkanu East LGAs, all of which are considered "hot spots" in Enugu State.
- Maintain enhanced activities that have improved MDA coverage: LGA-based field supervisors with assigned motorcycles to access hard-to-reach communities; ODK supervisory tool and household MDA cards; and reinvigorated mop-up efforts.

- Conduct central-level and local-level cross-border meetings in Abia, Anambra, Ebonyi, Edo, Enugu, Nasarawa, and Plateau to synchronize activities on both sides of the border, maximize MDA impact where applicable, and ensure that any recrudescence is detected.
- Work with NOEC and FMOH to strengthen cross-border collaboration especially in areas where transmission zones cut across many administrative zones. Work to establish biological transmission zones to aid this collaboration.
- Support a meeting of the Nigeria Onchocerciasis Elimination Committee (NOEC) in December and attend the NOEC in May (supported by other partners). Advocate for:
    - Detection of hot spots in line with new WHO guidelines focusing on analyzing ward-level prevalence and conduct impact assessments.
    - Establishment of sentinel sites using the river basin systems and creating buffer zones around known hotspots and SIZs, Expansion of sub-state (e.g. LGA-level) evaluation units and classification as has been done in Enugu. Begin to show this on the NOEC map.
- Continue partnership with Gates Foundation on their entomological model for improving black fly collections.
- Present entomology model field validation results with data from seven states at May 2025 meeting, and present plan for FMOH to host the model.
- Launch the second version of the entomology model.
- Explore adaptation of Nigeria model process for use in other countries.
- Support RB MDA, coverage surveys, and entomology in Cross River State to assist the FMOH with USAID funding gaps.
- Continue PES in Plateau and Nasarawa States. Continue PTS in Abia, Anambra, Ebonyi, Edo, Enugu and Delta now that all LF-endemic districts in the states have passed TAS1 and LF MDA is halted statewide. Commence PTS in Imo if the final four LGAs pass TAS-1. Communicate program changes to CDDs and populations no longer being treated, and train CDDs to educate communities on these changes.
- Provide lab support to non-TCC states as funding and lab priorities allow. Priority should be given to TCC samples or assessments conducted in states neighboring TCC-assisted states.

LYMPHATIC FILARIASIS/MALARIA:

- Expand LF DMDI services in all TCC-assisted states in SE/SS Nigeria with the support of Izumi, FCDO/ELFA, RLMF and Sightsavers, per approved work plans. Ensure that WHO requirements for DMDI are being met in Plateau and Nasarawa, and scale up efforts in the remaining assisted TCC states, including 1) burden assessment, 2) strengthening of primary care support for patients with lymphedema/elephantiasis/acute attacks and hydrocele, 3) increasing the number of and participation in Hope Groups, and 4) support of hydrocele surgeries.
- Conclude the Hope Groups impact study in Ebonyi State, and begin writing up results.
- Employ innovative ways to conduct TAS-1 in the currently security-compromised 4 LGAs in

Imo state, which are the final four LGAs in TCC-assisted states that have not passed TAS-1. Where TAS-1 and RB surveys indicate all community-based MDA can cease, conduct health education to prepare the populations for MDA halt, and advise the state MOH that TCC support for SCH and STH will cease (see below).

- Conduct integrated TAS-2 in 5 LGAs (Abakaliki, Afikpo North, Ebonyi, Ikwo, Ohaozara), because they are in Ebonyi, a state that is conducting RB reclassification.
- Support a WHO mhGAP training of trainers that targets government health workers, in collaboration with TCC Mental Health Program.
- Seek engagement with the national program as it finalizes National LF Post-treatment Surveillance guidelines.
- To help maintain progress made by the LF program, continue the LF/malaria collaboration, strategically deploying Clarke LLIN donations where most needed and working with State malaria programs to ensure usage and care for the nets.

SCHISTOSOMIASIS (SCH) AND SOIL TRANSMITTED HELMINTHIASIS (STH):

- Follow up the Ebonyi SCH/STH impact study done when TAS-1 was completed and community-wide MDA with albendazole and ivermectin was stopped. Hypothesis: with albendazole treatment continuing with school-age children only, within 3 years we would see adults have an increase in hookworm and school-age children an increase in trichiasis. Expected conclusion: community-wide albendazole ivermectin is the best treatment for STH.
- Work towards complete mainstreaming of SCH/STH programs by August 2026, such that programs are embedded into a school-based or otherwise appropriately-platformed program fully supported by national/state funds. In consultation with Atlanta team, determine where to prioritize final SCH/STH assessments that will accompany the completion of mainstreaming.
- In areas where mainstreaming of SCH and STH has occurred, continue supporting drug logistics, planning, and resource mobilization within government health system for one final year.

SOUTH SUDAN

Presenter: Mr. Yak Yak Bol (Ministry of Health, South Sudan)

Summary:

In 2024, The Carter Center launched assistance to the of South Sudanese Ministry of Health for RB and LF elimination as the new coordinating partner for the

the Last Mile Fund activities in the country. Aligned with the WHO NTD Roadmap, the Ministry aims to eliminate priority NTDs by 2030 through the use of chemotherapy, vector control, and surveillance.

Mapping for river blindness began in 1997 and expanded to 356 villages by 2009, confirming RB endemicity in 48 of 80 counties. LF mapping conducted in 2018–2019 identified 50 counties as LF-endemic. By 2022, mass drug administration for RB and LF had been implemented in 64 counties: 14 were endemic for RB only, 16 were endemic for LF only, and 34 were co-endemic for both diseases (Figure 42).

One of South Sudan's major barriers to progressing in eliminating RB and LF is insufficient funding, which limits the ability to conduct MDA campaigns across all endemic states. While organizations such as Christian Blind Mission (CBM) and The MENTOR Initiative have supported MDA efforts in select counties, coverage remains uneven due to financial constraints, insecurity, and logistical challenges.

Our work in South Sudan reflects partnerships with the Ministry of Health and RLMF.

Treatments:

In collaboration with the Ministry of Health and local implementing partner, The Carter Center delivered 561,421 RB treatments across three counties, achieving 88% of the annual treatment goal. For LF, 313,268 treatments were provided in two counties, reaching 87% of the 2024 treatment goal (Figure 43).

Training:

In 2024, the South Sudan program trained 3,549 volunteers (3,195 CDDs, 319 CSs, and 35 HWs) for the RB/LF program; these data can be seen by disease in the tables below, as well as the 2025 training goals for each disease.

Treatment Achievements and Objectives, South Sudan			
	2024 Treatment Targets	2024 Treatments (%)	2025 Treatment Targets
RB	638,967	561,421 (88%)	5,559,242
LF	358,487	313,268 (87%)	4,121,997

Training Objectives and Achievements, South Sudan			
	2024 Training Targets	2024 Training (%)	2025 Training Targets
CDDs	3,195	3,195 (100%)	27,419
CSs	319	319 (100%)	2,941
HWs	35	35 (100%)	574

SOUTH SUDAN RECOMMENDATIONS 2025

GENERAL:

- Scale up Carter Center operations, including recruiting essential program staff.
- Work toward a target ratio of at least 1 CDD: 100 people, 1 CS: 5 CDDs, and 1 CS: Village.
- Continue cross-border coordination with Ethiopia, Sudan, and Uganda.
- Restart the National RB/LF Elimination Committee.
- Assist in enhancing the national laboratory. Assess current RB/LF lab capacities.
- Strengthen coordination with other NTD programs, such as Guinea Worm surveillance.
- Assist the MOH in improving population estimates for accurate drug allocation.
- Obtain APOC-era data to assess progress in counties with over 10 MDA rounds needing review.

RIVER BLINDNESS

- Conduct stop-MDA entomological and epidemiological surveys in Magwi County.
- Conduct OEM in Unity (Rubkona, Leer), and Upper Nile (Luakpiny/Nasir) States.

LYMPHATIC FILARIASIS

- Apply the new Epidemiological Monitoring Survey (EMS) protocol (which replaces the “pre-TAS”) in 11 eligible counties in Western Equatoria and Lakes States.
- Pilot IVM + ALB + PZQ combination in selected counties to assess acceptability, feasibility, and cost-benefit of integrating PZQ into existing RB/LF MDA campaigns.

SUDAN

Presenters: Drs. Sara Lavinia Brair and Mazin Ahmed (The Carter Center - Sudan)

Summary:

Since 1997, The Carter Center has assisted the Sudanese FMOH in eliminating RB transmission in the country. In 2006, Sudan was the first African country to declare a national RB elimination policy. There are four transmission foci known to exist in Sudan: Abu Hamad (River Nile State), Galabat (Gedaref State), Khor Yabus (Blue Nile State), and Radom (South Darfur State) (Figure 44). Abu Hamad achieved a historic milestone in 2015, becoming the first focus in Africa to be declared free of transmission under the WHO elimination guidelines. More recently, in February 2023, the FMOH officially declared transmission elimination in the Galabat focus (Figure 45).

Sudan is also endemic for LF, and the FMOH has targeted eliminating it as a public health problem since 2012. In 2016, mapping studies revealed that LF is endemic in 65 (34%) of the country's 189 localities, across 14 of its 18 states. Approximately 12 million Sudanese are at risk for LF. In 2022, the Carter Center expanded assistance to the Sudanese FMOH to include LF elimination as well as RB elimination through a grant from RLMF.

In April 2023, armed conflict erupted in Khartoum, Sudan's capital, severely disrupting program activities nationwide and damaging Carter Center offices and the FMOH/Carter Center laboratory in Khartoum. Throughout 2024, program operations remained limited in many areas due to ongoing insecurity and access constraints.

The Carter Center's work in Sudan reflects partnerships with the Federal Ministry of Health and RLMF.

Treatments:

River blindness treatments were not administered in Blue Nile and South Darfur states in 2024 due to ongoing conflict. For the same reason, treatment targets have also not been established for 2025.

In 2024, the Sudan program assisted with distributing 1,401,289 LF treatments across three states, representing 40% of the treatment target (Figure 46). As of 2024, 50 of the 65 LF-endemic districts (83%) have received at least one round of MDA (Figure 47). This reflects both the program's continued commitment to disease transmission elimination and the ongoing challenges posed by conflict-related access constraints and operational disruptions. The 2025 treatment targets provided in the data tables below represent the program need in six states where treatment is projected to be feasible. MDA is unlikely to be feasible in other states.

Training:

In 2024, the Sudan program trained 2,989 volunteers (2,574 CDDs, 243 CSs, and 172 HWs) for the LF program. 2025 training goals for RB and LF are in the data table below.

Impact:

Entomological surveys for PES were completed in December 2024, in which over 16,000 blackflies were collected. The MOH/TCC laboratory in Uganda has offered to analyze the flies due to the destruction of the Sudanese laboratory.

Special Topic:
Dr. Lavinia Brair gave a special presentation titled “Lesson Learned: Implementing MDA in Conflict Areas,” which highlighted key lessons the Sudan program learned from implementing MDA in secure areas amid civil unrest. The presentation emphasized the importance of adaptive planning, local partnerships, and community trust to maintain treatment continuity. Examples of adaptive planning involve adjusting strategies and operations to maintain essential services and achieve program goals despite instability.

Treatment Objectives and Achievements, Sudan LF			
	2024 Treatment Targets	2024 Treatments (%)	2025 Treatment Targets
UTG	3,471,844	1,401,289 (40%)	2,697,385

Training Objectives and Achievements, Sudan LF			
	2024 Training Targets	2024 Training (%)	2025 Training Targets
CDDs	3,512	2,574 (73%)	3,348
CSs	289	243 (84%)	246
HWs	253	172 (68%)	505

SUDAN RECOMMENDATIONS 2025

GENERAL:

- Work toward a target ratio of at least 1 CDD: 100 people, 1 CS: 5 CDDs, and 1 CS: Village.
- Resume cross-border coordination with the Central African Republic, Ethiopia, and South Sudan when security allows.
- Continue cross-border coordination with Ethiopia, South Sudan, and Uganda.
- Re-establish the National RB/LF Elimination Committee
- Update the national strategic plans for the elimination of RB and LF.

RIVER BLINDNESS

- Publish a peer-reviewed article on the Galabat focus transmission elimination.
- Collaborate with Uganda to test flies collected in Galabat during PES.
- Conduct entomological surveys in the Merowe Dam spillway area as a part of PES in the Abu Hamad focus.
- Evaluate the onchocerciasis transmission status in the Blue Nile State (Khor Yabous) when security allows.

LYMPHATIC FILARIASIS

- Continue collecting lymphedema and hydrocele case counts and health facility capacity information during MDA activities.
- Make the Arabic translation of the WHO LF MMDP materials available to WHO and other partners.

UGANDA

Presenters: Dr. Edridah Muheki and Elisa Byamukama (The Carter Center-Uganda)

Summary:

Since 1996, TCC has assisted the Ugandan MOH in eliminating the transmission of RB in the country. In 2007, Uganda declared a goal of RB transmission elimination in all 17 transmission foci nationwide, including the Victoria Nile focus, which achieved elimination in the early 1970s.

In 2008, the Uganda Ministry of Health established the Uganda Onchocerciasis Elimination Expert Advisory Committee (UOEEAC). At its 17th meeting, held on August 7-8, 2024, with support from TCC and Act to End NTDs | East, it was confirmed that the Lhubiriha focus, within Kasese District, has met WHO criteria for interrupting river blindness transmission and stopping MDA. Figures 48 and 49 show the current status of transmission status in the country.

The Carter Center's work in Uganda is based on a longstanding partnership with the MOH and received support in 2024 from USAID's Act to End NTDs | East, led by RTI International, The ELMA Foundation, and other generous donors.

Treatments:

In 2024, TCC assisted with distributing 1,425,211 treatments (including passive and refugee treatments), reaching 85% of the treatment target of 1,677,102 (Figure 50). A total of 95,806 passive treatments were delivered, and 164,498 treatments were provided to refugees. The remaining 1,164,907 treatments were delivered to host populations in historical onchocerciasis foci, achieving 93% of the treatment target of 1,248,116 in those foci. Refer to the 2025 treatment targets in the data tables below.

Training:

Uganda's health programs commonly use the Village Health Team (VHT) model, where volunteer community members serve as the primary link between households and the health system. VHTs receive general training through a national manual and additional instruction for specific interventions. In 2024, the program trained 7,892 community-based health workers: 4,246 VHTs (51% female), 3,583 CSs (37% female), and 63 HWs (17% female). In 2024, Uganda transitioned from using CDDs, who primarily distributes medicine during an MDA campaign and are not integrated into the broader health system, to engaging VHTs for mass drug administration. This is due to a decline in CDD participation over the years. Refer to the data tables below for the 2025 training targets.

Impact:

In 2024, the Lhubiriha focus bordering the Democratic Republic of Congo (DRC) was reclassified as "transmission interrupted" after serological surveys of more than 4900 children 5-9 years old in Lhubiriha and the cross-border area of Beni Butembo, DRC tested negative for Ov16, while 62 black flies collected June 2022 – June 2024 were negative for O-150. Black fly abundance is negligible after floods in 2020 destroyed local breeding sites. This means 158,313 people no longer require MDA, adding to the estimated 7 million people across Uganda's 15 other foci where transmission has been stopped. The five districts of the upper Madi Mid North focus that are cross-border with South Sudan remain under twice-per-year treatment with Mectizan (Figure 48).

Special Topics:
Dr. Edridah Muheki's special presentation, "East Africa Cross-Border Update," focused on the collaborative efforts among Ethiopia, South Sudan, Sudan, and Uganda through the East Africa Cross-border Coordination Group for RB and LF. The presentation highlighted the historical context and development of cross-border partnerships aimed at coordinating disease elimination activities in shared transmission zones. In 2024, delegations convened during a one-day meeting in Atlanta, Georgia after the Carter Center Program Review meeting; other cross-border discussions occurred during national onchocerciasis elimination committee meetings in Ethiopia and Uganda. Dr Edridah summarized recommendations from these meetings. The presentation highlights the importance of maintaining and enhancing cross-border partnerships through synchronized strategies and shared resources to accelerate transmission elimination.

Dr. Muheki also presented results of a study conducted by an independent consultant Mr. Maxson Anyolitho (Lira University), to determine reasons for declining community drug distributors' involvement in MDA. The study found that many of the early recruits have left the program . Key challenges identified include lack of financial support, demanding workloads and lack of appreciation/recognition. It emphasized the need to address challenges within the community structures to ensure long-term sustainability.

River Blindness Treatment Objectives and Achievements, Uganda			
	2024 Treatment Targets	2024 Treatments (%)	2025 Treatment Targets
UTG2	1,677,102	1,425,211 (85%)	1,593,580

Training Objectives and Achievements, Uganda			
	2024 Training Targets	2024 Trainings (%)	2025 Training Targets
VHTs	10,941	4,246 (39%)	4,886
CSs	3,592	3,583 (100%)	0
HWs	63	63(100%)	89

UGANDA RECOMMENDATIONS 2025

GENERAL:

- Provide financial and administrative support for the 2025 Ugandan Onchocerciasis Elimination Expert Advisory Committee (UOEEAC) meeting.
- Develop strategic approaches for post-elimination surveillance, which will be conducted after confirming elimination through post-treatment surveillance.
- Develop strategic approaches for post-verification surveillance following country-wide verification by the World Health Organization.
- Invite representatives from the Democratic Republic of Congo and South Sudan to the UOEEAC meeting.

MADI-MID NORTH (MMN) AND LHUBIRIHA:

- Conduct entomological and epidemiological surveys in the five districts of the Upper MMN focus, currently classified as "transmission interruption-suspected."
- Conduct Post-Treatment Surveillance in Lower MMN and Lhubiriha
- Coordinate with South Sudan MOH programs in cross-border special intervention zones (SIZs).
- Coordinate MDA campaigns on both sides of the SIZ to ensure mobile populations receive treatment.
- Provide technical support for entomological surveillance in Magwi County, South Sudan, the Upper MMN cross-border area.
- Advocate districts to sustain community-directed Slash & Clear activities for *Simulium damnosum* vector control in the MMN focus.
- Publish a peer-reviewed article on the Lhubiriha focus elimination.

MT. ELGON, ITWARA, AND WAMBABYA-RWAMARONGO

- Conduct Post-Elimination Surveys

Reports from Countries Considered for Expanded Carter Center Assistance

ANGOLA

Presenter: Dra Cecilia De Almeida (Ministry of Health, Angola)

Summary:

The national mapping of NTDs in Angola began in 2002 with RB REMO mapping of RB supported by APOC, a process that continued until 2011. In 2015, with the support of the WHO-AFRO NTD mapping project, a mapping exercise was launched for LF, STH, and SCH in 48 municipalities. In the same year, APOC began a mapping exercise to refine the delineation of RB-endemic areas using the skin biopsy technique, to better define areas of endemicity as the global approach moved from RB control to elimination. Forty-eight (29%) of the country's 164 municipalities (considered the implementation unit), encompassing a population of 6.8 million people, are endemic for RB (Figure 51). The remaining 116 municipalities are in need of OEM. Thirty-eight (23%) municipalities with 4.4 million people are considered endemic for LF and 17 municipalities need mapping or confirmatory re-mapping. The remainder are considered non-endemic.

The National Program for the Fight Against Neglected Tropical Diseases, part of the National Directorate of Public Health, leads efforts to control and eliminate NTDs. This includes conducting mapping, implementing MDA campaigns, assessing impact, and developing national guidelines. Collaboration with provincial programs, international partners, and operational research initiatives, such as LoaScope assessments for *Loa loa* risk, supports Angola's goal of improving health outcomes and progressing toward NTD elimination.

MDA for RB began in two provinces in 2016, scaling up to more than 1 million treatments annually from 2018-2020. Following a gap in 2021 and 2022, treatments resumed in 2023. In 2024, the Ministry of Health provided 2,681,833 treatments in 36 IUs in 8 provinces with a therapeutic coverage of 65% overall.

MDA for LF began in 2017. In 2024, 1,003,749 treatments were provided in 24 IUs with therapeutic coverage of 57%.

ANGOLA RECOMMENDATIONS 2025

GENERAL:

- Work with the national program and local partners to secure funding for RB and LF elimination activities.
- Once external funding is secured, scale up Carter Center operations, including recruitment of essential program staff.
- Conduct coverage surveys in 4 IUs in two provinces.
- Utilize the supervisor coverage tool in 25 IUs.
- Establish a national onchocerciasis elimination committee.
- Create and share with all partners an updated map of geographic delineations in Angola, which increases the number of provinces and municipalities. This will have logistical and financial impacts on program implementation plans.
- Encourage the integration of RB, LF, STH, and SCH implementation activities where the diseases overlap.

BURUNDI

Presenter: Dr Victor Bucumi (Ministry of Health, Burundi)

Summary:
In Burundi, the fight against RB is led by the Ministry of Public Health and AIDS Control through the National Integrated Program for the Control of Neglected Tropical Diseases and Blindness and is fully integrated into the national health system. RB control efforts began in the 1970s, with initial studies defining endemic zones and the first ivermectin treatments introduced in 1990. REMO conducted between 2001 and 2005 identified 12 (24%) of the 49 health districts were meso- or hyper-endemic (Figure 52), covering 371 villages with approximately 2.4 million people at risk currently. Recent OEM surveys conducted in 34 hypo-endemic areas found 3.3% Ov16 seroprevalence among adult participants. Mectizan MDA for RB began in 2005 and rapidly scaled up in subsequent years. In For LF, integrated mapping in 2007 concluded that Burundi is non-endemic, dispelling earlier assumptions about its presence in the country.

In 2024, the Ministry of Health provided 1,937,227 Mectizan treatments in the 12 meso-/hyper-endemic districts with a therapeutic coverage of 81.6%.

BURUNDI RECOMMENDATIONS 2025

GENERAL:

- Work with the national program and local partners to secure funding for RB and LF elimination activities.
- Update national LF guidelines to align with the WHO 2021 – 2030 Roadmap for NTDs.
- Conduct RB stop-treatment surveys in the 12 districts that are currently under treatment.
- Conduct confirmatory mapping for LF to corroborate the reported absence of LF transmission in Burundi.
- Revitalize the onchocerciasis elimination committee.
- Convene coordination meetings between the national program and stakeholders at sub-national levels.
- Consider opportunities for integration with other NTD programs.
- Improve cross border communication, interventions and surveillance by holding regular meetings between Burundi program and the programs of DRC, Rwanda and Tanzania.
- Advocate for government investment in the supply chain system to improve timely availability of drugs and testing kits and maintain inventory to prevent activity delays.

CHAD

Presenter: Dr Hamit Chidi Djorkodei (Ministry of Health, Chad)

Summary:
RB was first reported in Chad in 1929 near Gauthiot Falls, with additional cases identified in 1967 in Zakouma Park. Early responses included vector control efforts in the 1950s. The establishment of the National Onchocerciasis Control Program in 1991 marked a significant advancement in tackling the disease. REMO surveys conducted in the 1990s identified seven provinces as RB-endemic, leading to the implementation of MDA strategies, including CDTI, which continues to date. Additionally, the Ministry of Health launched an MDA program for lymphatic filariasis in 2001 to reduce its prevalence in endemic areas. Currently, Chad faces endemicity in 55 districts for RB and 42 districts for LF, as determined by a 2022 country mapping exercise (Figure 53).

To eliminate LF as a public health problem, Chad is initiating strategic changes, including increasing community engagement and education, integrating LF initiatives with broader health programs, improving surveillance and data collection, and addressing logistical challenges in drug distribution. These measures aim to enhance treatment reach, optimize resources, and ensure sustained progress toward the elimination of both RB and LF.

In 2024, the Ministry of Health reported 6,327,268 treatments in 53 districts in 7 provinces with coverage of 82% for RB and 3,319,261 treatments in 42 districts in 6 provinces with coverage of 82% for LF.

Treatment Objectives, Chad	
	2025 Treatment Targets
RB	2,670,983
LF	1,331,353

Training Objectives, Chad	
	2025 Training Targets
CDDs	37,577
CSs	967
HWs	264

CHAD RECOMMENDATIONS 2025

GENERAL:

- Work with the national program and local partners to secure funding for RB and LF elimination activities.
- Once external funding is secured, scale up Carter Center operations, including recruitment of essential program staff.
- Prioritize interventions in areas of known (and overlapping) RB and LF endemicity.
- Conduct RB pre-stop-MDA assessments in IUs that have received more than 20 rounds of treatment.
- Conduct OEM and LF Mini-TAS in areas where data are sparse, lacking or outdated.
- Provide assistance to enhance the national laboratory. Inform this assistance by conducting an assessment of current RB/LF lab capacities.
- Create a cross-border collaboration initiative to help coordinate NTD activities with Cameroon, the Central African Republic and Sudan.
- Conduct a situational assessment of the capacity of the healthcare infrastructure related to LF DMDI.
- Support the national program to develop a detailed NTD strategic plan that complements the 2022 – 2030 National Health Development Plan.

MADAGASCAR

Presenter: Dr Jose Alphonse Nely (Ministry of Health, Madagascar)

Summary:
Madagascar considers LF a priority to contribute to achieving the United Nations Sustainable Development Goal 3, which aims to "end the epidemics of HIV, tuberculosis, malaria and neglected tropical diseases by 2030." Since the creation of the National Program to Eliminate Lymphatic Filariasis in 2002, mapping has identified 87 (76%) of the country's 114 districts as endemic (Figure 54). In 2016, four of the 87 districts met WHO stop-MDA criteria, meaning 83 districts are currently considered endemic and in need of MDA. Efforts are currently ongoing to verify and refine endemicity status in previously classified non-endemic areas. As of 2023, 15,303 cases of lymphedema and 14,069 cases of hydrocele were recorded during MDA campaigns.

MDA campaigns began in 2005 using dual therapy with diethylcarbamazine – albendazole (DA) in high-prevalence districts and have since expanded nationwide. In 2019, the program adopted the triple drug treatment strategy with ivermectin - diethylcarbamazine – albendazole (IDA) to accelerate progress toward elimination. In 2023, the Ministry of Health integrated LF MDA with polio immunization campaigns, achieving 100% geographical coverage of LF MDA for the first time. These sustained efforts underscore Madagascar's commitment to reducing LF transmission, morbidity and achieving its elimination goals.

In 2024, the Ministry of Health provided DA in 37 districts achieving >65% coverage in all areas and IDA in 30 districts achieving ≥80% coverage in 27 of the 30 districts.

Treatment Objectives, Madagascar	
	2025 Treatment Targets
LF	6,278,238

Training Objectives, Madagascar	
	2025 Training Targets
CDDs	8,672
CSs	58
HWs	610

MADAGASCAR RECOMMENDATIONS 2025

GENERAL:

- Work with the national program and local partners to secure funding for LF elimination activities.
- Continue to seek opportunities for integrated program delivery and evaluation.
- Conduct integrated LF treatment Leprosy screening campaigns.
- Conduct pre-TAS (now called epidemiological monitoring surveys) in 27 districts.
- Conduct TAS-1 surveys in 59 districts.
- Prioritize the allocation of funds in the national budget dedicated to improvement of the country's supply chain management system.

ANNEX 1: River Blindness Elimination Program

Human onchocerciasis, an infection caused by the parasitic worm *Onchocerca volvulus*, causes eye lesions that can progress to visual loss or complete blindness. In addition to severe eye disease, onchocerciasis causes papular or hypopigmented skin lesions and intense itching. The parasite is transmitted by certain species of *Simulium* black flies, with the most common vector being *Simulium damnosum sensu lato (s.l.)*. *Simulium* species black flies breed in rapidly flowing rivers and streams, thus leading to the common name for the disease, "river blindness."

In humans, the adult worms cluster in subcutaneous fibrous onchocercomas (commonly referred to as 'nodules') that are often visible and palpable. In these nodules, fertilized females release first-stage larvae (microfilariae [mf]) that migrate into the subdermis and eye, causing immune reactions that result in the major morbidities associated with the infection. Some mf are picked up when the vector flies take a blood meal. In the flies, the mf eventually develops into third-stage larvae (L3), infectious to humans during subsequent blood meals. In humans, the larvae develop into adult worms, continuing the life cycle. There are no known environmental or epidemiologically important animal reservoirs of *O. volvulus*.

In 2024, the World Health Organization (WHO) estimated that at least 250 million people in 26 countries required preventive chemotherapy against onchocerciasis[7]. At least 14.6 million infected people already suffer skin disease, and 1.15 million have vision loss. Over 99% of infected people live in Africa, with the remaining <1% living in Brazil, Venezuela and Yemen. Globally, 25.5 million people live in areas that no longer require MDA for the disease. Through 2024, the WHO officially verified that four countries have eliminated onchocerciasis transmission: Colombia (2013), Ecuador (2014), Mexico (2015) and Guatemala (2016).

Periodic MDA with oral ivermectin tablets prevents eye and skin disease caused by *O. volvulus*. Repeated treatment can also reduce or interrupt disease transmission depending on factors such as population infection levels, vector efficiency, treatment frequency and treatment coverage.

The Carter Center's River Blindness Elimination Program (RBEP) is committed to safe and sustainable mass distribution of Mectizan, along with health education, to eliminate onchocerciasis transmission. The RBEP helped to shift the global approach to river blindness to a focus on transmission elimination rather than just disease control. In traditional control programs, ivermectin was distributed once per year in areas with the highest disease burden, known as meso or hyperendemic areas, where nodular rates are ≥20%. These programs aimed to reduce symptoms like skin and eye disease, but do not stop transmission, meaning MDA must continue indefinitely. This made the long-term sustainability of the program and the continued effectiveness of the drug essential. In contrast, today's elimination strategy administers Mectizan at least twice per year and includes treatment of hypoendemic areas, where the nodule rates are below 20%. The goal is to eliminate transmission entirely by reducing the parasite population to a point where it can no longer reproduce. Since there is no animal or environmental reservoir for the parasite, MDA can be safely stopped once transmission is broken.

[7] World Health Organization (2025). "Elimination of human onchocerciasis: progress report, 2024–2025." *Weekly Epidemiological Record* **100**(41): 451-460.

By 2013, all countries supported by RBEP had adopted transmission elimination as their official goal. In response, RBEP committed to stopping transmission in all assisted areas. The World Health Organization formally adopted a global elimination approach for onchocerciasis as part of its Neglected Tropical Diseases Road Map 2021-2030, which set ambitious targets for eliminating transmission in multiple countries by 2030. To accelerate this effort, WHO launched the Global Onchocerciasis Network for Elimination (GONE) on January 30, 2023. GONE serves as a global platform to coordinate stakeholders, improve communication, and support countries in achieving the 2030 elimination targets.

In some TCC-assisted areas in Nigeria, a historical barrier to treatment has been the coendemicity of the parasitic worm *Loa loa*. Mectizan treatment in a person with high *Loa loa* parasite loads (>20,000 *Loa loa* microfilaria per ml of blood) can result in severe central nervous system adverse reactions, with complications that can lead to coma or death. In partnership with Nigeria's federal and local governments, TCC conducted an extensive survey in Nigeria in 2016 using a technology called the "LoaScope." It determined that microfilaria levels of *Loa loa* were not sufficient in TCC-supported areas to preclude treatment; of over 10,000 persons examined with the LoaScope, the highest count observed was under 12,000 mf per ml of blood. Our results (published in 2018 by Emukah et al. in *AJTMH*) were reviewed by the Mectizan Expert Committee and the Federal Ministry of Health of Nigeria. Both gave their permission to use Mectizan MDA treatment in *Loa loa* areas in Nigeria that are Mectizan-naïve and hypoendemic for onchocerciasis.

A major focus of TCC is reaching the best possible treatment coverage, monitored through routine monthly reports by assisted programs, periodic coverage surveys, and impact on RB transmission indicators. A discussion of this reporting process and treatment indices used by the program, and in this report, is below. Important coverage terms include:

- the Ultimate Treatment Goal (UTG), which is the census-based calculation of treatment-eligible people (healthy, non-pregnant and at least 5 years of age) living in a program area;
- UTG(2), and UTG(4), which is the multiplication of the UTG by two or by four, respectively, and used by elimination programs in areas where semiannual or quarterly treatments are required to break transmission;
- treatment coverage, which TCC defines as >90% achievement of the UTG, UTG(2), or UTG(4) (85% for OEPA). It is important not to confuse coverage reported in this Program Review with coverage calculated based on the total population (often called "epidemiologic coverage") that includes children. The difference in the denominators between these two calculations can amount to 10-20%.

In the majority of TCC programs in Africa, ivermectin tablets are distributed at the community level by grassroots community volunteers known as Community Directed Distributors (CDDs) through a process known as Community Directed Treatment with Ivermectin (CDTI). CDTI was perfected by the Tropical Disease Research Program of WHO and was broadly introduced into the African Programme for Onchocerciasis Control's (APOC)-supported project areas throughout Africa in the late 1990s. The "kinship/family/neighborhood-enhanced CDTI" approach, developed and pioneered by TCC in Uganda, aimed to train more CDDs than the standard CDTI model. It was implemented in Uganda and adapted to varying degrees in several other countries. In kinship-enhanced CDTI, CDDs serve within their kinships/family or neighborhoods, and decisions and treatment activities are provided at the sub-community level. A similar approach is used in Ethiopia, where the Health Development Army (HDA) system is based in communities' Health Development Units, with five

households/families of about 30 people served by at least one CDD from the HDA. Historically, the ratio of CDDs per population that our programs have pursued has been at least 1 CDD per 100 persons to be treated. Using its HDA, Ethiopia has moved towards supporting a ratio of 1 CDD: 50 people. Parts of Nigeria have established Community Leader Action Groups, where community leaders encourage their communities to participate in MDA and support their CDDs. Due to a decrease in the involvement of CDDs, Uganda's program transitioned in 2024 to the Village Health Team model. This approach leverages trained volunteer community members as the primary link between households and the health system. Unlike the earlier "kinship/family/neighborhood-enhanced CDTI," the VHT strategy is characterized by standardized national training and broader integration into routine health services.

CDDs are supervised by Community Supervisors (CSs). These are often district-level health personnel, or they may be more senior CDDs. This grouping may be managed by frontline health workers, similar to Ethiopia, where distributors and supervisors are managed by health extension workers (HEWs), who are part of the HDA national system. The desired ratio is 1 CS:5 CDDs.

Our MDA strategy seeks active participation of members of affected communities by 1) training as many inhabitants of endemic villages as possible to serve as distributors; 2) encouraging the involvement of women; 3) working to reduce the demand for financial or other "incentives"; 4) allowing community members to choose their distributors and the time and location of treatments.

CDDs and CSs are often highly engaged in other community-based health interventions, such as water provision and sanitation, malaria control, immunization, and integrated NTD control efforts.

River Blindness Elimination Program Reporting Processes

Treatment areas: An epidemiological mapping exercise is a prerequisite to identifying at-risk communities for mass Mectizan treatment programs. The assessment techniques used in the mapping exercise in Africa vary from those used in the Americas. An overview of the two approaches follows.

In much of Africa, a staged village sampling scheme called Rapid Epidemiological Mapping of Onchocerciasis (REMO) was executed with assistance from WHO to define endemic "zones" that should capture most or all villages having onchocercal nodule rates ≥ 20% in adults (which roughly corresponds to a prevalence of microfilariae (mf) in skin ≥ 40%) for mass treatment. The mapping strategy is based on studies that have shown that most ocular and dermal morbidity from onchocerciasis occurs in villages where the nodule prevalence exceeds 20%.

In the first stage of REMO, survey villages are selected based on a review of large-scale maps of areas that appear to be environmentally able to support black fly breeding and, therefore, transmission of *O. volvulus*. In the second stage, 'first line' villages located closest to what appears on maps to be rapidly flowing rivers (rivers near compressed contour lines on topographical maps) are prioritized for visits by field teams. In first line villages, a convenience sample of 30-50 adults are examined for characteristic onchocercal nodules. The mean nodule prevalence for each village sample is then mapped in geographic information systems (GIS), which is used to define endemic zones where all villages are to be treated by CDTI. As noted, CDTI treatment zones typically are defined to include all sample villages having a nodule prevalence of ≥20%.

All villages within the CDTI treatment zone are offered mass Mectizan treatment annually. Historically, endemic villages from CDTI where nodule rates fell under 20% (the so-called "hypoendemic areas") were excluded from MDA; this later changed when programs moved from the control strategy to the transmission elimination strategy. Not all persons infected with onchocerciasis (as defined by their having mf in their skin) have nodules. On average, nodule prevalence is 50% of mf prevalence, although this varies by geographical location. Villages in hypoendemic areas with nodule rates of <20% could still have 30% mf prevalence of onchocerciasis as determined by superficial skin biopsies ('skin snips') to identify *O. volvulus* mf by microscopic examination.

As the policy in Africa is now elimination, Mectizan-naïve areas should be reassessed based on recommendations from national onchocerciasis elimination committees and newly published WHO onchocerciasis elimination mapping (OEM) guidelines.[8]

In the Americas, the goal from early on has been to eliminate *O. volvulus* transmission. As a result, all endemic villages are offered mass Mectizan treatment every three or six months. The Onchocerciasis Elimination Program for the Americas (OEPA) has always targeted all endemic villages, including those that are hypoendemic. For the Americas, where the endemic foci are characteristically smaller and more defined than in Africa, every village in known or suspected endemic areas has a rapid epidemiological assessment of 50 adults, who have both nodule examinations and skin snip microscopy to identify *O. volvulus* microfilaria in skin. Villages in which one or more persons are positive (sample prevalence ≥2%) are considered "at risk" and are recommended for the twice-per-year (or four-times-per-year) mass drug administration (MDA) program. Thus, the cutoff prevalence for treatment was much lower for the Americas compared to the original threshold in Africa, until elimination of transmission of onchocerciasis in Africa became the focus.

Data Reporting: TCC country program offices report data and activities monthly to TCC headquarters in Atlanta. The reported treatment data are recorded in village-level registers during the census and directly observed treatment activities by community drug distributors (CDDs), national Ministry of Health (MOH) personnel, or local health workers. It is important to emphasize that these are MOH programs and MOH data.

The accuracy of treatment reports is routinely confirmed with random spot checks performed primarily by TCC and MOH personnel. These are supplemented by treatment coverage surveys, which are based on statistical sampling methods with household questionnaires administered by TCC and MOH staff. These data are typically collected on smartphones or tablets.

Summary reports of the number of villages and persons treated are compiled from the village registers by the CDDs and their CSs, then forwarded to the district level. District-level summary reports are forwarded (whenever possible through MOH surveillance and reporting channels) to both the state MOH headquarters and the national TCC offices, which forward the data monthly to RBEP in Atlanta. In the Americas, the MOHs of Venezuela and Brazil report their treatments semiannually or quarterly to the OEPA office in Guatemala City, which then provides a combined regional report to TCC and to the Program Coordination Committee (PCC), InterAmerican Conference on

[8] World Health Organization (2024). Onchocerciasis elimination mapping: handbook for national elimination programmes. Geneva.

Onchocerciasis (IACO) and the Pan American Health Organization (PAHO)/WHO in its regular meetings; OEPA updates are provided annually in WHO's WER articles (See Annex 5 for references to these publications). African MOHs report their annual results directly to WHO, which produces annual summaries of African programs' onchocerciasis treatments.

The data from monthly reports is supplemented with additional information at the annual TCC RBEP Review held within the first four months of the following year. At these reviews, TCC staff and partners convene to finalize treatment figures for the previous year, establish new treatment objectives for the coming year, and discuss results from monitoring and research initiatives. TCC reports its final treatment figures to the Mectizan Donation Program (MDP), Merck & Co., Inc. (known as MSD outside the United States of America and Canada), and the Onchocerciasis NGOs for Elimination (ONE).

RBEP Treatment Indices: Treatment data are reported monthly by district, focus, region, state, or zone, depending on the MOH's administrative structure, and include the number of persons and communities treated. Cumulative annual treatment figures are compared to the UTG, which represents the eligible at-risk population targeted for MDA. Treatment coverage is determined by dividing the total number of people who received treatment by the total number of people who are eligible to receive treatment (known as the Ultimate Treatment Goal, or UTG). The result is then multiplied by 100 to express the coverage as a percentage. UTG estimates assume full geographic coverage of the targeted area and typically increase by 3 – 5% annually to reflect normal population growth.

The eligible populations of at-risk communities targeted for mass distribution receive community-wide Mectizan treatment. The eligible at-risk population includes all persons living in at-risk communities who are eligible to receive Mectizan (i.e., non-pregnant persons who are either ≥5 years of age, ≥15 kg in weight, or ≥90 cm in height, and who are in good health). Although RBEP mass treatment activities exclude pregnant women, these women should be treated later during the treatment year, as soon as one week or more after parturition; therefore, all adult women are included in the UTG calculation. In practice, the UTG should be established by census, adjusting from the most recent treatment rounds. The UTG is expected to be the same figure used in the annual request for tablets submitted to the Mectizan Donation Program. The rationale for RBEP's focus on the UTG denominator has been published (Richards et al., *AJTMH* 2001; 65:108-14). In general, total population coverage is 16-20% less than UTG (eligible) population coverage, in accord with population pyramids in areas being served, where up to 20% of the population is under 5 years of age and thus ineligible for Mectizan treatment. Passive treatments with Mectizan are provided when patients present themselves in clinics within towns of endemic districts (especially in post-treatment scenarios), or where large sections of the population are highly mobile and are often from non-endemic areas.

The UTG(2) and UTG(4) denominators are used by elimination programs where six-monthly ('semiannual') or quarterly treatments are delivered, respectively. The values are twice or four times the UTG and represent treatments targeted for the year, not persons. Full coverage in once-per-year treatment areas is defined as 90% achievement of the UTG. Full coverage for elimination programs is 90% of the UTG(2) in African projects, and 85% of the UTG(2) or UTG(4) for OEPA. The differences in full coverage thresholds result from varying recommendations by the African and American expert committees.

ANNEX 2: Lymphatic Filariasis Elimination Program

LF in Africa is caused by *Wuchereria bancrofti*, a filarial worm that is transmitted in rural and urban areas by *Anopheline* and *Culex* sp. mosquitoes, respectively. The adult worms live in the lymphatic vessels and cause vessel dysfunction, often leading to poor drainage of lymphatic fluid. Clinical consequences include a collection of lymph (lymphatic fluid) that results in swelling of limbs and genital organs (lymphoedema, "elephantiasis" and hydrocele), and painful recurrent bacterial infections (“attacks” of acute adenolymphangitis). The female worms release mf, which are tiny embryonic worms that circulate in blood at night when the mosquito vectors bite. Mosquitoes pick up mf, develop over several days into infective larvae, and are then able to be transmitted to another person when the mosquitoes bite again. Mf are killed by annual single-dose combination therapy, with either Mectizan and albendazole or diethylcarbamazine and albendazole (in areas where there is no onchocerciasis and/or *Loa loa* infection). Annual MDA prevents mosquitoes from becoming infected and, when given for a period (estimated to be five to six years), can interrupt transmission of *W. bancrofti* (which has no animal reservoir). In 2013, WHO issued a provisional strategy for *Loa loa* areas that includes the dual approach of albendazole monotherapy via MDA twice per year, together with LLIN. Because of RBEP-sponsored research, as of 2017, Nigeria has been excluded from this *Loa loa* policy, and a combination of MDA with Mectizan/albendazole can be used there (see below).

Nigerians suffer in disproportionate numbers from LF. Nigeria is second globally (behind India) in human suffering from this parasite.

LF and Malaria in Nigeria: In Plateau and Nasarawa States, TCC, working with the FMOH of Nigeria and with state and local government ministries, assisted in establishing TCC’s first LF elimination program. The current effort is based on a strategy of two pillars: 1) annual MDA combination therapy consisting of albendazole and Mectizan to interrupt transmission of LF and 2) MMDP programs for those suffering from lymphoedema, elephantiasis, hydrocele, and adenolymphangitis. GSK and Merck donations in Nigeria allow pillar 1 MDA activities, which were the focus of the program's early years. The MDA program was launched in 2000 following disease mapping in 1998-99. After years of high treatment coverage and LLIN distribution by the malaria program, LF transmission was broken in the two states in 2012. Subsequent TAS surveys (TAS-2 and TAS-3) confirmed that children were not becoming reinfected during the PTS period. Additional entomology studies showing no infected mosquitos and LF antigen studies in adults showed that LF transmission had been eliminated. Seven million people are no longer at risk of LF due to a successful pillar 1 MDA program. PES continues in the two states, together with ongoing LLIN distribution, which will hopefully prevent reintroduction of the infection since the two states are surrounded by LF-endemic areas.

In 2014, LF treatments in Nigeria expanded to the seven states TCC assists in southern Nigeria as part of USAID’s ENVISION project, led by RTI International. Treatments started in 2014 in districts with an existing river blindness program and, in 2015, expanded to address all LF-endemic areas in the nine states. After two years of the provisional six-monthly albendazole-alone monotherapy (together with LLIN) due to *Loa loa* concerns, TCC, in partnership with Nigeria’s federal and local governments, conducted a large survey in 2016. The study determined that *Loa loa* levels were insufficient in TCC-supported areas to preclude treatment (Emukah et al., *AJTMH* 2018). Our results were favorably reviewed by the Mectizan Expert Committee; the program now supports annual Mectizan and albendazole MDA where needed in the seven states, rather than the less efficient and

more costly twice-per-year albendazole-only approach.

The Nigeria LF Program also addresses the second pillar of eliminating LF: clinical services to those suffering from LF morbidity. In 2019, with support from IZUMI Foundation, RBEP began work with its MOH partners to quantify the burden of morbidity and to help Plateau and Nasarawa strengthen primary care support and referral networks for the management of lymphedema and hydrocele surgery, as well as mental health needs (in support groups called Hope Groups). Similar MMDP assistance has subsequently expanded to all TCC-assisted states, with support from IZUMI Foundation, FCDO, and RLMF.

Through a previous grant from the Bill & Melinda Gates Foundation, TCC also conducted field research on the use of LLINs alone to combat LF in Imo and Ebonyi States, areas where LF MDA with Mectizan was at that time not possible due to the presence of *Loa loa*. Results showed that the LLINs significantly impacted mosquito infection (Richards et al., *Am J T Med Hyg* 2013). Thanks to The Global Fund Round 8 in the early 2010s, LLINs were distributed at a rate of two per household throughout the majority of Nigeria for malaria prevention; LLINs were shown to be synergistic with the MDA program in Plateau and Nasarawa states. The national malaria and LF programs remain actively involved in TCC-assisted programs, and TCC has assisted (in differing degrees) in the mass distribution of LLINs in all nine states where it works. Due in part to strong TCC advocacy, Nigeria launched its FMOH Guidelines for Malaria-Lymphatic Filariasis Co-implementation in Nigeria in June 2013. We continue to foster this important synergy in TCC-assisted states, although TCC's Malaria Program closed in 2014.

LF in Ethiopia: Ethiopia's much smaller LF program was launched in 2008 in tandem with TCC's Malaria Program, which assisted the MOH in distributing LLINs. The Ethiopian Malaria Program completed the mass distribution of LLINs throughout the malaria-endemic areas of Ethiopia just before the LF program (the first such program in Ethiopia) was launched. These LLINs undoubtedly have impacted LF transmission, and the 'killing two birds with one stone' strategy of fighting malaria and LF with LLINs were the primary reason the MOH launched the LF MDA effort. With GSK support, TCC assisted the MOH in launching an LF elimination pilot program in 2009. LF interventions have since expanded across all regions assisted by TCC. The Ethiopia LF program receives support from RLMF.

LF in Sudan: Since 2022, through a grant from RLMF, hosted by the END Fund, The Carter Center enhanced assistance for RB and expanded support to the Ministry of Health for LF elimination. RLMF, housed within The END Fund, is a multi-donor fund, initiated and led by His Highness Sheikh Mohamed bin Zayed Al Nahyan, President of United Arab Emirates. LF mapping in 2016 revealed that 65 (34%) of the country's 189 districts, distributed in 14 of its 18 states, were endemic. Around 12 million people are at risk for LF as of 2024 according to the WHO PCT databank.

***LF in South Sudan*:** In 2024, The Carter Center partnered with South Sudan's Ministry of Health to support the elimination of LF as part of RLMF's expansion across Africa and Yemen. Mapping for LF was conducted in 2018-2019 and identified 50 counties as endemic. By 2022, LF MDA had been implemented in 64 counties, including 16 counties endemic for LF only, and 34 counties co-endemic for LF and RB.

ANNEX 3: The Schistosomiasis/Soil-Transmitted Helminthiasis Control Program

SCHISTOSOMIASIS

Schistosomiasis (SCH) is a parasitic disease acquired from skin contact with fresh-water bodies where snails infected with the parasite are present. The cercarial stages of the parasite leave the snails and swim in the water until they find an exposed person. The cercaria then penetrates the skin and migrates through the body as 'schistosomula' parasitic forms. They develop into adult male and female worms when they reach the venules of the intestines (intestinal schistosomiasis caused by *Schistosoma mansoni*) or bladder and genitals (urinary schistosomiasis caused by *S. haematobium*). It is important to note that in Africa, where TCC works, SCH exists as these two different infections have different (and often overlapping) geographical distributions, epidemiology, and disease patterns (morbidity). In both conditions, female worms lay thousands of eggs that exit the body in feces (in the intestinal form) or urine (in the urinary form). If the eggs gain access to fresh water, they hatch and release miracidiae, which swim in search of a specific type of snail (*S. mansoni* infects snails of the *Biomphalaria* species; *S. haematobium* infects *Bulinus* species). The miracidia penetrate and infect the snails and transform and multiply, resulting in a single snail releasing thousands of cercaria, thus continuing the lifecycle.

Eggs deposited into human tissues by adult female worms cause inflammation, organ damage, bleeding, and anemia. Although all age groups are infected, persons with the greatest number of adult worms have the greatest number of eggs in their tissues, urine, and feces. Adults most commonly suffer from liver fibrosis and esophageal bleeding (intestinal schistosomiasis) or bladder and cervical cancer (urinary schistosomiasis). School-aged children (ages 5 to 14) may have abdominal pain, anemia, and (in urinary schistosomiasis) bloody urine. They act as the main disseminators by contaminating water with excreta. Mass Drug Administration (MDA) with the safe and effective oral medicine praziquantel can significantly reduce schistosomiasis morbidity. Praziquantel kills the adult worms, reduces the number of eggs that accumulate in tissues and, as a result, reduces the disease (morbidity) associated with schistosomiasis. The Merck KGaA, Darmstadt, Germany/World Health Organization (WHO) donation of praziquantel is given only for MDA in school-aged children, although adults and preschool-aged children would also benefit from treatment in endemic areas.

TCC's SCH program in Nigeria is seeking to adopt WHO's 2022 guidelines on control and elimination[9]. As with the 2011 guidelines, these call for different frequency of praziquantel preventive chemotherapy depending on parasite prevalence in a district. Thus, treatment numbers in the same state can vary from year to year, and training and logistics become more complicated. Programs anticipate WHO manuals that operationalize the 2022 guidelines.

Transmission is unlikely to be interrupted by the paradigm of MDA targeted at school-aged children because: 1) transmission occurs in all age groups; 2) praziquantel does not kill the migrating schistosomula forms, thus single dose treatment in children in highly endemic areas is unlikely to be curative; and 3) until open defecation and urination (or reduction of release of raw sewage into

[9] World Health Organization (2022). WHO guideline on control and elimination of human schistosomiasis. Geneva.

fresh water) are halted through construction and use of sanitation systems, MDA will have little to no impact on infected snails (which live for many months) and infected water. In other words, persons treated are either not cured of their schistosomula (developing) infections, and/or they become reinfected when they reenter the contaminated water.

SOIL-TRANSMITTED HELMINTHS

Soil-Transmitted Helminthiasis (STH) is caused by a group of four different intestinal worms that infect humans: *Ascaris lumbricoides* (roundworm), *Trichuris trichiura* (whipworm), *Ancylostoma duodenale*, and *Necator americanus* (hookworms). STH are among the most common infections worldwide, and heavy infections lead to developmental delay, malnutrition, intestinal obstruction, and anemia (depending on the infecting species). As with SCH, school-aged children are usually the most heavily infected with these worms, with the exception of hookworms, which have their heaviest infections in adults.

Transmission of soil-transmitted helminths occurs through feces. Eggs from the adult females are passed into the environment in feces, where they become infective within days (hookworm and whipworm) or weeks (roundworm). Once in the environment, infective whipworm and roundworm eggs reach their next human host via human ingestion of fecally-contaminated food or water. Hookworm eggs hatch in soil and the resultant larvae infect humans by penetration of the skin (often entering via bare feet).

Once in the human, hookworm larvae migrate through the circulatory system until they reach the lungs. From there, they pass through the trachea and mouth where they are ingested, traveling next to the intestines. They mature, mate, and release eggs within 6-8 weeks. Whipworm and roundworm eggs hatch into larvae in the intestine and remain there through adulthood.

Heavy worm infections result in blood loss which can lead to anemia and hypoproteinemia. In children, this can lead to poor physical and developmental growth, stunting, and decreased mental acuity. In adults, hookworm-associated anemia reduces productivity and can be especially dangerous in reproductive-aged (menstruating) women. Pulmonary complications can occur due to migration of roundworm or hookworm larvae through the lungs and, in the case of ascaris, bowel obstructions can occasionally lead to death.

The 2017 WHO guidelines for STH focus on providing treatment to school-aged children. STH MDA programs are for morbidity control; transmission will not be interrupted until open defecation is halted through deployment and the use of sanitary systems. As with SCH, treatment frequency differs based on a district's endemicity level; the result is that STH treatment numbers in the same state can vary greatly from district to district and from year to year.

Notably, the different worm species have different sensitivities and cure rates from the MDA regimens provided. Albendazole is superior to mebendazole. Roundworm is most sensitive to treatment, while whipworm is least sensitive. The Mectizan/albendazole combinations given for LF improve whipworm cure rates.

The challenges for TCC Nigeria in implementing schistosomiasis and STH programs include: 1) complex WHO guidelines that result in different regimens tailored to district epidemiology; 2) a focus since 2011 on a Ministry of Education (school-based) approach rather than the traditional Ministry

of Health (community- based) platform, which is more experienced at MDA activities; 3) a focus on teachers (in schools) rather than community distributors (house-to-house); 4) exclusion of potentially infected persons, including preschool children, unenrolled school-aged children (especially girls), and adults; 5) algorithms with thresholds statistically indistinguishable from one another; 6) mapping based on averages resulting in exclusion of communities that need interventions; 7) difficult calculations of coverage due to challenges with denominator determinations; 8) loss of high-quality STH control when community-wide LF MDA with the most potent STH treatment (Mectizan and albendazole) ceases after LF programs pass Transmission Assessment Surveys (TAS) assessments; 9) as LF and RB programs succeed and cease treatments, elements of these platforms that supported SCH/STH programs are lost; and 10) donor fatigue related to indefinite SCH/STH programs.

The Carter Center's SCH/STH work focuses on "mainstreaming" the two diseases into the large healthcare delivery system, abandoning the vertical MDA approach to control. In districts where the RB and LF platform does not exist, we are implementing plans to transfer support of MDA fully to the Ministries of Health (MOH) and Education.

ANNEX 4: Timeline of the River Blindness Campaign at The Carter Center

- **2024:** Expansion of RLMF enabled Carter Center to extend RB and LF assistance to South Sudan and to prepare partnerships with additional African countries. In Uganda, about 160,000 people qualified to stop RB treatments in the MMN focus, while in Ethiopia and Nigeria, about 470,000 and 8.1 million people qualified to stop LF treatments, respectively, in Carter Center-assisted areas. The *AJTMH* published a special issue "A Legacy of Impact in Global Health: Tribute to President Jimmy Carter and Mrs. Rosalynn Carter".
- **2023:** The Galabat focus in Sudan and Nyagak-Bondo focus in Uganda were declared transmission eliminated. More than 1.1 million people in the lower part of MMN focus qualified to stop MDA for RB and 4.2 million people in Nigeria (3.7 million) and Ethiopia (460,290) qualified to stop MDA for LF.
- **2022:** RBEP surpassed the distribution of 500 million Mectizan treatments for onchocerciasis. Three foci in Uganda completed PTS for RB and were reclassified as transmission eliminated. More than 20 million people qualified to stop treatment for RB:18.9 million in four states of Nigeria and 1.3 million in Ethiopia. For LF, 11.7 million people in Nigeria and around 70,000 in Ethiopia qualified to stop MDA. Building on long-term support for RB elimination in Sudan, TCC expanded support for LF elimination in the country.
- **2021:** Two states in Nigeria and three foci in Uganda completed PTS for onchocerciasis and achieved transmission elimination status. Nigeria also qualified to stop RB treatments in Delta State for 2.8 million people and LF treatments for 3.4 million people. Ethiopia qualified to halt 508,000 RB treatments and 260,923 LF treatments. In the Americas, the OEPA program broadened its access to remote Yanomami communities by building a new airstrip in Siapa Valley, Venezuela.
- **2020:** NTD programs worldwide suspended community-based activities in compliance with WHO recommendations to prevent the spread of COVID-19. As a result, most countries only achieved one round of MDA within the calendar year. RBEP-assisted MDA for onchocerciasis in Uganda was one of the first large-scale campaigns to resume globally. Program review and national committee meetings were held virtually (IACO, EOEEAC, UOEEAC) or postponed (PCC, NOEC).
- **2019:** Problems with the importation of Mectizan into Nigeria in 2019 resulted in an inability of RBEP-assisted programs to provide twice-per-year MDA for onchocerciasis; all RBEP-assisted Nigeria programs provided a single round of treatments. Just over 600,000 treatments were halted in Uganda after successful stop MDA assessments were conducted. The large MMN focus bordering the Republic of South Sudan was reclassified as 'transmission suspected interrupted.' However, the DRC Ebola outbreak halted cross-border activities between Uganda and the DRC. Onchocerciasis Elimination Mapping in Ethiopia provided data that led the national committee to recommend treatment be launched in several new areas of the country. The LF elimination program in Ethiopia stopped about 117,000 treatments after successful TAS surveys. The OEPA program held the 29th IACO conference in Brasilia with the theme "Brazil approaching the elimination of onchocerciasis." The conference praised the IHAs involved in both the Brazil and Venezuela elimination programs. In 2019, RBEP authors published papers on S&C vegetation clearance as non-chemical- based vector control in Uganda, the role of OEPA as a model for

Africa RB elimination programs, MDA coverage surveys in Uganda and Cameroon, and use of doxycycline treatment as an endgame strategy in the Americas.

- **2018:** Three papers (on topics of Uganda, OEPA, and National Onchocerciasis Elimination Committees) are published by RBEP authors in a special supplement on Onchocerciasis Elimination in the journal International Health. In Nigeria, an SCH and STH impact evaluation was conducted among 9,660 children; a reduction in the prevalence of infection compared to a 2013 baseline was demonstrated in many areas. In eastern Ethiopia's East and West Harage zones, a new onchocerciasis focus was identified in OV16 surveys in an area previously believed to be non-endemic. In Uganda, MDA for onchocerciasis was recommended to be halted among more than 335,000 persons with declaration of transmission interruption in two foci. The OEPA program celebrated its 25th anniversary as it struggled to operate in Venezuela amidst political and financial turmoil.

- **2017:** The most successful year ever for numbers of RBEP-assisted Mectizan treatments (over 55 million) delivered. Decisions to stop treatments at the end of 2017 in 3.8 million persons resident in RBEP-assisted areas in three African countries (Ethiopia, Nigeria, and Sudan), believed to be the largest number of persons for whom RB MDA has been stopped in a single year. Sudan and Ethiopia jointly declared a stop Mectizan MDA decision for 1.2 million persons in the cross-border Galabat/Metema onchocerciasis transmission zone. Nigeria halts MDA for onchocerciasis among 2.2 million persons in Plateau and Nasarawa States. Uganda halts MDA among 421,000 persons in two foci. Venezuela completes PTS in its largest focus (the Northeast focus) and transmission there is declared eliminated.

- **2016:** WHO verifies that Guatemala has eliminated onchocerciasis transmission. Uganda declares river blindness transmission eliminated in four foci. TCC celebrates its ½ billionth treatment for NTDs. NOEC releases a plan of action to eliminate river blindness in Nigeria. TCC is selected as a semi-finalist in the MacArthur Foundation's 100&Change grant competition with a proposal to support the NOEC plan but is not ultimately the grant recipient.

- **2015:** WHO verifies that Mexico has eliminated onchocerciasis, and Guatemala requests verification. TCC provides technical and financial assistance to help establish a national onchocerciasis expert advisory committee in Nigeria. Sudan announces that transmission has been eliminated in Abu Hamad Focus.

- **2014:** WHO verifies that Ecuador has eliminated onchocerciasis. The International Task Force for Disease Eradication (ITFDE) reviews RB/LF in Africa again (*WER* 2014). TCC provides technical and financial assistance to help establish a national onchocerciasis expert advisory committee in Ethiopia.

- **2013:** The name of TCC's River Blindness Program changes to TCC's River Blindness Elimination Program to reflect the paradigm shift to focusing efforts on eliminating RB transmission everywhere TCC works. Colombia is the first country in the world verified by WHO to be free of onchocerciasis. Ecuador applies to WHO for verification of elimination.

- **2012**: Sudan announces interruption of onchocerciasis transmission in Abu Hamad Focus (Higazi, 2013). TCC's River Blindness Program obtains Board of Trustees' approval for an eight-year plan to interrupt RB transmission everywhere it assists by 2020. WHO sends a verification team to Colombia to determine if the country has eliminated onchocerciasis. Plateau and Nasarawa states in Nigeria qualify to halt MDA for LF.

- **2011:** TCC's ITFDE reviews the RB and LF elimination efforts in Africa, applauds the move by APOC from RB control to elimination, and calls for better coordination of RB and LF interventions as well as with malaria bed net distribution efforts (WER 2011). An expert committee (with Frank Richards, the TCC RBP Director, as a member), meeting under the auspices of the World Bank, recommends an elimination goal for ten African countries by 2020, including Nigeria, Uganda, and Ethiopia. In late 2012, the World Bank/APOC governing board recommends onchocerciasis elimination now be APOC's goal.

- **2010:** TCC reports considerable success in RB elimination efforts in the Americas (series of WER articles) and parts of Africa. However, Katabarwa (TCC/RBP) notes a need to expand treatment into the so-called hypoendemic areas excluded by APOC's treatment strategies. He also challenges the Diawara report by noting failures of once-per-year treatment with Mectizan alone for 17 years in TCC-assisted North Province, Cameroon; TCC calls for twice-per-year treatment in these areas (Katabarwa, 2011). At an international conference, TCC reports an analysis of the impact of annual Mectizan and albendazole (for lymphatic filariasis) on onchocerciasis transmission elimination in many areas of Plateau and Nasarawa States of Nigeria.

- **2009:** A key Gates Foundation-supported WHO/TDR study by Diawara (2009) conducted in Senegal and Mali (derived as an outcome of the 2002 Conference on the Eradicability of Onchocerciasis) proves RB elimination is possible with 17 years of Mectizan alone under some conditions in Africa. Gates, MDP, TCC, and APOC all call for "Shrinking the Map" in Africa (WHO 2009). Rakers (TCC/RBP) reports that RB programs in Nigeria would collapse without external support, questioning the 'sustainability' theory (*Lancet*, 2009).

- **2008:** TCC provides technical and financial assistance to help establish a national onchocerciasis expert advisory committee in Uganda with seed support from Mr. John Moores.

- **2007:** TCC's International Task Force for Disease Eradication reviews RB eradicability and notes evidence that Mectizan alone may interrupt transmission in Africa, but that the challenge of *Loa loa* needs to be resolved. (WHO 2007). TCC/RBP agrees to assist Uganda in its new goal of national RB elimination.

- **2006:** TCC agrees to assist Sudan's declaration of national elimination, starting with enhanced efforts in the Abu Hamad focus on the River Nile (Higazi 2011, 2013).

- **2005:** A paper published by Hopkins, Richards, and Katabarwa ("Whither Onchocerciasis Control in Africa?") challenges the feasibility of indefinite RB control in Africa without continued external support, calls for governments to do more to fund their programs; and calls for further research into RB elimination in Africa (Hopkins, 2005).

- **2003:** Richards co-authors a paper on mass treatment decision-making in *Loa loa* areas where onchocerciasis occurs (Addis, 2003).

- **2002:** TCC and WHO (with Gates Foundation support) co-host the Conference on the Eradicability of Onchocerciasis that concludes RB can be eliminated in the Americas but not yet throughout Africa with current tools (Mectizan alone). The challenge is noted of the parasite *Loa loa*, which occurs in some areas with RB: Mectizan given to a person with *Loa loa* infection can result in severe nervous system reactions, including coma. The conference calls for further study in Africa and for implementers to 'go for transmission elimination' in Africa where feasible (Dadzie, 2003). The Gates Foundation, in part due to the findings of the conference, shortly thereafter provide major grants to TCC in support the OEPA program and TDR to study using

Mectizan alone to eliminate onchocerciasis transmission in Mali and Senegal.

- **2000:** OEPA needs a 'definition of success' endorsed by WHO; with a push from President Carter to WHO DG H Gro Brundland, WHO agreed to hold an important meeting to establish certification criteria for onchocerciasis elimination (WHO, 2001), which had great utility for programs in the Americas and Uganda. Richards, writing in The Lancet, notes the importance of the LF program in advancing the RB elimination agenda and challenges the African program to move toward onchocerciasis transmission elimination in a model similar to that in the Americas.
- **1998:** Richards, with other TCC authors (Miri and Sauerbrey), writes about opportunities for RB elimination in a special edition of the Bulletin of WHO entitled "Global Disease Elimination and Eradication as Public Health Strategies." He also writes about the history of launching the OEPA initiative (*Bull PAHO*).
- **1997:** TCC Vice President of Health Programs, Dr. Donald Hopkins, and Richards publish "Visionary Campaign: Eliminating River Blindness" in the 1997 Encyclopedia Britannica Medical and Health Annual.
- **1996:** TCC assumed country program activities of RBF in the Americas, Nigeria, Cameroon, Sudan, and Uganda. (Ethiopia started in 2001.) Dr. Frank Richards is seconded from CDC to TCC as its RB technical director. RBF formally closes, and program funding in Africa becomes the responsibility of the newly launched APOC, which was jointly developed by NGOs (including RBF and TCC), WHO, and the World Bank with bilateral and multilateral donors.
- **1991:** The River Blindness Foundation (RBF) is launched by philanthropists John and Rebecca Moores of Houston, Texas. RBF quickly becomes the largest source of support for Mectizan distribution activities, funding NGOs such as Sightsavers, Helen Keller International, the International Eye Foundation, CBM, and others. It also launches the OEPA initiative in the Americas and supports the WHO-NGO coordination office for onchocerciasis in Geneva.

ANNEX 5: Publications Authored or Coauthored by RBEP Personnel

*2024 Publications shown in **bold**.*

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ANNEX 6: Program Review Agenda

29th Annual
River Blindness, Lymphatic Filariasis, and Schistosomiasis Program Review

Monday, February 17, 2025

Start	End	Title	Speaker
9:00 AM	9:20 AM	Day 1 Welcome and Introduction	Dr. Gregory Noland
9:20 AM	9:25 AM	Welcome Remarks	Ms. Paige Alexander
9:25 AM	9:30 AM	Welcome Remarks	Dr. Kashef Ijaz
9:30 AM	9:55 AM	Tribute to President Carter	Dr. Gregory Noland
9:55 AM	10:20 AM	RBEP Overview	Dr. Gregory Noland
10:20 AM	10:30 AM	Partner Updates: Merck	Ms. Marilyn Mainardi
10:30 AM	11:00 AM	COFFEE BREAK & GROUP PHOTO	
Morning Session Chair:		Dr. Zerihun Tadesse	
11:00 AM	11:25 AM	Uganda: Treatments, Training and Impact	Mr. Elisa Byamukama
11:25 AM	11:40 AM	*Discussion*	
11:40 AM	12:05 PM	Uganda: CDD Participation Study Results	Dr. Edridah Muheki
12:05 PM	12:20 PM	*Discussion*	
12:20 PM	12:35 PM	Uganda: East Africa Cross-Border Coordination Group Update	Dr. Edridah Muheki
12:35 PM	12:50 PM	*Discussion*	
12:50 PM	2:00 PM	LUNCH	
Afternoon Session Chair:		Dr. Emmanuel Miri	
2:00 PM	2:25 PM	Sudan: Treatments, Training and Impact	Dr. Mazin Ahmed
2:25 PM	2:40 PM	*Discussion*	
2:40 PM	2:55 PM	Sudan: Lessons Learned: Implementing MDA in Conflict Areas	Dr. Sara Lavinia
2:55 PM	3:10 PM	*Discussion*	
3:10 PM	3:25 PM	COFFEE BREAK	
3:25 PM	3:50 PM	South Sudan: Country Update	Mr. Yak Yak Bol
3:50 PM	4:05 PM	*Discussion*	
4:05 PM	4:15 PM	Day 1 Closure	Dr. Gregory Noland
4:30 PM	6:30 PM	*Reception*	

29th Annual
River Blindness, Lymphatic Filariasis, and Schistosomiasis Program Review

Tuesday, February 18, 2025

Start	End	Title	Speaker
9:00 AM	9:05 AM	Day 2 Introduction	Dr. Gregory Noland
Morning Session Chair:		**Dr. Emmanuel Emukah**	
9:05 AM	9:20 AM	Update: WHO LF M&E Guidelines	Dr. Jonathan King
9:20 AM	9:35 AM	*Discussion*	
9:35 AM	10:00 AM	Ethiopia: RB Treatments and Impact	Mr. Aderajew Mohammed
10:00 AM	10:15 AM	*Discussion*	
10:15 AM	10:40 AM	Ethiopia: LF Treatments and Impact	Mr. Yohannes Eshetu
10:40 AM	10:55 AM	*Discussion*	
10:55 AM	11:25 AM	COFFEE BREAK	
11:25 AM	11:45 AM	Ethiopia: Metema PTS Update	Mr. Aderajew Mohammed
11:45 AM	12:00 PM	*Discussion*	
12:00 PM	12:15 PM	Comprehensive Genomic Surveillance of Simulium Flies and *Onchocerca volvulus* to Aid Onchocerciasis Elimination Programs	Dr. Warwick Grant
12:15 PM	12:30 PM	*Discussion*	
12:30 PM	2:00 PM	LUNCH	
Afternoon Session Chair:		**Ms. Sofia Villatoro**	
2:00 PM	2:20 PM	Ethiopia: Training, Integration and Community Ownership and Factors Affecting CDD Performance	Mr. Anley Haile
2:20 PM	2:35 PM	*Discussion*	
2:35 PM	2:55 PM	Angola: Country Update	Dra Cecilia De Almeida
2:55 PM	3:10 PM	*Discussion*	
3:10 PM	3:25 PM	COFFEE BREAK	
3:25 PM	3:45 PM	Burundi: Country Update	Dr. Victor Bucumi
3:45 PM	4:00 PM	*Discussion*	
4:00 PM	4:05 PM	Day 2 Closure	Dr. Gregory Noland

29th Annual
River Blindness, Lymphatic Filariasis, and Schistosomiasis Program Review

Wednesday, February 19, 2025

Start	End	Title	Speaker
9:00 AM	9:05 AM	Day 3 Welcome	Dr. Gregory Noland
Morning Session Chair:		Dr. Edridah Muheki	
9:05 AM	9:20 AM	Nigeria: National Onchocerciasis and Lymphatic Filariasis Elimination Status	Mr. Fatai Oyediran
9:20 AM	9:35 AM	*Discussion*	
9:35 AM	9:55 AM	Nigeria: RB & LF Treatments and Impact	Dr. Emmanuel Miri
9:55 AM	10:10 AM	*Discussion*	
10:10 AM	10:30 AM	Nigeria: Training, Integration and Community Ownership/Lessons Learned	Dr. Adamu Sallau
10:30 AM	10:45 AM	*Discussion*	
10:45 AM	11:15 AM	COFFEE BREAK	
11:15 AM	11:35 AM	Nigeria: Enugu RB Hotspot Update	Dr. Adamu Sallau
11:35 AM	11:50 AM	*Discussion*	
11:50 AM	12:10 PM	Nigeria: LF TAS Results	Dr. Cephas Ityonzughul
12:10 PM	12:25 PM	*Discussion*	
12:25 PM	2:00 PM	LUNCH	
Afternoon Session Chair:		Dr. Sara Lavinia	
2:00 PM	2:15 PM	Nigeria: LF DMDI Update	Dr. Abel Eigege
2:15 PM	2:30 PM	*Discussion*	
2:30 PM	2:45 PM	Nigeria: SCH/STH Status Updates	Dr. Emmanuel Emukah
2:45 PM	3:00 PM	*Discussion*	
3:00 PM	3:15 PM	COFFEE BREAK	
3:15 PM	3:30 PM	Nigeria: Operational Research Updates in Onchocerciasis Entomological Surveillance	Dr. Jenna Coalson
3:30 PM	3:45 PM	*Discusssion*	
3:45 PM	4:05 PM	Chad: Country Update	Dr. Chidi Djorkodei Hamit
4:05 PM	4:20 PM	*Discussion*	
4:20 PM	4:25 PM	Day 3 Closure	Dr. Gregory Noland

29th Annual
River Blindness, Lymphatic Filariasis, and Schistosomiasis Program Review

Thursday, February 20, 2025

Start	End	Title	Speaker
9:00 AM	9:05 AM	Day 4 Introduction	Dr. Gregory Noland
Morning Session Chair:		Dr. Abel Eigege	
9:05 AM	9:25 AM	OEPA Overview	Ms. Dalila Rios
9:25 AM	9:40 AM	*Discussion*	
9:40 AM	9:55 AM	Brazil: Amazonas Focus Update	Dr. Ciro Martins
9:55 AM	10:10 AM	*Discussion*	
10:10 AM	10:25 AM	Venezuela: South Focus Update	Dr. Oscar Noya Alarcon
10:25 AM	10:40 AM	*Discussion*	
10:40 AM	11:10 AM	COFFEE BREAK	
11:10 AM	11:30 AM	OEPA Dashboard and Community Prevalence Tracking	Ms. Regina Garcia
11:30 AM	11:45 AM	*Discussion*	
11:45 AM	12:05 PM	Madagascar: Country Update	Dr. Nely Alphonse Jose
12:05 PM	12:20 PM	*Discussion*	
12:20 PM	12:30 PM	Data Review	Ms. Emalee Martin
12:30 PM	12:40 PM	Meeting Closure	Dr. Gregory Noland
12:40 PM	2:00 PM	LUNCH	

ANNEX 7: Program Review Participants

(V) indicates virtual participation

The Carter Center - Atlanta

Mr. Alex Addison
Mr. Philip Adolwa
Ms. Paige Alexander
Ms. Paige Baum
Ms. Sara Baxter (v)
Ms. Valery Beiriger Valdez
Ms. Nina Benard
Ms. Antonette Benford
Ms. Lauri Bernard
Ms. Kelly Callahan
Ms. Meagan Clem Martz
Dr. Jenna Coalson
Mr. Yohannes Dawd
Mr. Yasir Deafalla (v)
Dr. Stephane Docteur
Ms. Maureen Donato
Ms. Jenny Dorris White (v)
Mr. Asmerom Gettu
Ms. Cassandra Grant (v)
Ms. Emily Griswold
Ms. Ursula Hamilton (v)
Dr. Karen Hamre
Ms. Madelle Hatch
Dr. Kashef Ijaz
Ms. Monica Johnson
Ms. Ursula Kajani
Mr. Curtis Kohlhaas
Ms. Victoria Krauss
Ms. Nicole Kruse
Ms. Samhita Kumar (v)
Ms. Hannah Lawinger
Ms. Emalee Martin
Ms. Lara Martin (v)
Ms. Amiah Matthews
Ms. Paola Mejia
Ms. Sirgut Mulatu-Tuffa
Ms. Savanna Murphy
Dr. Scott Nash (v)
Dr. Gregory Noland
Dr. Anicet Ntisumbwa
Ms. Chika Okala
Ms. Lindsay Rakers
Dr. Angelia Sanders
Ms. Janet Shin
Mr. Ben Spears (v)
Ms. Shandal Sullivan
Mr. Coleman Tappero (v)
Ms. Maura Toole
Dr. Anyess Travers
Ms. Karmen Unterwegner
Mr. Adam Weiss (v)
Ms. Atia Williams
Mr. Craig Withers
Ms. Sara Wom (v)

The Carter Center - International Staff

Dr. Lucia Verzotti - Angola
Dr. Al-Hassana Outman - Chad
Mr. Anley Haile Abate - Ethiopia
Mr. Aderajew Mohammed Abdulkadir - Ethiopia
Dr. Zerihun Tadesse Gebreselassie - Ethiopia
Mr. Yohannes Eshetu Talato - Ethiopia
Mr. Frew Demeke Tekletsadik - Ethiopia
Ms. Sofia Villatoro - Guatemala
Ms. Regina Garcia (v) - Guatemala
Ms. Alba Lucia Morales (v) - Guatemala
Ms. Dalila Rios - Guatemala
Dr. Luccene Desir - Haiti
Dr. Abel Eigege - Nigeria
Dr. Emmanuel Emukah - Nigeria
Dr. Cephas Ityonzughul - Nigeria
Mr. Bulus Mancha (v) - Nigeria
Dr. Emmanuel Miri - Nigeria
Dr. Adamu Sallau - Nigeria
Mr. Jim Niquette - South Sudan
Ms. Aja Isaac Kuol Nyok - South Sudan
Dr. Sara Lavinia Brair - Sudan
Mr. Ahmed Haroun (v) - Sudan
Dr. Mazin Ahmed Mohamed - Sudan
Dr. Asam Mohamed Ali Zarroug - Sudan
Ms. Elisa Byamukama - Uganda
Dr. Edridah Muheki - Uganda
Mr. Apollo Nduhukire - Uganda

Ministry of Health Representatives

Dr. Maria Cecília C. De Almeida - Angola
Dr. Victor Bucumi - Burundi
Dr. Zacharie Kubwimana - Burundi

Dr. Ciro Martins Gomes - Brazil
Dr. Abdallah Adam Mahamat - Chad
Dr. Hamit Chidi Djorkodei - Chad
Dr. Adoum Mahamat Oumar - Chad
Dr. Alfonse Jose Nely - Madagascar
Dr. Fanoelson Aime Solofonirina - Madagascar
Dr. Solofonirina Deranomenjanahary Fanoelson Aimé - Madagascar
Mr. Fatai Oyediran - Nigeria
Mr. Yak Yak Bol Mayen - South Sudan
Dr. Talal Hassan Abdelrhman Badwi (v) - Sudan
Dr. Alfred Mubangizi - Uganda

The Americas
Dr. Oscar Noya-Alarcón (PNEOFS)

Anesvad Foundation
Ms. Ana Löwenberg (v)

Gates Foundation
Dr. Rachel Bronzan (v)
Ms. Kathryn Malhotra (v)

Central University of Venezuela
Dr. Maria Eugenia Grillet (v)

Christian Blind Mission (CBM)
Ms. Juliana Amanyi-Enegela (v)
Mr. Benson Ojara (v)
Ms. Girija Sankar
Mr. Johan Willems

Crosscut
Mr. Coite Manuel (v)

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Mr. Nebiyu Negussu

Emory University
Dr. Jessica Carag
Dr. David Civitello
Dr. Deborah McFarland
Dr. Steven Yeh

Erasmus University Medical Center Rotterdam
Dr. Wilma A. Stolk (v)

GLIDE
Mr. Simon Bland

Imo State University, Owerri, Nigeria
Prof. B.E.B Nwoke

Independent Consultants
Dr. Adrian Hopkins (v)
Dr. Moses Katabarwa
Dr. Frank Richards

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Dr. Gretchen Stoddard
Ms. Yuko Yoshida

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Melissa Crutchfield

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Dr. Patti Hill
Ms. Leia Williams
Ms. KaSondra Byrd
Ms. Sarah Buki (v)

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Prof. Rory James Post

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Ms. Marilyn Mainardi
Ms. Maria Verbanac

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Dr. Francisca Olamiju

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Dr. Manal Taryam (v)

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Dr. Miguel Aragon Lopez (v)
Dr. Ronaldo Scholte (v)
Dr. Ana Luciañez Valente (v)

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Dr. Laurence Slutsker

RTI International
Dr. Rebecca Fluekiger
Dr. Michael French (v)
Ms. Lisa Rotondo (v)

Sightsavers
Mr. Simon Bush (v)
Dr. Philip Downs
Dr. Martins Imhansolovea (v)
Dr. Sunday Isiyaku
Dr. Louise Hamill
Ms. Sarah Huntbach-Noel
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Mr. Alexandre Pavluck

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Dr. Mary Doherty (v)
Dr. Steven Williams

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Dr. Teshome Gebre Kanno
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University of Florida
Dr. Madsen Beau De Rochars

University of South Florida
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