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CARTER CENTER

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Summary
2011 Program Review for The Lions-Carter Center SightFirst

RIVER BLINDNESS PROGRAMS

Cameroon, Ethiopia, Nigeria, OEPA, Sudan, and Uganda

21-23 February 2012
The Carter Center
Atlanta, GA

Lions Clubs International FOUNDATION

THE CARTER CENTER
RIVER BLINDNESS PROGRAM

September 2012

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And to many others, our sincere gratitude

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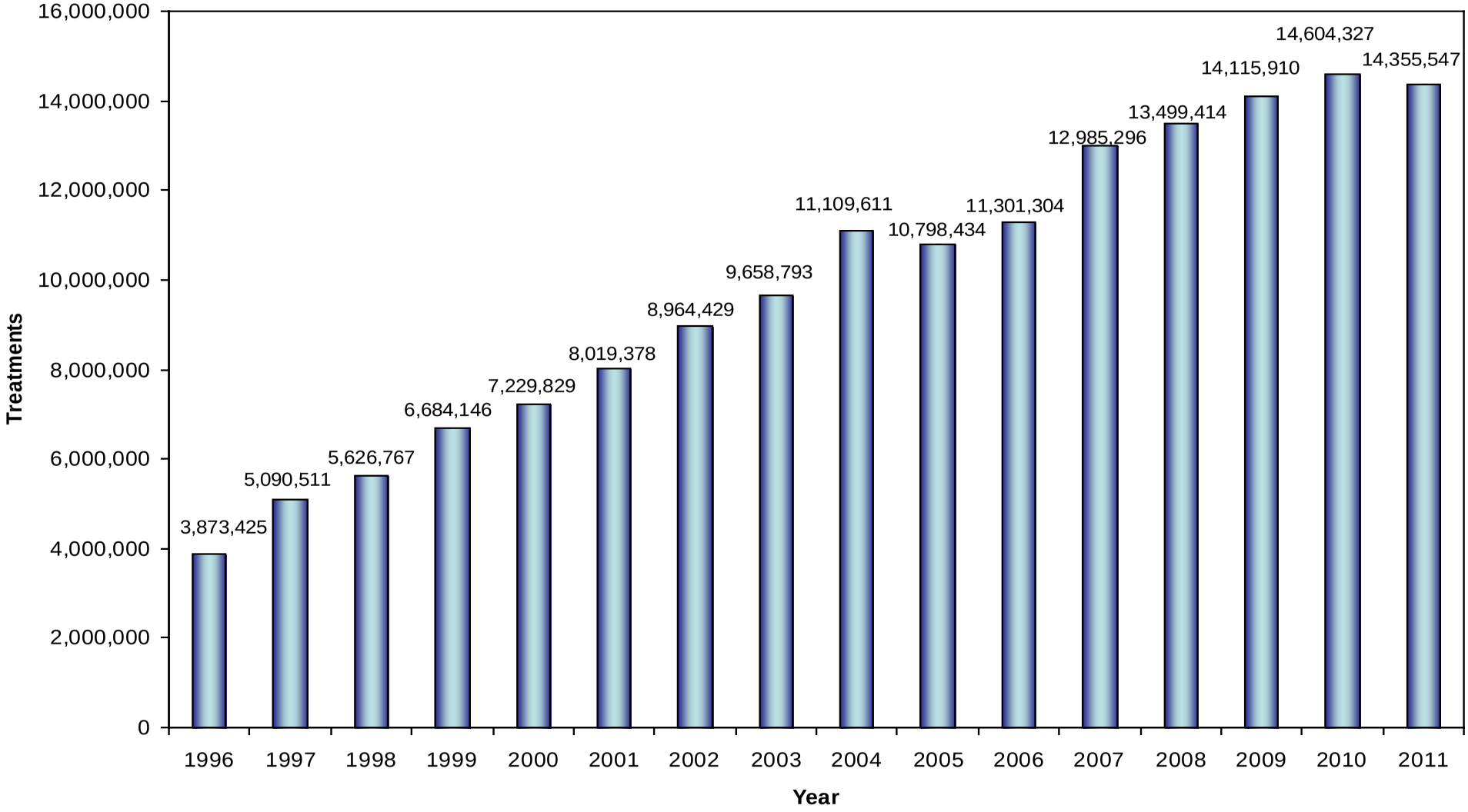

Figure B

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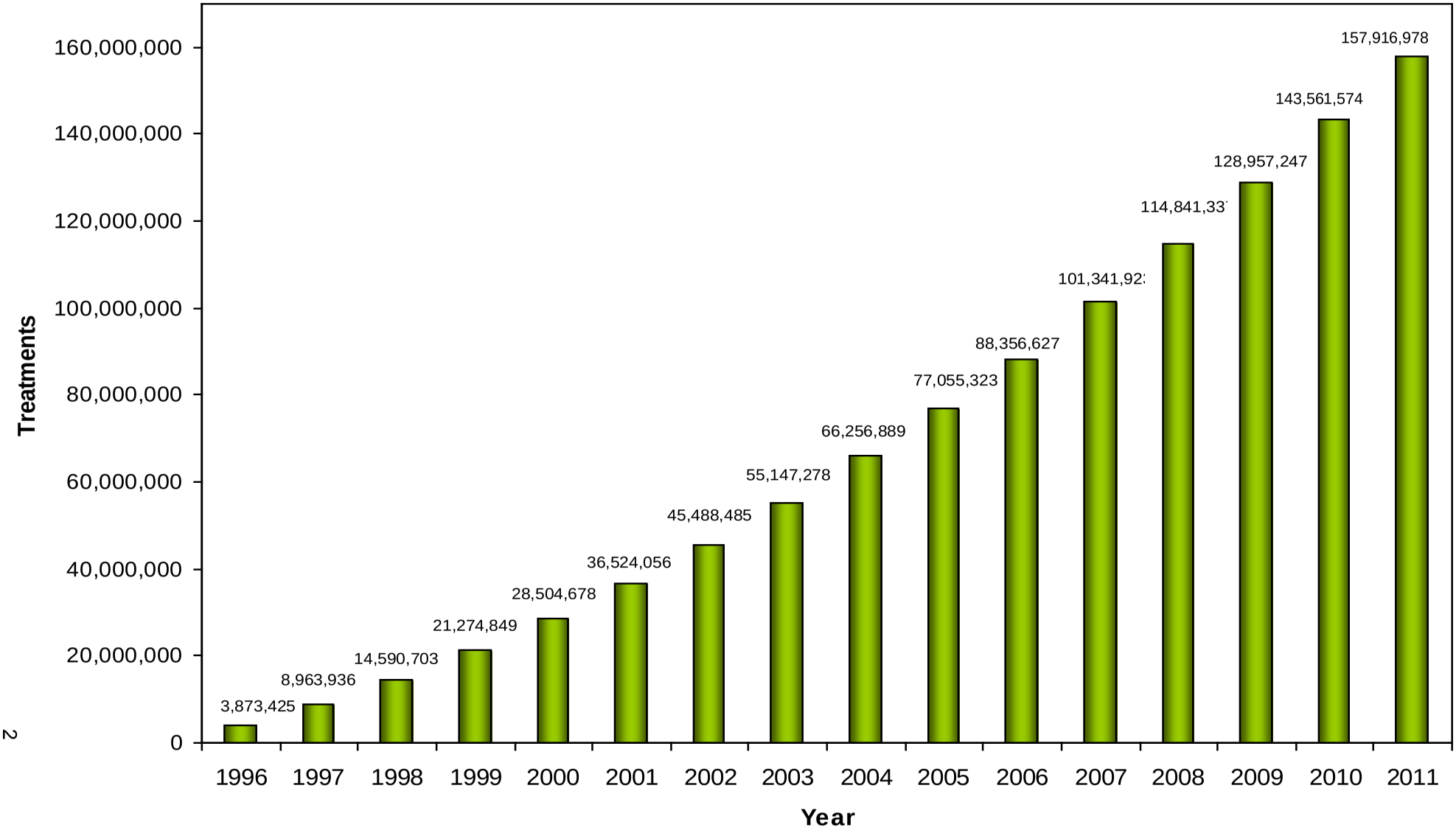

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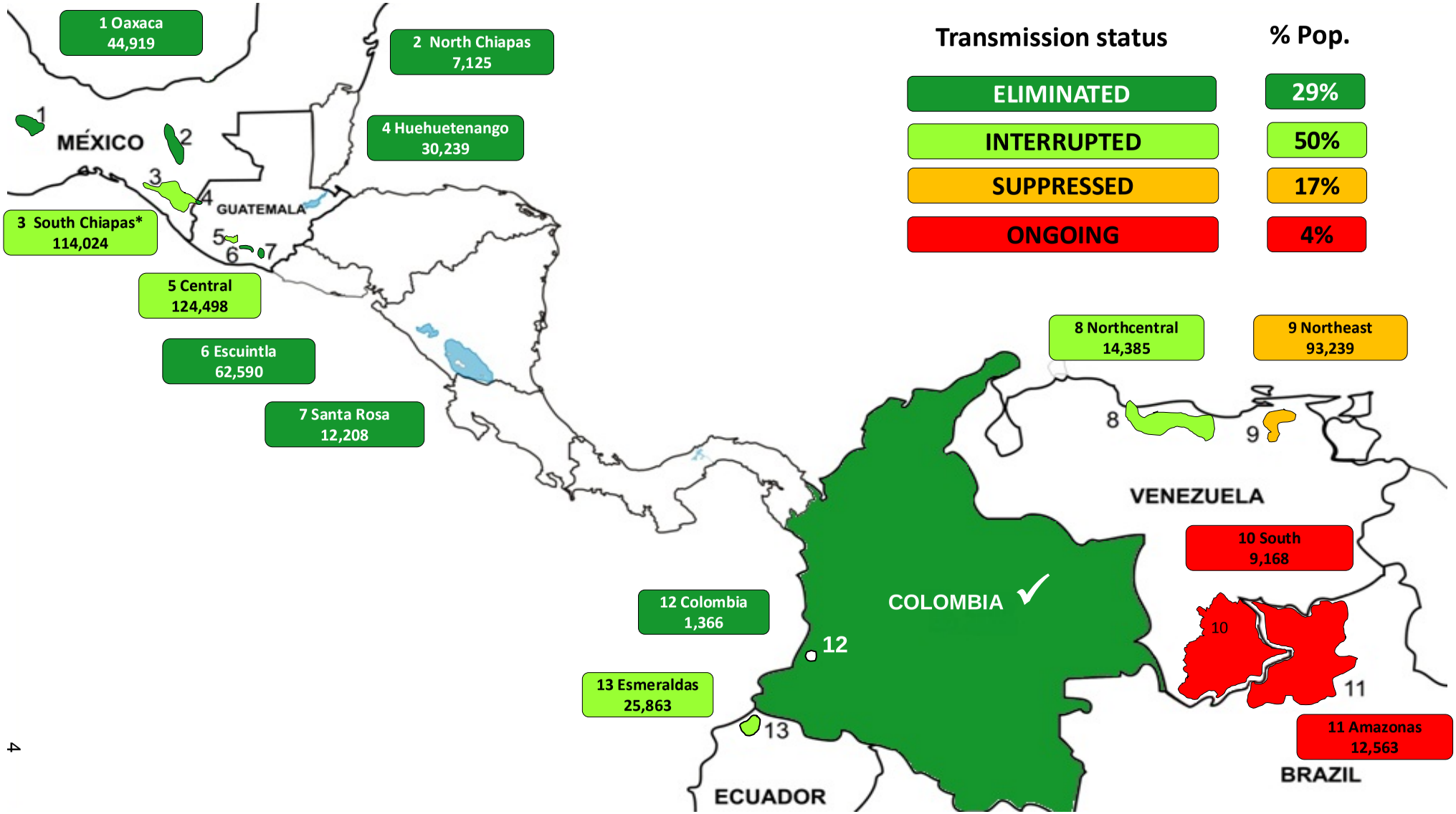

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Uganda: Carter Center-Assisted Districts, 2011

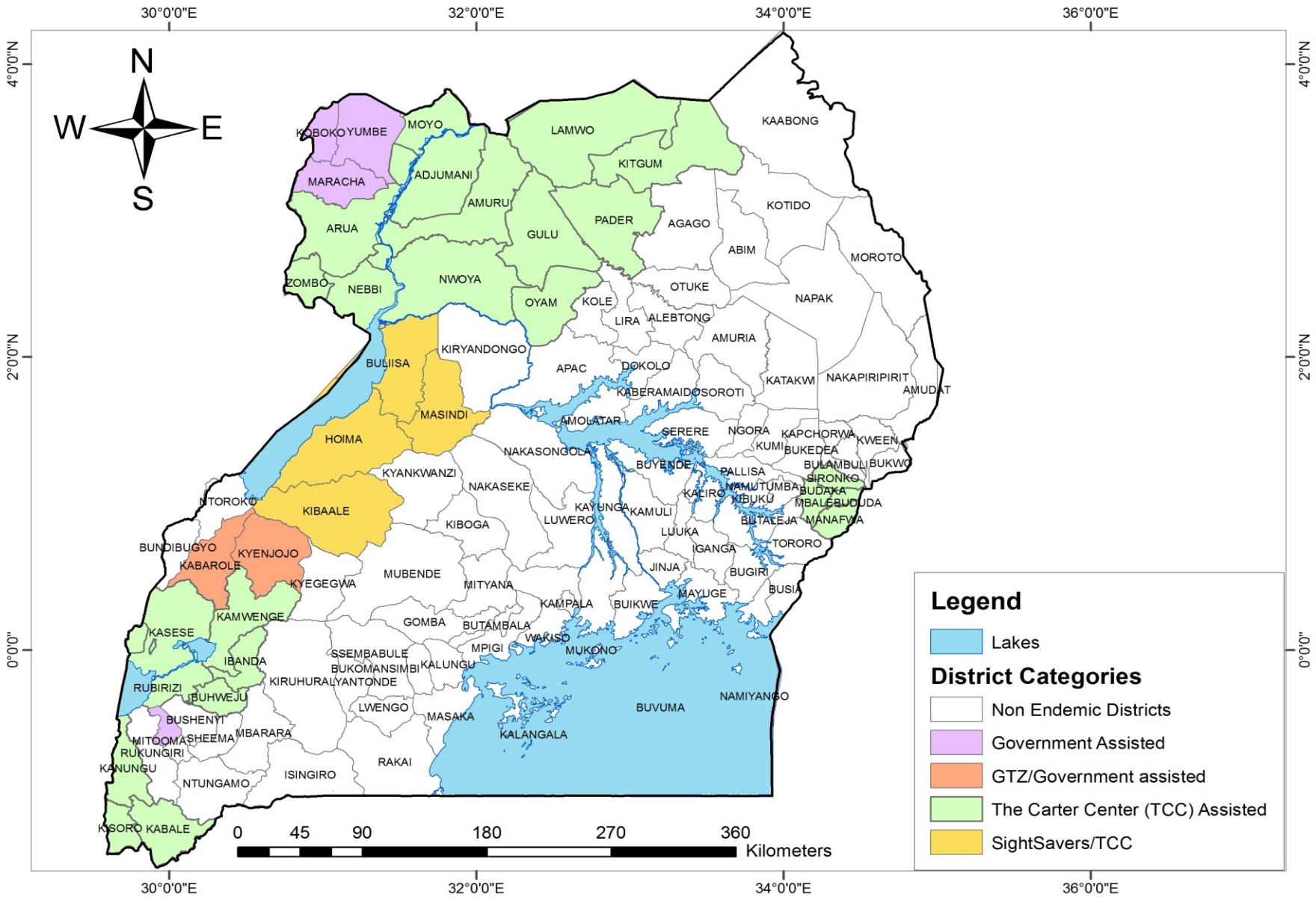

Figure F

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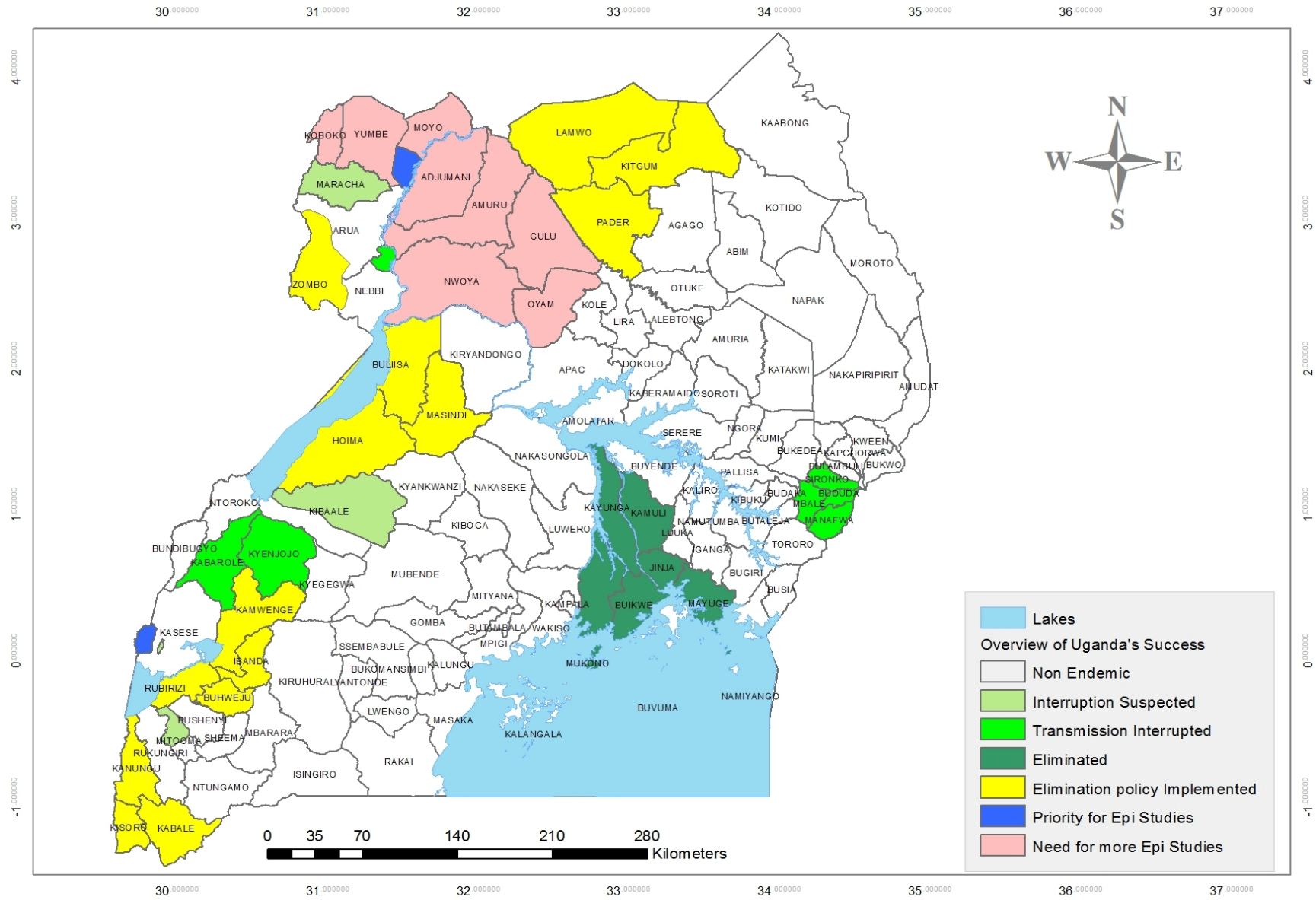

Figure G

Uganda declares interruption of transmission in Itwara, Wadelai and Mt. Elgon in 2011

THE REPUBLIC OF UGANDA

MINISTRY OF HEALTH

PRESS RELEASE

UGANDA MAKES TREMENDOUS PROGRESS TOWARDS ELIMINATION OF ONCHOCERCIASIS (RIVER BLINDNESS) DISEASE

Introduction:

The Ministry of Health in collaboration with partners has made tremendous strides in the Elimination of Onchocerciasis (River blindness). Onchocerciasis is a disease caused by a worm called *Onchocerca volvulus*. It is transmitted from one person to the other through the bite of an infected female black fly which mainly breeds in fast flowing rivers and streams.

The disease causes eye lesions, which can lead to impaired vision and blindness. It also causes ugly skin disease looking like leopard skin, which is characterized by severe itching and can be so severe that it disturbs sleep, concentration and work. The psychosocial impact of River Blindness includes emotional distress, stigmatization and social discrimination due to damaged skin lesions which sometimes lead to broken marriages.

The disease is common in 35 districts of Arua, Adjumani, Amuru, Bududa, Buhweju, Buliisa, Bushenyi, Hoima, Ibanda, Gulu, Kabale, Kabarole, Kamwenge, Kanungu, Kasese, Kibaale, Kisoro, Kitgum, Koboko, Kyenjojo, Lamwo, Manafwa, Maracha, Mbale, Masindi, Mitooma, Moyo, Nebbi, Nwoya, Oyam, Pader, Rubirizi, Sironko Yumbe and Zombo. More than three million people are at risk of acquiring the infection and over one million people are already infected.

It is estimated that in Kitgum, Lamwo and Pader districts where the river blindness strain is blinding, at least 5,400 people are blind or visually impaired with more than 159,000 debilitating skin disease.

Control of Onchocerciasis:

The Ministry of Health and its partners started its control programmes in early 1990s using ivermectin treatment of the affected communities. More than 70 person per every 100 persons affected in population has been under treatment for more than 10 years treating every 75 persons per every 100 in a community. The disease affected 70 people per every 100 people in the communities before the mass treatment was initiated in 1993. It has, however, now reduced to only 7 persons per every 100 persons in most endemic areas. This tremendous achievement in programme coverage and in reduction of the disease burden convinced the Ministry of Health to move from control programmes and launched an Elimination Policy with support from The Carter Center.

Elimination Policy:

The new strategy aims at elimination of the disease through a bi-annual treatment with ivermectin plus vector elimination. It is targeted at attaining elimination of the disease by 2020. It was launched in 14 districts covering six foci in January 2007 and implemented in a phased manner, with a plan to cover all the isolated foci of the disease by 2015.

Key Achievements since 2007:

The Government of Uganda with support of partners has successfully achieved interruption of transmission of the disease in Mt. Elgon focus covering the districts of Bududa, Mbale, Manafwa and Sironko; and in Itwara focus covering Kabarole and Kyenjojo districts. The Ministry of Health will formally notify the districts concerned to sensitize the communities before stopping of all interventions including mass treatment. Interruption of transmission of the disease has also been achieved in Wadelai focus in Nebbi district. However, annual treatment with ivermectin in Wadelai will not be stopped because it is still needed for the elimination of Lymphatic filariasis in this focus. Epidemiological and entomological studies for delineating the limits of onchocerciasis foci in areas not yet under the elimination policy will continue.

The disease affects a total population of about 3,287,696 people in Uganda. Interruption of transmission has been attained in a total population of 445,534 people that is 13.6 % of the population. Over 450,000 people in Uganda have been rid of this debilitating disease. This implies that this year (2012), about 793,220 treatments will not be provided, thus saving a lot of resources for the elimination program to invest in other river blindness foci that are launching the stepwise elimination. The districts will support the surveillance activities in the focus where the disease has been got rid of and will be integrated in the existing health service delivery for sustainability.

What are the benefits of eliminating River blindness from Uganda?

- A healthier population that is able to concentrate in more productive activities thus contributing to the reduction in poverty.
- Reduction in health expenditure towards controlling/eliminating river blindness.
- Health personnel involved in river blindness elimination will get time to work on other Neglected Tropical diseases.
- Improved school attendance and reduction in school drop outs.

Government Appeal:

- All districts where river blindness elimination has been attained are requested to ensure support for the necessary surveillance activities in the post treatment phase.
- Partners should increase advocacy at national and international levels to create more awareness and rally support for elimination activities in Uganda.
- Distribution of ivermectin twice a year in districts where elimination policy was luanched should attain at least 90% treatment coverage of all the eligible persons.
- Work closely with other onchocerciasis endemic countries that are bordering Uganda (DRC, South Sudan) in order to avoid disease re-infection.

Key Players:

- This success to the control of the diseases is attributed to the dedication of the Ministry of Health, districts local governments, the affected communities, and the partners that include; The Carter Center, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bernhard Notch Institute, WHO, African Programme for Onchocerciasis Control (APOC) and Merck & Co.

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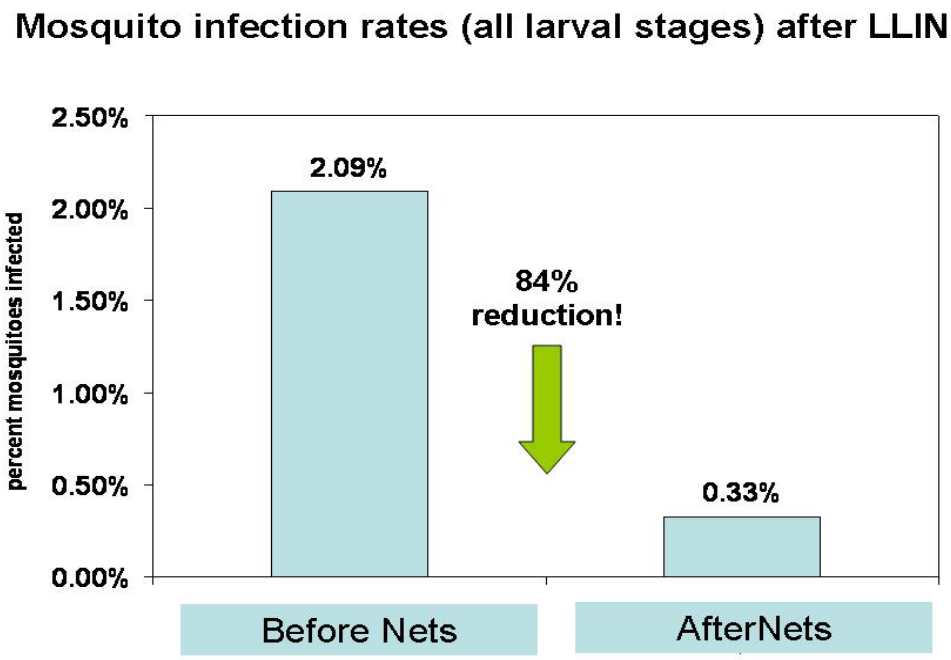
APOC

Uganda Daily Newspaper: New Vision, Friday, February 17, 2012

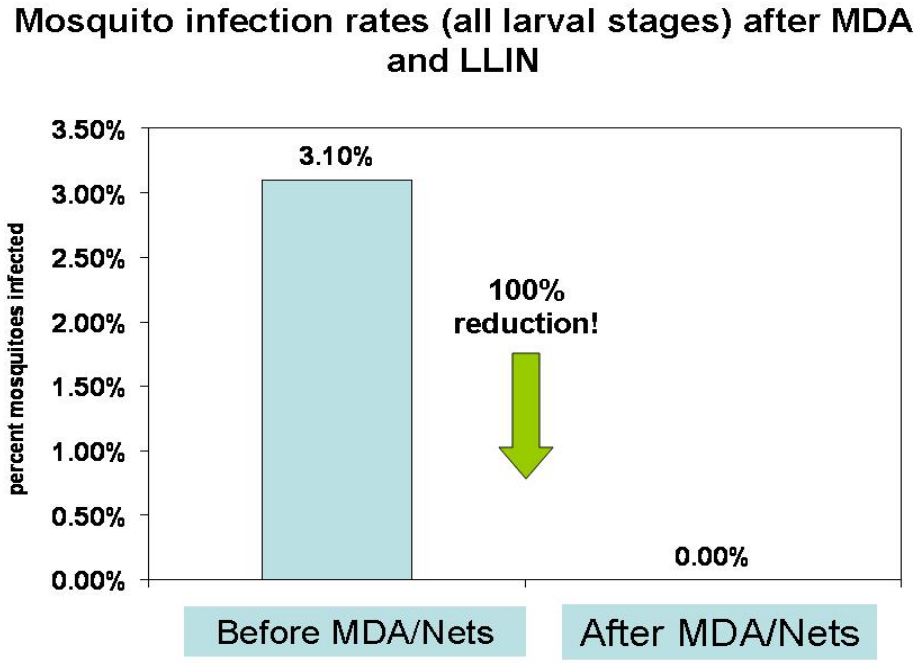
Figure H

Impact of MDA and LLINs on Lymphatic Filariasis Transmission in Nigeria

Panel A



Panel B



In 2011, <u>for the first time</u>, no infective (L3) mosquitoes were detected

MDA – Mass Drug Administration with Mectizan® and Albendazole
LLIN – Long Lasting Insecticidal Nets

ABSTRACT

The River Blindness Program (RBP) of The Carter Center assists the ministries of health (MOHs) of 11 countries[1] to distribute Mectizan® (ivermectin, donated by Merck) through programs whose goals are either to control or eliminate onchocerciasis. Most of these activities are undertaken in collaboration with Lions Club International Foundation (LCIF) under the Lions-Carter Center SightFirst Initiative. In 2011, the RBP and its partners provided more than 14.3 million Mectizan® treatments (Frontispiece Figure A). Cumulative RBP-assisted Mectizan® treatments since 1996 exceeded 150 million (Frontispiece B) in 2011, and this milestone was commemorated by a special "150" medal (see inset). The RBP also helps countries integrate river blindness efforts with lymphatic filariasis, malaria, schistosomiasis, trachoma, and Vitamin A supplementation when feasible.

In 2012, the RBP plans to undertake a paradigm shift by focusing all of its efforts on eliminating RB transmission. RBP will continue its elimination efforts in the Americas and Uganda, enhance its work in areas currently assisted in Nigeria and Ethiopia, wind down its programs in Sudan, and end its support to Cameroon.

A commemorative medal was distributed at the Program Review, celebrating over 150 million cumulative Mectizan treatments delivered by Carter Center (RBP)-assisted programs from 1996 – 2011. Design by Sherri Richards.

BACKGROUND

Human onchocerciasis, an infection caused by the parasitic worm *Onchocerca volvulus,* causes chronic skin disease and severe itching, as well as eye lesions that can progress to visual loss or complete blindness. The worms live in fibrous 'nodules' that often can be felt just under the skin. Onchocerciasis is transmitted by small black flies that breed in rapidly flowing rivers and streams, thus leading to the common name for the disease, "river blindness" (RB). The World Health Organization (WHO) estimates that approximately 37.2 million people are infected and 770,000 are blinded or severely visually impaired in 38 endemic countries. Approximately 123 million people live in endemic areas worldwide and are therefore at risk of infection; more than 99% of those at risk reside in Africa. Periodic mass treatment with Mectizan® prevents eye and skin disease caused by *O. volvulus* and may also be used to reduce or even interrupt transmission of the disease depending on the duration and frequency of treatment per year and the geographic extent of the distribution programs. (See Annex 1 and 2 for further details.)

The Carter Center's RBP is dedicated to safe and sustainable mass distribution of Mectizan® with health education to control or eliminate onchocerciasis. The distinction between control and elimination is important. In control, Mectizan® distribution likely will

[1] Brazil, Cameroon, Colombia, Ecuador, Ethiopia, Guatemala, Mexico, Nigeria, Sudan, Uganda and Venezuela

need to continue indefinitely because onchocerciasis transmission persists and people continue to get new infections; sustainability of control programs is vital and integration with other similar disease control activities for cost savings is an important element in this scenario. In elimination, Mectizan® treatment is used more intensively so that it can eventually be halted when evidence indicates that transmission of the parasite has ceased and the worm population has disappeared. Trying to eliminate onchocerciasis where feasible is an important goal of the RBP, and current RBP elimination efforts include all six endemic countries in the Americas and designated foci in Uganda and Sudan. In these eight countries, onchocerciasis elimination is a stated goal of the governments and their MOHs.

Local Lions Clubs and the LCIF are special partners of The Carter Center in the battle against RB under the Lions-Carter Center SightFirst Initiative. When The Carter Center assumed the functions of the River Blindness Foundation (RBF) in 1996, it also entered into RBF's collaboration with local Lions Clubs in Cameroon and Nigeria. Since 1997, LCIF has generously provided grants to The Carter Center for the control or elimination of RB through their SightFirst I and SightFirst II Initiatives. Through the Lions SightFirst I Initiative, LCIF and The Carter Center expanded their partnership to encompass controlling RB in five countries in Africa (Cameroon, Ethiopia, Nigeria, Sudan, and Uganda) and eliminating RB altogether in the six endemic countries of the Americas. The SightFirst II Initiative does not cover Nigeria, but provides generous support to all other countries we assist, including the more recent elimination efforts in Sudan and Uganda.

In 2003, the Carter Center's RBP received its first support from the Bill & Melinda Gates Foundation for the Onchocerciasis Elimination Program for the Americas (OEPA) through a matching grant that drew additional funding from LCIF, Merck, and more than 70 other donors. In 2006, the Gates Foundation began providing support to the Carter Center's integrated programs (which include RB) in Nigeria; that support concluded in 2011. Other external RBP partners include the U.S. Centers for Disease Control and Prevention (CDC), WHO, the African Program for Onchocerciasis Control (APOC)[2], and the World Bank, as well as other foundations, corporations, governments, and nongovernmental development organizations (NGDOs). Of course, the RBP would not be possible without the Merck donation of Mectizan®.

A major focus of The Carter Center is reaching adequate treatment coverage, communicated through routine monthly reports by assisted programs (Figure 1). The reader is referred to Annex 2 for a discussion of this reporting process and treatment indices used by the program and in this report. Important coverage terms include the **Ultimate Treatment Goal** (**UTG**), which is the treatment-eligible population in a program area (healthy persons >5 years of age); the **UTG(2) and UTG(4)**, used by elimination programs where semiannual or quarterly treatments are delivered; the **Annual Treatment Objective** (**ATO**), which is an interim target population in programs

[2] Carter Center RB projects no longer receive substantial APOC support since they are beyond the 5 year APOC project horizon.

that are not operating at full scale due to financial or resource constraints; and **full coverage**, which is defined as >90% achievement of the UTG established for active mass treatment, or, for elimination programs, >90% of the UTG(4) (85% for OEPA). **Passive treatments** are Mectizan® treatments for onchocerciasis provided through health care units located in hypoendemic communities (where estimated onchocerciasis nodule prevalence is under 20%) in the control program strategy. In elimination programs, hypoendemic villages receive mass treatment (not passive). Refer to Figure 2 to see program performance on treatment goals over time; this figure demonstrates the impressive progress each program has made towards the high coverage we are now seeing annually.

Mectizan® tablets are distributed in Africa 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), which was introduced with APOC support in the late 1990s. A focus of The Carter Center's RBP in some areas is on "kinship-enhanced CDTI," an approach that seeks to train more CDDs than classic CDTI. Kinship-enhanced CDTI groups CDDs and those they serve within their own kinship or residential areas; decisions and activities are handled at that level. This strategy seeks to increase the active participation of members of the affected communities over the years by: 1) training as many inhabitants of endemic villages as possible to serve as distributors; 2) encouraging the involvement of women; 3) reducing the demand for financial or other "incentives"; and 4) letting community members choose their own health workers and the location of treatment centers. The monitoring indices of the kinship approach include: 1) attaining at least 1 CDD per 100 persons to be treated in all communities; 2) sustaining treatment coverage of at least 90% of treatment-eligible persons; and 3) increasing involvement of women as CDDs and community supervisors. The costs of the kinship strategy and the demands of supervision of many CDDs have been major concerns expressed by partners about the kinship approach, and as a result these are areas of active RBP research. The CDDs and community supervisors are often highly engaged in other community based health interventions, such as water provision and sanitation, malaria control, immunization, and integrated neglected tropical disease (NTD) control efforts.

SUMMARY OF THE MEETING

The River Blindness Program hosted its 16th annual Program Review meeting on 21-23 February 2012, at the Carter Center's headquarters in Atlanta, Georgia. The meeting focused on the achievements, challenges and research of Carter Center-assisted onchocerciasis control and elimination programs in 2011. The Review also addressed other diseases and public health initiatives in which The Carter Center helps countries integrate river blindness efforts with lymphatic filariasis, malaria, schistosomiasis, trachoma, and Vitamin A supplementation. A major goal of this meeting was to provide recommendations for each program. The Review is modeled after similar reviews developed by The Carter Center and CDC for national Guinea Worm Eradication Programs since 1988.

Program Review participants included Carter Center country representatives Dr. Nabil Aziz (Sudan), Dr. Albert Eyamba (Cameroon), Ms. Peace Habomugisha (Uganda), Dr. Emmanuel Miri (Nigeria), Dr. Mauricio Sauerbrey (Director, OEPA), and Dr. Zerihun Tadesse (Ethiopia). Other technical staff members included Dr. Abel Eigege and Dr. Emmanuel Emukah (Nigeria); and Mr. Aseged Taye Zeleke (Ethiopia). MOH representatives included Dr. Andze Gervais (Cameroon); Mrs. Hiwot Solomon Taffese (Ethiopia); Dr. Jaafar Mansur Kabir (Nigeria); Dr. Kamal Hashim Osman and Dr. Isam Mohamed Zarroug (Sudan); and Dr. Dawson B. Mbulamberi (Uganda). Special guests included General (Dr.) Yakubu Gowon, former Nigerian President; Honorable Dr. Med. World Laureate Tebebe Y. Berhan (Lions – Ethiopia); Dr. Yao Sodahlon and Dr. Kisito Ogoussan (Mectizan® Donation Program - MDP); Ms. Minne Iwamoto (GlaxoSmithKline) and Dr. Laurent Yaméogo (APOC). Also present were representatives from CDC, Emory University, GNNTD, MITOSATH, Ohio University, Sightsavers International, the Task Force for Global Health, and the University of South Florida. The Review was opened by Dr. Donald R. Hopkins (Vice President, Health, The Carter Center). Dr. Frank Richards (Director, Malaria, RB, Lymphatic Filariasis and Schistosomiasis Programs, The Carter Center) chaired the meeting. (See Frontispiece Figure C for the photo from this meeting and Annexes 3, 4 and 5 for a complete participant list, contact list, and agenda).

In 2011, The Carter Center delivered 14,355,547 Mectizan® (donated by Merck) treatments in 30,149 villages in 11 countries, reaching 97% of the 2011 UTG (detailed data are presented in the table in Figure 1). Overall, 157,916,978 cumulative treatments have been provided since the RBP was launched in 1996. Approximately 17% of the 2011 treatments were supported by Lions. About 40% of 2011 treatments took place in Nigeria. See Figure 3 for an illustration of treatments over the years by project. Approximately 170,000 CDDs working at the grass roots community level were trained during the year to accomplish the 2011 treatments. Areas where the goal is onchocerciasis control (characterized by annual Mectizan® treatments in hyperendemic areas to prevent the most eye disease) accomplished about 11.5 million treatments in 2011. In areas where complete elimination of the disease is the goal (twice or four times per year treatment in all endemic areas to interrupt transmission), over 2.8 million treatments took place. Elimination is the target for the Abu Hamad focus in northern Sudan, seven foci in Uganda, and all six countries in the Americas where the disease is endemic. Great progress in four programs (Mexico, Guatemala, Sudan and Uganda) in interrupting river blindness transmission will result in halting about 1.2 million treatments in 2012, in areas that have interrupted transmission; these areas will enter a three year period of post-treatment surveillance. See individual country sections of this report for more detail.

The Carter Center-assisted programs have worked continually to enhance sustainability. One strategy is to include more women in the training sessions so that they can participate in community-directed treatment. Figure 4 shows the progress of these efforts; In 2001, 19% of CDDs were female; that number rose to 37% in 2011.

Americas: The Carter Center's Onchocerciasis Elimination Program for the Americas (OEPA) coalition includes MOHs of the six endemic countries, Lions Clubs and LCIF, Gates Foundation, the Pan American Health Organization (PAHO)/WHO, Mectizan Donation Program (MDP) and the CDC. OEPA's goal is to interrupt onchocerciasis transmission in the Americas region using a strategy of ivermectin mass administration every six months (twice per year) or every three months (four times per year). A total of 722,188 ivermectin treatments were given in the Americas in 2011, 94% of the goal.

Of thirteen endemic foci in six countries, ten have stopped treatment (see Frontispiece Figure D). Six foci have passed successfully through three years of post treatment surveillance (PTS). PTS is designed to demonstrate that no transmission has occurred in the absence of active interventions; once PTS is completed, a focus is deemed to have 'eliminated' onchocerciasis. Four foci are still under PTS. The newest additions to this list are Central focus of Guatemala and South Chiapas focus in Mexico, both of which just stopped mass treatment activities at the end of 2011. These are the two largest foci in the Americas, and halting treatment there will result in a 68% drop in treatments in the region in 2012. Colombia completed all of its national PTS activities in 2011, and became the first country to request certification of onchocerciasis elimination from the PAHO/WHO. Ecuador will complete its third year of PTS in 2012 and is hoped to submit its request to WHO in 2013.

Only three American foci still need mass treatments for onchocerciasis in 2012: Northeast and South (Venezuela), and Amazonas (Brazil). The total population of these three foci is 114,970. Since 2007, active eye disease attributable to onchocerciasis was found only in Brazil and Venezuela, and since 1995, no new cases of blindness attributable to onchocerciasis have been reported by MOHs in the Americas.

Uganda: Under a national policy of onchocerciasis elimination, the Lions-Carter Center assisted Uganda RBP administered 2,539,268 Mectizan® treatments in 2011 (96% of its target), provided by over 57,000 CDDs. Of the 2011 treatments, 842,899 were annual treatments in control areas and 1,696,369 were twice per year treatments in elimination areas (Figure 1). At its fourth meeting in August 2011, the Ugandan Onchocerciasis Elimination Executive Advisory Committee recommended treatments be halted in several foci in Uganda where transmission has been determined to have been interrupted through a series of serological and entomological studies. As a result, in 2012, 594,019 treatments will be halted in RBP assisted areas. Priority studies for 2012 in other key foci (Imaramagambo, Nyamugasani, and Maracha-Terego) also were recommended by the Advisory Committee to determine if transmission had been interrupted there. The Carter Center is supporting impact assessments (including entomological, serological and parasitological studies) in those foci. Counterbalancing the areas where treatment has been halted, RBP and its partners are preparing for a major expansion of the treatment program into the recently pacified northern and northwestern parts of Uganda, where severe onchocerciasis disease and high levels of transmission persist. Over 1.5 million new treatments are anticipated in 2012.

***Sudan*:** The Sudan Lions-Carter Center effort in support of the ministry of health program based in Khartoum reported 450,623 Mectizan® treatments (Figure 1), administered by 3,610 CDDs; 104% of the treatment goal, with 429,057 semiannual treatments in elimination areas and 21,566 annual treatments in control areas. At the Review, the Sudan ministry of health representatives announced that, based on parasitological, serological and entomological studies performed in 2011, it had determined that transmission of onchocerciasis had been interrupted in the Abu Hamad focus. Thus, the ministry has stopped treatment in this focus in 2012.

***Cameroon*:** In 2011, Lions-Carter Center assisted 1,379,706 Mectizan® treatments in West Province (Figure 1), administered by 14,884 CDDs and achieving 97% of the treatment goal. The Carter Center announced at the Review that due to financial constraints resulting from the global recession it would close its office in Cameroon in August 2012. We congratulate the staff there on significant accomplishments noted in previous issues, especially Country Representative Dr. Albert Eyamba (who has worked with The Carter Center since 1998), and Accountant Jean Marie Noubibou and Secretary Miriam Tayou (who have worked with RBP since its launching in 1996 and, before that, with the River Blindness Foundation program that launched the office in 1993).

***Nigeria*:** In 2011, 5,548,689 Mectizan® treatments for river blindness were assisted by the program in nine states in Nigeria in 2011 (99% of the UTG). Nigeria trained or re-trained over 53,000 CDDs to accomplish the distribution. In addition, 476,852 passive treatments were provided through clinics in the onchocerciasis hypoendemic local government areas (LGAs) of the southeastern assisted states.

The Lymphatic Filariasis (LF) Elimination Program is integrated with the RBP in Plateau and Nasarawa states, and assisted 3,198,340 combined Mectizan® and albendazole treatments. Due to longstanding MDA distribution (8 or more years) as well as recent mass distribution of long lasting insecticidal nets (LLINs) throughout two states, the LF program believes that LF transmission likely has been stopped in the two states (2008 studies confirmed transmission interruption in 10 of the 30 LGAs and LF treatments ceased in 5 LGAs in 2011). In 2012, The Carter Center will support a LF Treatment Assessment Survey (TAS) in these two states, following recently published WHO guidelines.

In 2011, Carter Center-assisted praziquantel treatments for schistosomiasis numbered 1,317,935 in the four assisted states (Delta, Edo, Nasarawa and Plateau). These treatments are integrated wherever possible with LF or RB treatments, using simultaneous administration of ivermectin, albendazole and praziquantel in areas where all three diseases exist, and ivermectin-praziquantel in RB/schistosomiasis areas. The Izumi Foundation supports this program in Delta and Edo states. The majority of the praziquantel used in Nigeria is donated to The Carter Center through WHO by Merck KGaA (E-Merck), Germany.

***Ethiopia*:** The Lions-Carter Center partnership in Ethiopia assisted in treating 3,208,581 persons to prevent onchocerciasis in 2011, 93% of the UTG (Figure 1). The Carter Center-assisted Malaria Control Program continued integrated efforts with the River Blindness Program in 2011, with CDDs there trained to monitor bed net use and provide behavior change communication related to their use and care. During 2011, over 40,000 CDDs were trained.

Thanks to GSK support, combined Mectizan®/albendazole treatments were provided for the third year for LF elimination in onchocerciasis endemic areas of Gambella region. With this funding, the LF Ethiopia program assisted in 84,929 combined treatments in 2011, 97% of the UTG. LF treatments in 2012 will expand over seven fold as the LF program launches albendazole treatments in all LF/RB coendemic areas where The Carter Center currently assists.

Conclusion of the meeting: Discussions took place about the proposed new goal of local authorities and the RBP in targeting "RB Transmission interruption" in all RBP-assisted areas in the Americas, Sudan, Uganda, Ethiopia and Nigeria by FY20, then safely stopping ivermectin treatment in those areas.

Editor's note: The Board of Trustees of The Carter Center approved the new goal of the River Blindness Program at its July 2012 meeting.

2012 GENERAL RECOMMENDATIONS FOR THE CARTER CENTER'S RIVER BLINDNESS PROGRAM

Move to an interruption of transmission ('elimination') objective in all TCC/RBP assisted areas where the government agrees. This includes new assessments and enhanced interventions (twice or four times per year ivermectin treatment) where transmission persists. Advocate for official national elimination policies in Ethiopia and Nigeria. Seek funding to support enhanced interventions required to achieve elimination*.

Government leadership is essential in directing the process for coordinated RB and LF elimination activities, and for integrated NTD expansion.

Help delimit the precise borders of African onchocerciasis foci targeted for elimination in TCC/RBP assisted areas. Collaborate with governments in countries where we work to move to an elimination policy. Encourage WHO (APOC, PAHO) and the concerned ministries of health to evaluate and treat cross border foci where elimination of transmission is the goal.

All Carter Center-assisted River Blindness Programs (TCC/RBP) should continue to show annual coverage data since 1996, related to the 85% (OEPA) or 90% (Africa) UTG coverage for ivermectin distribution.

Submit drug applications to MDP as early as possible, and no later than August of the year before the drug is needed. Work with federal agencies to facilitate appropriate documentation and clearance for all medications. Because drug requests are made well before treatment activities are done, treatment denominators will require adjustment during the treatment year. Changes in denominators varying by 5% or more should be noted in the monthly report, along with an explanation stating why the adjustment was made and if additional drug was needed. National program authorities and MDP should be advised accordingly. Changes in numbers of treatments to be administered require discussion and approval by the MOH/NOTF, MDP and TCC HQ.

Close office in Cameroon at the end of this TCC/RBP fiscal year (August 2012).

In African programs, seek to increase training, supervision, involvement of kinship groups, and gender balance among CDDs and community supervisors. Work toward a target ratio of at least 1 CDD:100 people and 1 community supervisor:5 CDDs.

Expansion of TCC/RBP programs into other 'integrated' NTD efforts requires formal Carter Center Board of Trustees approval, adequate funding to participate, and possibly Emory Institutional Review Board (IRB) approval. If the government wants to support integration in areas where TCC/RBP assists, we will not refuse to participate since these are government-owned programs. However, without Board approval, funding, and IRB review, The Carter Center can only be involved in coimplementation of treatment activities within designated river blindness Mectizan® distribution areas where we are already working, and within the time period when such distributions are

scheduled. We cannot be engaged in monitoring and evaluation activities related to unapproved programs.

Seek more Lions participation to help maintain program visibility and support wherever possible.

Apply The Carter Center monitoring protocol annually in Carter Center-assisted African programs to assess treatment coverage, health education, community involvement, and ownership.

Carter Center program staff must complete or renew the Emory IRB certification if they are to be involved with research programs.

Overall Treatment Objective for Onchocerciasis for 2012: 13,800,691

Quarterly UTG(4):	**129,532 treatments**
Semiannual UTG(2):	**3,801,888 treatments**
Annual UTG:	**9,869,271 persons**

Training Objective for 2012:

CDDs:	**181,817 (48,433 new)**
Community supervisors:	**32,185 (6,895 new)**

Figure 1

2011 Mectizan® Mass Treatment Figures for Carter Center River Blindness Program (RBP)-Assisted Areas in Nigeria, Uganda, Cameroon, Ethiopia, and Collaborative Programs in Latin America (OEPA) and Sudan

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	% UTG	% ALL RBP TX
NIGERIA	***UTG=**	**5,601,790**		**UTG(arv)=**	**7,917**										
Treatments	0	0	0	0	0	378,836	1,199,894	1,323,852	965,579	1,207,059	292,542	180,927	**5,548,689**	99%	40%
Villages treated	0	0	0	0	0	411	1,442	2,314	1,086	1,837	634	181	**7,905**	100%	27%
UGANDA	***UTG=**	**875,408**		**UTG(arv)=**	**1,458**										
Treatments	0	0	0	0	0	0	0	16,559	319,687	81,836	424,817	0	**842,899**	96%	6%
Villages treated	0	0	0	0	0	0	0	35	488	90	935	0	**1,458**	100%	5%
UGANDA ELIMI	****UTG(2)=**	**1,774,680**		**UTG(arv)=**	**1,947**										
Treatments	0	0	0	0	0	395,469	453,797	0	0	0	0	847,103	**1,696,369**	96%	12%
Villages treated	0	0	0	0	0	990	957	0	0	0	0	1,947	**1,947**	100%	7%
CAMEROON	***UTG=**	**1,420,034**		**UTG(arv)=**	**2,704**										
Treatments	0	0	0	0	0	0	0	0	0	0	0	1,379,706	**1,379,706**	97%	10%
Villages treated	0	0	0	0	0	0	0	0	0	0	0	2,704	**2,704**	100%	9%
OEPA	****UTG(2)=**	**521,120**		**UTG(arv)=**	**1,027**										
Treatments	0	0	0	0	0	242,245	0	0	0	0	0	248,197	**490,442**	94%	4%
Villages treated	0	0	0	0	0	1,103	0	0	0	0	0	1,103	**1,103**	107%	4%
OEPA	****UTG(4)=**	**249,680**		**UTG(arv)=**	**441**										
Treatments	0	0	57,071	0	0	56,279	0	0	59,008	0	0	59,388	**231,746**	93%	2%
Villages treated	0	0	443	0	0	443	0	0	443	0	0	443	**443**	100%	1%
ETHIOPIA	***UTG=**	**3,448,462**		**UTG(arv)=**	**14,336**										
Treatments	0	0	0	0	0	0	1,536,977	1,279,313	391,193	0	1,098	0	**3,208,581**	93%	23%
Villages treated	0	0	0	0	0	0	7,530	5,917	339	0	535	0	**14,321**	100%	48%
SUDAN	****ATO=**	**19,723**		**UTG(arv)=**	**19**										
Treatments	0	0	0	0	0	21,566	0	0	0	0	0	0	**21,566**	109%	0%
Villages treated	0	0	0	0	0	19	0	0	0	0	0	0	**19**	100%	0%
SUDAN ELIMIN	****UTG(2)=**	**411,520**		**UTG(arv)=**	**300**										
Treatments	0	0	0	0	0	155,558	60,746	0	0	29,854	6	182,893	**429,057**	104%	3%
Villages treated	0	0	0	0	0	300	0	0	0	0	0	300	**300**	100%	1%
TOTALS	***UTG=**	**14,322,417**		**UTG(arv)=**	**30,149**										
Treatments	**0**	**0**	**57,071**	**0**	**0**	**1,249,953**	**3,251,414**	**2,619,724**	**1,735,467**	**1,318,749**	**718,463**	**2,898,214**	**13,849,055**	**97%**	
Villages treated	**0**	**0**	**443**	**0**	**0**	**3,266**	**9,929**	**8,266**	**2,356**	**1,927**	**2,104**	**6,678**	**29,757**	**99%**	

Cumulative RBP-assisted treatments (1996 - 2011) = 157,916,978

2011 Mass Treatments	13,849,055
2011 Passive Treatments	506,492
2011 TOTAL TREATMENTS	**14,355,547**

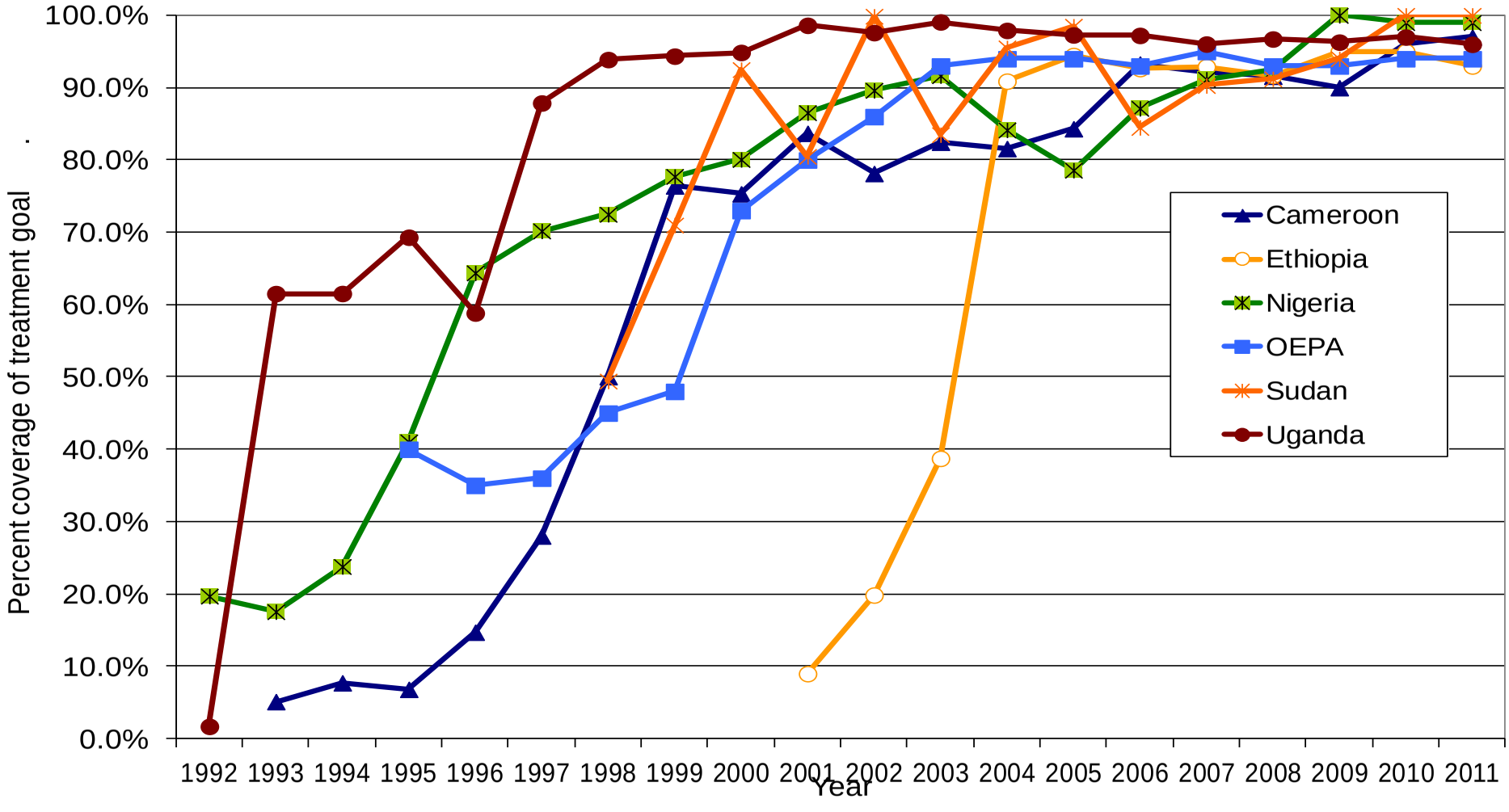
***UTG**: Ultimate Treatment Goal (all the treatment-eligible population in a program area, i.e. healthy persons >5 years of age)

OEPA's **UTG(2) and UTG(4) are the Ultimate Treatment Goal times 2 or 4, since OEPA treatments are semiannual or quarterly

*****ATO**: Annual Treatment Objective: used in this case because population is unknown

Figure 2

River Blindness Program: Annual coverage of eligible population by project: UTG or UTG(2), 1992 – 2011



* 1992 – 1995 treatments were provided by River Blindness Foundation

Figure 3

Carter Center-Assisted Programs: 1996 – 2011 Mectizan® Treatments by Program

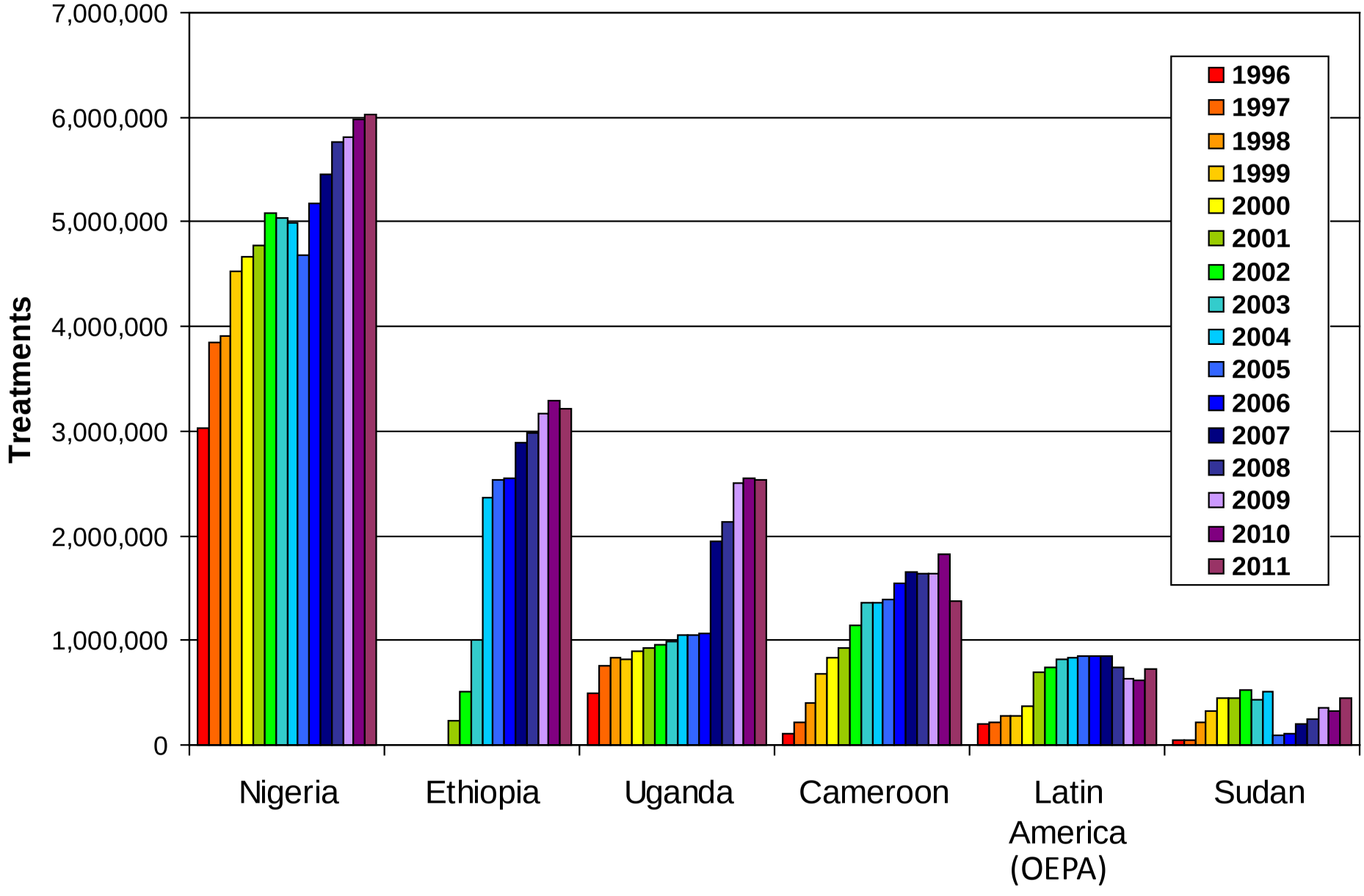
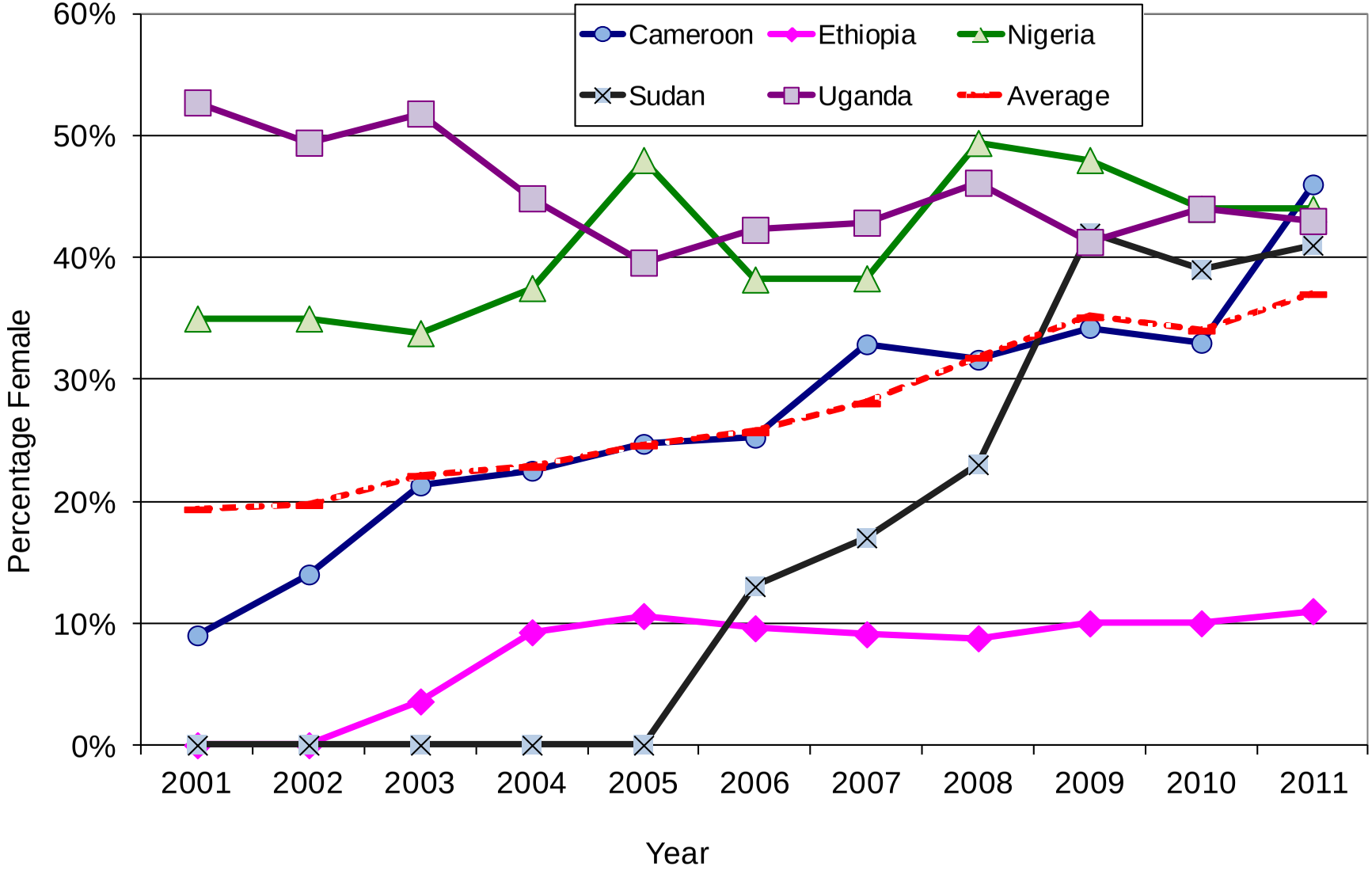


Figure 4

Increasing Percentage of Female Community Distributors in Carter Center-assisted River Blindness Programs in Africa: 2001 – 2011



ONCHOCERCIASIS ELIMINATION PROGRAM FOR THE AMERICAS (OEPA)

The Onchocerciasis Elimination Program for the Americas (OEPA) is a Carter Center-led program that serves as the vanguard of the regional initiative working to eliminate both morbidity and transmission of onchocerciasis from the Americas through distribution of Mectizan® every 6 months, and in some areas every 3 months, in all afflicted communities of the 13 endemic areas of the Americas region. Mass Drug Administration (MDA) aims at reaching ≥85% coverage of the population eligible for treatment. In addition to The Carter Center, the OEPA coalition includes ministries of health (MOHs) of the 6 countries with onchocerciasis in the Americas (Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela), the Lions Clubs International Foundation (LCIF) and local Lions Clubs, the Bill & Melinda Gates Foundation, Pan American Health Organization/World Health Organization (PAHO/WHO), Merck and the Mectizan® Donation Program (MDP), and the U.S. Centers for Disease Control and Prevention (CDC). A Program Coordinating Committee (PCC) serves as the steering committee for Carter Center OEPA staff, who are based in Guatemala City, Guatemala. Technical and financial assistance to the 6 countries flows through the OEPA office.

The initiative was launched by the River Blindness Foundation in 1993 in response to the 1991 Resolution XIV of the 35th PAHO Assembly that called for the elimination of onchocerciasis morbidity from the Americas by the year 2007. The Carter Center assumed administrative responsibilities for OEPA in 1996. In 2008, PAHO renewed the call to eliminate onchocerciasis (Resolution CD48.R12) throughout the region. A subsequent 2009 PAHO Resolution (CD49.R19), calling for the elimination or drastic reduction of 12 neglected infectious diseases of poverty in the Americas by 2015, includes onchocerciasis as an elimination target

In 2001, the WHO established a set of guidelines to assist onchocerciasis programs to determine whether interruption of transmission had occurred and MDA with ivermectin could be stopped. The process is shown diagrammatically in Figure 5 and involves three key points depicted by the three vertical arrows: 1) Suppression of transmission, when infective stage larvae are no longer introduced into the human population by the vectors (Annual Transmission Potential [ATP] is at or near zero), but the parasite population maintains the ability to recover if interventions are withdrawn; 2) Interruption of transmission, when the parasite population is thought to be unable to recover and ivermectin treatment can be halted; 3) Elimination of transmission and the parasite after a post-treatment surveillance (PTS) period confirms no return of transmission in the absence of treatment or other interventions. Once all country foci reach the elimination stage, final country certification can be considered by an independent international team meeting under the auspices of WHO.

By the end of 2011, transmission had been interrupted or eliminated in 10 of the original 13 foci in the Americas, and was ongoing only in the Yanomami Area (Figures 6 and 7) Brazil and Venezuela. Entomological studies in 2011 showed no active transmission in the Northeast focus of Venezuela. The transmission cycle is not considered broken

there yet, but 'suppressed', meaning that transmission would likely resume if ivermectin treatments were stopped.

Figure 7 shows the status of onchocerciasis in the 13 foci in the Americas at the beginning of 2012. Of the original 560,911 persons at risk in the region, 158,447 (28.2%) are no longer at risk of infection because they reside in areas where PTS has been successfully completed and onchocerciasis declared eliminated. Of the remaining 402,464 persons, 284,503 (70.7%) are under PTS (not being offered MDA) and 117,961 (29.3%) are under MDA programs. Those eligible for treatment in 2012 (107,357) represent a 67% drop in the treatment eligible population compared to 2011 (322,980). This is because assessments in 2011 indicated that MDA could be withdrawn from the Central (Guatemala) and South Chiapas (Mexico) foci, the largest and second largest MDA programs in the region, respectively.

2011 Treatment activities in the Americas

The total number of ivermectin treatments administered in the Region in 2011 was 722,188, a 16% decrease compared to the peak year of OEPA treatments in 2006 (862,154), when MDA was active in all 13 foci.

The total number of people eligible for treatment in the region in 2011 was 322,980. In those areas where ivermectin treatment is provided twice a year (every six months), the annual treatment goal was the Ultimate Treatment Goal (UTG) multiplied times 2 [designed by the notation UTG(2)]. Treatment with ivermectin at 3-month intervals has been recognized to enhance death of worms and decrease the proportion of inseminated females. In those areas where ivermectin treatment is being distributed 4 times a year (quarterly), the eligible population was multiplied by 4 [UTG(4)]. Annual treatment coverage was calculated by dividing the total number of treatments given in a year by either the UTG(2) or the UTG(4). In 2011, 490,442 treatments were given semiannually (which was 94% coverage of the regional UTG(2) of 521,120) and 231,746 quarterly treatments were given (94% of the regional UTG(4) of 249,680). Details of these treatments follow:

Brazil and Venezuela

The Yanomami Area is a transmission zone shared by Brazil's single endemic region (the Amazonas focus) and Venezuela's South focus (Figure 6). The Yanomami Area extends through remote and densely forested regions and is populated by the Yanomami people, a migratory indigenous group that routinely moves across the border at will. Overall, the Yanomami Area reached 97% of its UTG(2) in 2011 (12,705 treatments provided of a UTG(2) of 13,086, and 82% of its UTG(4) in 2011 (33,841 treatments provided of a UTG(4) of 41,486).

Brazil provided 8,078 treatments, 97% of its UTG(2) of 8,346, and surpassed the 85% treatment coverage goal for the eleventh consecutive year. Brazil's national program made a decision to deliver quarterly treatment in 10 communities (known as *polos*

base), 7 of which are hyper-endemic (defined as having >60% baseline prevalence of mf in skin) and 3 are meso-endemic (20-60% baseline prevalence of mf in skin), which together have an eligible population of 5,569 people. In 2011, 16,898 treatments were given of a UTG(4) of 20,294, resulting in 83% coverage.

The South focus (Venezuela's side of the Yanomami Area) delivered 4,627 treatments, 98% of its UTG(2) of 4,740. To advance elimination efforts, the Venezuelan program launched a quarterly treatment regimen in 2010 in 66 communities; this expanded to 135 communities in and around hyper-endemic areas in 2011. The eligible population in these communities is 5,298 people. In 2011, 16,943 treatments were given of a UTG(4) of 21,192, resulting in a coverage of 80%.

Venezuela has 2 other endemic foci (Northcentral and Northeast). The Ministry of Health suspended MDA in 2011 in the Northcentral focus based on epidemiological and entomological studies that showed transmission had been interrupted there. The Northeast focus distributed 127,815 semiannual treatments (96% of its UTG(2) of 132,748). Quarterly treatment in 35 hyper-endemic and 100 meso-endemic communities in this focus provided 78,053 treatments in 2011 (97% of a UTG(4) of 80,772).

Guatemala

Of Guatemala's original 4 endemic foci the Central focus was the only one under MDA in 2011, where 207,504 treatments were administered (92% of a UTG(2) of 224,776).

Mexico

Mexico had 3 endemic foci, with MDA only administered in 2011 in the Southern Chiapas focus where 142,418 semiannual treatments were provided (95% of the UTG(2) of 150,510) and 119,852 quarterly treatments in hyper, meso and hypo-endemic areas (96% of the UTG(4) of 125,440).

Post Treatment Surveillance (PTS)

PTS entomological evaluations were completed in 2010 in Colombia, and yielded no evidence of disease recrudescence. The Colombia program spent much of the year preparing, with OEPA and PAHO assistance, a detailed disease 'dossier' with a request for certification of elimination that was submitted to WHO at the Inter-American Conference on Onchocerciasis (IACO'11) (see below). Also during 2011, PTS evaluations in the Oaxaca focus of Mexico and the Huehuetenango focus of Guatemala showed no evidence of disease recrudescence. Ecuador will complete its third year of PTS in 2012, and in 2013, depending upon the outcome, may become the second country in the region to request WHO certification.

The Program Coordinating Committee: In 2011 the PCC, chaired by Dr. Ed Cupp, finalized the PCC PTS guidelines document and distributed it to country programs. The PCC also successfully completed a peer review process for the publication of the document [PCC/OEPA. Guide to detecting a potential recrudescence of onchocerciasis during the posttreatment surveillance period: the American paradigm. *Research and Reports in Tropical Medicine* 2012. 3(1): p. 21-33.] In this document the PCC has recommended that PTS focus on entomology (*O. volvulus* DNA detected by Polymerase Chain Reaction (PCR) in the black fly vector) as the most important first signal of recrudescence among the various possible epidemiological indicators (Figure 8). PCC/OEPA staff drafted the annual WHO/WER report for IACO 2010 that was published in 2011 (*Weekly Epidemiolgical Record*. 2011; 86: 417–424). The importance of having peer-reviewed publications for each focus as transmission is interrupted/eliminated was stressed to country programs by the PCC; publications should be done prior to the beginning of the WHO certification process.

The 21st annual Inter-American Conference on Onchocerciasis (IACO'11) "The Beginning of the End of River Blindness in the Americas": IACO'11 was held in Bogotá, Colombia, November 9 – 11, 2011, and was convened by the Ministry of Health of Colombia, The Carter Center, and PAHO, with support from the Bill & Melinda Gates Foundation, the Lions Clubs International Foundation, and Merck. It was attended by over 100 people, the largest number in IACO history, including 19 representatives of the Colombia Ministry of Health from national, departmental, and municipal levels. Dr. Juan Gonzalo López Casas (Director of the National Institute of Health) and Dr. Beatriz Londoño (Vice Minister of Health and Wellbeing) announced at the opening session that the Ministry of Health of Colombia had submitted its request for certification of onchocerciasis elimination to PAHO and WHO Geneva. Colombia is the first country in the Americas to reach this milestone.

In addition, it was announced at IACO'11 that Guatemala and Mexico had interrupted transmission of river blindness entirely within their borders in 2011 and will stop all ivermectin treatments in 2012 in the (historically) two largest onchocerciasis foci in the Americas (the Central focus in Guatemala and the South Chiapas focus in Mexico).

With only two countries (Brazil and Venezuela) still having onchocerciasis transmission of the original six countries in the Americas, the IACO'11 theme, "The Beginning of the End," was apt. IACO had a series of discussions focused on the major challenges in the Yanomami area and its extremely difficult jungle terrain, where hard-to-track nomadic populations harbor the worst remaining onchocerciasis in the Americas. Intensified MDA will be given there this year by increasing the population receiving quarterly treatments. However, the continuing discovery of new (and never before treated) endemic communities on the Venezuelan side of the Yanomami Area has added significantly to the challenge of promptly interrupting river blindness transmission throughout the region. New approaches and strategies, including remote sensing and enhanced cross border activities into Venezuela from the Brazilian side, are being considered at national and international levels to address this challenge.

2012 RECOMMENDATIONS FOR OEPA

The biggest priority is the Yanomami Area, which is the last active transmission zone for onchocerciasis in the Americas:

Detect any unidentified communities as soon as possible.

Implement immediate 4-times-per-year treatment, prioritizing hyperendemic areas. High treatment coverage (>85%) in each round should be considered essential.

Work closely with both countries to assure proper treatment in all areas. Encourage cross border collaboration and implementation teams operating out of Brazil, where infrastructure is greatest. Formation of a binational commission to oversee these teams is an important step to address this delicate political issue on the frontier. The commission should refer to a detailed implementation plan. Obtain high level and local level political support for the plan and operations.

Venezuela: Given weak infrastructure and civilian aerial transport in Venezuela, allow binational treatment teams to operate out of Brazilian airfields and use Venezuelan landing strips and helicopter landing sites in the Yanomami Area.

Brazil: implement elimination activities by the new entity SESAI (Health Secretary for Indigenous Populations) which has taken over these areas from FUNASA (National Health Foundation).

Secure funds for continuing support of OEPA activities (2012-2016).

Mexico and Guatemala: Halt treatment, provide health education, and launch PTS in Southern Chiapas focus, Mexico, and Central focus, Guatemala. Mexico and Guatemala now join Ecuador and Colombia as having stopped treatment nationwide.

Venezuela's Northeast focus: To hasten interruption of transmission, expand 4-times-per-year treatment with emphasis on hyper and meso-endemic communities. High treatment coverage (>85%) in each round is essential. Carry out in-depth epidemiological evaluation in the Northeast focus Venezuela after one year of 4x per year treatment towards the possibility of reaching the category of transmission interruption in that focus.

Assist Colombia, Ecuador, Mexico and Guatemala with pre-certification activities in foci that have completed PTS.

Publish the PTS document and papers for all foci where treatment has been halted in the peer reviewed scientific literature. The Colombia paper needs to be published as soon as possible.

Develop an approach in mathematical modeling that can be applied to PTS activities as described in the PCC PTS flow chart.

Maintain regional laboratory support in serology, entomology, and parasitology (including PCR testing in vectors and skin snips) led by University of Southern Florida (Dr. Thomas Unnasch).

Encourage heads of state to maintain or increase political and financial engagement in the effort, especially in Brazil and Venezuela.

Seek more local Lions Clubs involvement to help maintain program visibility and support wherever possible.

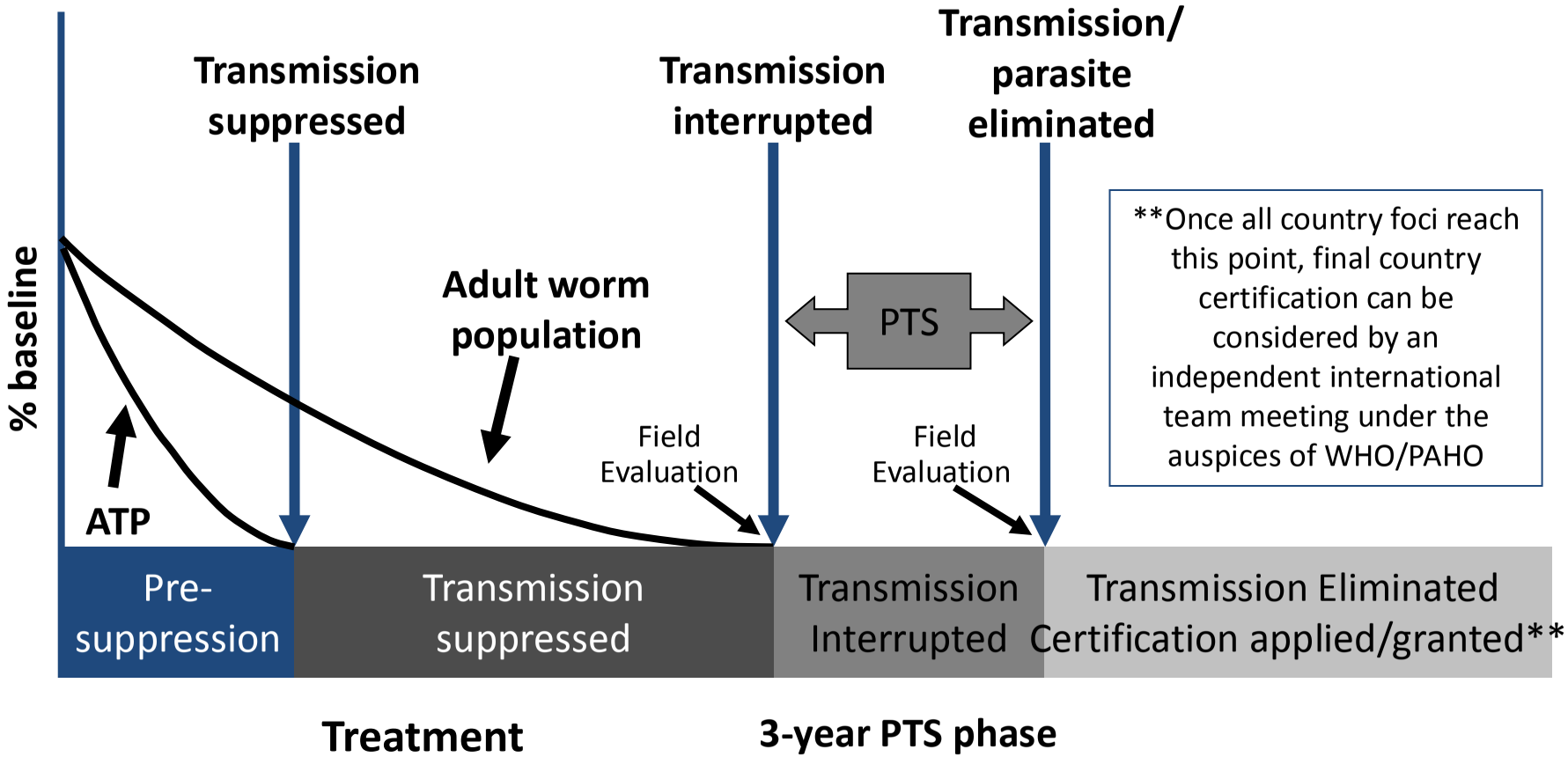
Carter Center program staff must complete or renew the Emory IRB certification.

Treatment Objectives for onchocerciasis for 2012:

UTG(2): 149,948 treatments
UTG(4): 129,532 treatments

Figure 5

Phases of the Elimination of Onchocerciasis (Based on WHO Certification Guidelines 2001*)



*WHO Report, (2001). *Certification of elimination of human onchocerciasis: Criteria and procedures*. Following a WHO meeting on "Criteria for Certification of interruption of transmission/elimination of human onchocerciasis" (document WHO/CDS/CPE/CEE/2001.18a). Geneva, World Health Organization.

Figure 6

Geographic Distribution and Transmission Status of Onchocerciasis in the Americas Region as of December 2011

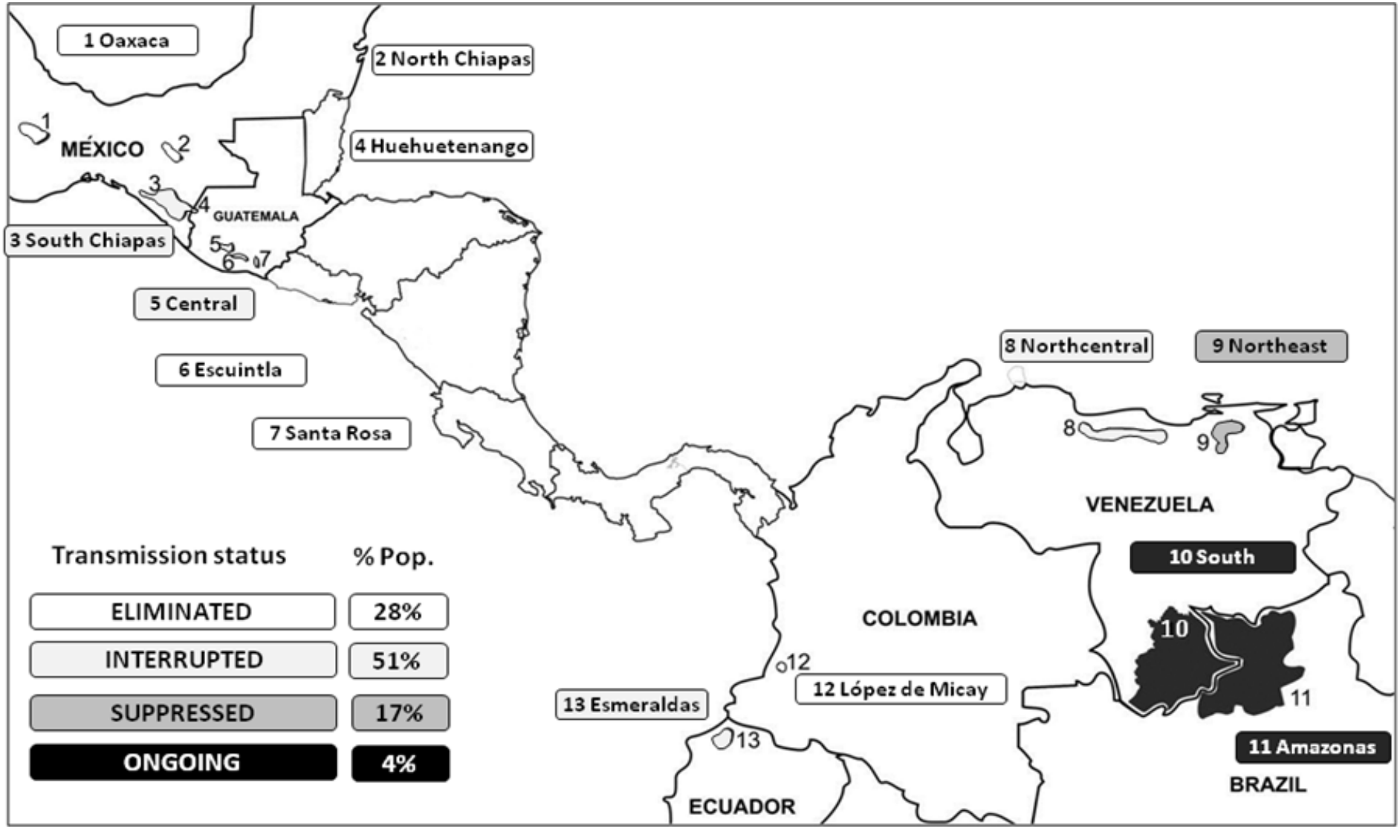


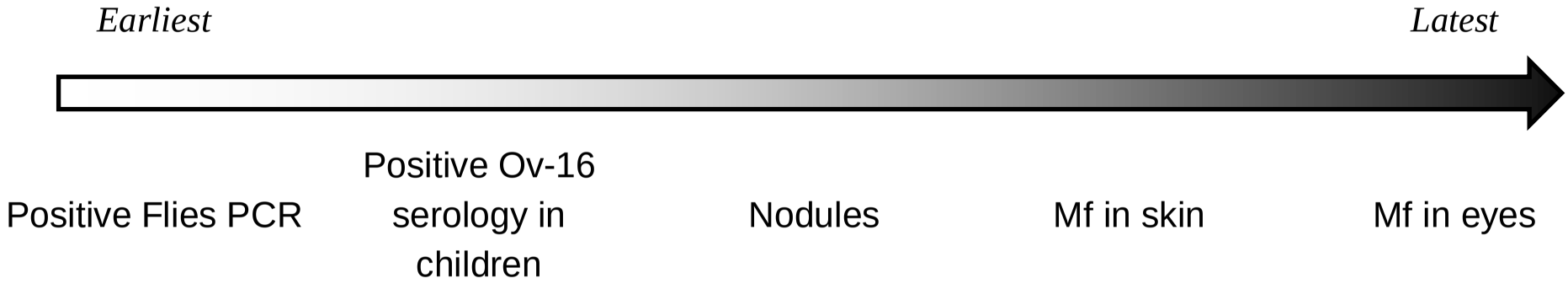
Figure 7

Population at Risk of Onchocerciasis, No Longer at Risk, Under PTS, Eligible for Treatment, and Transmission Status in 2012, by Focus

Focus (country)	*Population at risk (%)*	*Population no longer at risk (%)*	*Population under PTS*	*Population eligible for treatment*
Escuintla–Guatemala (Guatemala)	NA	62,590 (11)	NA	NA
Santa Rosa (Guatemala)	NA	12,208 (2)	NA	NA
Northern Chiapas (Mexico)	NA	7,125 (1)	NA	NA
López de Micay (Colombia)	NA	1,366 (0.2)	NA	NA
Huehuetenango (Guatemala)	NA	30,239 (5)	NA	NA
Oaxaca (Mexico)	NA	44,919 (8)	NA	NA
Esmeraldas–Pichincha (Ecuador)	25,863 (5)	NA	25,863	NA
Northcentral (Venezuela)	14,385 (3)	NA	14,385	NA
Southern Chiapas (Mexico)	117,825 (21)	NA	117,825	NA
Central(Guatemala)	126,430 (23)	NA	126,430	NA
Northeast (Venezuela)	94,583 (17)	NA	NA	88,224
Amazonas (Brazil)	12,988 (2)	NA	NA	10,542
South (Venezuela)	10,390 (2)	NA	NA	8,591
Total	**402.464**	**158,447**	**284,503**	**107,357**

Figure 8

Evolution of Onchocerciasis Recrudescence



(Based on 18 months required from inoculation of L_3s to production and release in the skin of microfilariae [mf] by gravid *O. volvulus* worms)

UGANDA

Background: Onchocerciasis affects 32 of the 111 districts in Uganda. The first Uganda focus to successfully eliminate the disease was Victoria, which claimed victory in the 1970s following a vector control campaign based on DDT spraying of rivers that liberated 3 million people from the threat of the disease. Onchocerciasis control using annual mass treatment with Mectizan® began in 1991. The original ministry of health ivermectin program enjoyed financial support from The River Blindness Foundation (RBF), Christoffel Blindenmission (CBM), and Sightsavers . In 1996, The Carter Center (TCC) assumed the activities of RBF. In 1997, the African Program for Onchocerciasis Control (APOC) began supporting some Ugandan efforts and introduced the community-directed approach to Mectizan® distribution. APOC also supported successful vector elimination efforts in 2 foci (Itwara and Mpamba-Nkusi) that used ground-based focal larvicide application together with annual Mectizan® distribution. In 2006, The Carter Center helped launch semi-annual treatments (every 6 months) to eliminate onchocerciasis from the Wadelai focus in Nebbi District, with support from Merck (administered by the NGDO Coalition for Mectizan® Distribution). Wadelai's success was confirmed in 2010, but annual treatment has to continue as the area is also endemic for lymphatic filariasis (LF). The Uganda Ministry of Health (MOH) was emboldened by these APOC and Lions-Carter Center-assisted elimination successes. Accordingly, in 2007 the government of Uganda announced a nationwide elimination policy that was to be based on twice-per-year treatment and (where feasible) vector elimination/control (using ground-based larviciding). The new flexible elimination policy was immediately applauded and supported technically and financially by the Lions-Carter Center partnership and Sightsavers.

A host of partners now assist Uganda in onchocerciasis control and elimination activities (Frontispiece Figure E). The Carter Center River Blindness Program (RBP) assists in 26 (81%) of those endemic districts: Kabale, Kanungu, Kasese, Kisoro, Rubirizi, Buhweju, Kamwenge and Ibanda (in southwest Uganda); Adjumani, Moyo, Nebbi, and Zombo (in the West Nile region bordering the Democratic Republic of the Congo or DRC); Amuru, Gulu, Nwoya and Oyam Districts (in the Middle North areas); and Bududa, Manafua, Mbale, and Sironko (in the Mount Elgon focus in the east, bordering Kenya). The Carter Center supports technical services and vector elimination activities and some community-directed treatment with ivermectin (CDTI) activities in Bulisa, Kibaale, Hoima, and Masindi, in partnership with Sightsavers, which operationally supports these districts. All districts continue to receive some level of support from APOC.

Lions have supported the Uganda effort through the Lions Club International Foundation (LCIF) SightFirst program. The first phase of LCIF funding to Uganda ended in 2005. In 2009, with support from Noor Dubai, LCIF provided additional funding to the program. In 2011, LCIF awarded a new two-year grant. Ugandan Lions Clubs are very active participants in and advocates for the Carter Center-assisted river blindness

control and elimination activities, including engaging and mobilizing members of parliament and other government officials. The Carter Center's Country Representative in Uganda, Ms. Peace Habomugisha, is a Lions Club member.

Although the ultimate goal is to eliminate onchocerciasis from all of Uganda, the government has prioritized 7 endemic areas in Uganda for enhanced elimination activities (Frontispiece Figure F): 1. Budongo focus in Bulisa, Hoima and Masindi districts; 2. Bwindi focus in Kabale, Kanungu and Kisoro districts; 3. Kashoya-Kitomi focus in Buhweju, Ibanda, Kamwenge, and Rubirizi districts; 4. Mt. Elgon focus in Bududa, Mbale, Manafua, and Sironko districts; 5. Mpamba-Nkusi in Kibaale District; 6. Wadelai focus in Nebbi district; and 7. Wambabya-Rwamarongo focus in Hoima District),

Uganda laboratory activity: In support of the elimination effort, The Carter Center has funded equipment, reagents, and training for the MOH laboratory that provides state-of-the-art diagnostic support to the elimination program. The laboratory is located at the MOH Vector Control Division in Kampala and provides polymerase chain reaction (PCR) testing for black flies and skin snips, and serologic enzyme-linked immunosorbent assay (ELISA) testing for OV16 antibodies. Technical backup and reference lab support is provided by Dr. Tom Unnasch's laboratory at the University of South Florida in Tampa, FL. By end of 2011, the laboratory had analyzed more than 25,775 samples of blood spots for OV 16 antibodies and 11,214 flies with PCR.

Expert advisory committee for national onchocerciasis elimination: To ensure that the elimination decisions are supported with the best scientific and technical advice, the Uganda MOH established the Ugandan Onchocerciasis Elimination Expert Advisory Committee (UOEEAC). The UOEEAC meetings are supported financially by The Carter Center. UOEEAC responsibilities are to review programmatic activity reports from each elimination-targeted focus in Uganda annually, advise the MOH on focus-specific monitoring, review the results from monitoring and evaluation activities, and make recommendations to the MOH on activities needed to reach the national elimination goal. In addition to MOH representatives, the UOEEAC includes several members-at-large who are recognized for their international expertise in onchocerciasis: Dr. Unnasch (University of South Florida), Professor Rolf Garms (Bernard Nocht Institute), Dr. Frank Walsh (former director of entomology of the WHO Onchocerciasis Control Program), and institutional representatives from the Carter Center, Sightsavers, and APOC. The World Health Organization (WHO) Uganda representative attends these meetings as an observer only, to avoid any conflict of interest since WHO will likely coordinate future certification of the elimination activities. NTD representatives, the Uganda LF coordinator, local Lions, Mectizan Donation Program representatives, and other donors and technical bodies also attend as observers.

The UOEEAC held its fourth session August 15 – 17, 2011. The meeting was opened by Dr. Dennis Lwamafa, commissioner of National Disease Control,) on behalf of the Director General of Health Services. The meeting was chaired by Dr. Unnasch. The UOEEAC reviewed the status of onchocerciasis elimination under national criteria

approved by the Uganda Ministry of Health (MOH). Based on these guidelines, onchocerciasis transmission interruption was declared in Wadelai, Itwara, and Mt. Elgon foci. The UOEEAC recommended that Itwara and Mt. Elgon move to the post-treatment surveillance (PTS) phase. The Carter Center directly assists treatments in Mt. Elgon, but not in Itwara. Annual treatments with ivermectin and albendazole will continue in Wadelai focus as part of (Nebbi) district-wide LF mass drug administration (MDA). The MOH approved the recommendation and (through a press release--Frontispiece Figure G) declared interruption of transmission in the three foci, and cessation of interventions and moving of the two foci into the three-year post-treatment surveillance (PTS) phase. For Imaramagambo focus (Bushenyi, Mitooma and Rubirizi districts), Nyamusagai (Kasese District) and Maracha-Terego focus (Arua, and Maracha districts), UOEEAC requested additional epidemiological information be collected in time for its 2012 meeting. The UOEEAC noted that interruption of transmission in these foci may have already occurred.

Treatments: The Carter Center assisted 86% of the national treatments delivered by the MOH in 2011 (see Figure 9). The Ultimate Treatment Goal (UTG) for Carter Center-assisted areas in 2011 was 875,408, using a control strategy with annual ivermectin treatment (Figure 10). The 2011 coverage of the UTG was 96% (842,899 treatments provided). In the areas targeted for elimination where the strategy was semiannual treatment, the 2011 UTG(2) was 1,774,680 (Figure 11). The 2011 coverage of UTG(2) was 95.6% (1,696,369 treatments provided). In total, the Uganda RBP assisted in a total of 2,539,268 treatments in 2011 (which includes 25,971 passive and visitor treatments). This was a 17% increase from 2010 treatments. Uganda reached 96% of its ultimate treatment goals and provided CDTI in all 3,405 villages targeted (100% geographic coverage). This was the 14th straight year of more than 90% coverage of the UTG in Carter Center-assisted areas. Despite removal of treatments from Mt. Elgon, the expansion of RBP into recently pacified onchocerciasis endemic areas of northern Uganda will result in a 59% increase in treatments in 2012 to an estimated 4,034,412 treatments.

Training and Health Education: Uganda trained or retrained 56,803 Community-Directed Distributors (CDDs) and 10,618 Community-Directed Health Supervisors (CDHSs) in 2011. Of these, 43% of the CDDs and 25% of the CDHSs were female. The current ratio of CDDs to population served is the best of any Carter Center-assisted program, at 1 CDD to 51 persons served, and the supervisor to CDD ratio was 1:5.

Financial Contribution: Figure 12 shows APOC, Carter Center/LCIF, and government (district and national) financial contributions to onchocerciasis control/elimination in areas assisted by the RBP. Starting in 2007, The Carter Center dramatically increased its funding with the launching of the new national elimination policy; APOC increased its funding in 2011. While political support for onchocerciasis control activities within the primary healthcare system is strong, cash from the national government has been neither regular nor sufficient to sustain the elimination effort without outside support.

Sustainability and Integration: The RBP-assisted CDTI program actively co-implements with the national lymphatic filariasis elimination effort in Adjumani and Moyo districts, reaching 246,014 persons with combination ivermectin and albendazole treatments in 2011 for UTG coverage of 96.2%. Also, in other onchocerciasis endemic districts (Kabale, Mbale, and Manafua), RBP co-implements with intestinal helminth control (through semiannual albendazole distribution to school aged children). Albendazole treatments totaled 108,215, reaching 95% and 96% of the target in the respective rounds.

2012 RECOMMENDATIONS FOR CARTER CENTER UGANDA

Elimination Efforts

Onchocerciasis interventions will be halted in 2012 in Mt. Elgon, Itwara, and Wadelai foci, and the National Onchocerciasis elimination guidelines will be accepted by the Ugandan Government. Mt. Elgon and Itwara will begin post-treatment surveillance (PTS) of three years to monitor for recrudescence of transmission. Wadelai is an LF focus, so treatments there will continue without TCC/RBP assistance, and PTS for onchocerciasis cannot be launched.

Publish elimination experiences of Wadelai and Mt. Elgon foci.

Complete the field assessments requested by UOEEAC before the next meeting:

> Imaramagambo: The committee felt that the focus was near to the point where transmission interruption might be declared. However, the committee recommended that surveys be undertaken in the upcoming year to confirm that the phoretic hosts of the vector have indeed disappeared from the focus. The committee also recommended that entomological surveys be carried out to confirm the absence of *Simulium damnosum* at this focus. While these studies are completed, community-wide treatment should continue.
>
> Nyamugasani: Continue community-wide treatment activities. Conduct OV16 serological and skin surveys in buffer communities separating this and Lubilila focus to confirm that these two are independent foci.
>
> Terego: Complete OV16 serological assays and continue entomological evaluations before making a recommendation on transmission interruption.

At the 2010 UOEEAC meeting, it was determined that the annual capacity of the Vector Control Division (of the MOH) laboratory was 17,500 blood spots per year and 5,000 PCR tests. The Carter Center, through Dr. Unnasch and the University of South Florida lab, will supply the required reagents and materials to process this number of specimens. If such lab supplies are insufficient, three months' advance notice is required to review justification for additional materials. The lab will continue to submit a monthly report showing what was accomplished in terms of numbers of specimens tested, the results obtained, and reagents used. The report should also outline any challenges.

Control Efforts

In areas where mapping and delimiting of onchocerciasis endemic areas is still taking place, annual distribution of ivermectin should continue.

Other Recommendations

Encourage the national secretariat for onchocerciasis elimination to submit accurate Mectizan® applications as early as possible, and no later than August of the year before the drug is needed. Work with federal agencies to facilitate appropriate documentation and clearance for all medications. Because drug requests are made well before treatment activities are done, treatment denominators will require adjustment during the treatment year. Changes in denominators varying by 5% or more should be noted in the monthly report, along with an explanation stating why the adjustment was made and if additional drug was needed. National program authorities and Mectizan Donation Program (MDP) should be advised accordingly. Changes in numbers of treatments to be administered (numerators), and frequency of administration (once versus twice per year) require discussion with Carter Center headquarters and approval by the MOH/National Onchocerciasis Task Force (NOTF) and MDP.

Expansion of TCC/RBP programs into other integrated NTD efforts requires formal Carter Center Board of Trustees approval, adequate funding to participate, and possibly Emory Institutional Review Board (IRB) approval. If the government wants to support integration in areas where TCC/RBP assists, we will not refuse to participate since these are government-owned programs. However, without Board approval, funding, and IRB review, The Carter Center can only be involved in coimplementation of treatment activities within designated river blindness Mectizan® distribution areas where we are already working, and within the time period when such distributions are scheduled. We cannot be engaged in monitoring and evaluation activities related to unapproved programs.

Maintain Lions involvement to help maintain program visibility and support.

Monitor government and APOC financial contributions for control and elimination efforts.

Conduct Carter Center monitoring protocol annually in a sample of districts to assess coverage, health education, community involvement, and ownership.

Seek to increase training, supervision, involvement of kinship groups, and gender balance among CDDs and community supervisors as appropriate (especially in districts previously not under the Carter Center's assistance), and ensure that training is done in a cost-efficient fashion. The ratio of community supervisors to CDDs should be 1:5 or better.

Uganda program staff must complete or renew the Emory Institutional Review Board certification if they are to be involved with research programs.

Treatment Objective for onchocerciasis for 2012: 4,034,412

Semiannual UTG(2):	**3,447,078**
Annual UTG:	**562,603**

Training Objective for 2012:

CDDs:	**37,305 (16,928 new)**
Community supervisors:	**8,737 (3,864 new)**

Figure 10

Uganda: 2011 Treatment Coverage in Annual Treatment Areas

Name of District	Total Popn	Popn treated cumulative for 2011	Ultimate Tx Goal (UTG) for 2011	Total Popn TX % for 2011	% Tx cov. of UTG 2011	Active villages cumulative for 2011	Active villages UTG for 2011	Active villages % for UTG for 2011
Adjumani	145,945	120,047	122,165	82.3	98.3	142	142	100
Amuru	46,935	37273	39820	79.4	93.6	25	25	100
Nwoya	90,051	66,103	67,536	73.4	97.9	53	53	100
Gulu	123736	95,332	100,360	77.0	95.0	90	90	100
Kasese	126,785	106,424	108,095	83.9	98.5	131	131	100
Moyo	165,550	125,967	133,810	76.1	94.1	189	189	100
Nebbi	112,011	87,296	93,024	77.9	93.8	168	168	100
Zombo	233,428	187,898	192,992	80.5	97.4	625	625	100
Oyam	21,057	16,559	17,606	78.6	94.1	35	35	100
Total	**1,065,498**	**842,899**	**875,408**	**79.1**	**96.3**	**1458**	**1458**	**100**

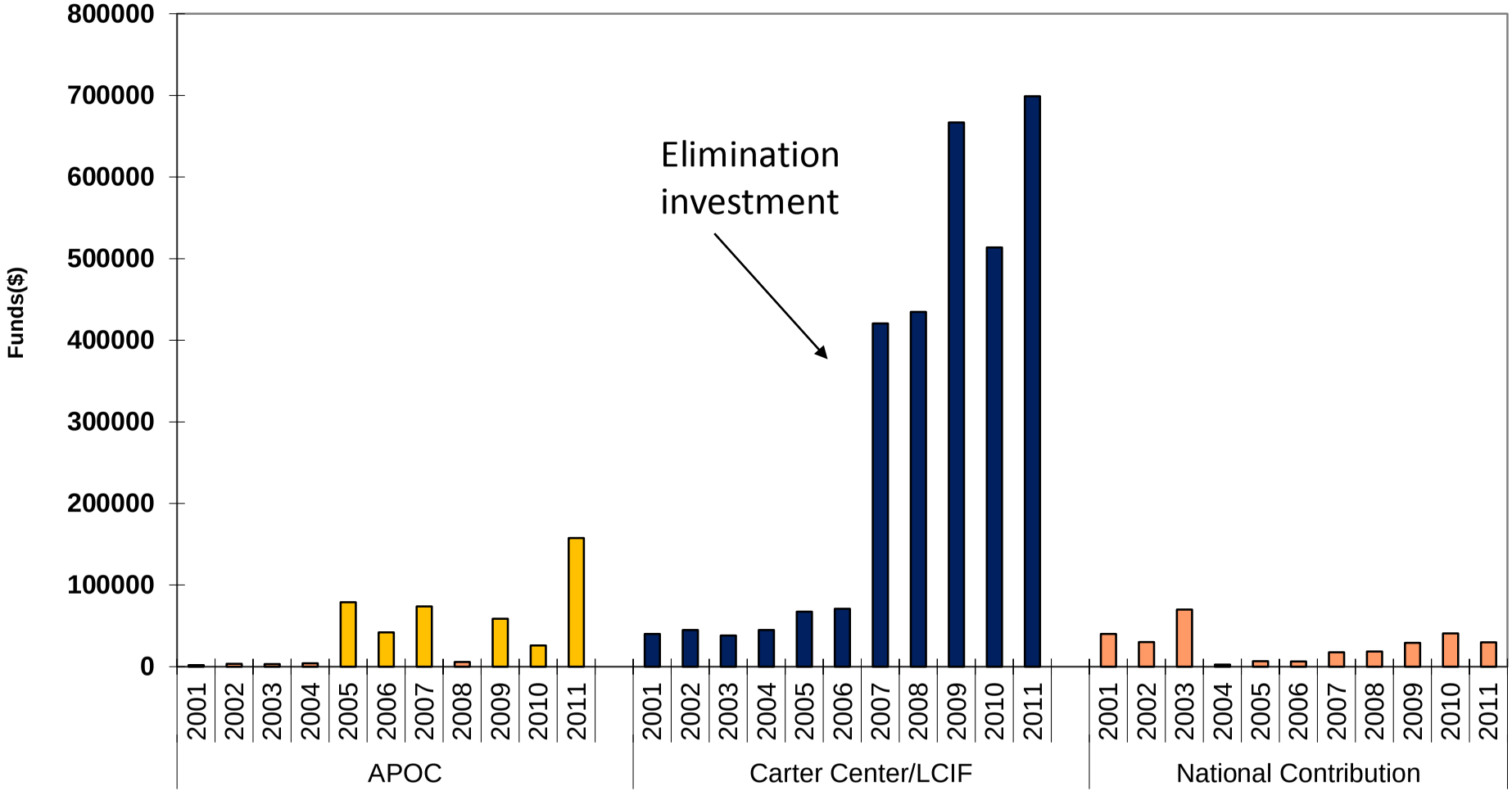
Figure 11

Uganda: 2011 Treatment Coverage in Semiannual Treatment Areas

Name of Focus	Name of District	Total Popn	No. treated 1st rd	No. treated 2nd rd	No. treated in both rounds	UTG 1 2011	UTG 2 2011	% UTG 1 1st round	% UTG 1 2nd round	% UTG 2 covered	Active villages UTG for 2011	Active villages % for UTG for 2011	
												1st Rd	2nd Rd
	Bududa	161,630	133,361	133,644	267,005	139,656	279,312	95.5	95.7	95.6	412	100	100
	Manafwa	40,604	32,458	32,389	64,847	33,698	67,396	96.3	96.1	96.2	98	100	100
	Mbale	50,253	40,687	40,770	81,457	40,781	81,562	99.8	100.0	99.9	131	100	100
Elgon	Sironko	76,375	63,673	64,347	128,020	64,396	128,694	98.9	99.9	99.5	179	100	100
	Buhweju	59,412	46,109	46,387	92,496	48,739	97,478	94.6	95.2	94.9	96	100	100
	Rubirizi	73,316	58,595	59,120	117,715	60,668	121,336	96.6	97.4	97.0	170	100	100
	Ibanda	25,645	20,271	20,332	40,603	21,260	42,520	95.3	95.6	95.5	60	100	100
Kashoya-Kitomi	Kamwenge	42,457	34,042	34,715	68,757	35,015	70,030	97.2	99.1	98.2	53	100	100
	Kabale	28,960	21,490	21,999	43,489	23,608	47,216	91.0	93.2	92.1	38	100	100
	Kanungu	56,321	42,418	43,023	85,441	45,790	91,580	92.6	94.0	93.3	105	100	100
Bwindi	Kisoro	36,371	27,070	27,194	54,264	29,905	59,810	90.5	90.9	90.7	45	100	100
Total		**651,344**	**520,174**	**523,920**	**1,044,094**	**543,516**	**1,086,934**	**95.7**	**96.4**	**96.1**	**1,387**	**100**	**100**
Wambabya-Rwamarongo	Hoima	74,600	59,962	56,467	116,429	63,050	126,100	95.1	89.6	92.3	70	100	100
	Hoima	75,626	60,014	56,386	116,400	63,472	126,944	94.6	88.8	91.7	70	100	100
	Buliisa	26,019	20,531	20,934	41,465	22,351	44,702	91.9	93.7	92.8	30	100	100
Budongo	Masindi	46,330	35,726	36,178	71,904	38,530	77,060	92.7	93.9	93.3	60	100	100
Mpamba-Nkusi	Kibaale	190,305	152,859	153,218	306,077	156,470	312,940	97.7	97.9	97.8	330	100	100
Total		**412,880**	**329,092**	**323,183**	**652,275**	**343,873**	**687,746**	**95.7**	**94.0**	94.8	**560**	**100**	**100**
Grand Total		**1,064,224**	**849,266**	**847,103**	**1,696,369**	**887,389**	**1,774,680**	**95.7**	**95.7**	**95.6**	**1,947**	**100**	**100**

Figure 12

Uganda: Financial Contributions in US Dollars (2001-2011)



NOTE: The above contribution does not include staff salaries and benefits for all the partners.

The APOC and government contributions are reported by our Carter Center country representatives based on their best possible determinations from information available in country through the National Onchocerciasis Task Force and other local sources. Capital equipment replacement provided by APOC and government salaries are not considered.

Figure 12

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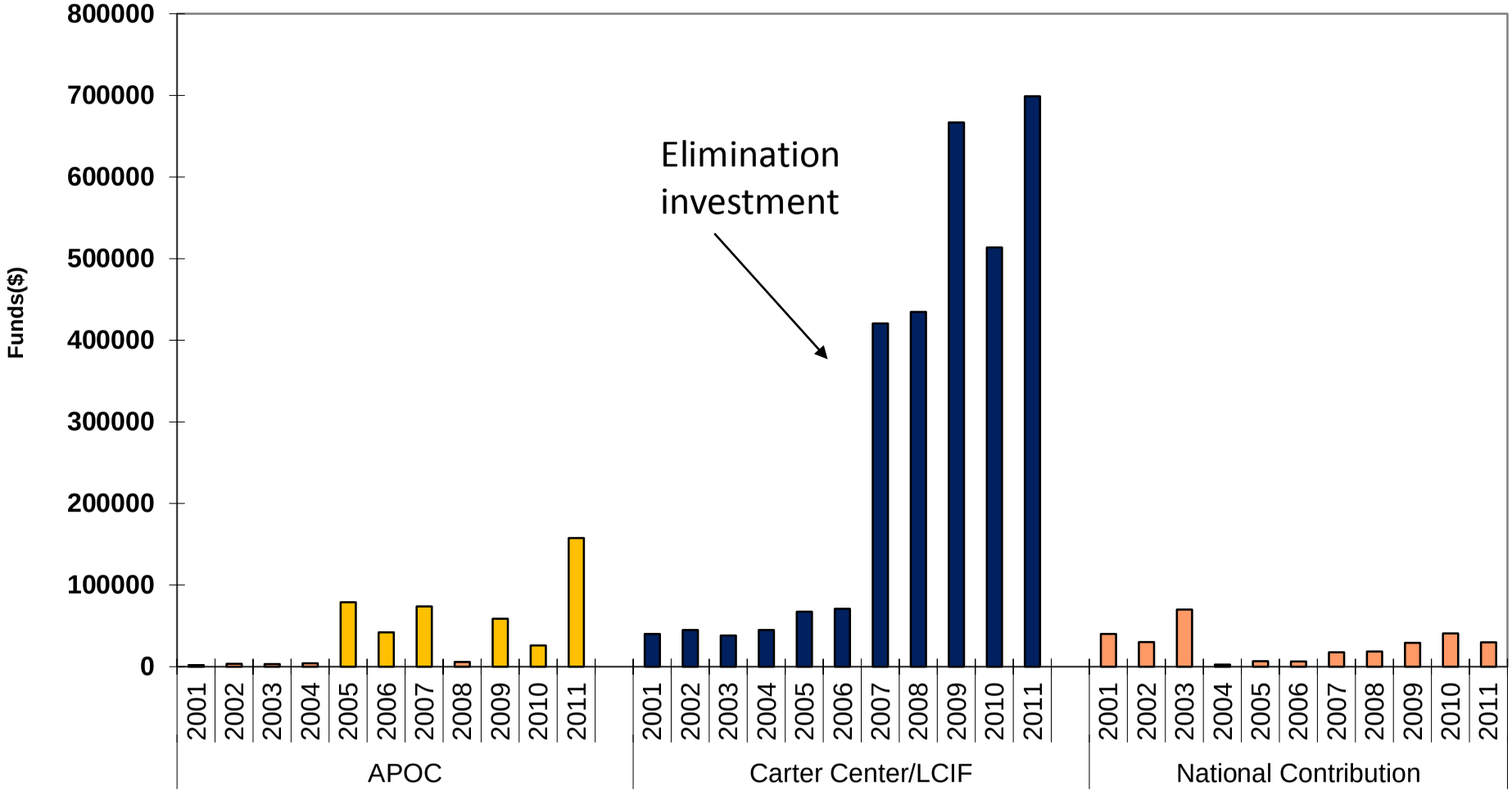

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SUDAN

Background: The River Blindness Program (RBP) in Sudan supports river blindness activities with Lions Clubs International Foundation support in three foci: Abu Hamad (River Nile state), Radom (South Darfur state), and Galabat (Gedarif state) (Figure 13).

In December 2006, the Government of Sudan (GOS) changed its onchocerciasis goals from control to elimination, concentrating initially on the isolated desert focus of Abu Hamad in River Nile state. RBP, with Lions SightFirst support, has principally worked on the elimination effort in Abu Hamad. The strategy there is based on increasing Mectizan® distribution from annually to every six months ('semi-annual treatment') and expansion of treatment into hypoendemic areas (Figure 14). A large impact assessment was conducted in 2011 in Abu Hamad that involved parasitological (Figure 15), entomological (Figure 16), and serological (Figure 17) surveys. The results strongly supported the conclusion that transmission had been interrupted. At the Review, the Sudan ministry of health representatives announced that, based on these results, it had determined that transmission of onchocerciasis had been interrupted in the Abu Hamad focus. The ministry planned to stop treatment in this focus in 2012.

RBP and Lions have also worked to launch the elimination strategy with semi-annual treatment in Galabat in Gedarif state during 2011. RBP also supports annual Mectizan® distribution to control onchocerciasis in Radom (Figure 18).

Treatments: A total of 450,623 treatments were delivered in the Sudan program in 2011. In Abu Hamad and Galabat, where twice-per-year treatment is provided (including to displaced persons), a total of 429,057 treatments were provided of a UTG(2) of 411,520 (104% percent). Details of twice per year treatment areas are provided in Figure 18.

Annual doses of Mectizan® were delivered in Radom resulting in 21,566 treatments (Figure 19). Due to civil conflict, a proper census of the affected population is unknown, so a UTG (defined as all treatment eligible persons within the area) cannot be determined. Accordingly, an annual treatment objective (ATO) based on the Mectizan drug order request is used as the denominator. In 2011, 110% of the ATO was covered in 95% of targeted villages.

Training and Health Education: The program trained 340 new community-directed distributors (CDDs) and retrained 3,270 CDDs in 2011 in Abu Hamad, Galabat and Radom. The number of CDDs per person averaged 1:73 in 2011, similar to that of 2010 (1:80). About 41 percent of the CDDs were female, a slight improvement from 2010 (Figure 20). Health education covered all 319 communities in the Abu Hamad, Galabat, and Radom foci.

Mectizan®: During 2011, 1,176,200 tablets were distributed in the Abu Hamad, Galabat, and Radom foci with an average of 2.6 tablets per person. No severe adverse effects were reported. The program began 2011 with a balance of 2,389,200 tablets.

Sustainability and Integration: In late 2007, the program began focusing on involving kinship/family groups in all the foci in mobilization and health education, selection and training of CDDs, and distribution of Mectizan®. This policy has improved training figures and has (reportedly) also reduced demand for monetary incentives.

2012 RECOMMENDATIONS FOR THE CARTER CENTER SUDAN

Abu Hamad

Publicize through a Program Review meeting in Khartoum and publications the success in the Abu Hamad focus together with our MOH partners and LCIF.

Stop ivermectin treatments in Abu Hamad, provide extensive health education as to why treatments will stop, and launch post treatment surveillance (PTS).

Figure 13

Sudan Program Areas

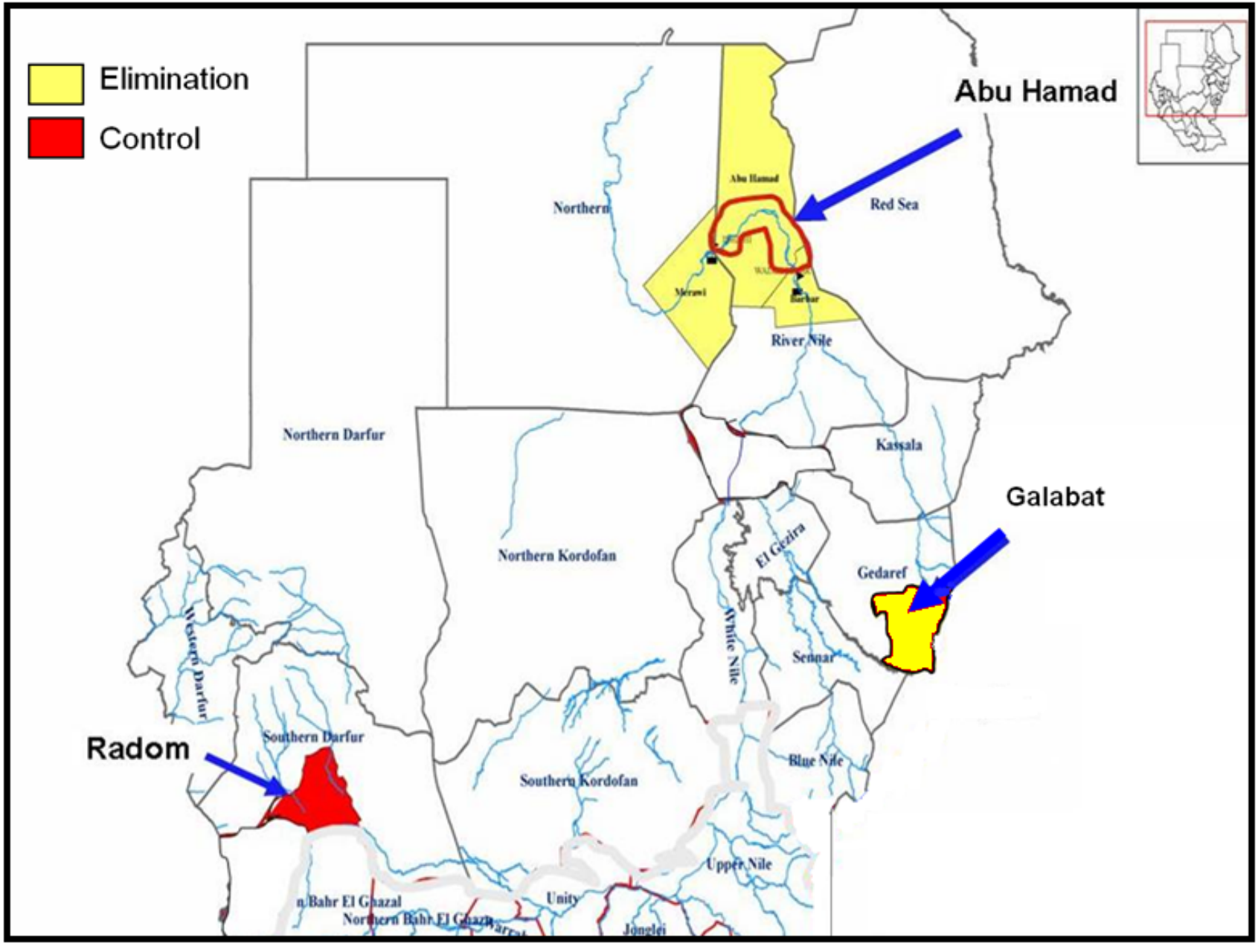
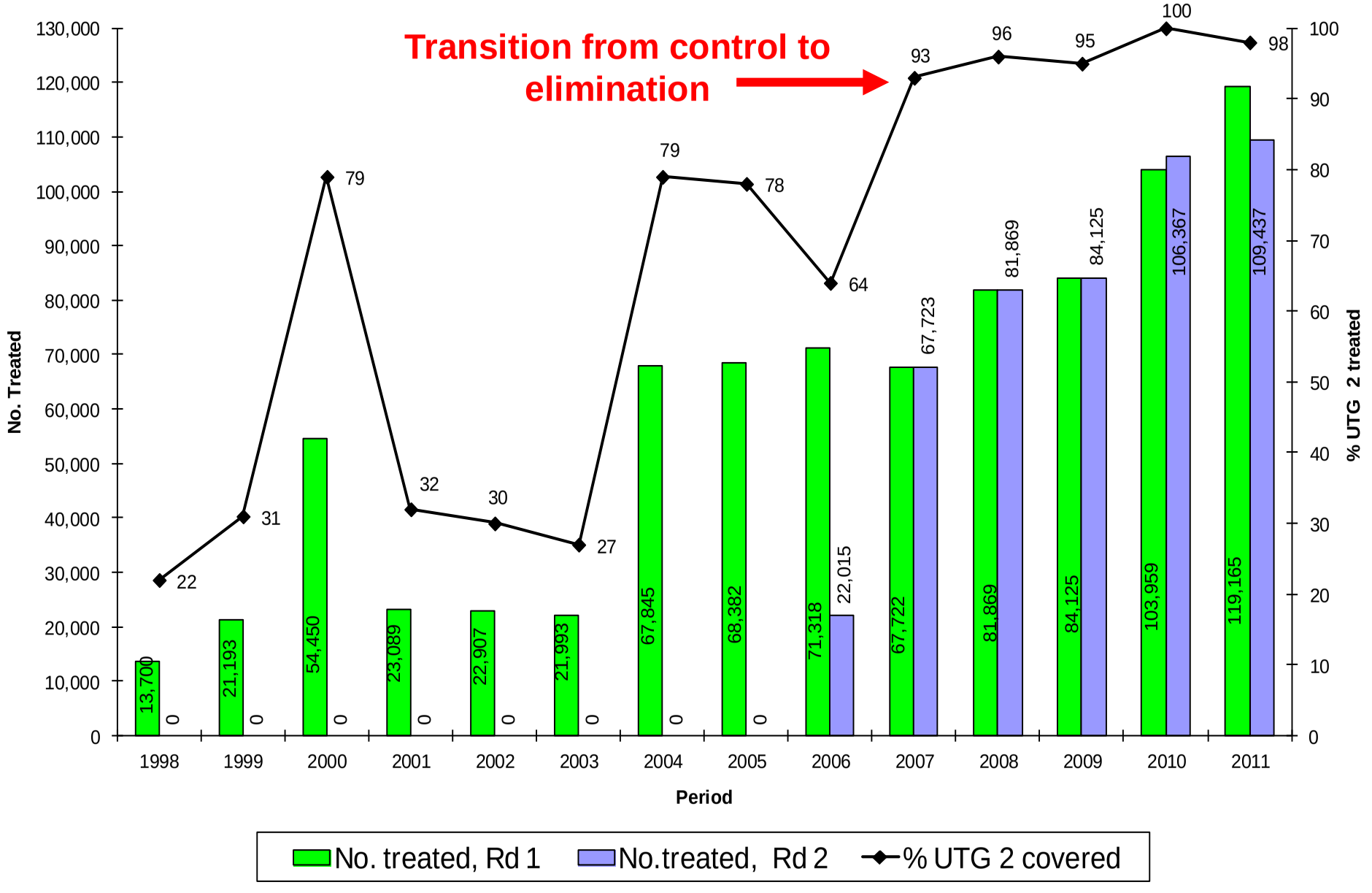


Figure 14

Increasing Treatments in Abu Hamad Focus (1998-2011)*



*** All treatments from 1998 to 2002 were assisted by APOC/Carter Center and from 2003 to date by Carter Center/Lions**

Figure 15

Abu Hamad: Progressive reduction of microfilariae (mf) prevalence from 1985 to 2011

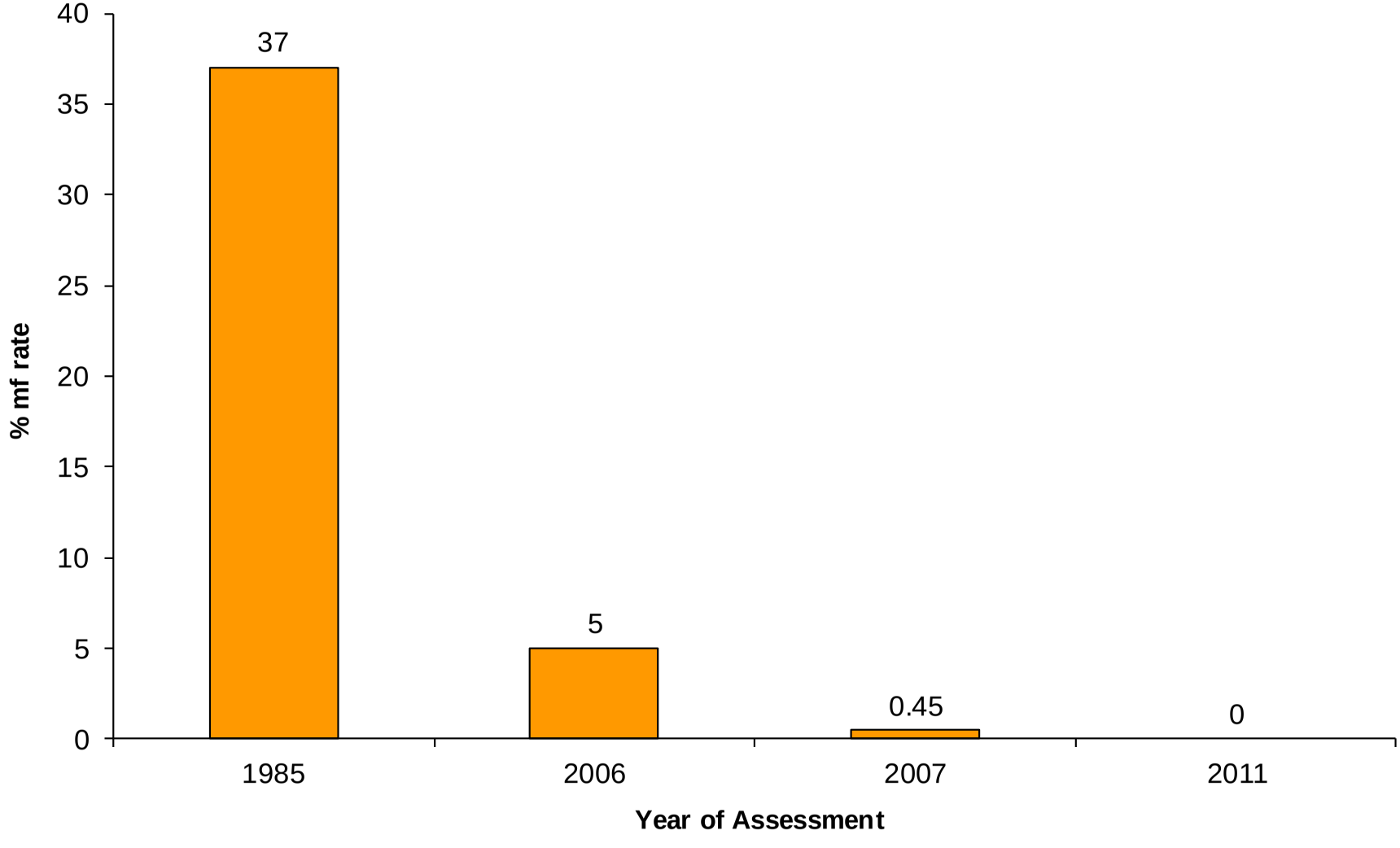


Figure 16

2011 *S. damnosum* Vector Assessments in Abu Hamad

PCR determination of *O. volvulus* L3 infection rate

Community	No. of Flies	Prevalence*	95% CI*
Karny	3,178	0	0-1.2
Mograt	9,008	0	0-0.43
Nady	5,173	0	0-0.74
Hamdab	0	N/A	
All Abu Hamad combined	17,359	0†	0-0.23†

*Expressed as L3 infection per 2000 flies

†The 95% CI is below the 1/2000 WHO/TDR indicator for transmission interruption

Figure 17

2011 Serological Assessment of Children ≤ 10 Years of Age Residing in Abu Hamad**

	No. examined	% positive
Abu Hamad Focus (22 villages)	3,955*	0
Beyond Abu Hamad limits (6 villages)	1,383	0
Displaced (6 villages)	1,418	0
Total	6,756	0*

*95% confidence interval excludes 0.1%

**Based on IgG4 antibody presence to the recombinant antigen OV16

Figure 18

Sudan: Semi-Annual Treatments in Elimination Areas, 2011

Focus	Total Population	UTG 1	Treated in R1	Treated in R2	UTG Covered R1	UTG Covered R2	Total Treated	UTG 2	% covg UTG 2	Active Villages treated 2010	% active villages covered 2010
Abu Hamad	101,185	88,007	102, 902	93,183	120%	108.3%	196,08 5	172,015	114%	137	100%
Almkabra b (Displaced Persons)	9,894	8,410	10,034	10,242	119%	121.8%	20,276	16,820	121%	3	100%
Alfeda (Displaced Persons)	3,800	3,230	3,512	3,462	109%	107%	6,974	6,460	108%	4	100%
Amry (Displaced Persons)	3,155	2,682	2,717	2,550	101%	95%	5,267	5,364	98%	3	100%
Total for Abu Hamad	118,034	103,329	119,165	109,437	119%	109%	228,602	200,658	114%	147	100%
Galabat	120,506	102,431	97,139	103,316	95%	101%	200,455	204,862	98%	153	100%
Grand Total	**238,540**	**205,760**	**216,304**	**212,753**	**105%**	**103%**	**429,057**	**411,520**	**104**	**300**	**100%**

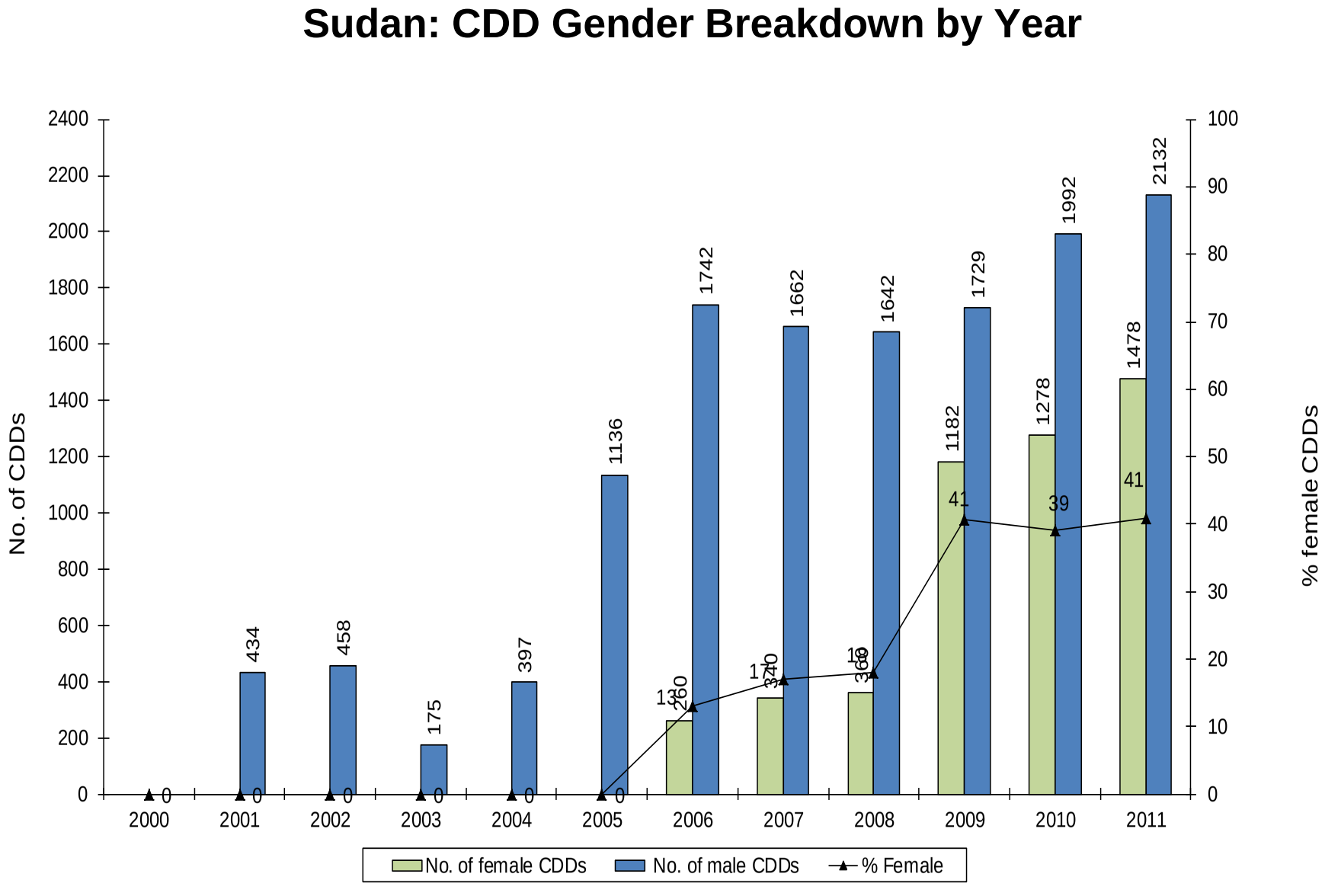
Figure 19

Sudan: Annual treatment in Radom (control area), 2011*

Focus	Total Popn 2011	ATO 2011	Popn treat`ed cumul. for 2011	% of ATO Tx 2011	% of Popn Tx 2011	Active villages treated 2011	Active villages cumul. 2011	Active villages of ATO for 2011	% of active villages covered 2011
Radom	23,203	19,723	21,566	109%	93%	20	19	19	95%

*Annual treatment Objective (ATO) is used since the entire geographic area affected and total population involved have never been ascertained due to civil strife.

Figure 20


Sudan: CDD Gender Breakdown by Year
No. of CDDs
% female CDDs
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
100
90
80
70
60
50
40
30
20
10
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
0
0
0
0
0
0
434
458
175
397
1136
1742
1662
1642
1729
1992
2132
260
340
368
1182
1278
1478
41
39
41
No. of female CDDs
No. of male CDDs
% Female

CAMEROON

Background:

Onchocerciasis is widespread in Cameroon, with an estimated 62% of its population at risk of infection. The Carter Center's predecessor, the River Blindness Foundation (RBF), began assisting the Ministry of Health (MOH) in North region in 1992, followed by West region (with the assistance of the Lions Clubs International Foundation – LCIF) in early 1996. The Carter Center began assisting both regions in 1996 when it took over RBF programs. The Lions-Carter Center SightFirst Initiative project is supervised by Lions District 403B and in partnership with the MOH. The original SightFirst Cameroon project ended in early 2001, when an extension was granted to supplement new African Program for Onchocerciasis Control (APOC) projects in LCIF-assisted zones. Both North and West regions have enjoyed past APOC support. Major support for program implementation from APOC was phased out in North region in 2003, and in West region in 2008, although supplemental funding does continue to be provided. The last year of LCIF support for Carter Center programs in Cameroon was 2010, although local Lions District 403B members remain strong advocates for continued onchocerciasis control, and LCIF continues to support Mectizan® distribution for onchocerciasis in other parts of the country.

In 2010, due to financial constraints, the River Blindness Program of The Carter Center (RBP) ended its assistance to the North region. In 2011, RBP only assisted the MOH to battle onchocerciasis in the West region (Figure 21). The Carter Center-assisted-treatments in Cameroon decreased from 34% of the national total in 2010 to 26% in 2011 (Figure 22). The Carter Center plans to withdraw all assistance to Cameroon at the end of the fiscal year (September 2012).

At the same time The Carter Center is scaling down, the neglected tropical disease (NTD) effort is scaling up in Cameroon, assisted by IRB (HKI) and RTI/USAID. New funds are being offered to fill the gap in North region, and either the NTD group or SightSavers International will also assist treatments in West region.

Treatments: Carter Center-assisted programs in the West region of Cameroon delivered 1,379,706 treatments in 2011 (Figures 22 and 23), 97% of the ultimate treatment goal (UTG) of 1,420,034. No severe adverse events (SAEs) were reported as a result of Mectizan® treatments in Cameroon in 2011.

Mectizan®: The Carter Center-assisted program received a total of 3,898,568 Mectizan® tablets from the Mectizan® Donation Program (MDP) for 2011 treatments. The program assisted in distributing 3,801,206 of these, with 2,076 tablets (0.05% of the total available) lost or expired during the period of distribution. The balance of 95,286 tablets was returned through the health system to the Drug Procurement and Delivery Agency (DPDA). The program reported an average of 2.8 tablets per treatment.

Training and Health Education: The process of ivermectin distribution by community directed distributors (CDDs) using the kinship strategy was initiated in 2004, and since then has been annually implemented. This strategy calls for selection and training of CDDs (to serve their kinship group rather than the larger community), thus, generating more CDDs in every community. Training is followed by close supervision: CDDs are supervised by community-selected supervisors in their respective communities, and health workers at frontline health units are supervised by the regional and Carter Center teams. In 2011, the RBP trained a total of 14,884 CDDs in the West region, exceeding the 2011 training objective (Figure 24). The ratio of CDD to population was 1:112 compared to 1:103 in 2010. There was one community supervisor per three CDDs, showing no change from 2010. Of the 14,884 CDDS trained, 46% were female (up from 33% in 2010).

Financial Contribution: The West region government invested the equivalent of $104,466 in the community-directed treatment with ivermectin (CDTI) program in 2011. See Figure 25 for APOC, Carter Center/LCIF, and national (including state and local) financial contributions from 2001 to 2011. The APOC financial contribution information was obtained from the national onchocerciasis control program (NOCP) secretariat and regional offices and does not include capital expenses.

Integration of Mectizan® Distribution with Other Activities: CDDs and community supervisors are involved with other community health activities, such as lymphatic filariasis (LF), national immunization days, an expanded program of immunization, family planning, HIV/AIDS prevention, bed net distribution, Vitamin A distribution, tuberculosis control, and water and sanitation activities.

2012 RECOMMENDATIONS FOR THE CARTER CENTER CAMEROON

Publish with APOC results for the assessment in West region.

End the TCC/RBP program in Cameroon in FY12, closing the office in August 2012.

Figure 21

Cameroon
Lions-Carter Center -Assisted Region

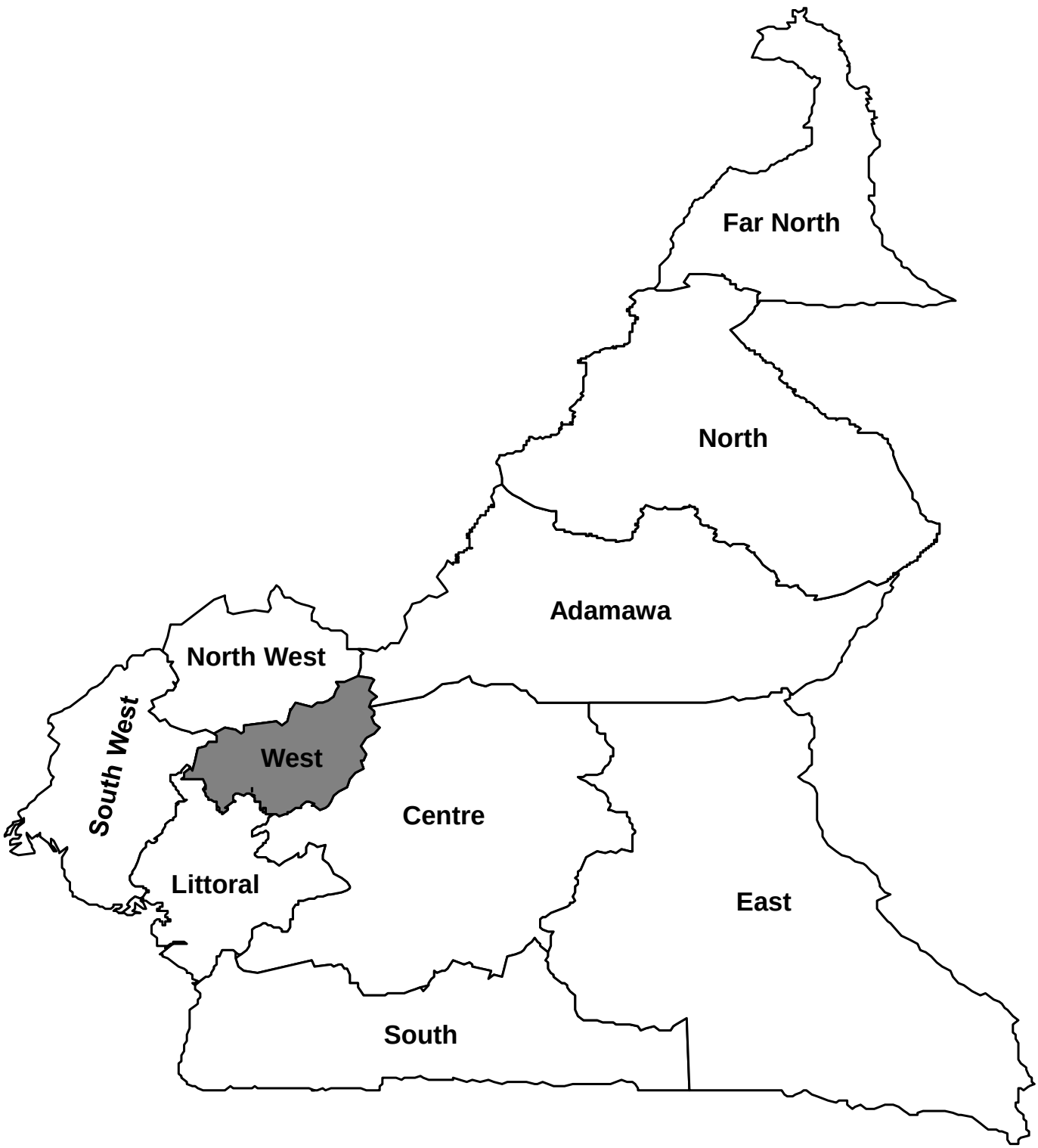
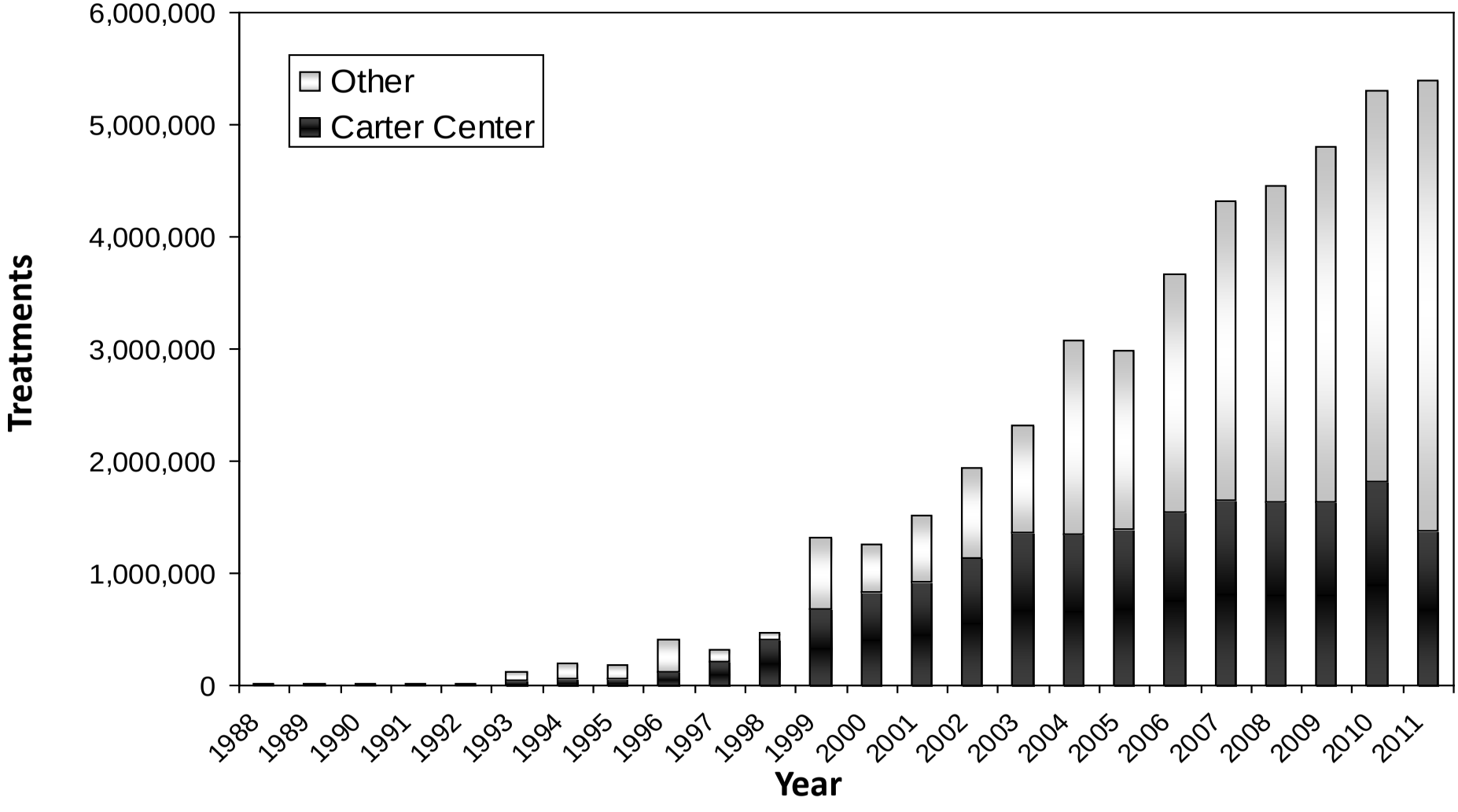


Figure 22

Cameroon: Lions-Carter Center-Assisted Mectizan® Treatments as Part of Total Treatments Provided, 1988-2011*



*Treatments in 1993-1995 by RBF. Source of provisional national figures: NGDO coordinating office.
Treatments in 2011: West region only.

Figure 23

Cameroon: Treatment Coverage 2011

Total Population	UTG for 2011	Population Treated Cumulative for 2011	% Total Pop. Treated	% UTG Treated	Active Comm. Treated in 2011	Active Comm. UTG for 2011	% Comm. UTG Treated.
1,670,628	1,420,034	1,379,706	82.6	97.2	2,704	2,704	100

Comm = Communities
UTG = Ultimate Treatment Goal

Figure 24

Cameroon: CDDs and Community Supervisors Trained (2005-2011)

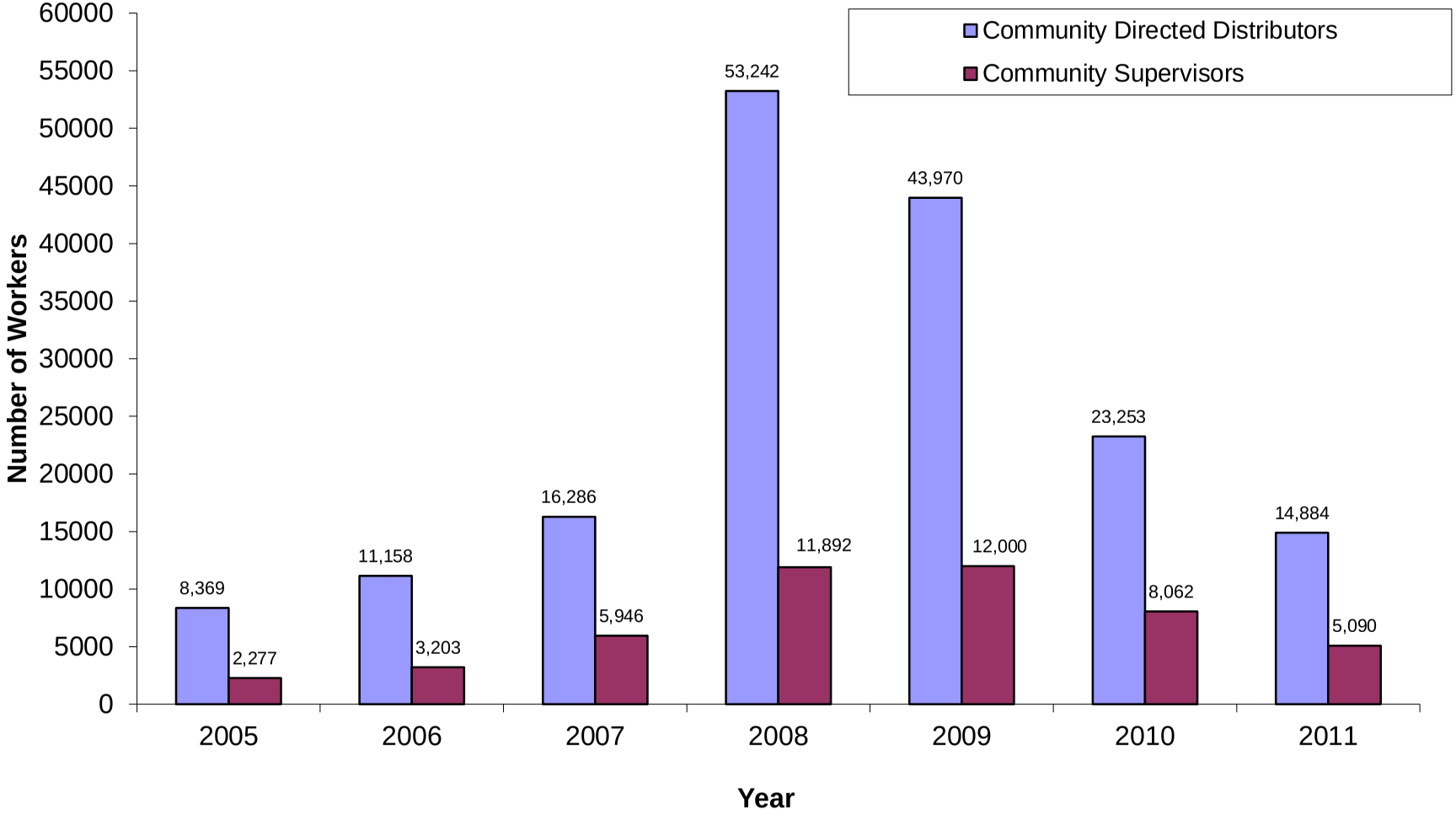
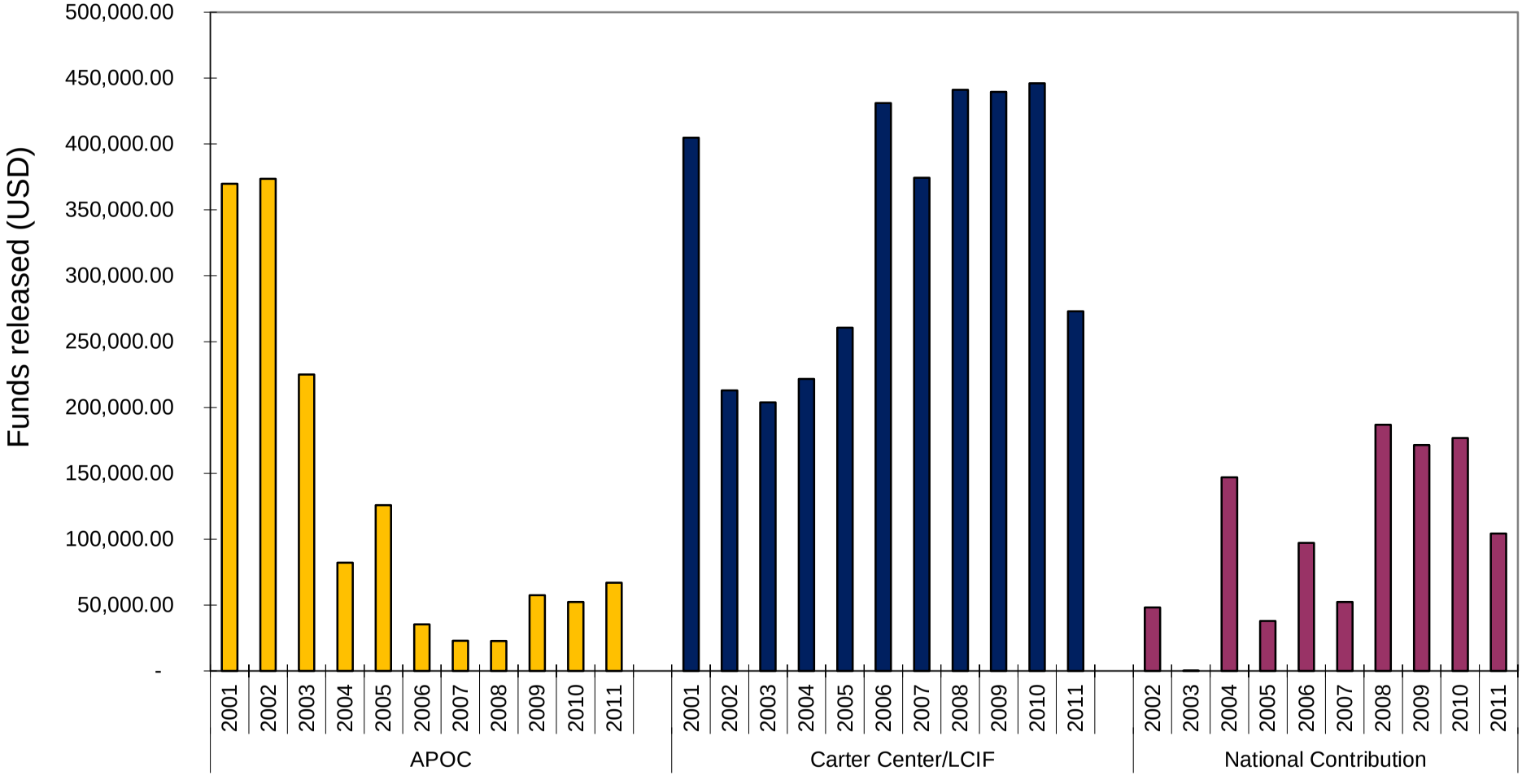


Figure 25

Cameroon: Financial Contributions (in USD), 2001 – 2011



NOTE: The above contribution does not include staff salaries and benefits for all the partners.

The APOC and government contributions are reported by our Carter Center country representatives based on their best possible determinations from information available in country through the National Onchocerciasis Task Force and other local sources capital equipment replacement provided by APOC, and government salaries are not considered.

NIGERIA

Background: Nigeria is the most endemic country in the world for river blindness (RB), with as much as 40% of the global onchocerciasis disease burden. It is estimated that up to 27 million Nigerians living in 32 endemic states need curative or preventative treatment with Mectizan® (ivermectin) for RB. The National Onchocerciasis Control Program (NOCP) is the largest Mectizan® distribution program in the world.

The Carter Center (TCC) program in Nigeria is headquartered in Jos, Plateau state, with supporting sub-offices in Benin City, Enugu, Lagos, and Owerri. The program assists treatment activities in 9 RB endemic states: Abia, Anambra, Delta, Ebonyi, Edo, Enugu, Imo, Nasarawa, and Plateau (see Figure 26). Abia, Anambra, Delta, Ebonyi, Edo, Enugu, and Imo are collectively referred to in this document as 'southeast.' The Carter Center's River Blindness Program (RBP) enjoyed LCIF support from 1999 to 2008 and core APOC from 2000 to 2005. Local Lions (District 404) have been active participants in the Carter Center-assisted RB control activities in Nigeria since 1996 and remain involved in RB advocacy efforts.

Treatments: In 2011, the Carter Center-assisted program in Nigeria provided health education and Mectizan® treatments to 6,025,541 persons (Figure 27); 5,548,689 of those were mass (active) treatments in 7,905 villages; 476,852 passive treatments were delivered in 2,077 hypo-endemic areas in the 7 states located in the southeastern part of the country. Treatments assisted by The Carter Center annually typically represent 25-30% of the total treatments in Nigeria (Figure 28).

The Carter Center Nigeria Program had approximately 20.5 million Mectizan® tablets available for 2011, and the average number of Mectizan® tablets per person treated was 2.9. There were 3,201,175 Mectizan® tablets remaining at the end of 2011.

No severe adverse events (SAEs) were reported as a result of Mectizan® treatments in Nigeria in 2011. Particularly close monitoring for adverse reactions is carried out in the southeastern states because of the presence of *Loa loa* in that part of the country. *Loa loa* is a parasite similar to *Onchocerca volvulus*, but in rare cases, it can provoke SAEs when Mectizan® is administered. Fortunately, no treatment-related SAEs have ever been reported in TCC-assisted areas in Nigeria.

The Carter Center also assisted in 3,198,340 treatments for lymphatic filariasis (LF) and 1,317,935 treatments for schistosomiasis in Nigeria (Figure 29), discussed in the Integrated Program sections that follow.

Training and Health Education: The 9 states assisted by The Carter Center conducted training or retraining for 68,599 professional and lay health personnel involved in Mectizan® distribution in 2011. Kinship-enhanced training in the southeast, which utilizes the extended family structure to provide treatment to small groups of related persons, included 53,385 Community-Directed Distributors (CDDs), 9,935 Community Supervisors (CS), and 5,819 Frontline Health-Level Workers. The ratio of

CDDs to population was 1 CDD per 131, close to the goal of 1:100. In the southeast states, nearly 50% of CDDs were female, versus 6% in Plateau and Nasarawa states. Supervision of CDDs in the southeast has been challenging, and more CSs are needed if CDD numbers are to be further expanded. Overall in the program, each CS supervises approximately 6 CDDs (ratio of 1:6).

Financial Contribution: The Carter Center-assisted RBP in Nigeria received APOC core funding during 1998-2003. Since then, some funding has been received through special APOC initiatives (Figure 30). The Nigeria RBP-assisted areas have had chronically insufficient government contributions. In 2009, a spike in government support was seen in Delta state to support schistosomiasis control but this level of support was limited and focal. The increase in funding by The Carter Center (2008-10) was due to funding from two Bill & Melinda Gates Foundation grants to RBP for integrated neglected tropical disease (NTD) research ("Proof of Concept for Integrated Health Interventions in Nigeria" and "*Loa loa* Paralyzes LF MDA in Central Africa: Integration of LF and Malaria Programs Can Resurrect a Continental Initiative"). These grants, which ended in 2011, are described in more detail below.

At the community level, 4,055 villages (or 39% of all at-risk villages receiving mass treatment) supported their CDDs with direct monetary support. Total village-level contributions were considerable and equaled approximately 5.13 million Naira ($33,093 USD at 155 Naira to the dollar). However, this contribution was 36% less than the 2010 village level contributions, for reasons that are poorly understood. When the 2011 amount is averaged over the large number of CDDs in the program, it amounts to $2.94 USD/CDD/year. Community contributions are not included in government contribution figures.

Local government area (LGA)-level contributions in 7 of the 9 states (neither Nasarawa nor Plateau LGAs contributed) totaled approximately 5.75 million Naira ($37,087 USD), a 77% increase from 2010. In contrast, state-level contributions were provided in only 1 of the 9 states and totaled approximately 350,000 Naira ($2,258 USD). Government monetary contributions described here do not contemplate the core salary costs of the Ministry of Health (MOH) personnel working in the program.

The Integrated Program in Plateau and Nasarawa: The Carter Center-assisted program in Nigeria pioneered the concept of integrated mass treatment for RB, LF and schistosomiasis in which the logistics and health education of a mass drug administration (MDA) program are shared across several programs. The program began in 1999 with integrated RB and urinary schistosomiasis interventions, expanding to include LF MDA in 2000. The central platform of the integrated program is an infrastructure and logistical system to deliver annual community-based mass Mectizan® and albendazole treatment for LF to all at risk in the two-state area. The effort has demonstrated a dramatic and effective scale-up of state wide interventions for schistosomiasis (in 2008), trachoma (in 2010), and malaria (in 2010). The LF treatment combination also is highly effective against several soil transmitted helminths (STH). The Gates Foundation grant ("Proof of Concept for Integrated Health Intervention in

Nigeria") demonstrated that integration results in broader services, lower costs, and higher efficiency among disease programs that use similar strategies. A paper was published in 2011 that reported findings related to cost savings through triple drug administration (TDA) with praziquantel, ivermectin and albendazole (Evans et al. 2011) This paper reported a savings of 41% over the stand-alone distributions.

Lymphatic Filariasis: The goal of the LF program in Plateau and Nasarawa states is to demonstrate that LF transmission can be interrupted with annual combination MDA consisting of Mectizan® and albendazole. Background information on LF and urinary schistosomiasis is provided in Annex 6, and the overall Plateau-Nasarawa experience was published in 2011 by Richards et al. LF is widespread in Plateau and Nasarawa states, and mass treatment and health education are necessary in all cities and villages in the 30 LGAs. Treatment for LF started in 2000 and achieved scale in 2003 (Figure 31). In 2008, after 5 years of treatment, a survey for LF prevalence was conducted using the Filariasis Immunochromatographic Card Tests (ICT) to establish if LF had been eliminated by the MDA program. Of the 30 LGAs comprising the 2 state area, 10 had achieved an overall LF antigenemia prevalence of <2 %, the (then) indicator for halting mass treatment (threshold has since been revised to <2% in children aged 6-7 years of age) (King et al. 2012 in press). Five of those LGAs were onchocerciasis endemic, and MDA continued to allow assessment of RB transmission (see data below). For the 5 LGAs that were only originally endemic for LF ('LF-only' LGAs), the Federal MOH approved MDA cessation on the condition that long-lasting insecticidal nets (LLIN) were distributed first in order to prevent reinvasion of the infection from neighboring areas. During 2010-2011, some 2.3 million LLINs were distributed throughout Plateau and Nasarawa states covering every household; accordingly, 656,137 LF MDA treatments were stopped in those 5 'LF-only' LGAs in 2011. A total of 3,198,340 persons in the 2 states received health education and mass treatment for LF in 2011 (Figure 29), accomplishing 94% of the treatment goal of 3,400,347. At the end of 2011, 118,860 albendazole tablets remained in stock.

In 2011, the WHO released new Treatment Assessment Survey (TAS) guidelines to determine when MDA for LF could be halted (World Health Organization. Monitoring and epidemiological assessment for mass drug administration in the global programme to eliminate lymphatic filariasis: a manual for national elimination programmes. WHO, Geneva, Switzerland, 2011). Under the conditions of Plateau and Nasarawa states, the WHO TAS recommends testing for circulating filarial antigen (using the ICT) in children ages 6-7 years in a school-based cluster survey. In 2012, RBP plans to follow these TAS guidelines to survey nearly 8,000 children in the remaining 20 LGAs.

River Blindness Elimination: Twelve LGAs in Plateau and Nasarawa states are co-endemic for RB and LF, of which 5 LGAs were demonstrated to have interrupted LF transmission in 2008 but had to continue MDA because the status of RB transmission in the area had yet to be determined. Accordingly from 2009-10, RBP conducted a series of epidemiological, serological and entomological assessments to determine the status of onchocerciasis transmission. The results of these surveys were analyzed in 2011, and the preliminary findings were discussed during the Review. In areas where baseline

surveys conducted in 1992 showed a mean skin-snip infection prevalence of 72%, our follow-up studies showed 0.2% infection in 2009, representing a 99% decrease in onchocerciasis infection. However, antibody positivity (OV16) in over 3,000 children was 0.42%, which was greater than allowed by WHO criteria (<0.1%). Entomology data are still being analyzed, but most vectors were found to be negative by polymerase chain reaction (PCR) for *O. volvulus* DNA. The Review concluded that transmission of onchocerciasis was close to being broken in these two states.

Fighting Malaria and Lymphatic Filariasis with LLIN: In Nigeria, LF is transmitted by *Anopheles* mosquitoes, the same mosquito that transmits malaria. LLINs are one of the most important prevention tools for malaria and are also believed to be useful as an adjunct to MDA in the LF elimination program. During 2010, The Carter Center partnered with the Nigerian MOH and others to distribute 1.45 million LLINs, donated through the Global Fund, in Plateau state, providing every household with two nets. Nasarawa state, with support from UNICEF, similarly distributed over 840,000 nets. Together, these distributions provided blanket LLIN coverage in both states. Since 2004, the year after MDA for LF reached scale in the two states, entomological data has shown that rates of LF infected mosquitoes has hovered between 0.3% and 1.8%. By the end of 2011, the year after LLINs had been distributed, the number of infected mosquitoes fell to 0% for the first time ever (Figure 32 and Frontispiece Figure H, Panel B). It is very likely that these LLINs were synergistic with MDA and interrupted LF transmission completely.

Schistosomiasis Control: In 2011, due to a continuing donation of praziquantel from Merck KGaA (E-Merck), through WHO, the Carter Center-assisted Schistosomiasis Control Program was once again able to treat more than 1 million children in Plateau and Nasarawa states (1,037,912) in a single year (Figure 33). Praziquantel has been shown to be safe for combined treatment with Mectizan® and albendazole, and the RBP has been a pioneer in the use of triple drug administration (TDA) (Eigege 2008). Figure 33 demonstrates that most treatments in Plateau and Nasarawa have been TDA since 2009. In 2011, the 5 LGAs that had stopped treatment for LF received stand-alone praziquantel treatments, a harbinger of the future when LF MDA is halted throughout the two-state area.

The Integrated Program in Southeast Nigeria: The Carter Center assists river blindness programs in 7 states in southeast Nigeria. In 2003, we began using that platform to integrate with schistosomiasis control in Delta state, and then expanded schistosomiasis activities to Edo state in 2010. In addition, in limited areas (4 LGA) in Imo and Ebonyi States, LF elimination and malaria control were integrated as part of a research project funded by the Gates Foundation.

Schistosomiasis Control: In 2011, The Carter Center continued to enjoy support for schistosomiasis work in the southeast thanks to the Izumi Foundation and a praziquantel donation by Merck KGaA/WHO. A total of 280,023 treatments were given in Delta and Edo in 2011, accomplishing 94% of the annual treatment objective (ATO). Of these treatments, 218,250 (80%) were combined Mectizan® and praziquantel

treatments. Adults were treated in communities with urinary schistosomiasis prevalence greater than 50%, and school children alone were targeted where prevalence exceeded 10%, in accordance to WHO guidelines. In total, nearly 570,000 praziquantel tablets were used, at an average dose of 2.2 tablets per person, and 1,202,000 praziquantel tablets were in stores at the end of 2011 for use in 2012.

Fighting Malaria and Lymphatic Filariasis with LLIN: In Imo and Ebonyi states, potential co-infection with *Loa loa* parasites prevents use of MDA with ivermectin due to increased risk of serious adverse reactions. In 4 LGAs, with a Gates Foundation grant (entitled, "*Loa loa* Paralyzes LF MDA in Central Africa: Integration of LF and Malaria Programs Can Resurrect a Continental Initiative") that ran from 2006-2011, the RBP has been working with the ministries of health of those states to determine if mosquito vector control for malaria by means of LLIN distribution will impact transmission of LF. The data are still being analyzed, but preliminary results from dissection of over 22,744 *Anopheles* mosquitoes collected over this time period showed an 84% decrease in all LF larval stages found (Frontispiece Figure H, Panel A) and no L3 infective stages by the end of the study in 2011.

The study suggests that LF transmission could be permanently interrupted if LLIN are used for a sufficiently long period of time, even without accompanying MDA (Frontispiece Figure H, Panel B). A publication on these results is being prepared.

2012 RECOMMENDATIONS FOR CARTER CENTER NIGERIA

All States

The Carter Center Nigeria office should strive to improve data collection, cleaning, backup, and reporting mechanisms.

Continue to advocate for use of the Jos Lab as a regional resource for monitoring and evaluation of NTDs

Work towards a target of a minimum 1 CDD to 100 population ratio and 1 community supervisor to 5 CDDs.

Advocate for the Federal Government of Nigeria to provide more financial support to The Carter Center-assisted health programs, and also for the release of counterpart funding from states and LGAs.

The Nigeria program should continue to track government and Carter Center funding figures in 2012, including any additional funds provided through APOC, as well as monitor trends for increased funding.

Expansion of TCC/RBP programs into other 'integrated' NTD efforts requires formal Carter Center Board of Trustees approval, adequate funding to participate, and possibly Emory Institutional Review Board (IRB) approval. If the government wants to support integration in areas where TCC/RBP assists, we will not refuse to participate since these are government-owned programs. However, without Board approval, funding and IRB review, The Carter Center can only be involved in co-implementation of treatment activities within designated RB Mectizan® distribution areas where we are already working, and within the time period when such distributions are scheduled. We cannot be engaged in monitoring and evaluation activities related to unapproved programs.

TCC must coordinate with national programs to ensure that the application for 2013 Mectizan® and albendazole is submitted no later than August of the year before the drug is needed. Carter Center must also work with federal agencies to facilitate appropriate documentation and clearance for all medications. Albendazole applications must require an annual report to be submitted by the national program and approved by the WHO regional office. Because drug requests are made well before treatment activities are done, treatment denominators will require adjustment during the treatment year. Changes in denominators varying by 5% or more should be noted in the monthly report, along with an explanation stating why the adjustment was made and if additional drug was needed. National program authorities and MDP should be advised accordingly. Changes in numbers of treatments to be administered (numerators), and frequency of administration (once versus twice per year) require discussion and approval by the MOH/NOTF, MDP and TCC HQ.

Nigeria program staff must complete or renew the Emory IRB certification if they are to be involved with research programs.

Lymphatic Filariasis/Malaria:

Work with former Nigerian head of state General (Dr.) Yakubu Gowon to help garner more political support for the scaling up and link between interventions against LF and malaria.

Work with national and state malaria authorities to advance the planned future delivery in TCC-supported states of LLINs related to the national campaign to provide 2 LLINs to all Nigerian households, particularly in Imo, Abia, Edo and Delta states, which are the TCC priority. Dr. Emmanuel Miri, Country Director, should seek to attend high level national malaria meetings whenever possible.

Conduct the WHO LF Treatment Assessment Survey (TAS) protocol encompassing the 20 LGAs needing assessment in Plateau and Nasarawa. Determine where LF treatments can be stopped and where treatments must continue. Publicize results and provide to FMOH and WHO.

Onchocerciasis:

Work with the MOH and NOTF to develop national policy for onchocerciasis elimination.

Publish RB entomology and serology assessment studies as soon as possible.

Augment onchocerciasis activities in the 7 states assisted in the southeast. Determine in LGAs under treatment where twice per year treatment might be needed. Determine and map the limits of onchocerciasis and *Loa loa* (with LF if necessary and funding permits) in all hypoendemic LGAs. Determine strategy for addressing areas where onchocerciasis transmission is active.

Analyze onchocerciasis data and determine policy for stopping treatment in LGAs where transmission has been interrupted in Plateau and Nasarawa states. Consider twice-per-year treatment with ivermectin in “hot-spots”, or problem, areas such as Akwanga (Bayan Dutse). Place 2013 drug order accordingly.

Conduct PCR based black fly entomology surveys in sentinel villages in the southeast states.

Consider conducting additional stop MDA surveys (dependent on evolving APOC/WHO guidelines) in 2013 in Plateau and Nasarawa states.

Conduct The Carter Center monitoring protocol annually in a sample of states to assess treatment coverage, health education, community involvement, and ownership.

Schistosomiasis:

Provide praziquantel to all school-age children in all LGAs of Plateau and Nasarawa States. In LGAs where MDA for LF has stopped, PZQ treatment will be stand-alone.

Consider launching school based (rather than community based) treatment.

Conduct prevalence survey of urinary schistosomiasis in collaboration with TAS in 20 LGAs in Plateau and Nasarawa. Include coverage, hematuria, and intensity of infection.

In southeast states, combine Mectizan® and praziquantel treatments where possible in areas where at least one year of stand-alone distribution for each drug already has occurred.

If funding permits, consider expansion of SH program into other states in the southeast.

Conduct routine SH monitoring in southeast states, where PZQ holidays continue.

Work to improve PZQ treatment coverage in Plateau and Nasarawa states. Conduct new PZQ coverage surveys to measure improvements in distribution.

Plateau and Nasarawa States Integrated Program:

Finalize analysis of the economic studies and the SMTC 'integrated' training process, and write up for publication. No new SMTC classes should be enrolled unless additional funding is identified.

Imo and Ebonyi States Integrated Program (LF/MAL):

It is first priority of the Nigerian TCC malaria program to distribute the remaining 6.5 million LLIN in 2012, in collaboration with MOH and partners, in Imo, Abia Edo, and Delta states.

Publish LLIN LF entomology studies as soon as possible.

Treatment and Distribution Objectives for Plateau and Nasarawa States 2012:

Mectizan® and albendazole UTG:	**3,453,353 persons**
Praziquantel ATO:	**1,214,167 children**
LLIN:	**58,000 nets**

Training Objective for LF, RB and Schistosomiasis (SH) for Plateau and Nasarawa States 2012:

River Blindness:

CDDs:	**5,890 (1,682 new)**
Community supervisors:	**731 (0 new)**

LF/malaria/schistosomiasis:

CDDs:	**12,812 (2,668 new)**
Community supervisors:	**1,828 (0 new)**

Treatment Objectives for Southeast States 2012:

Mectizan® UTG:	**4,372,990 persons**
Praziquantel ATO (Delta and Edo States):	**303,821 persons**
LLIN:	**6,527,314 nets**

Training Objective for RB and SH for Southeast States, 2012:

River Blindness:

CDDs:	**64,142 (4,635 new)**
Community supervisors:	**15,149 (1,115 new)**

Schistosomiasis:

CDDs:	**5,300 (1,415 new)**
Community supervisors:	**3,000 (991 new)**

Figure 26

Nigeria: Carter Center-Assisted States

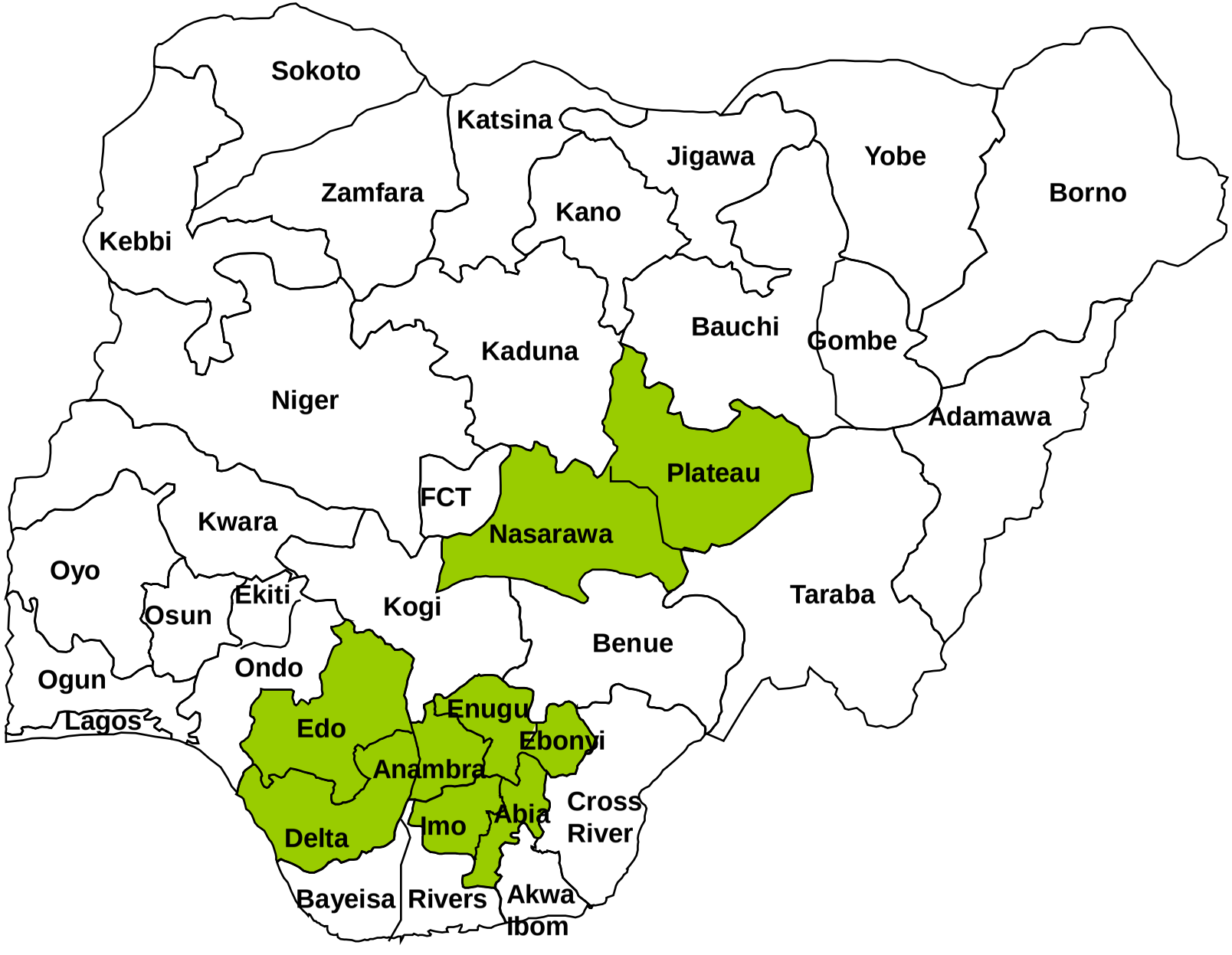


Figure 27

Nigeria: Carter Center-Assisted Areas
2011 River Blindness Treatments (Active & Passive)

Active Treatments

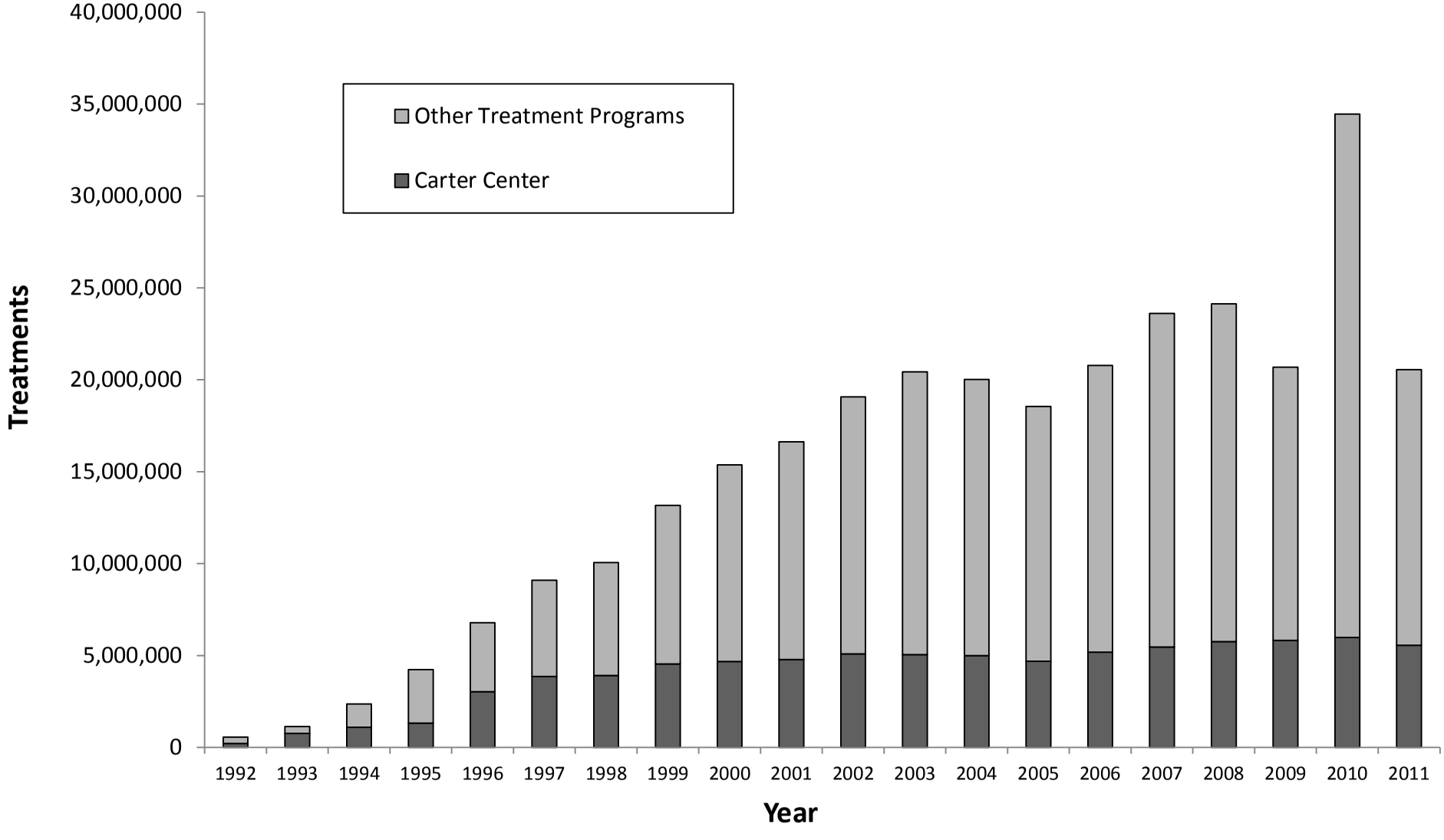
Name of State	No. of LGAs	Popn treated cumulative	Ultimate TX Goal (UTG)	% UTG treated	Total Popn	% of total popn treated	Active villages cumulative	Active villages UTG/ATO	Active villages % for UTG
ENUGU	15	807,081	807,081	100.0	1,008,851	80.0	1,373	1,373	100
ANAMBRA	16	596,025	598,074	99.7	747,592	79.7	1,062	1,062	100
EBONYI	10	502,786	502,786	100.0	628,482	80.0	973	973	100
EDO	12	756,570	780,595	96.9	975,744	77.5	530	530	100
DELTA	9	497,342	506,299	98.2	632,874	78.6	470	470	100
IMO	20	709,702	716,470	99.1	895,588	79.2	1,940	1,940	100
ABIA	12	418,369	418,390	100.0	522,987	80.0	684	684	100
PLATEAU	5	365,221	371,055	98.4	463,818	78.7	293	296	99.0
NASARAWA	7	895,593	901,041	99.4	1,126,301	79.5	580	589	98.5
TOTAL	**106**	**5,548,689**	**5,601,790**	**99.1**	**7,002,237**	**79.2**	**7,905**	**7,917**	**99.8**

Passive Treatments

Name of State	No. of LGAs	Popn treated cumulative	ATO	Popn treated %	Passive villages cumulative	Passive villages ATO	Passive villages % ATO
ENUGU	2	10,617	9,226	115.08	37	37	100
ANAMBRA	5	43,124	51,177	84.26	132	132	100
EBONYI	3	23,093	22,952	100.61	193	193	100
EDO	6	124,427	100,000	124.43	114	220	52
DELTA	16	94,224	102,000	92.38	280	280	100
IMO	9	99,063	127,593	77.64	704	728	97
ABIA	9	82,304	95,041	86.6	617	617	100
TOTAL	**50**	**476,852**	**507,989**	**93.87**	**2,077**	**2,207**	**94**

Figure 28

Nigeria: Carter Center-Assisted Treatments and Total Mectizan® Treatments Provided 1989-2011*



* Treatments from 1992-1995 were assisted by RBF. The 2011 national figure is provisional.

Figure 29

Nigeria: 2011 Lymphatic Filariasis and Schistosomiasis Treatments

Lymphatic Filariasis Treatments

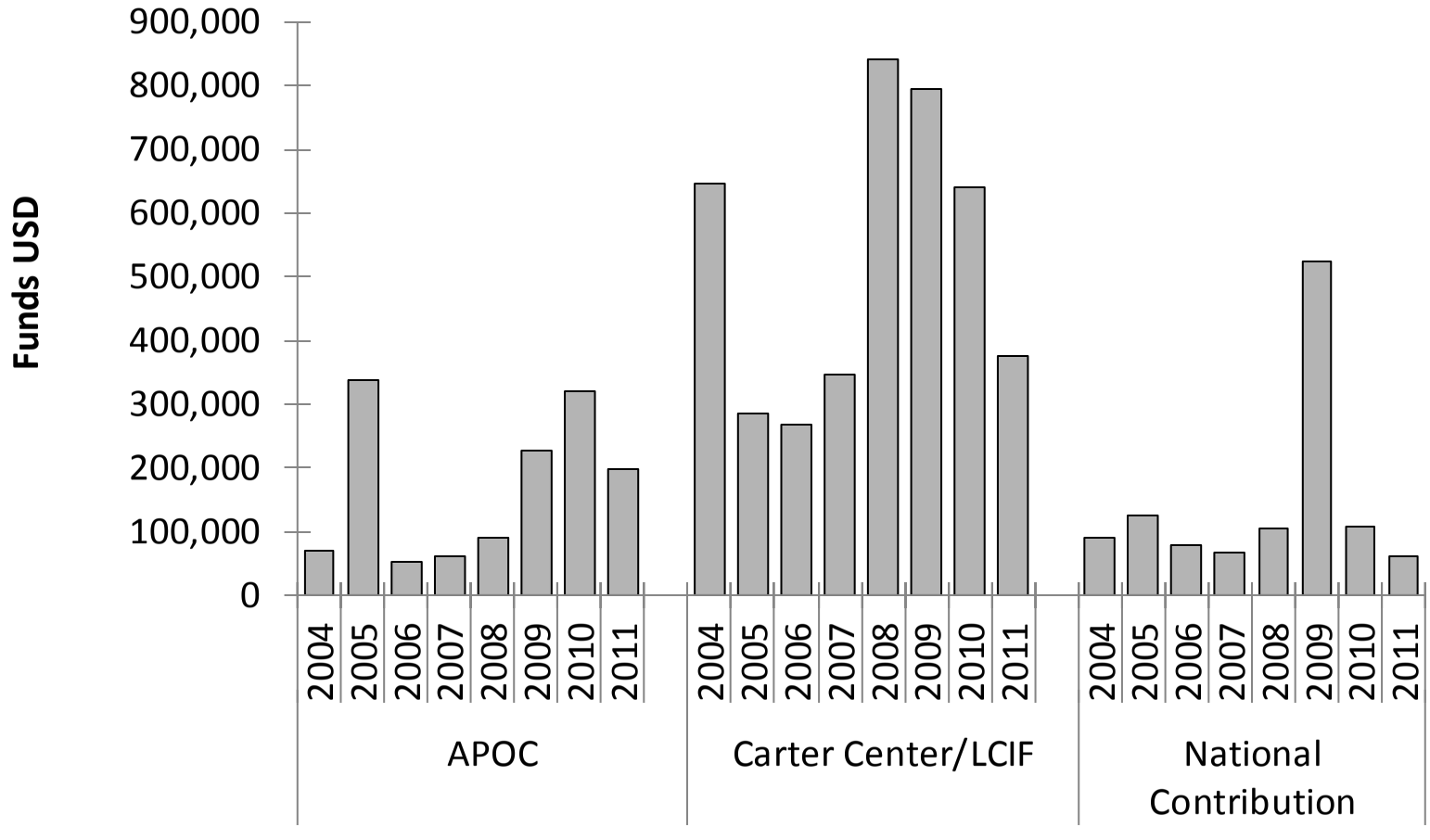
Name of State	No. of Local Government Areas	Popn treated cumulative	Ultimate TX Goal (UTG)	% UTG treated	Total Popn	% of total popn treated	Active villages cumulative	Active villages UTG	Active villages % of UTG
Plateau	14	1,571,859	1,717,643	91.5%	2,147,054	73.2%	2,097	2,328	90.1%
Nasarawa	11	1,626,481	1,682,704	96.7%	2,103,379	77.3%	965	975	99.0%
Total	**25**	**3,198,340**	**3,400,347**	**94.1%**	**4,250,433**	**75.2%**	**3,062**	**3,303**	**92.7%**

Schistosomiasis Treatments

State	No. of LGAs	Cumulative Treatments	ATO/UTG	% ATO/UTG Achieved
Edo	12	166,918	180,984	92.2%
Delta	10	113,105	116,880	96.8%
Plateau	17	582,561	680,428	85.6%
Nasarawa	13	455,351	515,796	88.3%
Total	**52**	**1,317,935**	**1,494,088**	**88.2%**

Figure 30

Financial Contribution by Individual Partners in US Dollars (2007-2011)



The APOC and government contributions are reported by our Carter Center country representatives based on their best possible determinations from information available in country through the National Onchocerciasis Task Force and other local sources. Capital equipment replacement provided by APOC and government salaries are not considered.

Figure 31

Nigeria: Scale-Up of Lymphatic Filariasis Treatments Integrated with River Blindness Treatments: Plateau and Nasarawa States

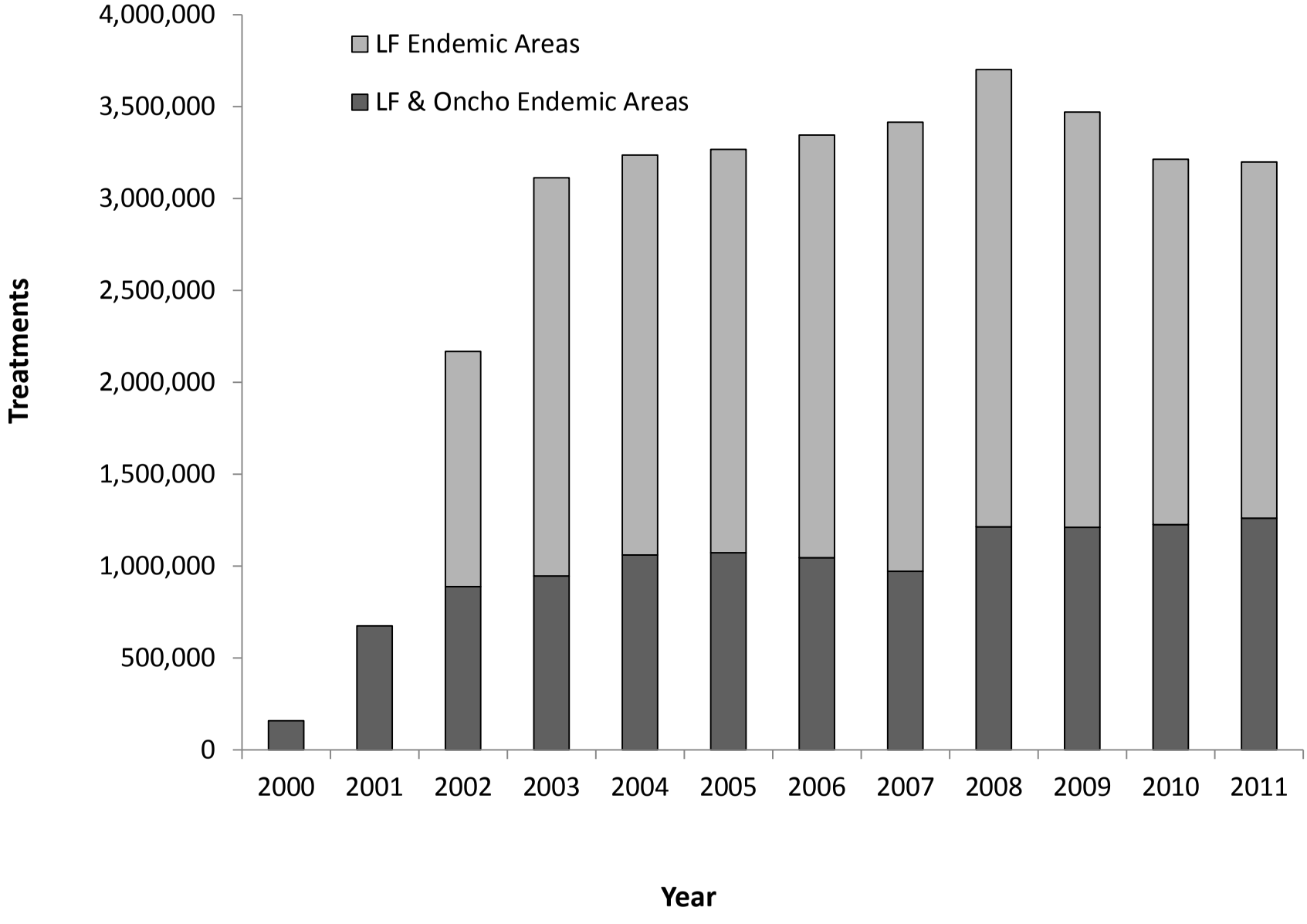


Figure 32

Plateau and Nasarawa Mosquito LF infection Rates (all larval stages) in 10 Sentinel Villages (2000 – September 2011): LLIN were Distributed Statewide in 2010

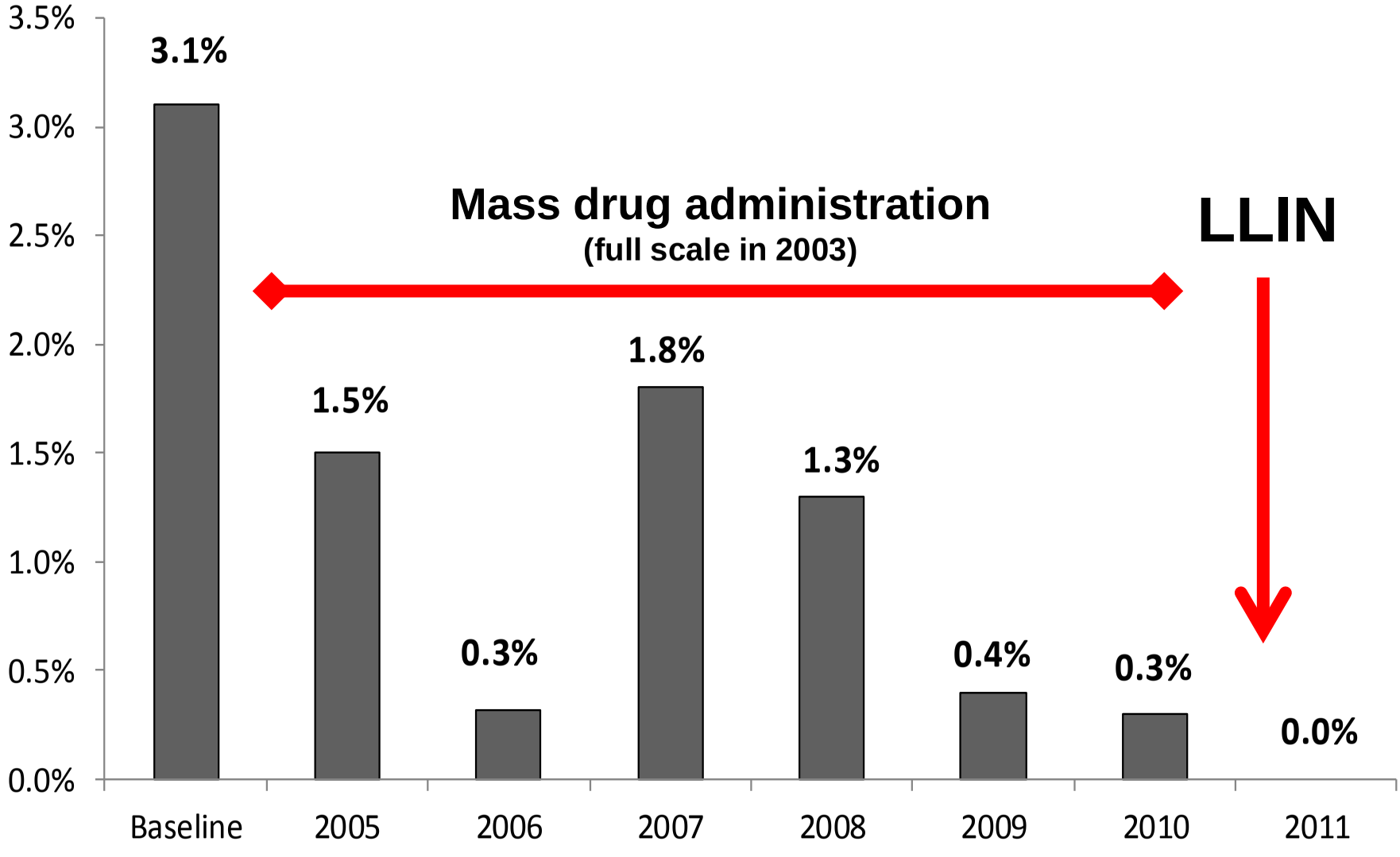
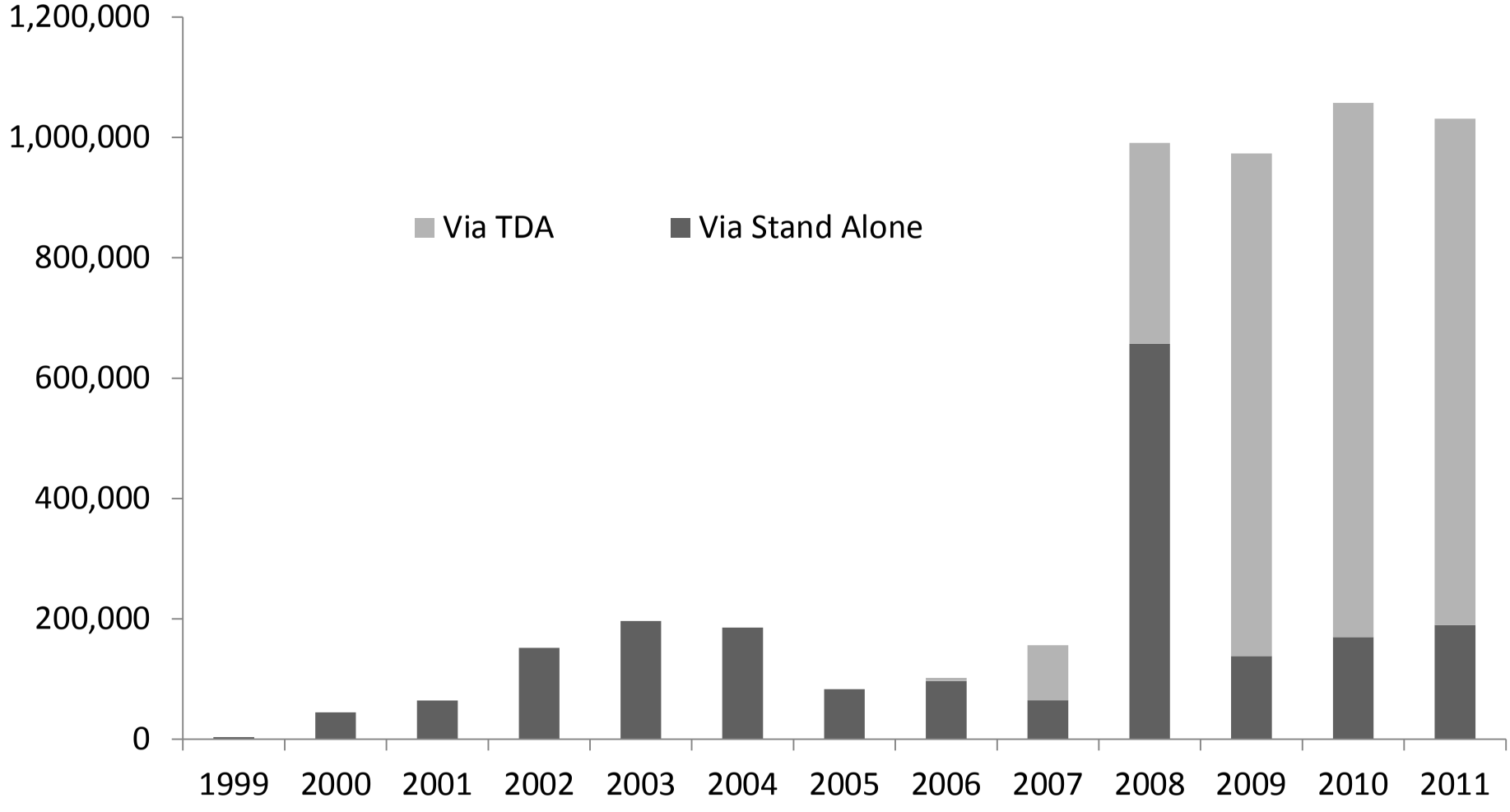


Figure 33

Scale up of Schistosomiasis Treatments in Plateau and Nasarawa, with Transition From Stand-Alone PZQ Treatments to PZQ via Triple Drug Administration (TDA)



ETHIOPIA

Background: Ethiopia is the second most populous country in Africa with a population of approximately 83 million. Onchocerciasis was first reported in southwestern regions in 1939, while the northwestern part of the country was recognized to be endemic in the 1970s. The National Onchocerciasis Task Force (NOTF) was established in 2000, and the African Program for Onchocerciasis Control (APOC) completed Rapid Epidemiological Mapping of Onchocerciasis (REMO) in Ethiopia in 2001. This mapping targeted 10 areas where the prevalence of onchocerciasis was estimated to be more than 40% (≥20% nodule rate) and thus eligible for APOC's community-directed treatment with ivermectin (CDTI) projects. The Carter Center, Lions Clubs International Foundation, and local Lions Clubs partnered with the Ministry of Health (MOH) and APOC in 8 of these 10 projects, beginning with Kaffa and Sheka zones in 2001. Since then, the River Blindness Program has expanded to include Bench-Maji, North Gondar, Illubabor, Jimma, Metekel and Gambella (Figure 34).

Members of Lions District 411A play an important role in both The River Blindness and Trachoma Control Programs in the Lions-Carter Center SightFirst project areas of Ethiopia. Ethiopian Lions participate actively in The Carter Center Ethiopian staff's annual retreat. The Honorable Dr. World Laureate Tebebe Y. Berhan attended the Program Review in Atlanta, representing the Lions Clubs of Ethiopia.

Treatments: During 2011, 3,208,581 people were treated in 14,321 targeted villages in the assisted zones, reaching 93% of the UTG and comprising 68% of all treatments given in Ethiopia (Figure 35 and 36).

Mectizan®: The national river blindness program received a total of 8,515,159 tablets from NOTF in 2011. Together with a balance of 958,910 tablets carried over from 2010, these were made available for distribution to Lions-Carter Center assisted areas. Through the course of the year, 9,191,021 tablets were distributed, with 34,280 (0.3%) damaged and none expired. The average number of tablets per person treated was 2.9. The balance at year's end was 248,768.

New Onchocerciasis Endemic Areas: In 2010-11, APOC supported new mapping activities in areas adjacent to Lions-Carter Center-assisted treatment areas. These adjacent areas were previously considered to be hypoendemic (nodule rates <20% and microfilaria rates <40%). Carter Center and MOH staff worked with APOC consultants in these activities, which took place in 25 untreated woredas in Illubabor, Jimma and North Gondar zones. Eighteen of these woredas (72%) had nodule and/or mf rates that were above the hypoendemic threshold and were therefore in need of Mectizan® treatment. An additional 1.7 million persons are estimated to need to be treated. The Carter Center plans to assist treatment in these areas beginning in 2013. This figure excludes four zones that were found to be endemic in the APOC mapping exercise where there Carter Center currently does not assist CDTI activities. There may still be

other areas meso- and hyperendemic for onchocerciasis in Ethiopia yet to be discovered.

Training and Health Education: Training was provided to 40,765 community-directed distributors (CDDs) (Figure 37); of these, 36,835 were returning CDDs (retrained) and 3,930 were newly recruited and trained for the first time. The ratio of CDDs per population remained about the same, at 1:100 (versus 1:96 in 2010). A total of 3,034 community supervisors were trained, overseeing an average of 13 CDDs each. These ratios have been improving annually. The percent of female CDDs is still low (11%) and has changed little over time (Figure 38); however, 68% of the Community Supervisors trained in 2011 were female. This is due to the effort by the MOH to engage the predominantly female Health Extension Workers in the CDTI supervisory program. Health education was provided in almost all targeted communities (14,321 of 14,336), representing 99.8% geographical coverage.

Financial Contribution: Although CDTI is being implemented through government health care delivery structures, key funding comes from the Lions Clubs International Foundation and individual donors to The Carter Center. The five-year core funding from APOC ended for Lions-Carter Center assisted RB programs in 2009, although APOC funding increased in 2011 for mapping activities (discussed above). Government investment in the program has been steadily improving (Figure 39).

Lymphatic Filariasis (LF): With GSK support, in 2008, LF mapping was conducted in several zones in western Ethiopia and found that LF was co-endemic with onchocerciasis in a number of areas currently assisted by TCC. The results of this mapping work were recently published (Shiferaw W, et al *Trans R Soc Trop Med Hyg*. 2012;106(2):117-27.)

Also with GSK support, The Carter Center assisted in launching a Ministry of Health LF elimination program in Gambella Region in 2009. In 2011, the program administered its third round of MDA with 84,929 combined Mectizan®/albendazole treatments for LF elimination in onchocerciasis-endemic areas of Gambella Region, reaching 97% of the ultimate treatment goal of 87,273. Plans are underway for expanding LF treatments in 2012 to an additional 780,000 individuals in onchocerciasis coendemic areas in Bench Maji, Metekel, and North Gondar.

Other Integration: The Carter Center's malaria program operated at the grassroots level through CDDs in parts of Jimma and Illubabor zones (Oromia regional state), Bench Maji, Sheka, and Keffa zones (SNNPR regional state), Metekel zone (Beneshangul-Gumuz regional state), North Gondar zone (Amhara regional state) and part of Gambella Region. In North Gondar, the integrated program also delivers Carter Center assisted trachoma control activities. Malaria prevention activities are now included in integrated CDD training courses. CDDs are trained to provide health education messages related to the use and care of long-lasting insecticide-treated bed nets (LLINs) during their MDA activities.

2012 RECOMMENDATIONS FOR CARTER CENTER ETHIOPIA

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Onchocerciasis

Advocate for a revitalized NOTF and development of a national elimination strategy addressing hypo-endemic woredas and twice-per-year treatment.

Conduct baseline assessments for onchocerciasis in approximately five sentinel villages in each zone with newly identified woredas in 2012 before first round of ivermectin is distributed later in the year. Prepare and facilitate the first distribution of ivermectin in newly identified endemic woredas in fourth quarter of 2012. Twice-per-year treatment will be launched in 2013.

Continue mapping and delimiting other active onchocerciasis transmission zones including assessments in areas currently under treatment as well as in previously untreated hypoendemic areas. Work with the Federal Ministry of Health to establish a national surveillance team that will assess (epidemiologically and entomologically) onchocerciasis endemicity, map affected areas, and build surveillance capacity at zonal and Woreda levels.

Establish a functional laboratory capable of performing OV16 antibody studies and PCR in black flies to support assessments and surveillance activities. The new laboratory is proposed to be in the Ethiopian Health and Nutrition Research Institute (EHNRI). Training and equipping the lab needs to be timed so that it is operational by the fourth quarter of 2012.

Based on the above assessments and national priorities for twice-per-year treatments in some areas, order Mectizan® accordingly.

Coordinate with the NOCP to ensure that the application for Mectizan® and albendazole for 2013 is submitted as early as possible, and no later than August of the year before the drug is needed. Work with federal agencies to facilitate appropriate documentation and clearance for all medications. Albendazole applications require an annual report to be submitted by the NOCP and approved by the World Health Organization's regional office. Because drug requests are made well before treatment activities are done, treatment denominators will require adjustment during the treatment year. Changes in denominators varying by 5% or more should be noted in the monthly report, along with an explanation stating why the adjustment was made and if additional drug was needed. National program authorities and Mectizan Donation Program (MDP) should be advised accordingly. Changes in numbers of treatments to be administered (numerators), and frequency of administration (once versus twice per year) require discussion at Carter Center headquarters and approval by the MOH/NOTF and the MDP.

Conduct the Carter Center's monitoring protocol annually to assess and validate coverage, health education, community involvement, and ownership.

Maintain a target of a minimum 1 CDD to 100 population ratio. Seek to increase training, supervision, involvement of kinship groups and gender balance among CDDs and community supervisors as appropriate. The current goal of 5 CDDs per supervisor cannot be reached as CDTI activity supervision is primarily by government-employed health extension workers. Therefore, the program should begin to assess their effectiveness as the program moves towards semi-annual treatment.

Seek more Lions involvement to help maintain program visibility and support.

Lymphatic Filariasis

Complete sentinel village assessments of LF-endemic woredas in North Gondar and Metekel as soon as possible. Publish results of sentinel village work.

Continue ivermectin and albendazole treatments for LF in Gambella and expand treatment to all TCC-assisted onchocerciasis (CDTI) woredas where LF is co-endemic.

Provide LF training and health education in these LF expansion areas. This includes: 1) developing and distributing multi-drug reporting forms for CDDs and HEWs and 2) developing and distributing new CDD training, education, and mobilization materials.

Other recommendations

Expansion of TCC/RBP programs into other 'integrated' NTD efforts requires formal Carter Center Board of Trustees approval, adequate funding to participate, and possibly Emory Institutional Review Board (IRB) approval. If the government wants to support integration in areas where TCC/RBP assists, we will not refuse to participate since these are government-owned programs. However, without Board approval, funding and IRB review, The Carter Center can only be involved in coimplementation of treatment activities within designated river blindness Mectizan® distribution areas where we are already working, and within the time period when such distributions are scheduled. We cannot be engaged in monitoring and evaluation activities related to unapproved programs.

Work with TCC Atlanta staff to determine schistosomiasis and soil transmitted helminth prevalence in onchocerciasis and/or LF endemic woredas assisted by RBP.

Carter Center Ethiopia program staff must complete or renew the Emory Institutional Review Board certification if they are to be involved with research programs.

Treatment Objective for onchocerciasis for 2012: 3,622,776 persons

Training Objective for 2012:

CDDs:	**65,029 CDDs (23,773 new)**
Community supervisors:	**4,061 community supervisors (925 new)**

Figure 34

Ethiopia: Lions-Carter Center-Assisted CDTI Projects

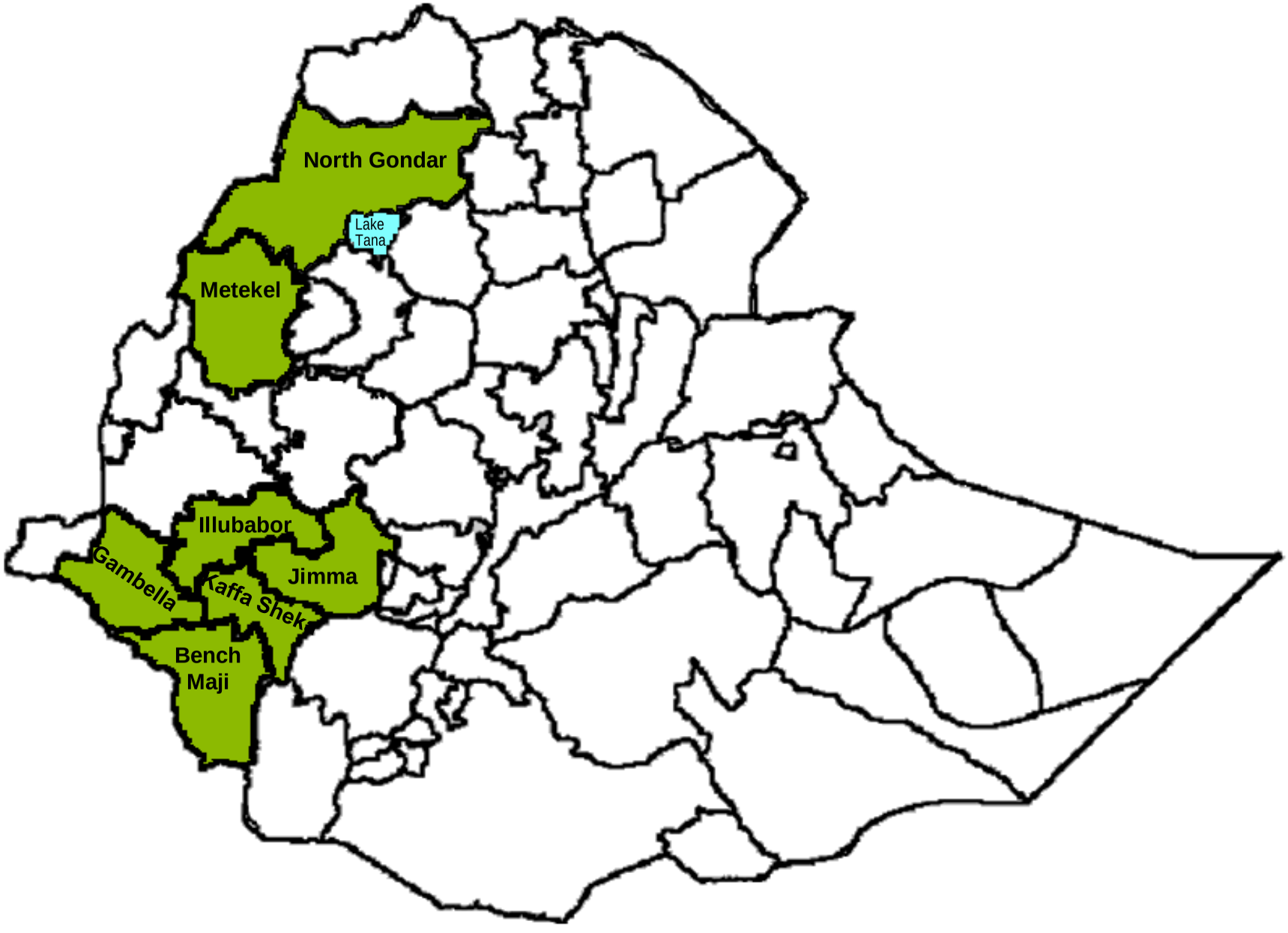


Figure 35

Ethiopia: Lions-Carter Center-Assisted Areas: 2011 River Blindness Treatments

Project zone	Total Population	Ultimate TX Goal (UTG) 2011	Popn treated 2011	% Total Popn Tx	% UTG Tx	Active villages treated	Active villages UTG	% of active villages covered
Kaffa	1,013,706	851,513	777,507	77%	91%	2,572	2,572	100%
Sheka	219,411	184,305	166,474	76%	90%	639	639	100%
Bench Maji	710,113	596,495	520,296	73%	87%	1,354	1,354	100%
N. Gondar	304,737	255,979	213,556	70%	83%	854	863	99%
Illubabor	735,536	617,850	597,399	81%	97%	3,943	3,943	100%
Jimma	868,237	729,319	736,193	85%	101%	4,260	4,260	100%
Metekel	149,676	125,728	112,227	75%	89%	360	366	98%
Gambella	103,896	87,273	84,929	82%	97%	339	339	100%
TOTAL	**4,105,312**	**3,448,462**	**3,208,581**	**78%**	**93%**	**14,321**	**14,336**	**100%**

Figure 36

Ethiopia: Lions-Carter Center-Assisted Mectizan® Treatments as Percentage of Total Treatments Provided, 2001-2011

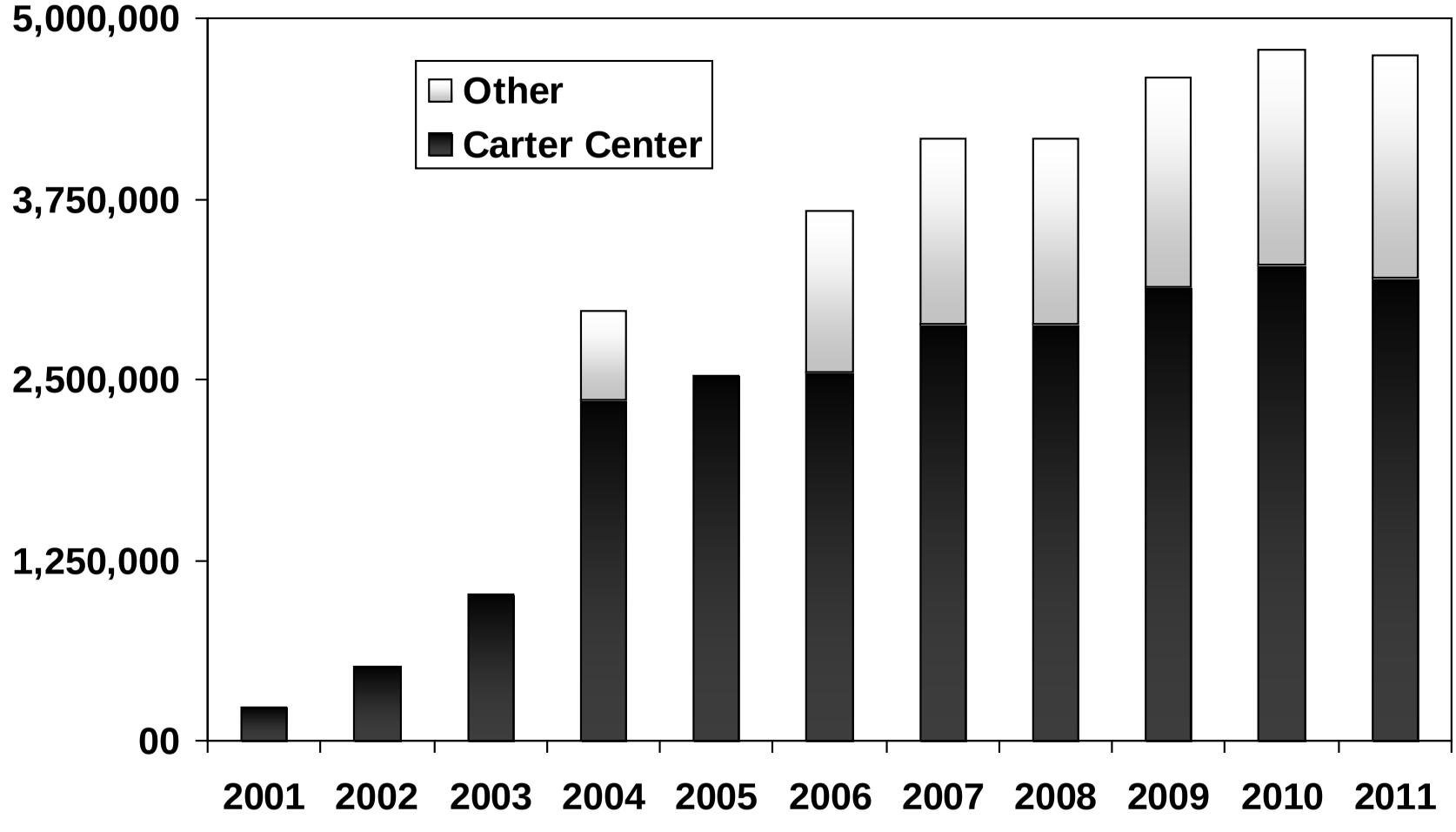


Figure 37

Ethiopia: CDDs and Community Supervisors Trained (2004 - 2011)

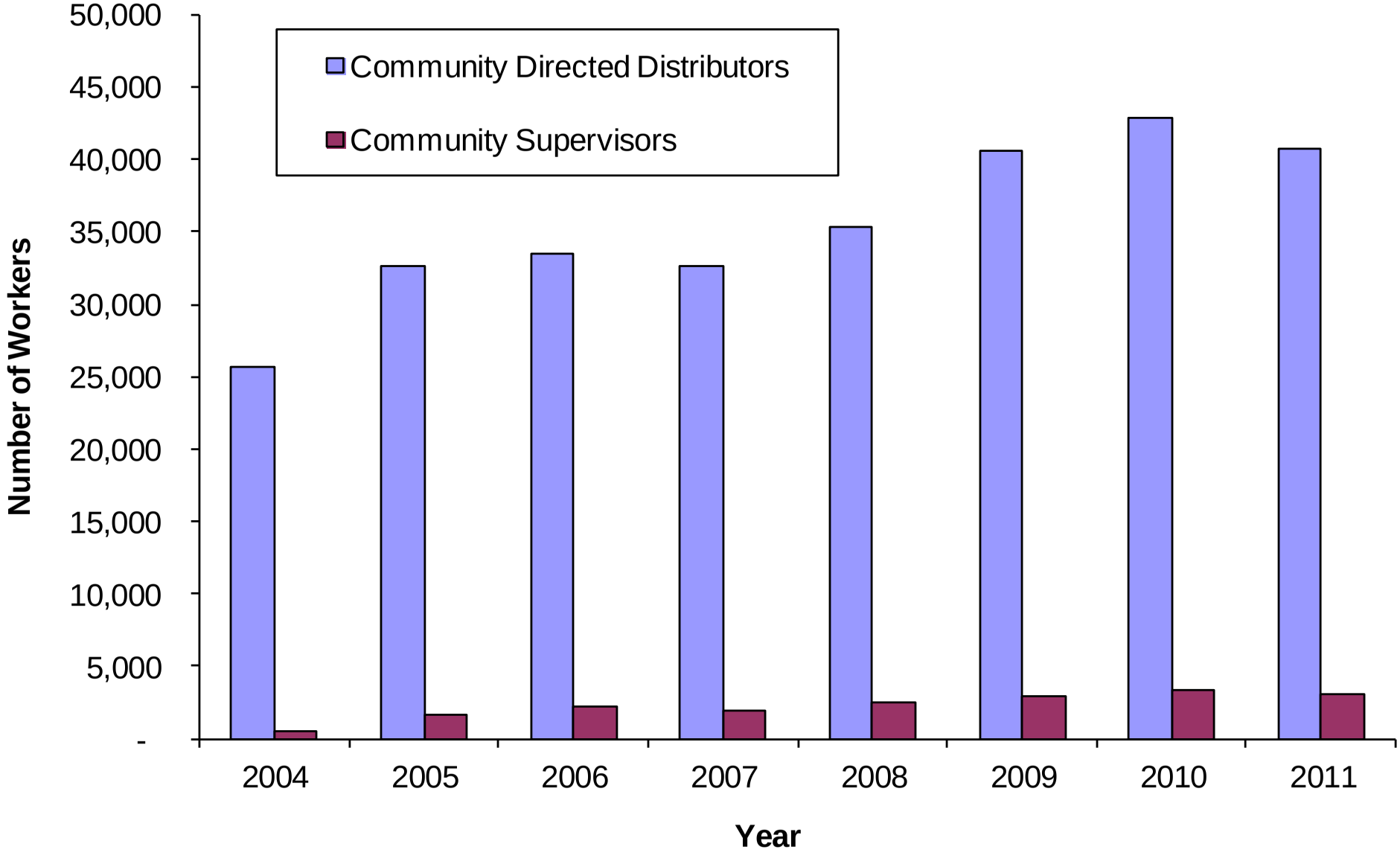


Figure 38

Ethiopia: Training of CDDs: 2001-2011 and percentage female

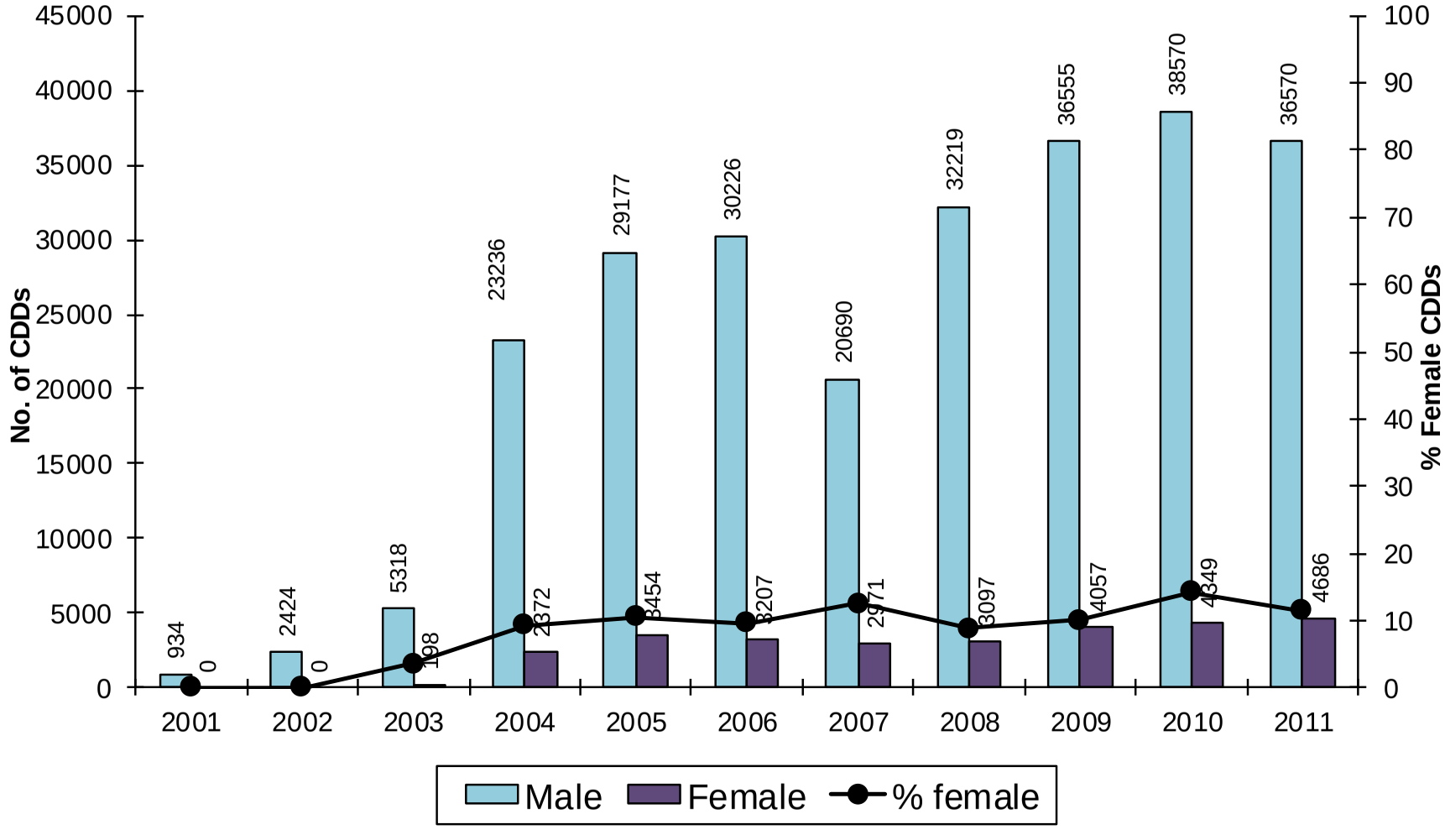
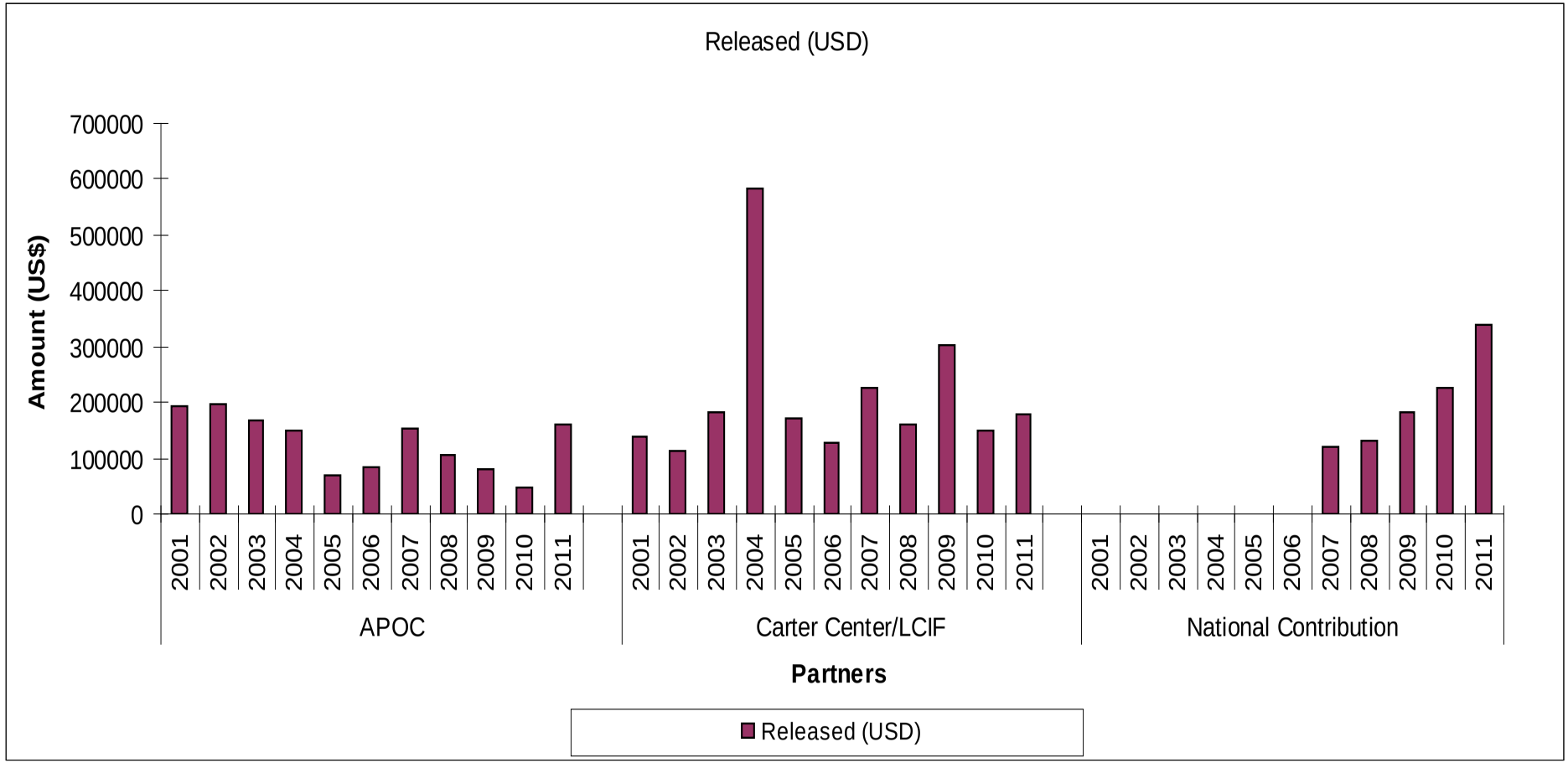


Figure 39

Ethiopia: Financial Contribution by different Partners 2001-2011



NOTE: The above contribution does not include staff salaries and benefits for all the partners.

The APOC and government contributions are reported by our Carter Center country representatives based on their best possible determinations from information available in country through the National Onchocerciasis Task Force and other local sources.

ACRONYMS

APOC	African Program for Onchocerciasis Control
arvs	at-risk villages (villages requiring community-wide active mass therapy)
ATO	Annual Treatment Objective
ATP	Annual Transmission Potential
BCC	Behavior Change Communication
CBM	Christoffel Blindenmission
CDC	Centers for Disease Control and Prevention
CDD	Community Directed Distributors
CDHS	Community-Directed Health Supervisors
CDTI	Community-Directed Treatment with Ivermectin
CPA	Comprehensive Peace Agreement
CS	Community Supervisors
DDT	Dichlorodiphenyltrichloroethane
DEC	Diethylcarbamazine
DNA	Deoxyribonucleic Acid
DPD	Division of Parasitic Diseases
earp	eligible at-risk population
ELISA	enzyme-linked immunosorbent assay
FMOH	Federal Ministry of Health
FUNASA	National Health Foundation
GNNTD	Global Network
GOS	Government of Sudan
GOSS	Government of South Sudan
GSK	GlaxoSmithKline
HE	Health Education
HEW	Health Education Worker
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
HKI	Helen Keller International
HQ	Headquarters
IACO	InterAmerican Conference on Onchocerciasis
IEC	Information, Education, and Communication
IRB	Institutional Review Board
JAF	Joint Action Forum
KGaA	E-Merck
LCCSFI	Lions-Carter Center SightFirst Initiative
LCIF	Lions Clubs International Foundation
LF	Lymphatic Filariasis
LGA	local government areas
LLIN	Long Lasting Insecticidal (bed) Net
MDA	Mass Drug Administration
MDP	Mectizan® Donation Program
MEC	Mectizan® Expert Committee
Mectizan®	Ivermectin (Merck & Co., Inc., product name)

MITOSATH	Mission to Save the Helpless
MOH	Ministry of Health
NGDO	Non-Governmental Development Organization
NOCP	National Onchocerciasis Control Program
NOTF	National Onchocerciasis Task Force
NTDs	Neglected Tropical Diseases
OCP	Onchocerciasis Control Program of West Africa
OEPA	Onchocerciasis Elimination Program for the Americas
PAHO	Pan American Health Organization
PBD	Department of Prevention of Blindness and Deafness
PCC	Program Coordinating Committee of OEPA
PCR	Polymerase Chain Reaction
PTS	Post-Treatment Surveillance
PZQ	Praziquantel
RB	River Blindness
RBF	River Blindness Foundation
RBP	River Blindness Program of The Carter Center
REMO	Rapid Epidemiological Mapping of Onchocerciasis
RTI	Research Triangle Institute
SAC	School Age Children
SAE	Severe Adverse Events
SESAI	Health Secretary for Indigenous Populations)
SH	*Schistosomiasis haematobium* (urinary schistosomiasis)
SM	*Schistosomiasis mansoni*
SMTC	Sustainable Management Training Center
STAG	Strategic and Technical Advisory Group
STH	Soil Transmitted Helminths
TAS	Treatment Assessment Survey
TCC	Technical Consultative Committee of APOC
TDA	Triple Drug Administration
TDR	Special Programme for Research and Training in Tropical Diseases
UNICEF	United Nations Children's Emergency Fund
UOEEAC	Ugandan Onchocerciasis Elimination Expert Advisory Committee
USAID	United States Agency for International Development
UTG	Ultimate Treatment Goal
VAS	Vitamin A Supplementation
WER	Weekly Epidemiolgical Record
WHO	World Health Organization

ANNEX 1: A history of the river blindness campaign at The Carter Center

Human onchocerciasis, caused by the parasite *Onchocerca volvulus*, is an infection characterized by chronic skin and eye lesions. Onchocerciasis is transmitted by small black flies of the genus *Simulium* that breed in rapidly flowing rivers and streams. Due to the high disease rates near rivers, onchocerciasis has been called "river blindness." The adult parasites develop in humans, and reside in non-painful nodules, measuring about one to two centimeters in diameter. They have the consistency and dimensions of cooked lima beans and often can be easily felt under the skin. The parasites are thin male and female worms that measure up to 12 inches in length and have a lifespan of five to 15 years. Female worms, which are four to five times longer than males, release embryonic stage offspring called microfilariae that emerge from the nodules. The microfilariae swarm under the skin, where they cause itching and rashes and can enter the eyes, where they cause inflammation and ocular damage. The transmission cycle is carried on as these microfilariae are picked up, metamorphose into infectious larvae and are transmitted to another person when the infectious black flies return to bite humans once more. The World Health Organization (WHO) estimates that approximately 32.7 million people are infected and 770,000 are blinded or severely visually impaired in 37 endemic countries, 30 of which are in Africa. Approximately 123 million people live in endemic areas worldwide and are therefore at risk of infection; more than 99 percent of those are African. Annual mass treatment with the oral tablets of a medicine called ivermectin (Mectizan®), donated by Merck, prevents eye and skin disease by killing the microfilariae. Unfortunately, ivermectin is not curative, as it does not kill the adult *O. volvulus* (although it does reduce the worms' lifespan). Annual treatment does reduce transmission of the parasite by lowering the amount of microfilariae available to black flies. Twice-per-year treatment (e.g., every six months) is more certain to interrupt transmission of the disease if treatment coverage is high, as this keeps microfilariae levels (and, thus, fly infection rates) extremely low throughout the year. When transmission falls below a critical threshold, worm populations cannot be sustained. Twice- or four-times-per-year treatment also increases the death rate of the adult worms.

Mass drug administration with Mectizan® in community treatment programs is the main global strategy for the control and elimination of onchocerciasis. It has largely replaced vector control, which was the sole strategy for onchocerciasis control before Merck began donating Mectizan® in 1987. Vector control approaches have always focused on "larviciding," meaning putting chemicals into streams to kill the aquatic stages of the black flies, rather than attacking the adult black fly stages that emerge from rivers to bite humans. The large World Bank/World Health Organization partnership known as the Onchocerciasis Control Program of West Africa (OCP) used helicopters and fixed-wing aircraft to deliver larvicides for many years; that program closed in 2003. Larviciding on a smaller scale, administered by ground-based field teams (hence, known as "ground larviciding"), is done as a supplement to Mectizan® treatment as part of the Uganda elimination program.

The Carter Center and its River Blindness Program: In 1987, Merck & Co., Inc. approached Dr. William Foege, then executive director of The Carter Center, for assistance in organizing the global distribution of Mectizan®. Shortly thereafter, in 1988, the Mectizan® Expert Committee (MEC) and the Mectizan Donation Program (MDP) were created and housed at the Atlanta-based Task Force for Child Survival and Development (now called the Task Force for Global Health), an independent partner of The Carter Center, with Dr. Foege as Chair. The global initiative has grown to one that now enables approximately 140 million treatments per year, and has cumulatively provided over one billion treatments valued at more than $4.2 billion U.S. dollars during the 25 years that it has been in existence. The donation is widely considered a model of public/private partnership that demonstrates how industry, international organizations, donors, national Ministries of Health (MOHs) and affected communities can successfully work together toward solving a major health problem. The MDP has spawned other public-private partnerships based on large drug donations and mass treatment programs to fight what are collectively known as the neglected tropical diseases (NTDs). These include the Global Alliance for the Elimination of Lymphatic Filariasis (GlaxoSmithKline through WHO), the International Trachoma Initiative (Pfizer), the Schistosomiasis Initiative (Merck KGaA/E-Merck through WHO), and Children without Worms (Johnson & Johnson and most recently GlaxoSmithKline). Many of these programs are based at the Task Force for Global Health.

In 1996, The Carter Center expanded its role in the coalition fighting river blindness by acquiring most of the operations of the River Blindness Foundation (RBF), a Houston-based organization founded in 1990 by John and Rebecca Moores. The River Blindness Program (RBP) was established at The Carter Center to assume the field activities of the RBF. The primary aim of the RBP is to help Ministries of Health and residents of affected communities to establish and/or sustain optimal Mectizan® distribution and related health education (HE) activities and to monitor the process toward control of onchocerciasis. RBP also seeks to completely eliminate onchocerciasis where possible, so that Mectizan treatments can be safely stopped. RBP undertakes elimination efforts only when MOHs request our assistance to do so. In 2011, RBP assisted parts of five countries in Africa: Cameroon, Ethiopia, Nigeria, Sudan and Uganda. The RBP's Onchocerciasis Elimination Program for the Americas (OEPA) coordinates activities to completely eliminate transmission and RB infection in all six onchocerciasis-endemic countries in the Americas (Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela). OEPA works under declarations by the Pan American Health Organization (PAHO) to eliminate onchocerciasis transmission from the Americas region.

Shortly after assuming the field activities of the RBF in 1997, The Carter Center's RBP expanded to northern and southern Sudan (now Sudan and South Sudan) with support from the Lions Clubs International Foundation (LCIF) as part of the Carter Center's peace initiative and Guinea worm disease eradication efforts. In 1999, as part of the expanded Lions-Carter Center Sight First Initiative (LCCSFI), The Carter Center accepted an invitation to assist onchocerciasis control activities in Ethiopia. Mectizan treatments and HE began in 2001. The Comprehensive Peace Agreement (CPA) in

Sudan, signed in January 2005, put an end to the decades-old civil war and created the Government of South Sudan (GOSS). The RBP ceased its support of river blindness control activities in GOSS areas of the country shortly after the CPA was signed, when the African Program for Onchocerciasis Control (APOC) and Christoffel Blindenmission (CBM) signed an agreement to support and establish five Community-Directed Treatment with Ivermectin (CDTI) projects in GOSS areas that overlapped areas historically assisted by RBP. In 2011 the Republic of South Sudan was formed after a referendum in the south overwhelmingly called for partition. North Sudan is now referred to as simply 'Sudan'.

Sudan and Uganda launched elimination strategies in 2006 and 2007 respectively. Both countries formally invited The Carter Center to participate in their elimination efforts. In Sudan, the elimination strategy targets the Abu Hamad focus on the River Nile, where transmission was determined to have been interrupted in 2011 by the Sudan Ministry of Health. In Uganda, the strategy is to phase in a country-wide flexible policy of elimination that includes not only twice-per-year treatment, but also vector elimination or targeted vector control where feasible through larviciding of breeding sites in fast-running rivers and streams.

Integration: Whenever possible, RBP works to integrate (or "co-implement") MDA activities for onchocerciasis, schistosomiasis, lymphatic filariasis, soil transmitted helminths, and trachoma. Vitamin A supplementation for young children and insecticide-treated net distribution are also a part of our integrated efforts, which are undertaken inside of our RB assisted areas at the request of MOHs and to the extent that our funding allows.

Partnerships: The Carter Center works through partnerships, with our primary partners being the Ministries of Health (MOHs) and their national onchocerciasis control or elimination programs. The Carter Center assists programs that are executed within and through the existing primary health care system, with the aim to strengthen those systems. The Carter Center and MOH staff work closely with district and frontline health workers and the afflicted rural communities; RBP does not establish parallel systems to the MOH. RBP provides financial and technical assistance as well as information, education, and communication (IEC), and behavior change communication (BCC). The primary principle is that the people themselves must be empowered to be full partners in the program and in the drug delivery process. As mentioned above, The Carter Center has had a long partnership with Lions Clubs and the Lions' SightFirst Initiative, supported by the Lions Clubs International Foundation, in addition to long standing relationships with Merck. and the Division of Parasitic Diseases (DPD) at the U.S. Centers for Disease Control & Prevention (CDC). The Carter Center also works closely with the Task Force for Global Health, which houses the Mectizan Donation Program.

Partners in the African Programs: In Africa, the main Carter Center partners are the MOHs in host countries (Cameroon, Ethiopia, Nigeria, Sudan, and Uganda). The Carter Center also works with other non-governmental development organizations (NGDOs)

through the NGDO Coalition for Mectizan® Distribution that includes, among others, Christoffel Blindenmission, Helen Keller International, Interchurch Medical Assistance, LCIF, Merck, Sightsavers, and the U.S. Committee for UNICEF.

The African Program for Onchocerciasis Control (APOC), which is executed by WHO and funded through a trust fund housed at The World Bank, is another important partner of The Carter Center. APOC was launched in 1995, and aims to establish country-sustained river blindness treatment programs with a "community-directed" approach by 2015 throughout highly endemic onchocerciasis areas in Africa. Carter Center disease control experts Dr. Donald Hopkins, Dr. Frank Richards, and Dr. Moses Katabarwa have all served on the Technical Consultative Committee of APOC.

Dr. Richards also serves on the Strategic and Technical Advisory Group (STAG) to WHO's NTD Department and is vice chair of the NGDO Coalition for Mectizan® Distribution.

Partners in the Americas Programs: The Carter Center provides the administrative framework for OEPA. Headquartered in Guatemala, OEPA is the technical and coordinating body of a multinational, multi-agency coalition working for the elimination of all onchocerciasis morbidity and transmission from the Americas by the year 2015. Through OEPA, The Carter Center partners with the national programs and MOHs of all six endemic countries of the Americas (Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela). Regional technical and programmatic goals are developed by a Program Coordinating Committee (PCC), which is convened by OEPA and has representation from key members of the initiative. The Carter Center works with LCIF, PAHO, CDC, and several U.S. and Latin American universities. In 2003, The Carter Center's RBP received its first support from the Bill & Melinda Gates Foundation for OEPA through a matching grant mechanism that drew additional funding from LCIF, Merck, and more than 70 other donors. In 2012, OEPA begins receiving major support from USAID.

Onchocerciasis elimination in Africa: APOC is actively entertaining a change in strategy from control to elimination, at least in some areas of Africa. The Carter Center has long been engaged in demonstrating onchocerciasis elimination in Africa, and has also been engaged in the intellectual debate about its feasibility on the continent (see timeline on following page). RBP applauds the APOC paradigm shift. RBP will continue to play a leadership role in demonstrating an approach to African onchocerciasis elimination that involves reorienting programs away from the control mode toward a more rigorous elimination mode that implies expanded, intensified, and flexible interventions against onchocerciasis, as well as better mapping, monitoring and evaluation. Elimination cannot be achieved by "business as usual."

Timeline of The Carter Center in River Blindness Elimination

- **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.
- **2000:** OEPA needed a 'definition of success' endorsed by WHO. With a push by President Carter, WHO agreed to hold an important meeting to establish certification criteria for onchocerciasis elimination. (WHO 2001) These guidelines remain a key milestone and are used by OEPA and Uganda efforts. Richards, writing in *Lancet*, notes the importance of the LF program in advancing the RB elimination agenda.
- **2002:** Carter Center and WHO (with Gates' support) co-hosted a "Conference on RB Eradicability" that concluded RB can be eliminated in the Americas but not yet throughout Africa with current tools (ivermectin alone). The challenge of the parasite *Loa loa*, which occurs in some areas that have RB, was noted (ivermectin given to a person having *Loa loa* infection can result in severe nervous system reactions, including coma). (Dadzie 2003)
- **2005:** Paper published by Hopkins, Richards, and Katabarwa ("Whither Onchocerciasis Control in Africa?") challenges feasibility of indefinite RB control in Africa without continued external support. Calls for governments to do more to fund their RB programs, and calls for further research into RB elimination in Africa. (Hopkins 2005)
- **2006:** TCC/RBP agrees to assist North Sudan in elimination efforts in the Abu Hamad focus on the River Nile. (Higazi 2011)
- **2007:** TCC/RBP reviews RB eradicability and notes evidence that ivermectin alone may interrupt transmission in Africa, but that the challenge of *Loa loa* is not resolved. (WHO 2007). TCC/RBP agrees to assist Uganda in its new goal of national RB elimination.
- **2009:** A key WHO/TDR study by Diawara (2009) that was conducted in Senegal and Mali with Gates support (derived as an outcome of the 2001 Conference on Eradicability) proves RB elimination is possible with 17 years of ivermectin alone under some conditions in Africa. Gates, MDP, TCC and APOC all call for "Shrinking the Map" in Africa (WHO 2009). Rakers (TCC/RBP staff) reports that RB programs in Nigeria would collapse without external support, questioning the 'sustainability' theory.
- **2010:** TCC/RBP reports considerable success in RB elimination efforts in the Americas (series of *Weekly Epidemiological Record* articles) and parts of Africa. However, Katabarwa (TCC/RBP staff) notes a need to expand treatment into the so called hypoendemic areas excluded in the APOC treatment targeting strategies. He also challenges the Diawara report by noting failures of once per year treatment with ivermectin alone for 17 years in TCC assisted North Province Cameroon. TCC/RBP calls for twice per year treatment in these areas (Katabarwa 2011). At an international conference TCC/RBP reports an analysis of the impact of annual ivermectin and albendazole (for lymphatic filariasis) on onchocerciasis transmission elimination in many areas of Plateau and Nasarawa States of Nigeria.
- **2011:** TCC's International Task Force for Disease Eradication 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, LF and malaria bed net distribution efforts (*Weekly Epidemiological Record* 2011). An expert committee (with Frank Richards 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 is expected to accept that recommendation for elimination as a key reason to ask donors to extend the APOC program from 2015 to 2025.

ANNEX 2: The Carter Center RBP reporting processes and research agenda

At-risk Villages (arvs): An epidemiological mapping exercise was a prerequisite to identifying at-risk villages (arvs) for mass Mectizan® treatment programs. The assessment techniques used in the mapping exercise in Africa varied 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 percent in adults (which roughly corresponds to a microfilariae in skin prevalence ≥40 percent) 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 percent. 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, the survey villages are visited by field teams and a convenience sample of 30-50 adults are examined (by palpation) for characteristic onchocercal nodules. The mean nodule prevalence for each village sample is mapped (often using geographic information systems) and the map is used to define endemic zones called 'community directed treatment with ivermectin (CDTI) treatment zones'. These zones typically are defined by sample villages having nodule prevalence of ≥20 percent. All villages within the CDTI treatment zone are offered mass Mectizan® treatment annually. This approach is modified for areas where the parasite *Loa loa* exists. The approach of REMO excludes some areas from CDTI, where there may be onchocerciasis but nodules rates are under 20 percent (the so-called "hypodendemic areas"). As the policy shifts from control to elimination, the role of hypoendemic areas in *Onchocerca volvulus* transmission is being critically re-examined. The River Blindness Program (RBP) contributes to this area of investigation in our assisted areas (see Katabarwa, *Trop Med Int Health*. 2010; 15:645-52). Based on evidence we have collected, we firmly believe that transmission occurs in some hypoendemic areas and that they must therefore be treated with CDTI, with a shift in policy from control to elimination of onchocerciasis.

In the Americas, the goal is to eliminate both morbidity and transmission from *O. volvulus* and, as a result, all villages where transmission can occur are considered "at-risk" and are offered mass Mectizan® treatment activities every three or six months. Thus, a "broader net" is cast for mass treatment where elimination is the goal and the concept of excluding hypoendemic villages does not exist. For the Americas, where the endemic foci are characteristically smaller and more defined than Africa, every village in known or suspected endemic areas has a rapid epidemiological assessment of 50 adults, who have both nodule examinations and superficial skin biopsies to identify *O. volvulus* microfilaria in skin. Villages in which one or more persons are positive (sample prevalence ≥2 percent) are considered "at-risk" and are recommended for the mass treatment campaign. Thus, the cutoff prevalence for treatment is much lower for the Americas compared to Africa, and approximates thresholds used by the Lymphatic

Filariasis (LF) elimination campaign (>1 percent) where the goal is also transmission interruption. It is because the lower LF elimination program treatment thresholds are being used in Plateau and Nasarawa states that we believe onchocerciasis transmission may have likewise been interrupted there. This is another area of active RBP research in Nigeria.

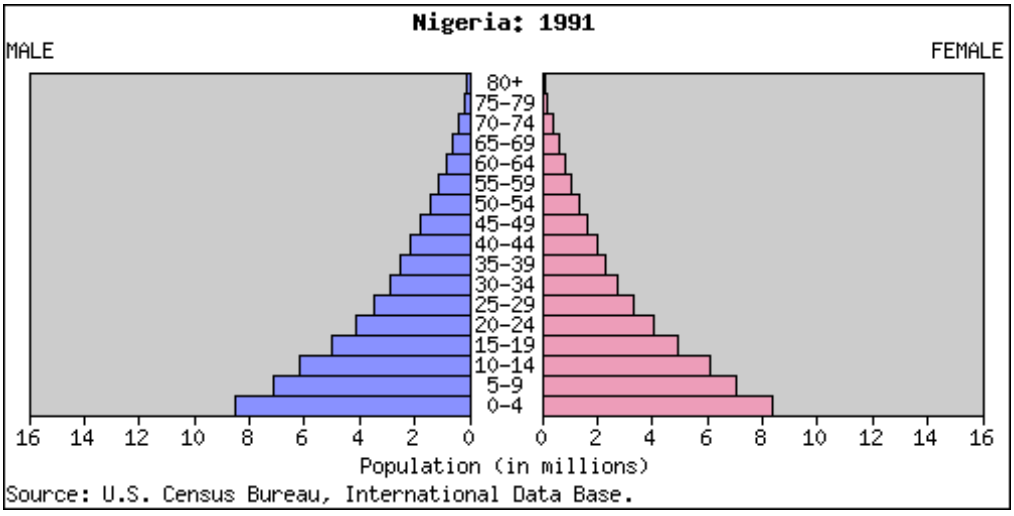
Data Reporting: The Carter Center program offices report monthly to The Carter Center headquarters in Atlanta. These reports include: 1) numbers of villages and persons treated during the previous month (reporting of treatments are updated quarterly for the Americas); 2) the status of the Mectizan® tablet supply; 3) training and health education activities; 4) epidemiological assessment, research, and program monitoring activities; and 5) administrative issues. Standardized tables and graphs are used across programs. The treatment data that are reported originate from village level records prepared during mass treatment activities carried out by village distributors and/or national Ministry of Health (MOH) personnel. The accuracy of these reports is routinely confirmed with random spot checks performed primarily by MOH personnel, supplemented by a standardized monitoring questionnaire administered by The Carter Center staff and/or Lions Clubs members. Summary reports of numbers of villages and persons treated are compiled at the district level and forwarded (whenever possible through MOH surveillance and reporting channels) to both headquarters of the national onchocerciasis programs and the national Carter Center offices. In the Americas, the MOHs in the six countries report treatments quarterly to the OEPA office in Guatemala City, which then provides a combined regional report to The Carter Center and to the Program Coordination Committee (PCC), InterAmerican Conference on Onchocerciasis (IACO) and the Pan American Health Organization (PAHO)/World Health Organization (WHO) in its regular meetings; OEPA updates are provided in WHO's annual *Weekly Epidemiological Record* articles (See *Wkly Epidemiol Rec*. 2011; 86: 417–424). African MOHs report their annual results directly to WHO and APOC.

The data from monthly reports are supplemented with additional information at the annual Carter Center River Blindness Program Review held during the first quarter of the following year. At these reviews, all Carter Center program directors and other partners convene to finalize treatment figures for the previous year and establish new treatment objectives for the coming year. Data on Mectizan® treatments provided by other programs/partners operating in other parts of the countries where The Carter Center assists also are discussed (if these data are available), as well as results from research initiatives. The Carter Center reports its final annual treatment figures to the Mectizan Donation Program (MDP), Merck, and the NGDO Onchocerciasis Coordination office located in the Department of Prevention of Blindness and Deafness (PBD), WHO, Geneva.

RBP Treatment Indices: Treatments are reported as numbers of persons and number of at-risk villages (arvs) treated for the month by district, focus, region, state or zone, depending on the geographical stratification of the country. Cumulative treatment figures for the year are compared to the Annual Treatment Objectives (ATOs) or Ultimate Treatment Goals (UTGs). The decision whether to use ATOs or UTGs is

based on projections of program capacity. Mature programs that sufficiently reach all targeted communities within their entire program area are said to be at "full geographic coverage," and use the UTG index as their coverage denominator (see below). UTG figures typically increase by about five percent annually to account for normal population growth. All Carter Center-assisted river blindness programs have already reached their UTGs, as have the Plateau/Nasarawa Lymphatic Filariasis (LF) and Schistosomiasis (SH) programs; the SH program in southeast Nigeria is at scale in two of the seven states assisted. LF MDA activities are not currently possible in southeast Nigeria due to *Loa loa* coendemicity.

The eligible populations of at-risk villages (arvs) targeted for active mass distribution receive community-wide Mectizan® treatment. The eligible at-risk population (earp) includes all persons living in arvs who are eligible to receive Mectizan® (i.e., who are either ≥5 years of age, ≥15 kg in weight, or ≥90 cm in height, and who are in good health). Although RBP mass treatment activities exclude pregnant women, these women should be treated later during the treatment year (treatment may be given one week or more after parturition) and therefore all adult women are included in the UTG calculation. In practice, the UTG is established by arv census 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. APOC and LF elimination use total population as their treatment denominator, so RBP routinely reports both coverage of eligible population (UTG) and coverage of total population ("therapeutic coverage") to satisfy those program's needs. The rationale for RBP's focus on the UTG denominator has been published (Richards et al., *American Journal of Tropical Medicine and Hygiene* 2001; 65:108-14). In general, total population coverage is 8-10% less than UTG (eligible) population coverage, in accord with population pyramids in areas being served, where 8 percent of the population is under 5 years of age and thus ineligible for Mectizan® treatment (see example below, Nigeria).



The UTG(2) and UTG(4) denominators are used by elimination programs where semiannual or quarterly treatments are delivered: the values are twice or four times the

UTG, and represent treatments delivered, not persons treated. Full coverage in control programs is defined as 90 percent achievement of the UTG established for active mass treatment. Full coverage for elimination programs is 90 percent of the UTG(2) in African projects, or 85 percent of the UTG(2) or UTG(4) for OEPA. The differences in full coverage thresholds result from different recommendations by the African and American expert steering committees. Passive treatments are Mectizan® treatments for onchocerciasis provided through health care units located in hypoendemic communities (where estimated onchocerciasis nodule prevalence is under 20 percent) in the control program strategy. In elimination programs supported by RBP, hypoendemic villages receive mass treatment (not passive).

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ANNEX 5: Program Review Agenda

Sixteenth Annual River Blindness Program Review Agenda
Tuesday February 21 – Thursday February 23, 2012
The Carter Center, Atlanta, GA

Day 1: Tuesday February 21, 2012

8:00	*Shuttle pickup at hotel*	
8:30 – 9:00	*Continental breakfast*	
9:00 – 9:15 9:15 – 9:45	Welcome Overview and Introduction to Part 1	Dr. Donald Hopkins Dr. Frank Richards (chair)

Part 1: 2011 Treatment Activity Summary

9:45 – 10:15 10:15 – 10:30	Nigeria: Onchocerciasis *Discussion*	Dr. Emmanuel Emukah
10:30 –11:00 11:00 – 11:15	Nigeria: Lymphatic Filariasis, Schistosomiasis and Malaria *Discussion*	Dr. Abel Eigege
11:15 – 11:45	*Coffee Break and Group Photo*	
11:45 –12:15 12:15 – 12:30	Ethiopia presentation *Discussion*	Dr. Zerihun Tadesse
12:30 – 2:00	*Lunch*	
2:00 – 2:30 2:30 – 2:45	OEPA presentation *Discussion*	Dr. Mauricio Sauerbrey
2:45 – 3:15 3:15 – 3:30	Uganda presentation *Discussion*	Ms. Peace Habomugisha
3:30 – 3:45	*Coffee Break*	
3:45 – 4:15 4:15 – 4:30	Sudan presentation *Discussion*	Dr. Kamal Osman
4:30 – 5:00 5:00 – 5:15	Cameroon presentation *Discussion*	Dr. Albert Eyamba
5:15	*Session Adjourned*	

Day 2: Wednesday February 22, 2012

8:00	*Shuttle pickup at hotel*	
8:30 – 9:00	*Continental breakfast*	

Part 2: Sustainability and Integration

9:00 – 9:15 9:15 – 9:30	Mectizan® and albendazole issues *Discussion*	Mectizan Donation Program
9:30 – 9:50	Introduction to Part 2	Dr. Moses Katabarwa
9:50 – 10:20 10:20 – 10:35	Uganda presentation: sustainability and integration *Discussion*	Ms. Peace Habomugisha
10:35 – 11:00	*Coffee Break*	
11:00 – 11:45 11:45 – 12:00	Cameroon presentation: sustainability and integration *Discussion*	Dr. Albert Eyamba
12:00 – 12:20 12:20 – 12:30	Sudan presentation: sustainability and integration *Discussion*	Dr. Nabil Aziz
12:30 – 1:30	*Lunch*	
1:30 – 2:00 2:00 – 2:15	Ethiopia presentation: sustainability and integration *Discussion*	Dr. Aseged Taye
2:15 – 2:45 2:45 – 3:00	Nigeria presentation: sustainability and integration *Discussion*	Dr. Emmanuel Emukah
3:00 – 3:30 3:30 – 3:45	Nigeria: Plateau and Nasarawa 2011 LF entomology results, 2012 LF TAS plans *Discussion*	Dr. Abel Eigege
3:45 – 4:00	*Coffee Break*	
4:00 – 4:15 4:15 – 4:30 4:30 – 4:45	The future of schistosomiasis Praziquantel coverage surveys *Discussion (with comments from Dr. Eigege)*	Mr. Darin Evans Mr. Jonathan King
4:45 – 5:15 5:15 – 5:30	OEPA presentation: Epi table update and Post Treatment Surveillance (PTS) *Discussion*	Dr. Mauricio Sauerbrey
5:30	*Session Adjourned*	

Day 3: Thursday February 23, 2012

8:00	*Shuttle pickup at hotel*	
8:30 – 9:00	*Continental breakfast*	

Part 3: Research and Special Reports

9:00 – 9:20 9:20 – 9:30	Monitoring treatment coverage: an analysis of 7 years of results *Discussion*	Dr. Moses Katabarwa
9:30 – 9:35	Introduction to Part 3	Ms. Lindsay Rakers
9:35 – 10:15 10:15 – 10:30	OEPA: In-depth look at the Yanomami area *Discussion*	Dr. Mauricio Sauerbrey
10:30 – 11:00 11:00 – 11:15	Cameroon: Impact assessment, West Region *Discussion*	Dr. Albert Eyamba
11:15 – 11:30	*Coffee Break*	
11:30 – 12:00 12:00 – 12:15	Nigeria presentation: 2010 RB transmission study final report *Discussion*	Dr. Abel Eigege
12:15 – 12:45 12:45 – 1:00	Nigeria: Southeast: LF Gates study final report *Discussion*	Dr. Emmanuel Emukah
1:00 – 2:00	*Lunch*	
2:00 – 2:30 2:30 – 2:45	Uganda: status of elimination program *Discussion*	Dr. Moses Katabarwa
2:45 – 3:15 3:15 – 3:30	Sudan: Abu Hamad update with final report on lab studies *Discussion*	Dr. Isam Zarroug
3:30 – 3:45	*Coffee Break*	
3:45 – 4:15 4:15 – 4:30	Ethiopia: APOC RB evaluation, LF sentinel results *Discussion*	Dr. Aseged Taye
4:30 – 5:15	Summary and Closure of Sixteenth Session	Dr. Donald Hopkins Dr. Frank Richards
5:15	*2011 Carter Center River Blindness Program Review Adjourned*	

ANNEX 6: The Nigeria Lymphatic Filariasis (LF) Elimination Program and Schistosomiasis Control Program

Lymphatic filariasis 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 dysfunction, often leading to poor lymphatic drainage. Clinical consequences include swelling of limbs and genital organs (lymphoedema and "elephantiasis"), and painful recurrent attacks of acute adenolymphangitis. The female worms release microfilariae, which are tiny embryonic worms that circulate in blood at night, when the vector mosquitoes bite. Microfilariae are picked up by mosquitoes, develop over several days into infectious larvae, and are then able to be transmitted to another person when the mosquitoes bite again. Microfilariae are killed by annual single-dose combination therapy, with either Mectizan® (donated by Merck) and albendazole (donated by GlaxoSmithKline), or diethylcarbamazine (DEC) and albendazole (in areas where there is no onchocerciasis and/or *Loa loa* infection). Annual mass drug administration (MDA) prevents mosquitoes from being infected, and when given for a period of time (estimated to be five to six years) can interrupt transmission of *W. bancrofti* (which has no animal reservoir).

Schistosomiasis is acquired from contact with fresh water. *Cercariae*, released from infected snails, penetrate the skin and develop into adult worms that reside in venules of the intestines (*Schistosoma mansoni*) or bladder (*S. hematobium*). Female worms lay thousands of eggs that exit the body in feces or urine. If the eggs gain access to fresh water, they hatch and release miracidae, which swim in search of certain types of snails that they penetrate and infect. In the snails, the miracidiae transform and multiply, releasing cercariae, thus continuing the lifecycle. Disease from schistosomiasis comes from the inflammation caused by the eggs deposited into human tissues by the female worms. These eggs cause inflammation, organ damage, bleeding, and anemia. School-aged children (ages five to 14) are the most heavily affected by schistosomiasis and act as the main disseminators of this infection through their urination and defecation in or near fresh water. MDA with the safe and effective oral medicine praziquantel can significantly reduce schistosomiasis morbidity. Praziquantel kills the adult worms and so prevents the eggs from accumulating in tissues. Until 2007, praziquantel was not routinely donated in large amounts to control programs by the pharmaceutical companies (as are Mectizan® and albendazole) and had to be purchased at approximately U.S. $0.20 per child treated. In April 2007, the pharmaceutical company Merck KGaA (E-Merck) announced a 200 million tablet, 10-year donation of praziquantel to the World Health Organization for schistosomiasis control. By 2011, the company's donation had grown to about 25 million tablets per year. In January 2012, Merck KGaA went further: it pledged to increase its praziquantel donation program tenfold, to 250 million tablets per year.

Nigerians suffer in disproportionate numbers from LF and schistosomiasis. The country is considered to contain the largest number of persons at risk for LF in Africa, and is ranked third globally behind India and Indonesia in the human suffering from this parasite. It is estimated that more than 25 million Nigerians (22 percent of the

population) are infected with LF, and the mass drug administration for LF in Nigeria will need to reach many times this number to cover the entire at-risk population. For schistosomiasis, an estimated 20 million Nigerians (the greatest of any country) need to be treated with praziquantel every one to three years.

The Carter Center, working with the Federal Ministry of Health (FMOH) of Nigeria and with the state and local government ministries in Plateau and Nasarawa states, has assisted in establishing an LF elimination program in Plateau and Nasarawa states. The effort is based on a strategy of health education (HE) and annual drug combination therapy with albendazole and Mectizan®. The manufacturers of the drugs have global donation programs for LF: GlaxoSmithKline donates albendazole, and Merck donates Mectizan®. Through a grant from the Bill & Melinda Gates Foundation, The Center conducted field research on using LLINs alone to combat LF in Imo and Ebonyi states, which are areas where LF MDA is not currently possible due to the presence of *Loa loa*. Preliminary results show LLIN are having great impact on mosquito infection. Thanks to the Global Fund Round 8, long-lasting insecticide treated nets (LLINs) are now being mass distributed for malaria prevention, two per household, throughout Nigeria; this supplements HE and drug combination therapy as one more way to fight LF. The national programs are actively involved in The Carter Center-assisted program, and The Carter Center has assisted in the mass distribution of LLIN in some states where we work.

The Carter Center's Schistosomiasis Control Program operates in Plateau, Nasarawa, Delta and Edo states (See maps in Nigeria section). The strategy is similar to the RBP and LF programs: HE and mass annual treatments with safe and effective oral drugs, in this case praziquantel. Until 2007, praziquantel was not routinely donated to the program, although in past years, The Carter Center received limited gifts of praziquantel from pharmaceutical companies including: Bayer AG, Medochemie, Ltd., and most recently, Shin Poong Pharmaceutical Company, Ltd. The Carter Center has purchased the remainder with funds raised from other donors. WHO, in collaboration with Merck KGaA, has been donating praziquantel tablets to our Plateau and Nasarawa projects since 2008, with the intention to continue this donation annually for up to 10 years, depending on progress and the Center's ability to find funding for drug distribution. This major development removed the hurdle of the price of praziquantel (approximately U.S. $0.20 per treatment) for those two states, which restricted the growth of the schistosomiasis program in the past. The schistosomiasis program in Delta and Edo states operates and purchases praziquantel with a generous grant from the Izumi Foundation, and also receives some donated praziquantel from Merck KGaA.

The strategy in those two states is to treat all the estimated one million school aged children. Treatment in Plateau and Nasarawa addresses coendemic intestinal *Schistosomiasis mansoni* (SM), in addition to urinary schistosomiasis (*Schistosomiasis haematobium* or SH). The change in approach was decided upon after a Carter Center-supported study, in collaboration with Emory University School of Medicine, concluded that the costs of the village-by-village diagnosis of SH and SM would be greater than those of the presumptive treatment of the school-age children (SAC) in all villages. Until

improved and less expensive rapid diagnostic methods for SM become available, the least costly approach to the overall problem of schistosomiasis in this part of Nigeria would therefore be widespread mass drug distributions, without screening for at-risk populations.

ANNEX 7: Monitoring sustainability and costs after withdrawal of core funding by the African Program for Onchocerciasis Control (APOC)

The African Program for Onchocerciasis Control (APOC) administers a large World Bank trust fund for onchocerciasis, which provides major, core support for African onchocerciasis projects during their first five years. The Carter Center River Blindness Program (RBP) and its national partners enjoyed APOC Trust Fund support for delivery of Mectizan® for 18 Carter Center-assisted river blindness projects in Africa, until each completed the five-year cycle between 2002 and 2008 (Table A). Several RBP projects continue to receive support for special initiatives, but no longer receive regular APOC funding for implementation (field) activities such as community mobilization, health education, supervision, monitoring, data collection, and reporting. While these fundamental tasks required for sustaining Mectizan® treatment programs should be the responsibility of government, RBP has, in general, observed insufficient national funding needed to sustain the original APOC projects, although government support trended upward in 2009.

Table A: APOC funding for The Carter Center assisted CDTI projects

COUNTRY	PROJECT	First year with APOC (JAF, definitive)	5th year APOC core funding ended
Nigeria	Imo/Abia	1998 Sept	2003 Oct
Nigeria	Enugu/Ebonyi/Anambra	1998 Sept	2003 Oct
Nigeria	Edo/Delta	1999 June	2004 Nov
Nigeria	Plateau/Nasarawa	1998 April	2003 May
Cameroon	North Province	1998 Nov	2003 Oct
Cameroon	West Province	2001 Jan	2006 June
Sudan	Northern	1997 May	2003
Uganda	Kasese/Kisoro	1997 May	2002 July
Uganda	Mbale/Kabale	1998 Sept	2003 Oct
Uganda	Kanungu/Nebbi	1998 Dec	2004 June/July
Uganda	Moyo/Gulu/Apac/Adjumani	1999 Aug	2005 Feb
Ethiopia	Illubabor Zone	2004 June	2008 Nov
Ethiopia	Jimma Zone	2004 June	2008 Nov
Ethiopia	Kaffa/Sheka Zones	2000 Aug	2005 Oct
Ethiopia	Bench Maji Zone	2002 Oct	2007 Mar
Ethiopia	North Gondar Zone	2002 Oct	2008 Mar
Ethiopia	Metekel Zone*	2004 Aug	2008 Aug
Ethiopia	Gambella Zone*	2004 Sept	2008 Sept
* APOC began funding in 2004. Carter Center became an NGDO partner in 2005.			

The RBP has made it one of its basic monitoring tasks to collect and refine government and Carter Center funding figures, along with additional funds provided through APOC. Monitoring trends for increased funding is especially important to determine if countries are filling the ”post-APOC” funding gap. The post-APOC gap is defined as budget

shortfalls in key areas arising since the withdrawal of core APOC support for distribution activities. The RBP is monitoring Ultimate Treatment Goal (UTG) coverage by post-APOC treatment year as well, and has not observed a decline in treatments in the post-APOC period. However, when RBP has temporarily withdrawn its support, also, we have observed programmatic decline in either treatments (see Rakers et al, Lancet 2009) or in programmatic activities such as training, health education or treatment reporting. The ultimate goal for control programs is to see Mectizan® delivery handed over to the full fiscal responsibility of the national, state, and local governments. However, in the new elimination paradigm that likely will soon be embraced by APOC and its partners for Africa, the ultimate goal will be able to safely stop administering Mecitzan®; sustainability as an ultimate goal will no longer be required.

ANNEX 8: Publications Authored or Coauthored by RBP Personnel

Program Coordinating Committee and OEPA staff. Guide to detecting a potential recrudescence of onchocerciasis during the post treatment surveillance period: the American paradigm. *Research and Reports in Tropical Medicine.* 2012; 3: 21–33.

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