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Summary
2009 Program Review for The Lions-Carter Center SightFirst

RIVER BLINDNESS PROGRAMS
Cameroon, Ethiopia, Nigeria, OEPA, Sudan, and Uganda

23 – 25 March 2010
The Carter Center
Atlanta, GA

Lions Clubs International FOUNDATION

THE CARTER CENTER
RIVER BLINDNESS PROGRAM

October 2010

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And to many others, our sincere gratitude

Figure A

2009 River Blindness Program Review Participants

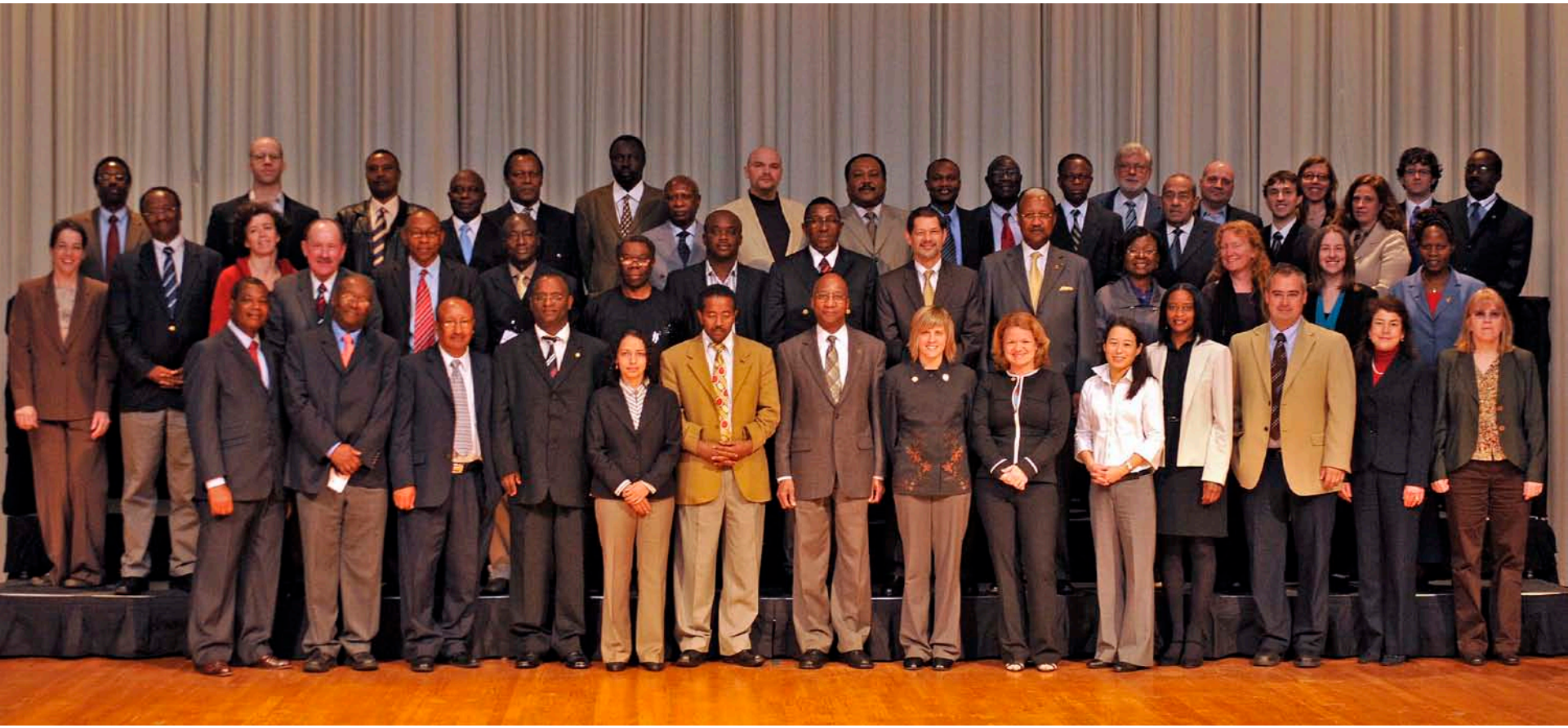


Figure B

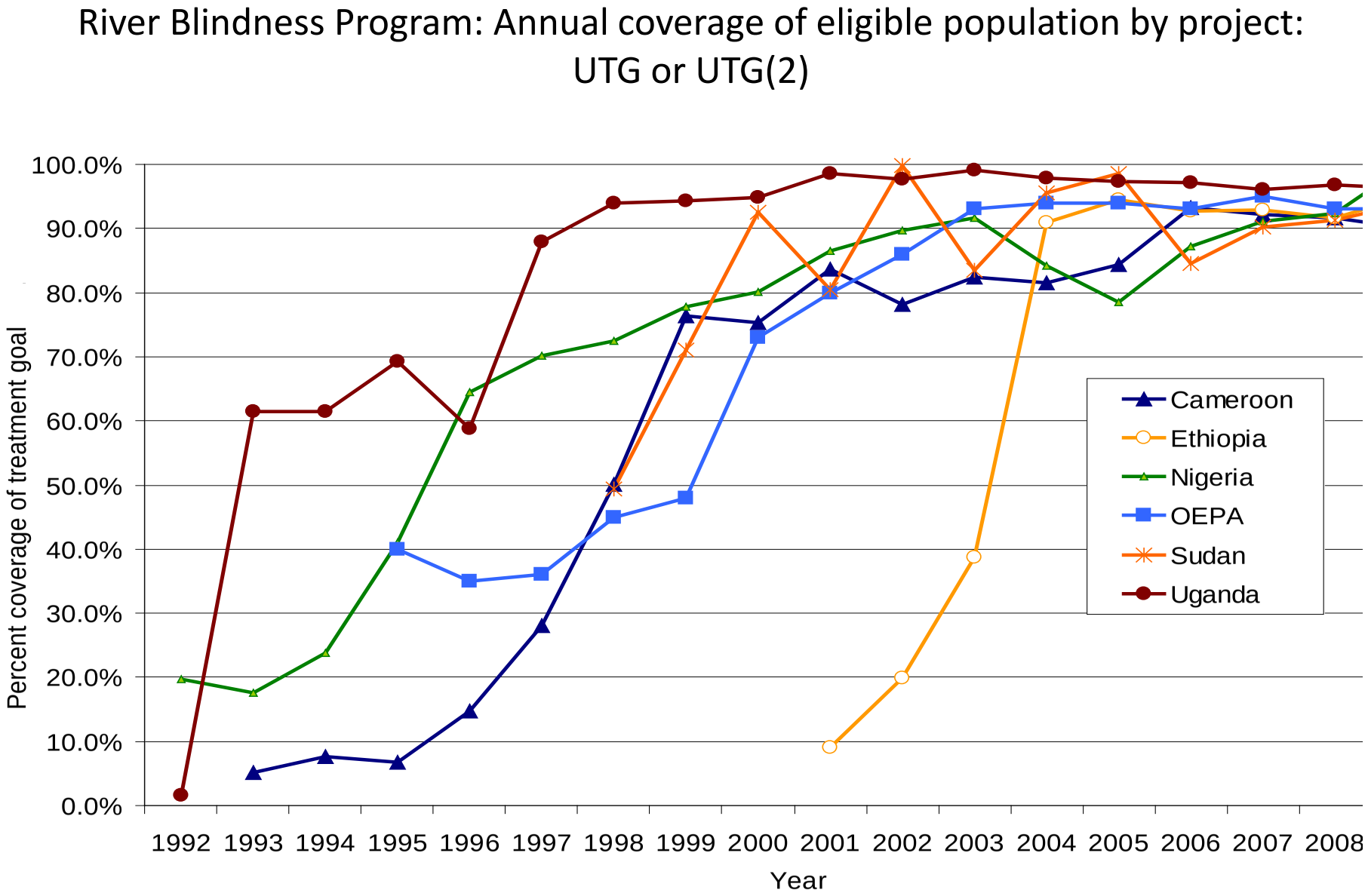

River Blindness Program: Annual coverage of eligible population by project: UTG or UTG(2)
Percent coverage of treatment goal
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008
Year
Cameroon
Ethiopia
Nigeria
OEPA
Sudan
Uganda

Figure C

Increasing Percentage of Female Community Distributors in Carter Center-assisted River Blindness Programs in Africa 2001 – 2009

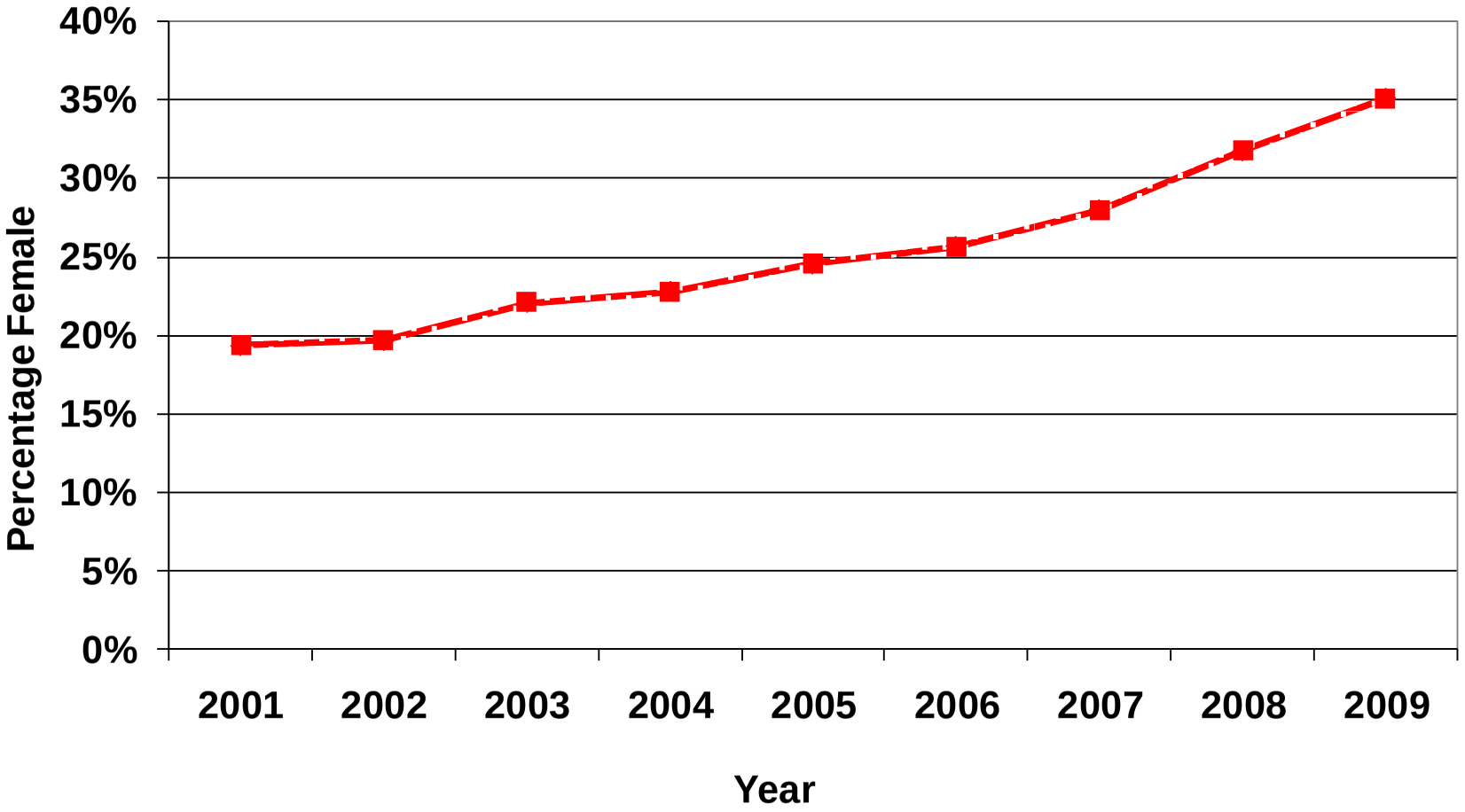


Figure D

Treatment Coverage Among the 13 Foci With River Blindness in the Americas:
Transition From Mass Treatment to Post Treatment Surveillance (PTS) as Transmission is Interrupted and Mass Treatment Halted (2006- 2009)

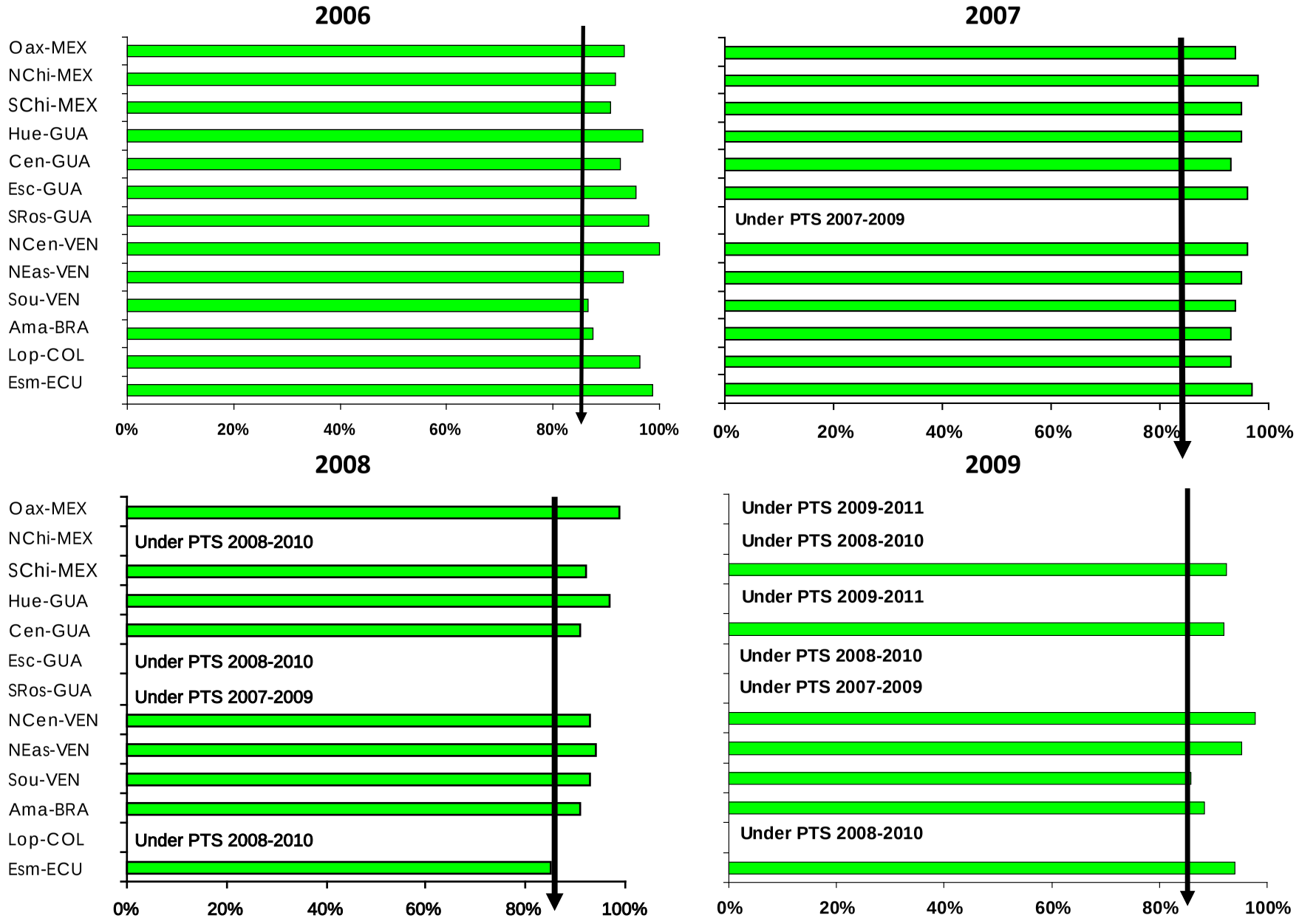


Figure E

Disappearance of *Simulium neavei spp* Vector Flies in Mt. Elgon Focus of Eastern Uganda with Abate Larviciding Applications

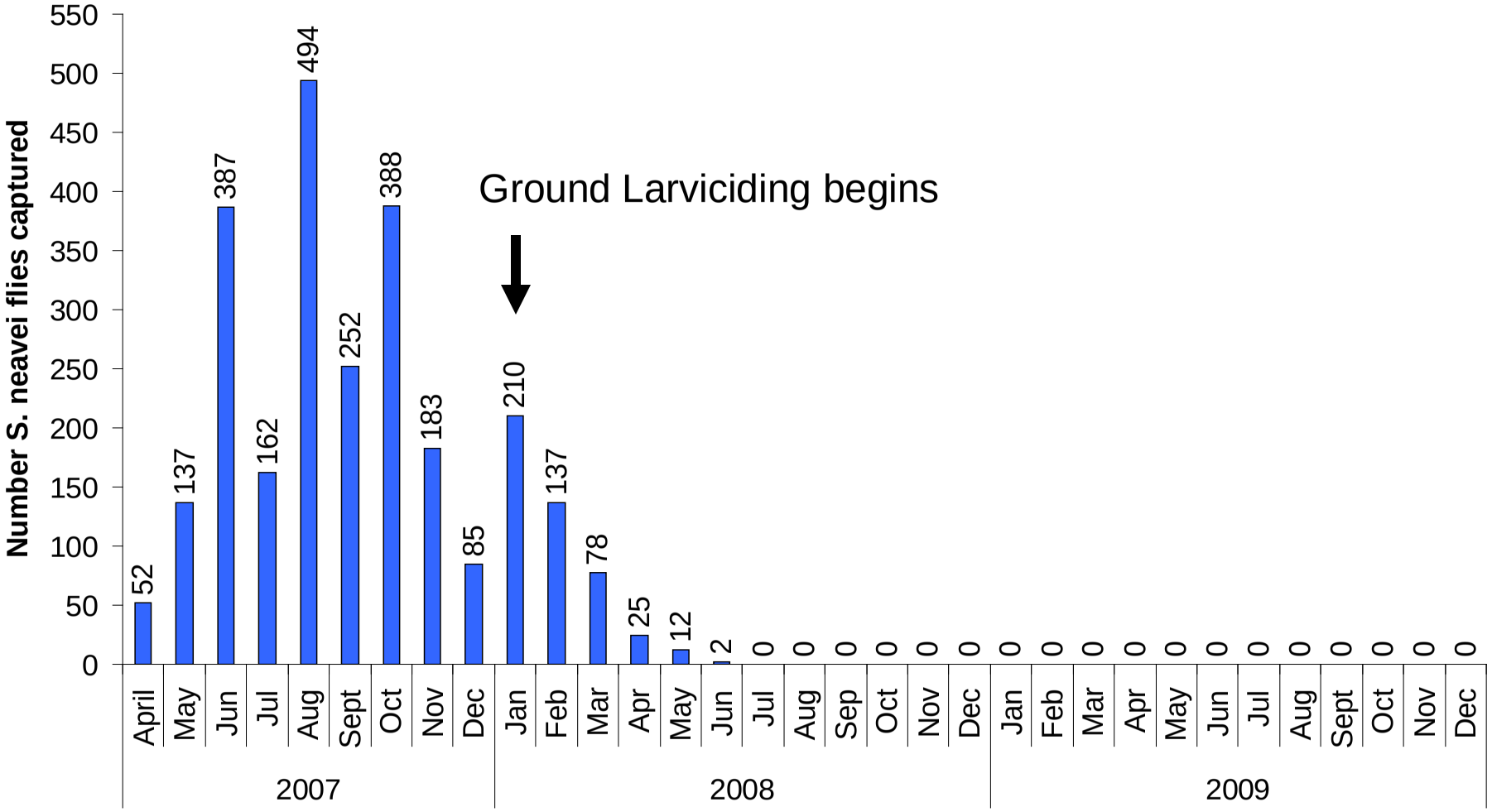


Figure F

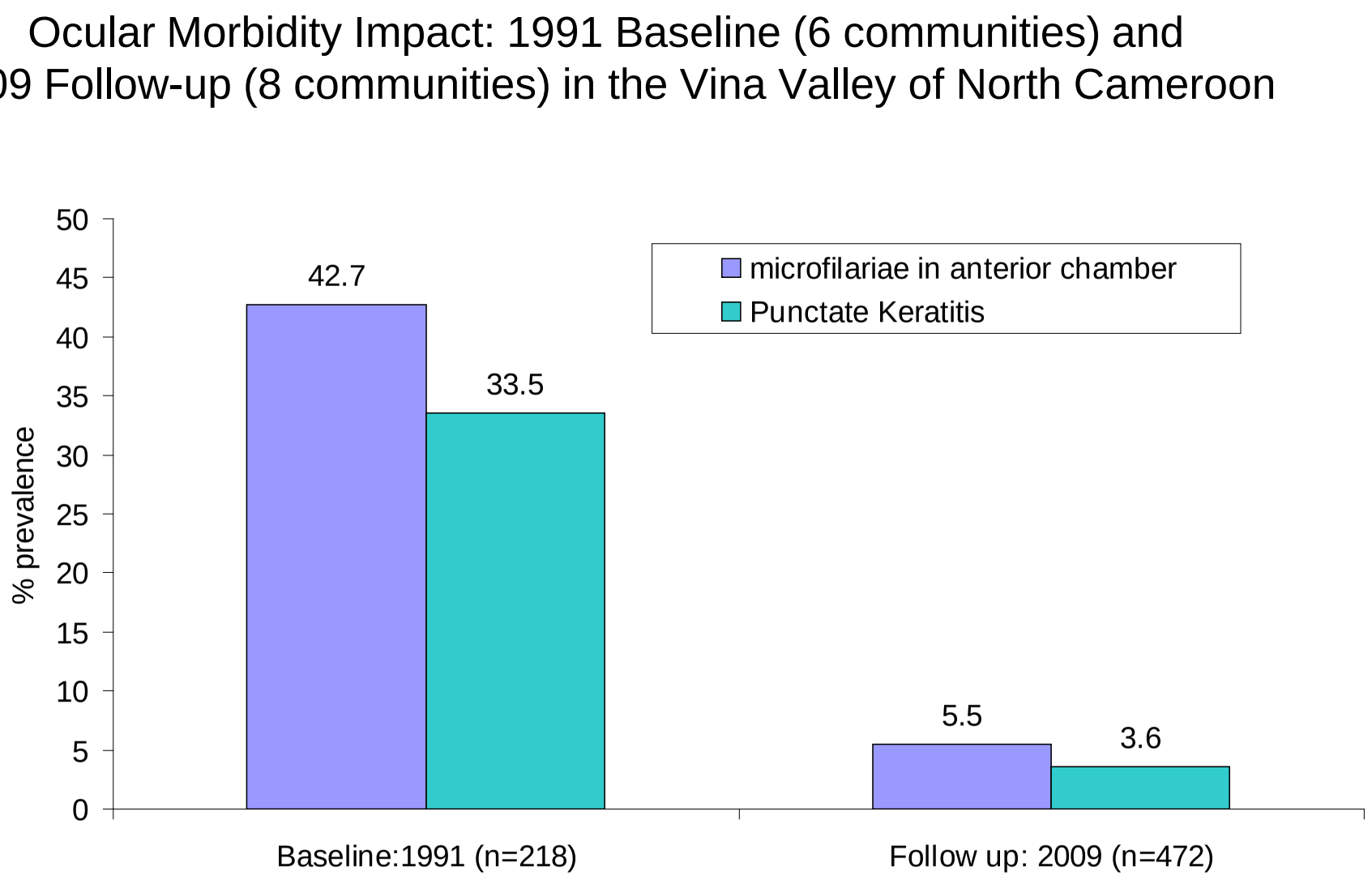

Ocular Morbidity Impact: 1991 Baseline (6 communities) and 2009 Follow-up (8 communities) in the Vina Valley of North Cameroon
% prevalence
50
45
40
35
30
25
20
15
10
5
0
42.7
33.5
5.5
3.6
microfilariae in anterior chamber
Punctate Keratitis
Baseline:1991 (n=218)
Follow up: 2009 (n=472)

Figure G

Ninety-nine Percent Reduction in Onchocercal Nodule Prevalence in Sentinel Villages of Plateau and Nasarawa States (Nigeria) under Mass Drug Administration with Ivermectin (1992-1999) and Ivermectin combined with Albendazole (2000-2009)

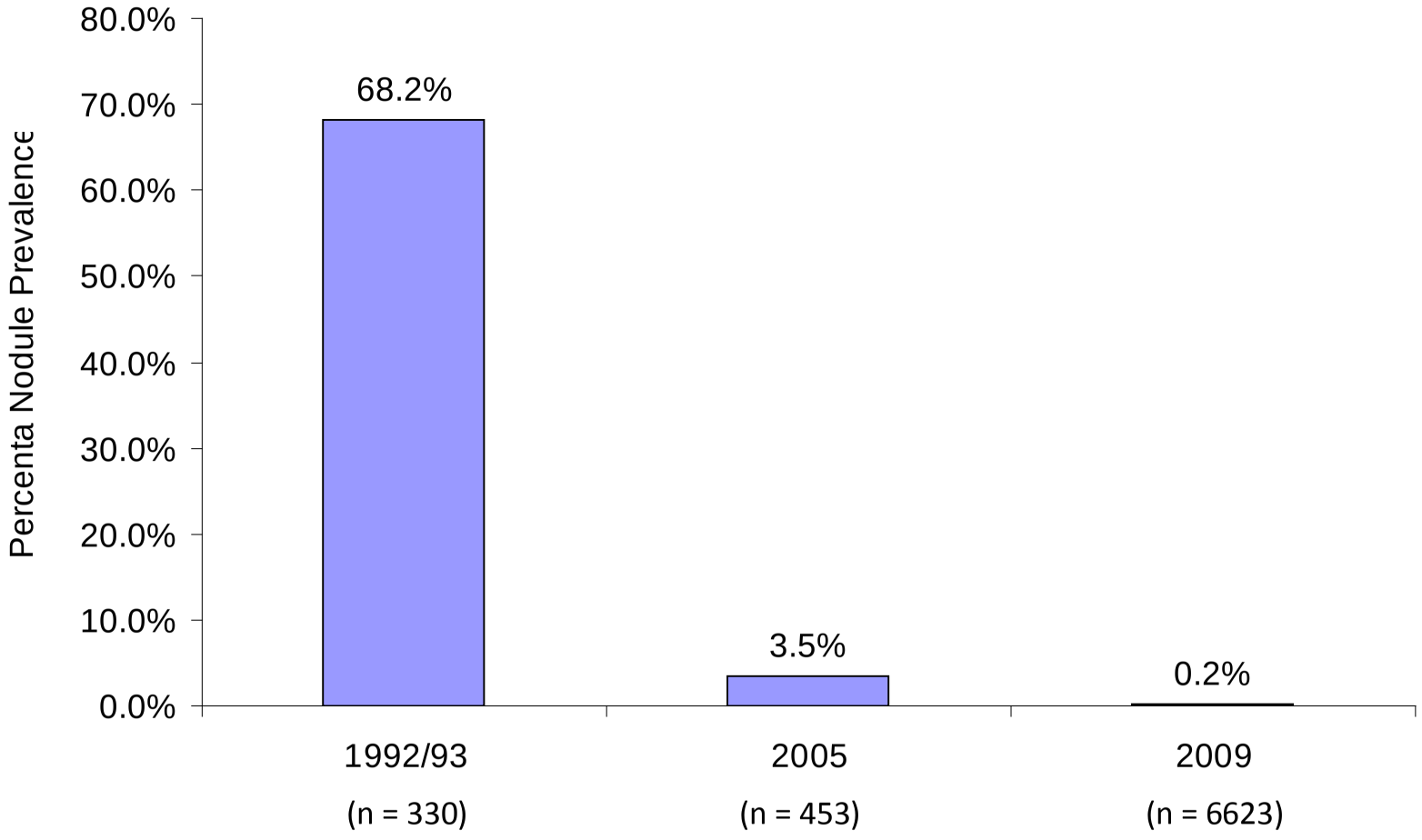


Figure H

Uganda: Plan for Onchocerciasis Elimination*

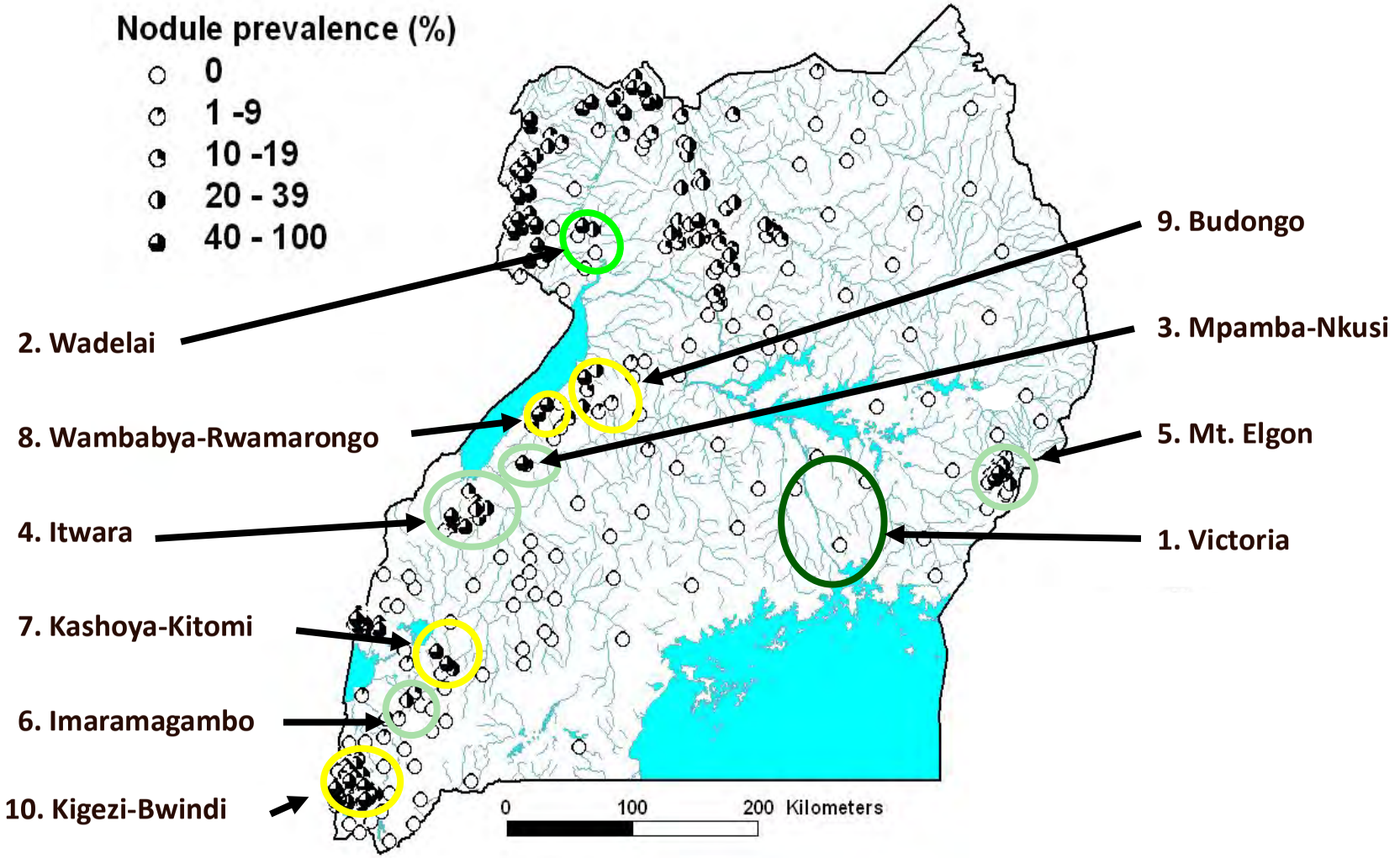
No.	Focus	PTS Ye/No	Vector	District	# MDA annual rounds	# of MDA semi annual rounds	Total Pop	2010 UTG1	UTG2	Status of Transmission	Yr of elimination	Plan for MDA treatment	Plan for Larviciding	Larviciding Start/End
1	Victoria		*S. damnosum*	Jinja	N/A	N/A	198,160			Eliminated	1973	No need	*No need*	
				Mukono	N/A	N/A	387,707			Eliminated	1973	No need	*No need*	
				Kamuli	N/A	N/A	268,046			Eliminated	1973	No need	*No need*	
				Mayuge	N/A	N/A	156,714			Eliminated	1973	No need	*No need*	
				Kayunga	N/A	N/A	142,565			Eliminated	1973	No need	*No need*	
2	Wadelai		*S.neavei*	Nebbi	15	9	17,739	14,382	28,764	Interrupted		Semi-Annual	*not done*	*No need*
3	Mpamba-Nkusi		*S. neavei*	Kibale	17	N/A	180,287	149,356	298712	Interruption Suspected		Semi-Annual	*Status post*	*/2006*
4	Itwara		*S. neavei*	Kabarole	20	N/A	30,689	25,655		Interruption Suspected		Annual	*Status post*	*/2003*
				Kyenjojo	20	N/A	63,850	50,823		Interruption Suspected		Annual	*Status post*	*/2003*
5	Mt. Elgon		*S.neavei*	Manafwa	15	7	39,231	32,558	65,116	Interruption Suspected		Semi-Annual	*Vector Elimination*	*2008/*
				Mbale	15	7	49,264	40,173	80,346	Interruption Suspected		Semi-Annual	*Vector Elimination*	*2008/*
				Sironko	15	7	75,016	63,247	126,494	Interruption Suspected		Semi-Annual	*Vector Elimination*	*2008/*
				Bududa	15	7	156,164	134,933	269,866	Interruption Suspected		Semi-Annual	*Vector Elimination*	*2008/*
6	Imaramagambo		*S.neavei*	Bushenyi	18	N/A	102,180	85,748		Interruption Suspected		Annual	*not done*	*No need*
7	Kashoya-Kitomi		*S.neavei*	Bushenyi	16	7	130,855	107,830	215,660	uncertain		Semi-Annual	*Vector Elimination*	*2007/*
				Ibanda	16	7	24,778	20541	41,082	uncertain		Semi-Annual	*Vector Elimination*	*2007/*
				Kamwenge	18	7	41,021	33,831	67,662	uncertain		Semi-Annual	*Vector Elimination*	*2007/*
8	Wambabya-Rwamarongo		*S. neavei*	Hoima	16	7	72,077	60,918	121,836	ongoing		Semi-Annual	*Vector Elimination*	*2009*
9	Budongo		*S.neavei*	Masindi	16	7	44,763	37,227	74,454	ongoing		Semi-Annual	*Vector Elimination*	*pending*
				Buliisa	16	7	25,139	21,595	43,190	ongoing		Semi-Annual	*Vector Elimination*	*pending*
				Hoima	16	7	73,069	61,326	122,652	ongoing		Semi-Annual	*Vector Elimination*	*pending*
10	Kigezi-Bwindi		*S.neavei/damnosum*	Kabale	15	7	27,604	22,499	44,998	ongoing		Semi-Annual	*Vector Control*	*pending*
				Kanungu	15	7	54,416	44,242	88,484	ongoing		Semi-Annual	*Vector Control*	*pending*
				Kisoro	15	7	35,141	28,894	57,788	ongoing		Semi-Annual	*Vector Control*	*pending*
11	Maracha-Terego		*S.neavei/damnosum*	Maracha-Terego	18	N/A	170,377	136,302		ongoing		Annual		
12	Okoro/Nyagak		*S.neavei*	Nebbi	18	N/A	653,645	581,197		ongoing		Annual		
13	Obongi / Moyo		*S.neavei*	Moyo	17	N/A	41,182	33,368		ongoing		Annual		
14	Lubilila		*S.damnosum*	Kasese	17	N/A	119,315	102,718		ongoing		Annual		
15	Nyamugasani		*S.damnosum*	Kasese	17	N/A	11,270	10,167		ongoing		Annual		
16	Madi		*S.damnosum*	Moyo	17	N/A	113,106	91,290		ongoing		Annual		
				Adjumani	17	N/A	164,780	140,208		ongoing		Annual		
17	West Nile		*S.neavei/damnosum*	Yumbe	18	N/A	286,615	229,292		ongoing		Annual		
				Koboko	18	N/A	167,076	133,661		ongoing		Annual		
				Arua	18	N/A	138,063	134,696		ongoing		Annual		
18	Mid-North		*S.damnosum*	Oyam	17	N/A	20,345	17,011		ongoing		Annual		
				Gulu	17	N/A	117,510	94,872		ongoing		Annual		
				Amuru	17	N/A	151,098	120,145		ongoing		Annual		
				Pader	N/A	N/A	450100	373583		ongoing		Annual		
				Kitgum	N/A	N/A	133888	111128		ongoing		Annual		
	Total				535	107	5,134,845	3,345,416	1,747,104					

Dark Green	Eliminated	Yellow	Implement elimination policy
Light Green	Transmission Interrupted	Blue	Priority for epi studies for delineation of each focus before semi-annual treatment decision
Grey-Green	Transmission Interruption suspected	Red	Not much is known (Need for Epi stidies)

* Based on recommendations from the Uganda Onchocerciasis Elimination Expert Advisory Committee to the Uganda Ministry of Health, Kampala, August 2010

Figure I

Uganda: Foci where Onchocerciasis Elimination Policy is Being Implemented*



* Numbers correspond to oncho flag in Frontispiece Figure H

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EXECUTIVE SUMMARY

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 & Co., Inc.) through programs whose goals are either to control or eliminate onchocerciasis. In 2009, the RBP and its partners provided more than 14 million Mectizan® treatments, the largest since the launching of the program in 1996. Cumulative RBP-assisted Mectizan® treatments since 1996 have reached nearly 129 million.

Human onchocerciasis, an infection caused by a parasitic worm called *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 37 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 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 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 6 endemic countries in the Americas and designated foci in Uganda and Sudan. In these 8 countries, onchocerciasis elimination is a stated goal of the governments and their MOHs.

Local Lions Clubs and the Lions Clubs International Foundation (LCIF) are special partners of The Carter Center in the battle against RB. 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

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

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 5 countries in Africa (Cameroon, Ethiopia, Nigeria, Sudan, and Uganda) and eliminating RB altogether in the 6 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 (BMGF) for the Onchocerciasis Elimination Program for the Americas (OEPA) through a matching grant mechanism that drew additional funding from LCIF; Merck & Co., Inc.; and more than 70 other donors. In 2006, the Gates Foundation began providing support to The Carter Center's integrated programs (that include RB) in Nigeria. 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 & Co. donation of Mectizan®.

The River Blindness Program hosted its 14th annual Program Review meeting on March 23 - 25, 2010, at Carter Center headquarters in Atlanta, Georgia. The meeting focused on the achievements, challenges and research of Carter Center-assisted onchocerciasis control and elimination programs in 2009. 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), Mr. Teshome Gebre (Ethiopia), Ms. Peace Habomugisha (Uganda), Dr. Emmanuel Miri (Nigeria) and Dr. Mauricio Sauerbrey (Director, OEPA). Other technical staff members included Dr. Abel Eigege and Dr. Emmanuel Emukah (Nigeria); and Dr. Zerihun Tadesse, Dr. Tekola Endeshaw and Mr. Abate Tilahun Habtemariam (Ethiopia). MOH representatives included Dr. D W K Lwamafa and Mr. Thomas Lakwo (Uganda); Prof. Andze Gervaise (Cameroon); Drs. Michael Anibueze and Babatunde Ipaye (Nigeria); and Dr. Tong Chor Malek Duran (Sudan). Special guests included Honorable Dr. Med. World Laureate Tebebe Y. Berhan (Lions – Ethiopia); Ms. Kristen Eckert (LCIF); Ms. Julie Jacobson (BMGF); Dr. Adrian Hopkins, Dr. Yao Sodahlon, and Dr. Kisito Ogoussan (Mectizan® Donation Program - MDP); Ms. Minne Iwamoto (GlaxoSmithKline); Dr. Grace Fobi (APOC); Drs. Lester Chitsulo and Tony Ukety (WHO); and Mr. William Jany (Clarke Mosquito Control). Also present were representatives from CDC, Sightsavers International, RTI

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

International, the Task Force for Global Health, Auburn University, Emory University, Johns Hopkins University, University of South Florida, and the Universidad del Valle de Guatemala. The Review was opened by Dr. Donald R. Hopkins, Vice President, Health, The Carter Center. Dr. Frank Richards (Director of The Carter Center's Malaria, RB, Lymphatic Filariasis and Schistosomiasis Programs) chaired the meeting. (See Frontispiece Figure A for the photo from this meeting and Annexes 3, 4 and 5 for a complete participant list, contact list, and agenda).

A major focus of The Carter Center is routine monthly reporting by assisted programs. 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 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)**, which is used by elimination programs where semiannual treatments are delivered; the **Annual Treatment Objective** (**ATO**), which is an interim target population in programs 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(2) (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 Frontispiece Figure B 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 RBP is on "kinship-enhanced CDTI," an approach that seeks to train more CDDs than classic CDTI. In kinship-enhanced CDTI, decisions and activities are taken at the level of each kinship within a community, that is, grouping CDDs and those they serve within their own kinship clans. 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 "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 (see Frontispiece C). The costs of the kinship strategy, and the demands of supervision of many CDDs, are areas of active RBP research. The CDDs and community supervisors often demonstrate high levels of involvement in other types of interventions, working in programs to control other neglected tropical diseases, water provision and sanitation, malaria control, and immunization.

Summary of the Meeting

In 2009, The Carter Center assisted 14,115,910 Mectizan® (donated by Merck & Co., Inc.) treatments in 11 countries, reaching 97% of the 2009 UTG and exceeding 14 million treatments for the first time (Figures 1 and 2). Overall, 128,957,247 cumulative treatments have been provided since the RBP was launched in 1996 (Figure 3). Approximately 59% of the 2009 treatments were supported by Lions (Figure 4). Figure 5 shows that all RBP programs reached the 90% UTG goals in 2008 and 2009. About 40% of 2009 treatments took place in Nigeria. See Figure 6 for an illustration of treatments over the years by project. Approximately 225,000 CDDs working at the grass roots community level were trained during the year to accomplish these 14 million treatments. Areas where the goal is onchocerciasis control (characterized by annual Mectizan® treatments to prevent eye disease), accomplished about 11.7 million treatments in 2009. In areas where complete elimination of the disease is the goal (twice per year treatment to interrupt transmission), 2.4 million treatments took place. Elimination goals are currently the target for the Abu Hamad focus in north Sudan, 6 foci in Uganda, and all 6 countries in the Americas where the disease is endemic.

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. Frontispiece Figure C shows the progress of these efforts; in 2001, 19% of CDDs were female. That number rose to 35% in 2009. While the goal of community-directed programs is ultimately for countries to sustain them, much progress remains to be made for these programs to be self-sufficient. See Figure 7 for funding sources of 4 assisted African countries, by partner (APOC, government and The Carter Center) over time. The increase in Carter Center funding is due to increased research (Nigeria, Ethiopia and Cameroon) and the increased expenditures of elimination efforts (Uganda).

Americas: The aim of OEPA is to interrupt onchocerciasis transmission in the region of the Americas by 2012. The OEPA coalition includes the MOHs of the 6 countries, The Carter Center, Lions Clubs and LCIF, BMGF, PAHO/WHO, MDP, and CDC. Frontispiece Figure D shows treatment coverage in the Americas since 2006, and the sequential removal of foci due to cessation of treatment each year. Of the 13 endemic foci in 6 countries, 6 foci were no longer providing Mectizan® treatment in 2009, with Huehuetenango (Guatemala) and Oaxaca (Mexico) joining the foci where treatments have stopped. A major development in 2009 was the decision by Ecuador that it would halt treatments in 2010, making it the second country (after Colombia) to completely stop interventions against onchocerciasis. Thus, in 2010, only 6 foci of the original 13 foci will receive Mectizan® treatment, in 4 countries. As more foci halt Mectizan® treatment after transmission is interrupted, the regional treatment figures will continue to drop. A 3-year post-treatment surveillance (PTS) period follows the cessation of treatment in each focus prior to declaration of ‘elimination.’

Uganda: The Lions-Carter Center Uganda RBP treatment figures continue to climb as more areas move to an elimination (twice per year treatment) strategy supported by

MOH policy (Figure 6). The program assisted 2,510,079 treatments in 2009, up 18% from the 2.1 million in 2008. Of these, 900,333 were in control areas and 1,609,746 were in elimination areas. The Uganda RBP achieved 96% of its treatment targets. During 2009, Uganda's program trained 77,600 CDDs (39% female), reaching a ratio of 1 CDD:28 persons. Uganda hosted the second Ugandan Onchocerciasis Elimination Committee (UOEC) meeting in August 2009, with support of the RBP. The UOEC reviewed data with respect to 2001 WHO elimination guidelines and concluded that transmission of onchocerciasis in 3 foci (Itwara, Mt. Elgon and Wadelai) had been interrupted. See Frontispiece Figure E showing the impact of ground larviciding (beginning in 2008) on vector black fly populations in the Mt. Elgon focus. MOH interventions in those foci, however, have continued as the MOH looks for further evidence prior to stopping treatments.

Sudan: The Sudan Lions-Carter Center effort, based in Khartoum, reported Mectizan® treatment figures that included annual treatments in control areas, and twice per year treatments in the Abu Hamad elimination focus, in accord with the elimination policy of the MOH. The reported 152,218 treatments in 2009 in control areas and 197,865 treatments in the elimination focus of Abu Hamad achieved 94% of overall treatment targets. Sudan trained 4,274 CDDs, over twice the number trained in 2008, reaching a ratio of 1 CDD:109 persons. Of these, 42% were female, an impressive achievement for a program which had not a single female CDD between 1998 and 2005. An assessment of the program's impact on transmission is planned in 2010.

Cameroon: A total of 1,642,612 persons in North and West Region received Lions-Carter Center-assisted mass Mectizan® treatments in 2009, 90% of the UTG. Trained CDDs numbered 43,970 (31% female), and reaching a ratio of 1 CDD:48 persons. An onchocerciasis impact study was conducted in North Region in 2009 to evaluate 17 years of annual ivermectin treatment. From 2000 to 2009 (10 out of 17 years of annual ivermectin distribution), UTG coverage has been above 90%. The study included an evaluation of ocular morbidity attributable to onchocerciasis (Frontispiece Figure F). Significant reductions of onchocercal eye disease had occurred compared to baseline, but ocular morbidity remained above 1%, the WHO threshold definition for presence of ocular morbidity. The study also found that a small percentage of children were still positive for microfilaria and black flies were positive for larval stages of *Onchocerca volvulus,* indicating that annual treatment had not interrupted transmission.

Nigeria: More than 5.3 million Mectizan® mass treatments for RB were assisted in 9 states by the RBP in Nigeria in 2009 (100% UTG), as well as 463,044 passive treatments (provided through clinics) in the 7 assisted states in the southeast. Nigeria trained or re-trained 60,047 CDDs to accomplish the distribution. The ratio of CDDs to persons treated was 1 CDD: 108. In the Southeast states, 50% of CDDs were female, while in Plateau and Nasarawa just over 8% were. An evaluation of the impact that annual combined Mectizan® albendazole treatments for lymphatic filariasis elimination have had on onchocerciasis rates was performed in 2009 in Plateau and Nasarawa States, with support by the BMGF (Frontispiece Figure G). Preliminary results showed a 99.7% reduction in nodule rates since 1992/1993. Of particular importance was that

mf infection rates in children were nonexistent, which suggested elimination of onchocerciasis transmission may have been achieved as a by-product of the LF effort. It is possible that combination therapy for LF elimination has had additional benefits in simultaneously interrupting onchocerciasis transmission. For the second year in a row, Nigeria exceeded 1 million praziquantel treatments in the 3 states that have a Schistosomiasis Control Program. Praziquantel has been donated to The Carter Center through WHO by Merck KGaA (E-Merck)-Germany starting in 2008. Along with support from Izumi and Hussman Foundations, this has allowed treatment figures to climb to 5 times their 2007 level. In addition, approximately 114,000 long-lasting insecticide treated bed nets (LLINs) were distributed in 4 states by Carter Center-assisted programs. Half of these were purchased with support by the BMGF and distributed in Imo and Ebonyi States in order to study whether use of LLINs can interrupt transmission of lymphatic filariasis in areas where co-endemicity of *Loa loa* prevents using MDA with Mectizan® and albendazole. The other half were provided in Plateau and Nasarawa States by the Federal Government of Nigeria and through a donation by Clarke Mosquito Control.

Ethiopia: The Lions-Carter Center partnership in Ethiopia assisted in treating 3,163,181 persons to prevent onchocerciasis in 2009, 95% of the UTG. The Carter Center-assisted malaria program continued integrated efforts with the RBP in 2009, as part of the 'MALONCHO' project, with CDDs there trained to monitor bed net use and provide behavior change communication (BCC) related to their use and care. During 2009, 40,532 CDDs were trained (10% female), reaching a ratio of 1 CDD: 98 persons. Thanks to GSK support, for the first time combined Mectizan®/albendazole treatments were provided for LF elimination in onchocerciasis endemic areas of Gambella Region. With this funding the Ethiopia RBP assisted in 77,442 combined treatments in 2009, 93% of the UTG of 83,191.

2010 GENERAL RECOMMENDATIONS FOR THE CARTER CENTER'S RIVER BLINDNESS PROGRAM

All Carter Center-assisted African programs should continue to show annual coverage data since 1996, related to the 90% eligible population (UTG) coverage goal for ivermectin distribution in Africa. OEPA should continue to use at least 85% UTG coverage as its goal.

Expansion of Carter Center programs into other disease control efforts requires formal Carter Center Board of Trustees approval, adequate funding to participate, and possibly Emory IRB approval. If the government wants to support integration in areas where The Carter Center 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 integration/coimplementation activities within designated river blindness Mectizan® distribution areas and within the time period when such distributions are scheduled.

Government leadership is essential in directing the process for integrated NTD expansion.

The Carter Center will include Vitamin A Supplementation (VAS) if distribution can be simultaneous with Mectizan® distribution, but it cannot provide financial support for separate rounds of VAS or distribution in areas where we are not already assisting annual Mectizan® distribution. The Carter Center's priority is Mectizan® distribution, and it cannot delay Mectizan® distribution if VAS supplies are not readily available. The RBP should seek to publish its experience with VAS activities.

Refine epidemiological indices where we are assisting onchocerciasis elimination efforts in Africa (Sudan and Uganda). Continue working to delimit the precise borders of the isolated foci targeted for elimination.

Encourage WHO (APOC, PAHO) to assist us in evaluating cross border issues in the onchocerciasis elimination programs that we are assisting in Sudan and Uganda. Some of these issues need to be addressed in ministerial meetings on cross-border health issues.

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

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

Note that Merck & Co., Inc., will now be using 2.8 tablets as the average treatment figure in applications (down from 3 tablets per treatment). Submit drug applications as early as possible, and no later than 6 months in advance of desired date of shipment

receipt. Treatments do not need to be complete in order to submit requests for the upcoming year.

Evaluate how the new MDP country-wide application policy affects Carter Center-supported elimination 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 in our assisted African programs. CDD training (new and continuing) needs to be expressed in relation to annual training goals. Cost per CDD trained and change in coverage as displayed on the treatment category scale should be examined.

Measure costs and supervisory demands of conversion to the kinship strategy where this transition is occurring. Seek to determine and publish results of programmatic improvement resulting from conversion to the kinship strategy.

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

Treatment Objective for onchocerciasis for 2010: 14,589,049

Semiannual UTG(2):	**2,548,372 treatments**
Annual UTG:	**12,040,677 persons**

Training Objective for 2010:

CDDs:	**230,819 (69,896 new)**
Community supervisors:	**42,422 (14,315 new)**

Figure 1

2009 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=**	**5,281,705**		**UTG(arv)=**	**7,917**										
Treatments	0	0	90,495	332,083	751,330	1,384,385	1,211,965	731,748	377,829	222,120	80,733	171,885	**5,354,573**	101%	39%
Villages treated	0	0	258	596	1,011	2,001	1,605	1,084	638	430	156	132	**7,911**	100%	26%
UGANDA	***UTG=**	**931,236**		**UTG(arv)=**	**1,514**										
Treatments	0	0	0	0	15,804	0	448,850	435,679	0	0	0	0	**900,333**	97%	7%
Villages treated	0	0	0	0	35	0	903	1,479	0	0	0	0	**1,514**	100%	5%
UGANDA ELIMI	****UTG(2)=**	**1,673,820**		**UTG(arv)=**	**1,920**										
Treatments	0	0	0	0	671,261	0	0	131,619	0	0	806,866	0	**1,609,746**	96%	12%
Villages treated	0	0	0	0	1,597	0	0	323	0	0	1,920	0	**1,920**	100%	6%
CAMEROON	***UTG=**	**1,826,082**		**UTG(arv)=**	**3,705**										
Treatments	0	0	0	0	0	0	259,810	949,174	0	342,011	83,158	8,459	**1,642,612**	90%	12%
Villages treated	0	0	0	0	0	0	101	2,495	0	1,000	65	2	**3,663**	99%	12%
OEPA	****UTG(2)=**	**672,366**		**UTG(arv)=**	**1,541**										
Treatments	0	0	0	0	0	0	312,368	0	0	158,498	0	155,280	**626,146**	93%	5%
Villages treated	0	0	0	0	0	0	1,424	0	0		0	1,424	**1,424**	92%	5%
ETHIOPIA	***UTG=**	**3,343,558**		**UTG(arv)=**	**13,897**										
Treatments	0	0	0	0	0	1,327,213	1,758,526	0	68,645	8,797	0	0	**3,163,181**	95%	23%
Villages treated	0	0	0	0	0	5,699	7,832	0	276	90	0	0	**13,897**	100%	45%
SUDAN	***UTG=**	**171,732**		**UTG(arv)=**	**218**										
Treatments	0	0	0	0	0	0	0	0	0	0	59,855	92,363	**152,218**	89%	1%
Villages treated	0	0	0	0	0	0	0	0	0	0	150	68	**218**	100%	1%
SUDAN ELIMIN	****UTG(2)=**	**200,658**		**UTG(arv)=**	**144**										
Treatments	0	0	0	35,719	447	70	0	56,533	0	3,889	0	101,207	**197,865**	99%	1%
Villages treated	0	0	0	83	1	5	0	55	0	0	0	144	**144**	100%	0%
TOTALS	***UTG=**	**14,101,157**		**UTG(arv)=**	**30,856**										
Treatments	**0**	**0**	**90,495**	**367,802**	**1,438,842**	**3,160,518**	**3,978,348**	**2,304,753**	**446,474**	**832,633**	**1,071,964**	**436,831**	**13,646,674**	**97%**	
Villages treated	**0**	**0**	**258**	**679**	**2,644**	**2,909**	**4,609**	**5,436**	**638**	**1,430**	**2,141**	**1,702**	**30,691**	**99%**	

Cumulative RBP-assisted treatments (1996 - 2009) = 128,957,247

2009 Mass Treatments	13,646,674
2009 Passive Treatments	469,236
2009 TOTAL TREATMENTS	**14,115,910**

***UTG**: Ultimate Treatment Goal

OEPA figures reported quarterly, **UTG(2) is the Ultimate Treatment Goal times 2, since OEPA treatments are semiannual

Cumulative (includes passive)														
1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	**TOTAL**
3,873,425	5,090,511	5,626,767	6,684,146	7,229,829	8,019,378	8,964,429	9,658,793	11,109,611	10,798,434	11,301,304	12,985,296	13,499,414	14,115,910	**128,957,247**

Figure 2

Carter Center-Assisted Programs: Annual Mectizan® Treatments, 1996 – 2009

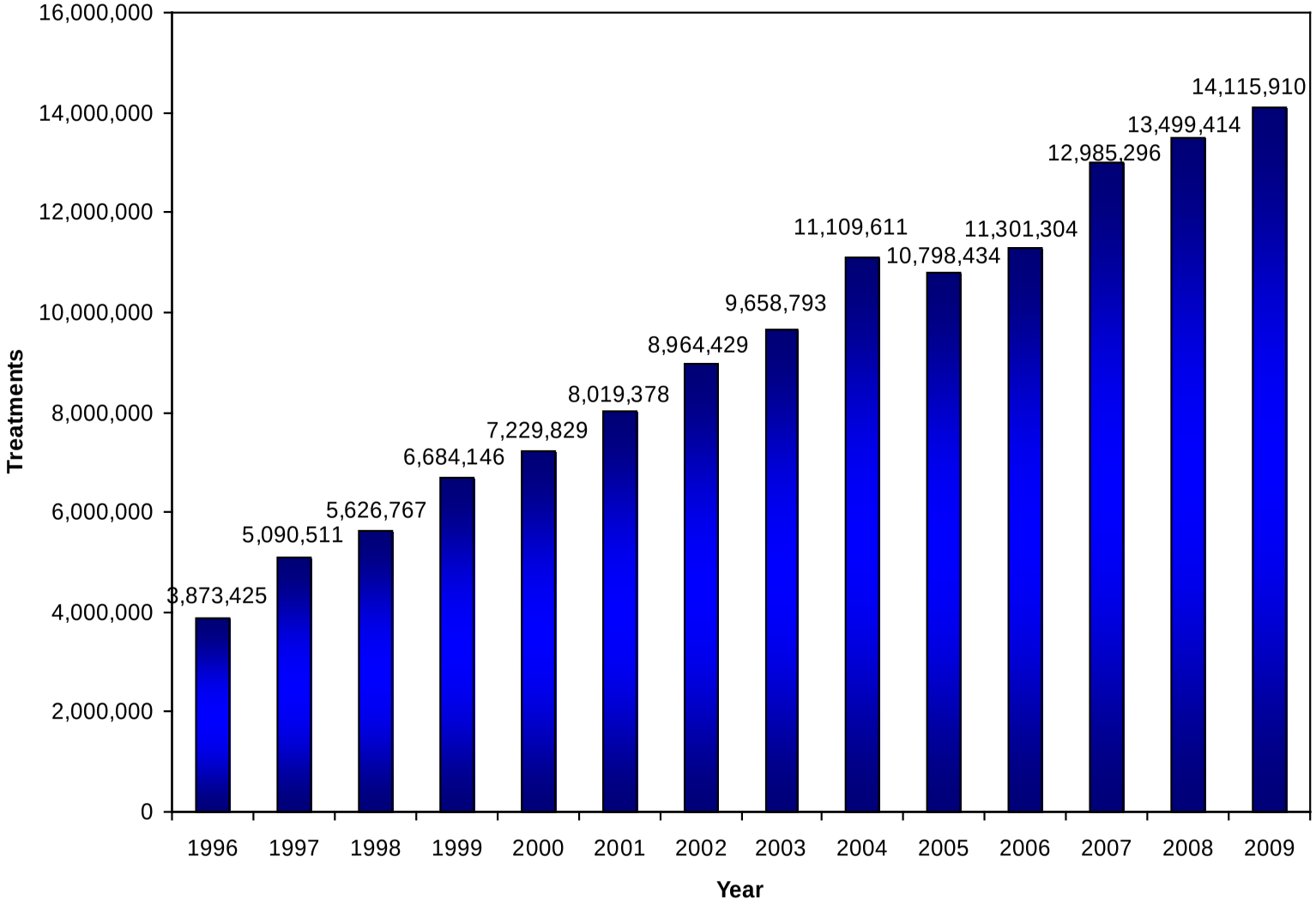


Figure 3

Carter Center-Assisted Programs: Cumulative Mectizan® Treatments, 1996 – 2009

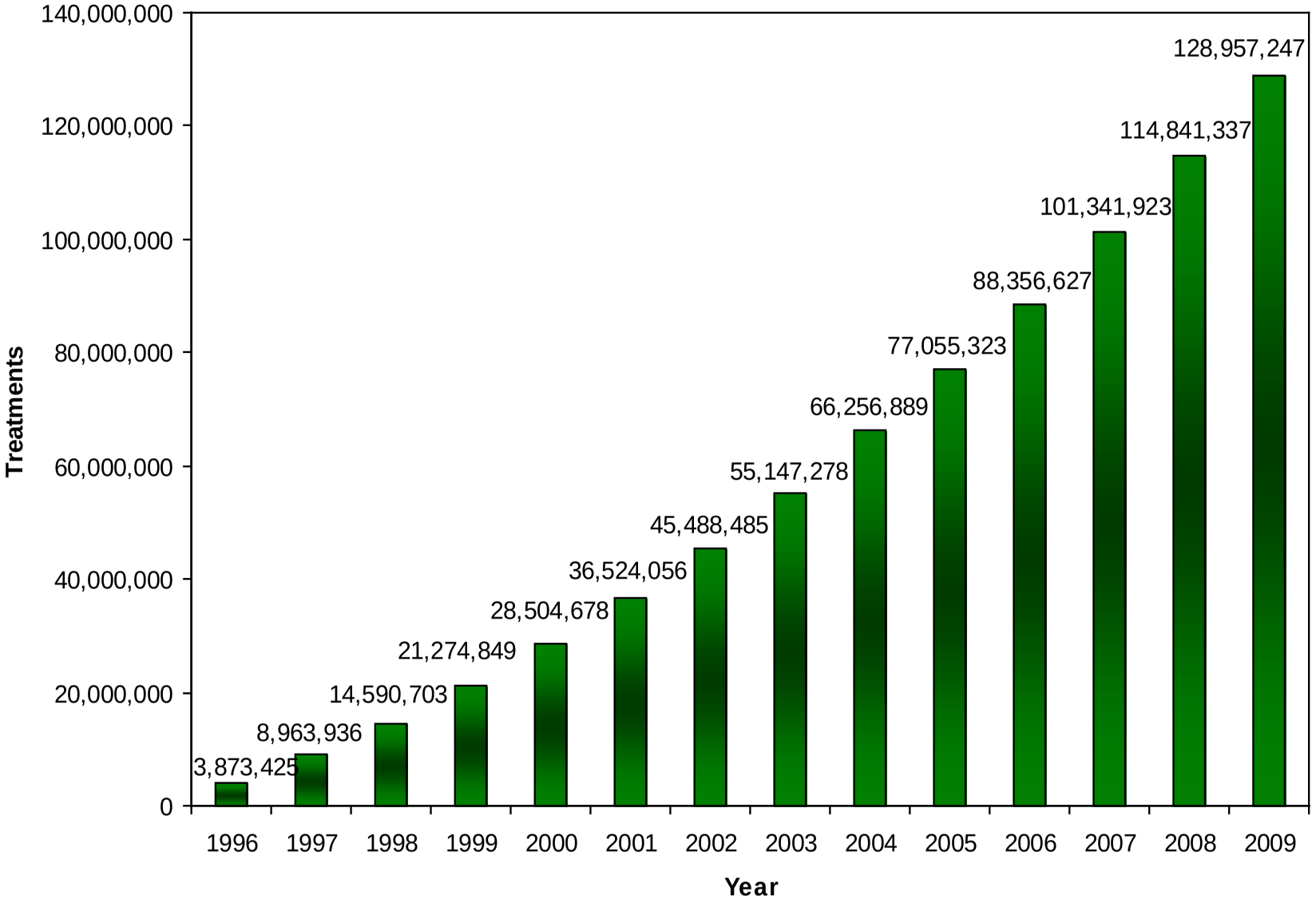


Figure 4

Annual Mectizan Treatments, Carter Center-Assisted and Carter Center / Lions-Assisted Programs

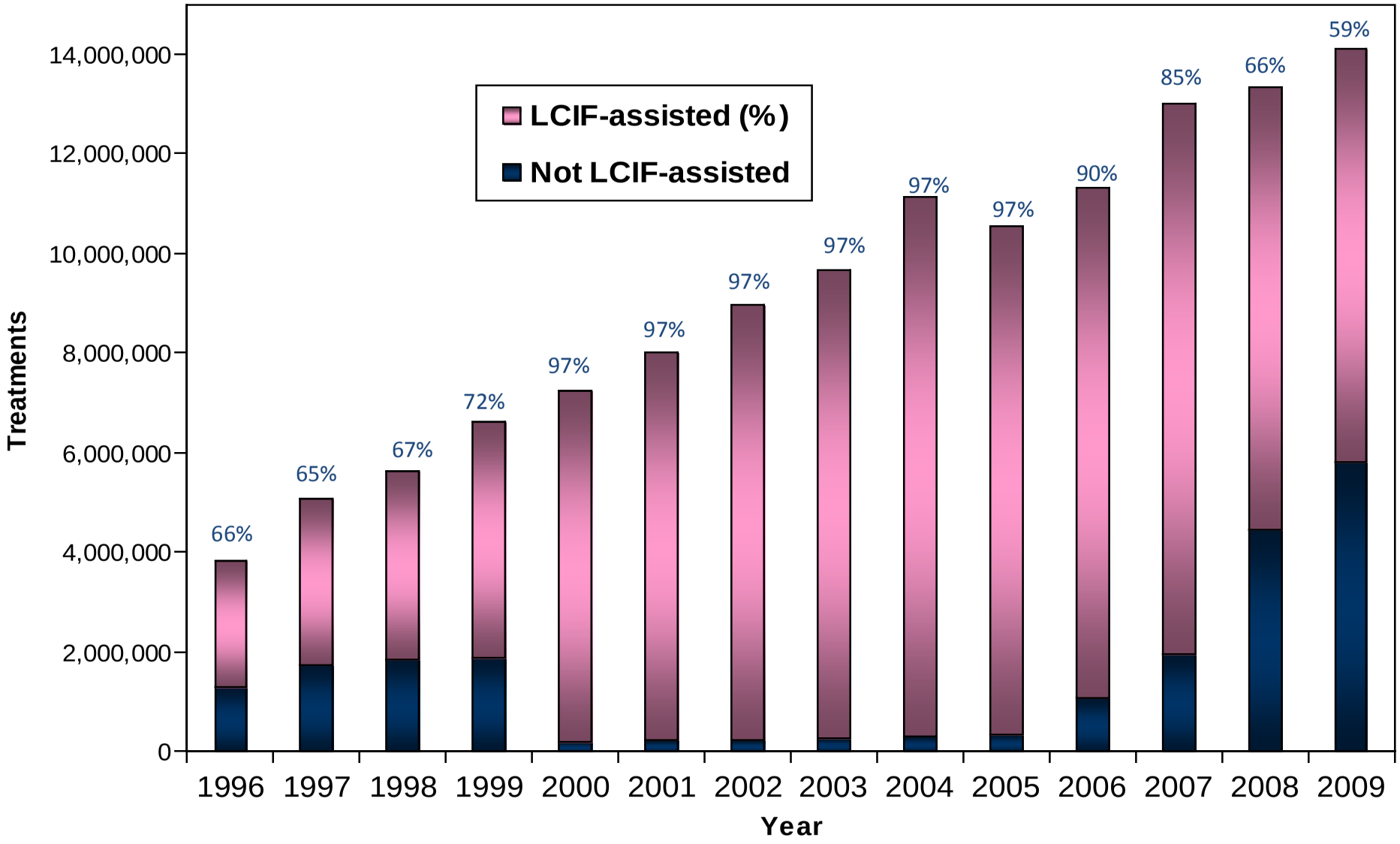


Figure 5

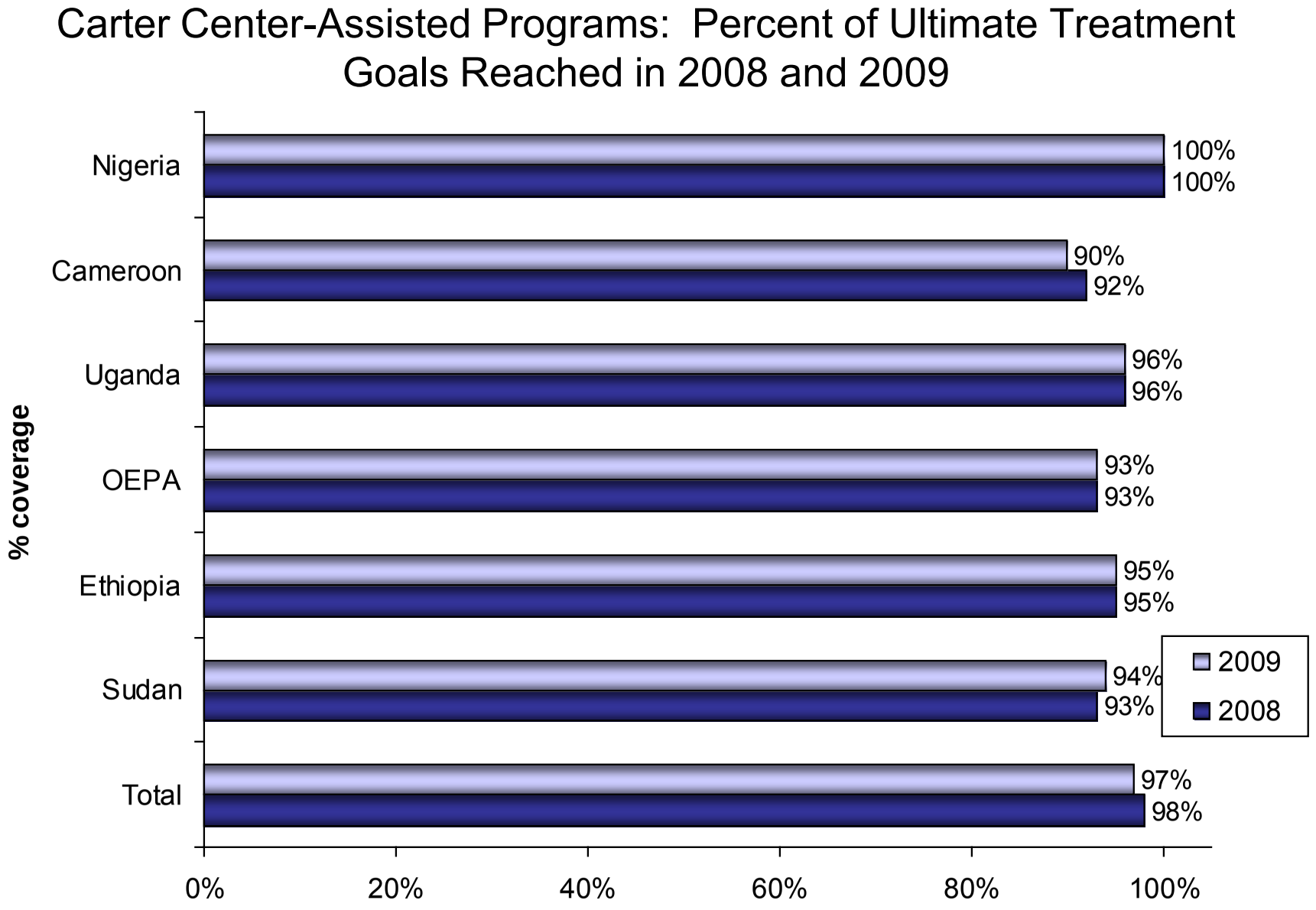

Carter Center-Assisted Programs: Percent of Ultimate Treatment Goals Reached in 2008 and 2009
% coverage
Nigeria
Cameroon
Uganda
OEPA
Ethiopia
Sudan
Total
100%
100%
90%
92%
96%
96%
93%
93%
95%
95%
94%
93%
97%
98%
2009
2008
0%
20%
40%
60%
80%
100%

Figure 6

Carter Center-Assisted Programs: 1996 – 2009 Mectizan® Treatments by Program

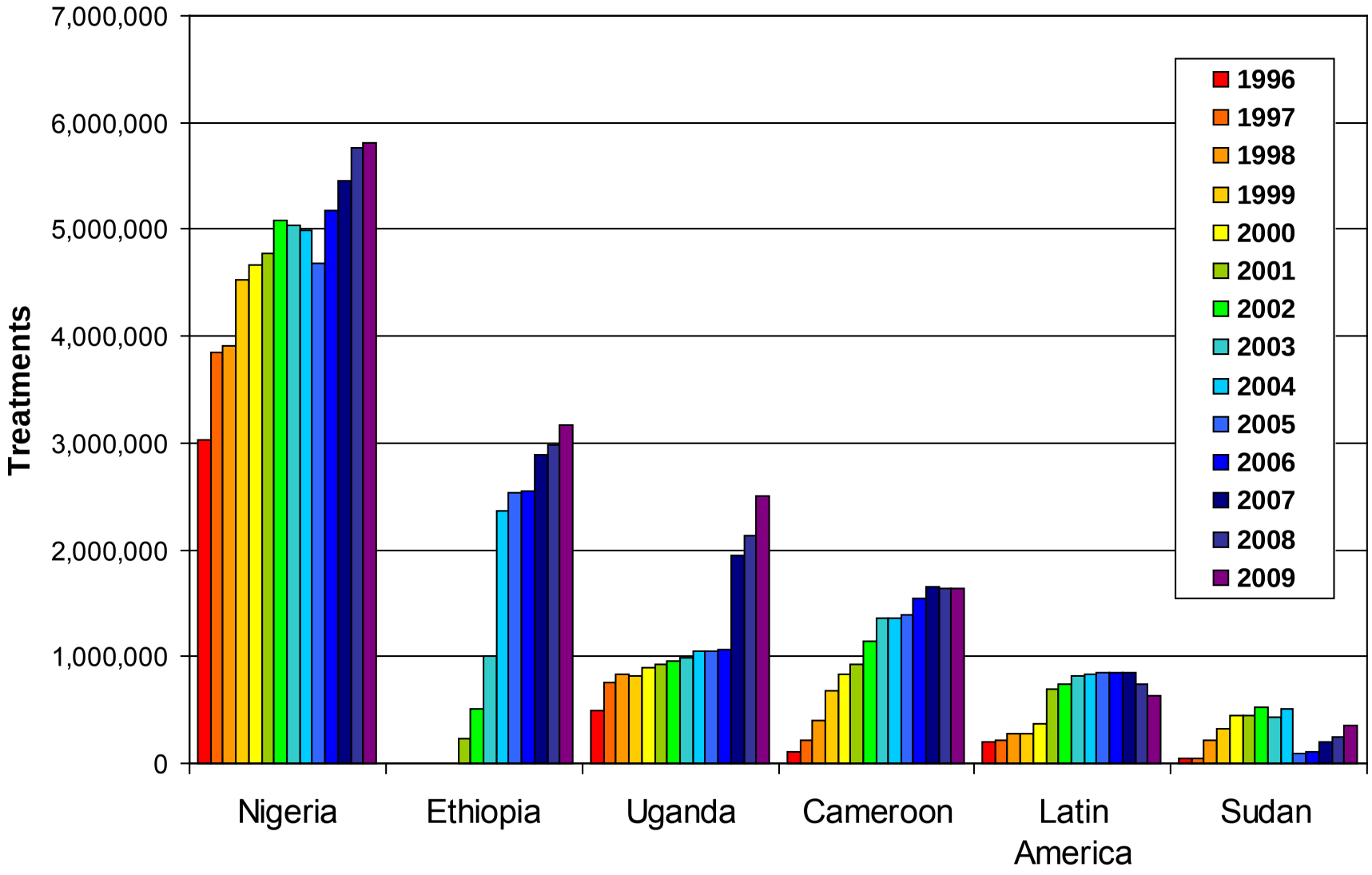
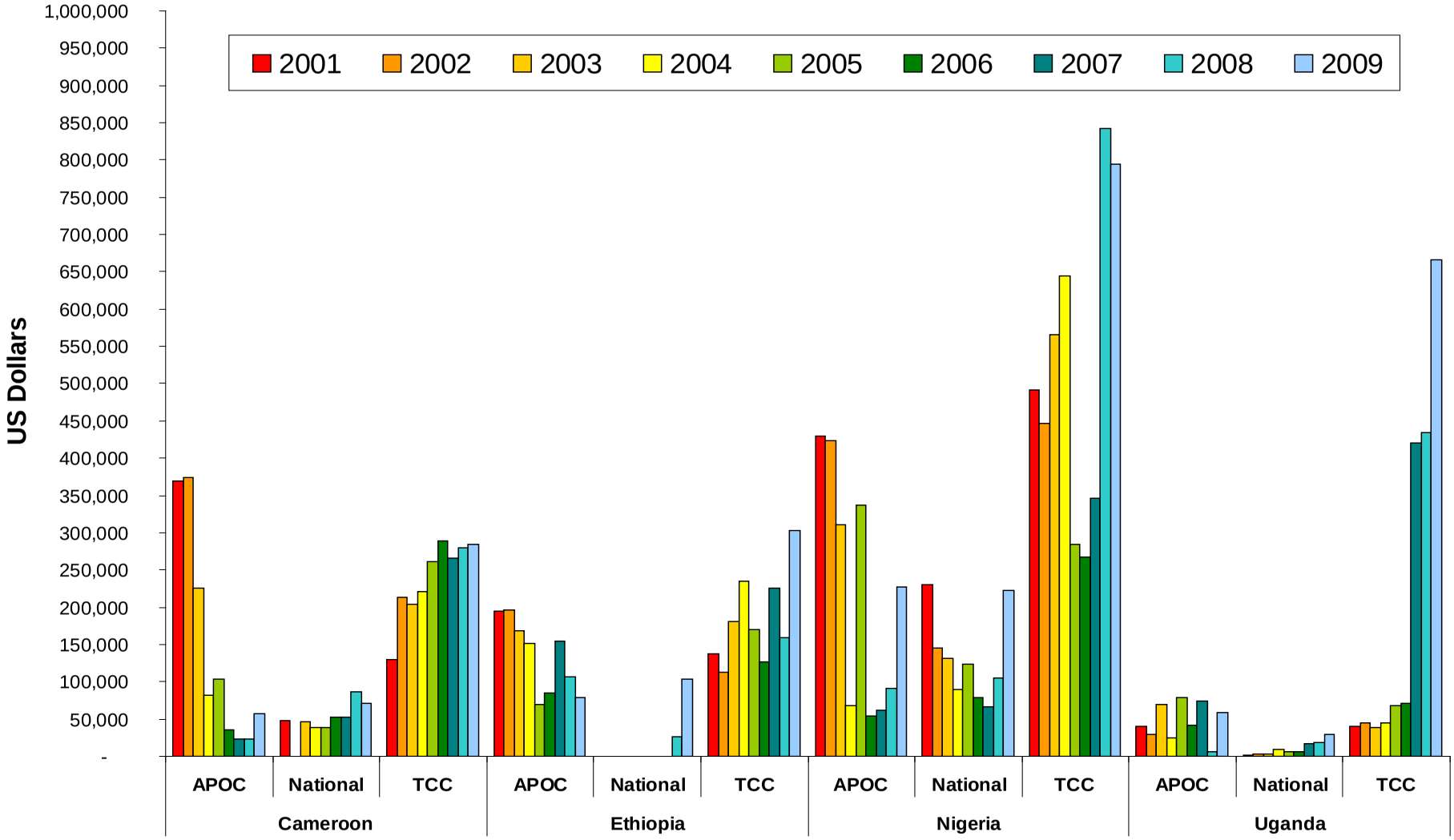


Figure 7

Increasing Investment in River Blindness by The Carter Center (TCC), Compared to Other Partners in Africa: Cameroon, Ethiopia, Nigeria and Uganda (2001 – 2009)



APOC: African Programme for Onchocerciasis Control

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 semiannual distributions of Mectizan® (every 6 months) in the endemic areas of the region. The initiative was launched by the River Blindness Foundation in 1993 in response to the 1991 Resolution XIV of the 35th Pan American Health Organization (PAHO) Assembly, which 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) and set a goal to interrupt transmission of the parasite throughout the region by 2012[3].

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, PAHO/World Health Organization (WHO), the Mectizan® Donation Program (MDP) and the U.S. Centers for Disease Control and Prevention (CDC). A Program Coordinating Committee (PCC) serves as a steering committee for the OEPA staff, who are based in Guatemala City, Guatemala. The Carter Center coordinates technical and financial assistance to the 6 countries through the OEPA office.

The OEPA strategy is to help the national onchocerciasis elimination programs provide mass treatment with ivermectin at least twice per year, reaching a minimum of 85% coverage of the treatment eligible population. Mass drug administration (MDA) is sustained until onchocerciasis ocular morbidity has disappeared and transmission is interrupted.

Interruption of transmission in more foci continues to decrease treatments: The total number of foci under MDA in the region dropped from the original 13 in 2006 to 7 in 2009 (Figure 8), with the number of ivermectin treatments administered decreasing from 852,721 in 2006 to 626,146 in 2009. The 6 foci that were no longer receiving MDA in 2009 (Figure 9) are Santa Rosa, Huehuetenango and Escuintla (Guatemala); North Chiapas and Oaxaca (Mexico); and Lopez de Micay (Colombia). In 2009, based on a review of recent transmission data, the PCC recommended to the government of Ecuador that treatments be suspended in that country. This recommendation was accepted, making Ecuador is the second country to halt MDA (after Colombia) in the Americas. As recommended in the WHO's onchocerciasis elimination certification guidelines[4], foci removed from MDA are to conduct post-treatment surveillance (PTS) for a minimum of 3 years. If no recrudescence of infection is detected during PTS, then *O. volvulus* can be declared to have been eliminated from that focus. Requests to WHO for certification of elimination, however, can only be made for entire countries, not

[3] http://www.paho.org/english/gov/cd/cd48.r12-e.pdf, accessed 28 July 2010
[4] http://whqlibdoc.who.int/hq/2001/WHO_CDS_CPE_CEE_2001.18b.pdf, accessed 28 July 2010

for individual foci. In sum, at the end of 2009, transmission had been interrupted in 2 of 6 countries and in 7 foci of the original 13 endemic foci in the region, 6 of which have started the 3-year period of PTS, with Ecuador beginning PTS in 2010. .

Treatments: As a result of the reductions in foci under treatment, overall regional ivermectin treatments are declining (Figure 10). In 2009, the 7 foci that remained under treatment reported a total of 626,146 treatments, a 27% drop since the peak treatments provided in 2005. The total number of people eligible for ivermectin treatment in the Americas region in 2009 was 336,183 (the ultimate treatment goal or UTG). The number of eligible people and percentage of the region's UTG by country in descending order for 2009 are: Guatemala 105,293 (31%), Venezuela 103,487 (31%), Mexico 102,310 (30%), Ecuador 16,113 (5%), Brazil 8,980 (3%) and Colombia 0 (0%). Since ivermectin treatment is provided twice a year, the treatment coverage denominator (called the UTG(2)) is twice the UTG, or 672,366 treatments. Treatment coverage for 2009, calculated as the total number of treatments delivered during the year divided by the UTG(2), was 93%. Frontispiece Figure C depicts UTG(2) achievement by focus over the last 4 years, as well as the reduction in the number of foci under treatment. Country-specific treatment activities are described individually below.

Country specific information:

Brazil's endemic population inhabits a single focus that extends through parts of Amazonas and Roraima states. This focus is continuous with Venezuela's South Focus, which together form what is known as the Yanomami Area. The entire bi-national transmission zone has an vast area of 90,000 km2 but a sparse population with a combined UTG(2) of only 27,469. Overall, the Yanomami Area reached 87 percent of its UTG(2) (31,502 treatments). Brazil provided 15,850 treatments in 2009, 88 percent of its UTG(2) of 17,960, and surpassed the 85 percent treatment coverage goal for the ninth consecutive year. The Venezuelan side of the Yanomami Area delivered 11,619 treatments (86 percent of its UTG(2) of 13,542) in 2009, and achieved its coverage goal for the fourth consecutive year.

Colombia has a single endemic focus (López de Micay, Cauca) where the Ministry of Social Protection (Ministry of Health) made the decision in 2007 to halt ivermectin MDA starting in 2008. The 3-year PTS period to detect transmission recrudescence began in 2008. If the PTS evaluation is favorable, Colombia would be the first country in the Americas to request certification of onchocerciasis elimination from PAHO/WHO in 2011.

Ecuador has a single endemic focus in Esmeraldas Province (the Esmeraldas–Pichincha focus). Results from the 2009 epidemiological evaluation in this focus were reviewed by the PCC during its meeting in November 2009. The MOH has provided MDA coverage since 1990: 25 MDA rounds achieved coverage exceeding 85%**,** and there has been good semiannual treatment coverage for 8 of the past 9 years (Figure 11). Entomological data (>30,000 flies examined) showed that vector infection rates were significantly lower than 1 infective fly in 2,000 flies. Transmission in the human population, as judged by testing for infection in 2,012 children younger than 8 years old,

was less than 0.1%. According to WHO's guidelines, these results show that transmission of the parasite has been interrupted. In addition, evaluations of sentinel villages showed the prevalence of skin and eye infection in adults (judged by microscopic examination for microfilariae) was zero.

Guatemala has 4 endemic foci (the Central Endemic Zone or CEZ, Escuintla, Huehuetenango and Santa Rosa). In early 2007, Santa Rosa was the first focus in the Americas to declare that transmission had been interrupted and to suspend treatment. In 2008, MDA was stopped in Escuintla–Guatemala. In 2009, treatment was stopped in Huehuetenango. The CEZ is the only focus that remains under treatment. The MOH surpassed the 85% coverage goal for the eighth consecutive year by providing 194,265 treatments in 2009, 92% of the UTG(2) of 210,586. Data monitoring of treatment impact suggests that transmission has been interrupted in the CEZ, but additional evaluations are needed before a recommendation can be made by the PCC to suspend MDA there.

Mexico has 3 endemic foci (Oaxaca, South Chiapas and North Chiapas), of which only the South Chiapas focus was under MDA in 2009. The MOH halted ivermectin MDA in the North Chiapas focus in 2008, and in 2009, in Oaxaca. In South Chiapas, 189,044 treatments were provided in 2009, 92% of the UTG(2) of 204,620. Coverage has exceeded 85% for 9 consecutive years. In 2003, due to continued transmission in 50 mesoendemic and hyperendemic villages in South Chiapas (that is, villages with a baseline prevalence >40%) the MOH launched quarterly MDA with ivermectin to hasten elimination. Based on the success of this trial, the quarterly program was expanded in 2009 to include another 113 communities. By the end of 2009, any community with a baseline prevalence of greater than 40%, or that still had people with nodules, was being treated 4 times each year. In areas where quarterly treatment was given, coverage for each round in 2009 surpassed 90%. In 2009, data suggested that transmission had been interrupted in the South Chiapas focus, but additional evaluations are needed before a recommendation can be issued to suspend MDA.

Venezuela has 3 endemic foci, Northcentral, Northeast and South (part of the Yanomami Area discussed in the section on Brazil). Venezuela met its treatment coverage goals in 2009 for the fourth consecutive year. The Northcentral and Northeast foci reached their treatment coverage goals for the seventh consecutive year. Overall, in 2009, Venezuela provided 196,656 treatments, 95% of its UTG(2) of 206,974. Onchocercal eye disease and transmission continue throughout all Venezuelan foci, although in 2009 entomological indices suggested that transmission had been interrupted in the Northcentral focus; this will be evaluated by OEPA in 2010.

IACO 2009: The Inter-American Conference on Onchocerciasis (IACO) is an annual event that gathers all stakeholders of the OEPA Regional Initiative in a forum for the national programs to present their progress and discuss their challenges. The nineteenth annual IACO (IACO 2009) was held November 4-6, 2009, in Rio de Janeiro, Brazil. The meeting was organized by the MOH of Brazil, Instituto Oswaldo Cruz and OEPA, and over 100 people attended. The main theme of IACO 2009 was "Regional Elimination of Onchocerciasis: the Unfinished Agenda."

In addition to noting the great achievement in Ecuador, IACO 2009 recommended that programs in the Yanomami Area be strengthened. Cooperation agreements between Brazil and Venezuela that include provisions to improve health care for indigenous people along the shared border, offer the possibility of a breakthrough in new support that will improve access to overall health care infrastructure in the Yanomami Area. Additionally, the conference noted that a considerable body of published research has shown that a 6-week course of daily oral doxycycline is (unlike ivermectin) effective against adult *O. volvulus* worms. (Doxycycline kills endosymbiotic bacteria (*Wolbachia*) that reside inside the worms and provide important nutritional requirements; without the bacteria, the worms become sterile and slowly die). The conference recommended that national programs consider providing doxycycline treatment on a selective basis as an additional tool in the elimination effort. Doxycycline cannot be given to young children or pregnant women.

The Program Coordinating Committee: The PCC of OEPA met twice in 2009. Its most important deliberations pertained to its recommendation to the MOH of Ecuador that ivermectin MDA be suspended throughout that country starting in 2010. Entomological, parasitological and serological results were reviewed during both PCC meetings and at the IACO conference. The Esmeraldas–Pichincha focus had been one of the most hyperendemic foci in the Americas, with a prevalence of infection in skin reaching 81%, and eye infection almost 23% (Figure 12). This focus is also important because its principle vector is *Simulium exiguum*, one of the most efficient in the Americas at transmitting *O. volvulus*, rivaling the efficiency of *S. damnosum s.s.* in Africa. In addition to the monitoring data, the elimination program's mathematical predictive model (called Eu-SIMONA) calculated with 95% certainty that recrudescence would not occur if MDA were halted in 2010. Nevertheless, given the efficiency of the vector in Ecuador, the PCC and IACO recommended that PTS potentially be extended beyond the usual 3 years, and that the Ecuadorian onchocerciasis teams' presence in communities be maintained so that they would be ready to act quickly to reinstate ivermectin MDA if there was evidence of recrudescence. It also was recommended that the onchocerciasis teams be used to deliver albendazole MDA twice per year in these communities to treat soil-transmitted helminthiases, to order to maintain their PTS activities and the ability to respond to a recrudescence of onchocerciasis and to utilize the MDA structure created under the OEPA initiative to control other important diseases.

It is noteworthy that the costs of the OEPA initiative since its launching have been just over USD$111 million (Figure 13). The largest donors to the effort are the MDP in-kind costs of Mectizan® (valued at $1.50/tablet) and the 6 governments of the endemic countries (35% of operational costs). Based on the progress made, it appears likely that the Yanomami Area (containing Brazilian and Venezuelan foci), and perhaps the Northeast focus in Venezuela, will be the last in the region to halt MDA. Even with the most optimistic projection – that transmission could be interrupted and MDA halted in all foci by 2012 – the need to maintain 3 years of surveillance means that it would be 2016 when all countries would have requested that WHO certify elimination.

2010 RECOMMENDATIONS FOR OEPA

National programs in the Americas provided 46% of costs of the elimination effort in 2009 (up from 28% in 2008). Encourage heads of state to maintain or increase political and financial engagement in the effort.

Secure the appropriate funds for continuing support of OEPA activities (2010-2015) after the BMGF grant is completed at the end of this calendar year (December 2010).

Work to expand the capacity of laboratories with which we work, in order to accommodate the growing number of assessments being conducted as part of the "stop treatment" exercise and PTS activities.

Complete epidemiologic evaluations in South Chiapas (Mexico), Central (Guatemala), and Northcentral (Venezuela) as quickly as possible, aiming to obtain a PCC resolution/recommendation to stop treatment there in 2011, if indicated.

OEPA should finalize PTS guidelines for PCC review.

Implement PTS in foci where treatments have been stopped: Santa Rosa, Escuintla and Huehuetenango (in Guatemala); North Chiapas and Oaxaca (Mexico); Ecuador; and Colombia.

Publish results of studies that led to the PCC recommendations to stop treatment in Ecuador and Colombia.

In other areas where governments are considering doxycycline treatment to accelerate interruption of transmission, OEPA should remind MOHs that treatment cannot be given to pregnant women or children under 10 years.

Implement (or continue) the 4-times-per-year treatment approach in highly endemic parts of Mexico, Venezuela and Brazil, to accelerate interruption of transmission in those foci.

Encourage execution of the binational agreement between Venezuela and Brazil regarding strengthening of the health infrastructure in the shared focus of the Yanomami Area.

Investigate with Merck & Co., Inc. the possibility of changing the ivermectin safe dosage rule from 150 ug/kg to 400 ug/kg for the Venezuela/Brazil Yanomami Area, to allow persons who are over 5 years of age, but weigh less than 15 kilograms, and/or are shorter than 90 centimeters, to become eligible for treatment.

Update the 13-foci table, particularly completing Annual Transmission Potential (ATP) and mathematical transmission modeling columns.

Submit Mectizan® applications at least 6 months in advance of desired date of shipment receipt. Treatments do not need to be complete to submit requests for the upcoming year.

Maintain CDC, University del Valle/Guatemala (Nancy Cruz-Ortiz), and University of Southern Florida (Tom Unnasch) lab involvement, particularly in serology, nodule histology, molecular entomology, modeling and drug studies.

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

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

Treatment Objective UTG(2) for onchocerciasis for 2010: 652,506 treatments

Figure 8

2009 Transmission Status in the 13 Foci of the Americas

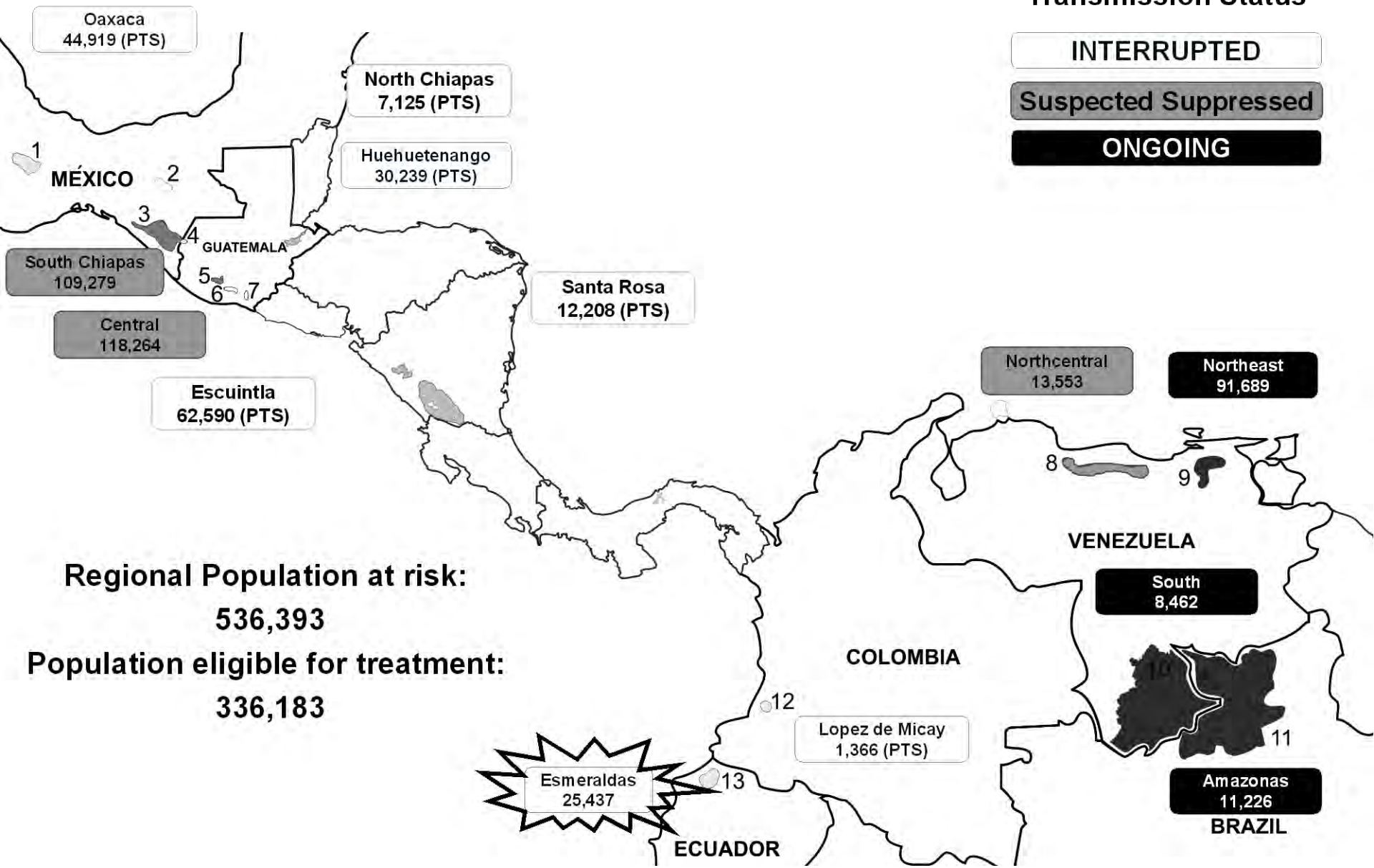


Figure 9

OEPA: Status of Onchocerciasis (River Blindness) in the Americas

Focus	Eye Disease Eliminated?	Transmission Interrupted?
Santa Rosa, GU	Yes	Yes (2006)
Lopez de Micay, CO	Yes	Yes (2007)
Escuintla, GU	Yes	Yes (2007)
North Chiapas, MX	Yes	Yes (2007)
Huehuetenango, GU	Yes	Yes (2008)
Oaxaca, MX	Yes	Yes (2008)
Esmeraldas, EC	Yes	Yes (2009)
South Chiapas, MX	Yes	Transmission suppressed
Central, GU	Yes	Transmission suppressed
Northcentral, VZ	Yes	Transmission suppressed
Northeast, VZ	No	No
Amazonas, BR	No	No
South, VZ	No	No

Figure 10

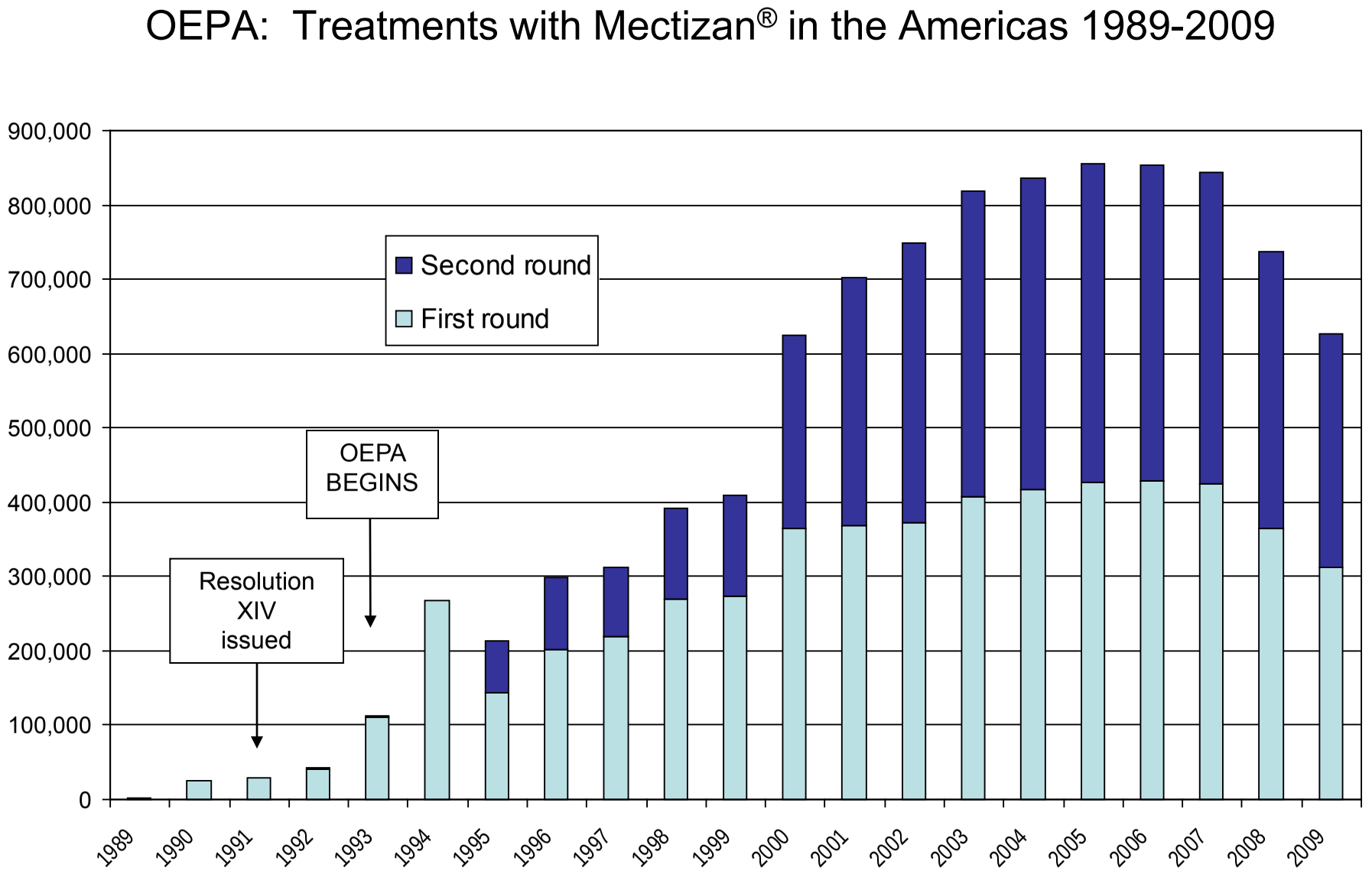

OEPA: Treatments with Mectizan® in the Americas 1989-2009
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Second round
First round
OEPA BEGINS
Resolution XIV issued
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009

Figure 11

Ecuador: Ivermectin Treatment Coverage Expressed as a Percentage of UTG (1995-2009)

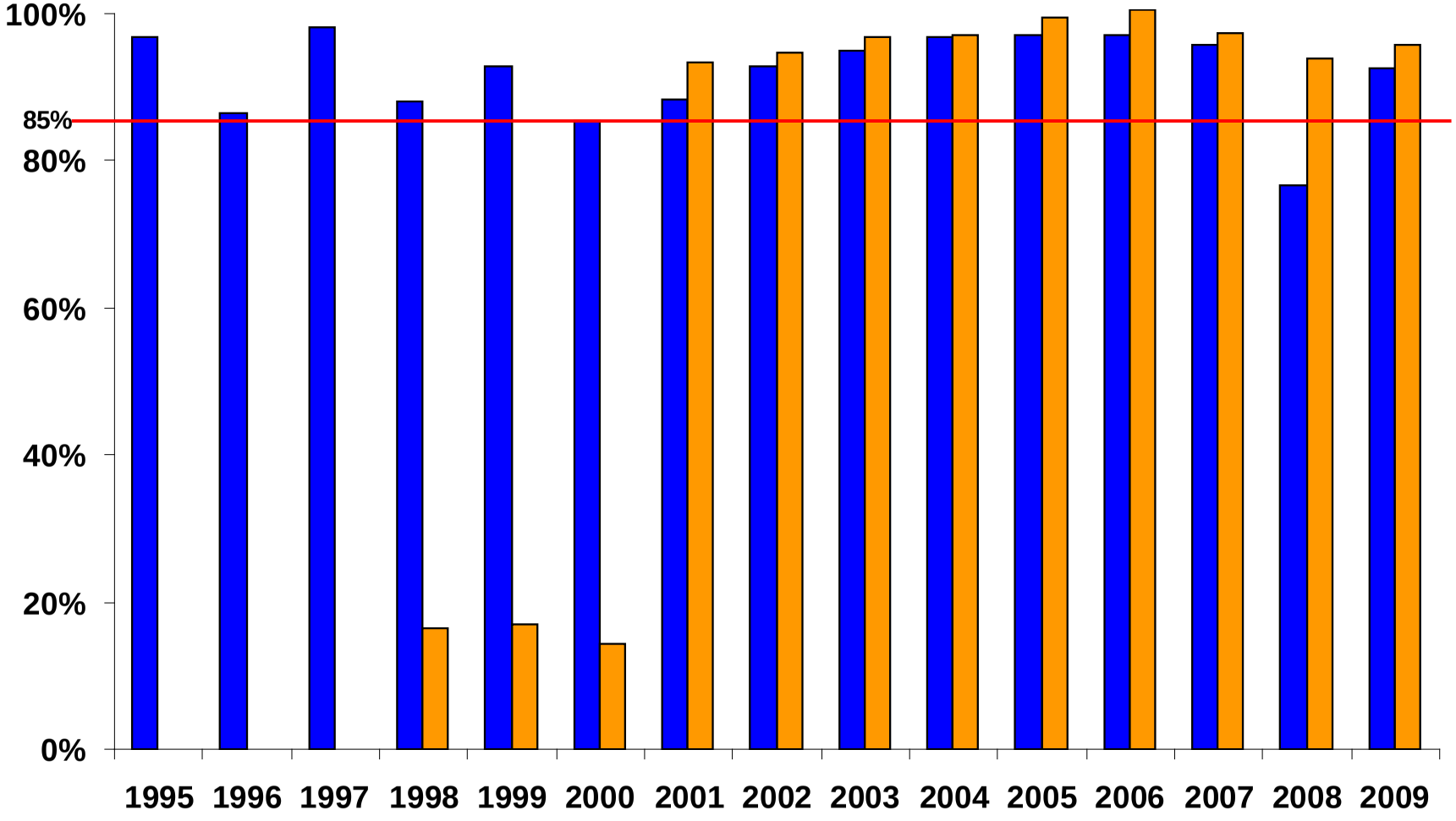


Figure 12

Ecuador: Change in Prevalence of *O. volvulus* Microfilaria in Skin (Mf) and in the Anterior Chamber of the Eye (MfAC) in Sentinel Villages (1991-2008)

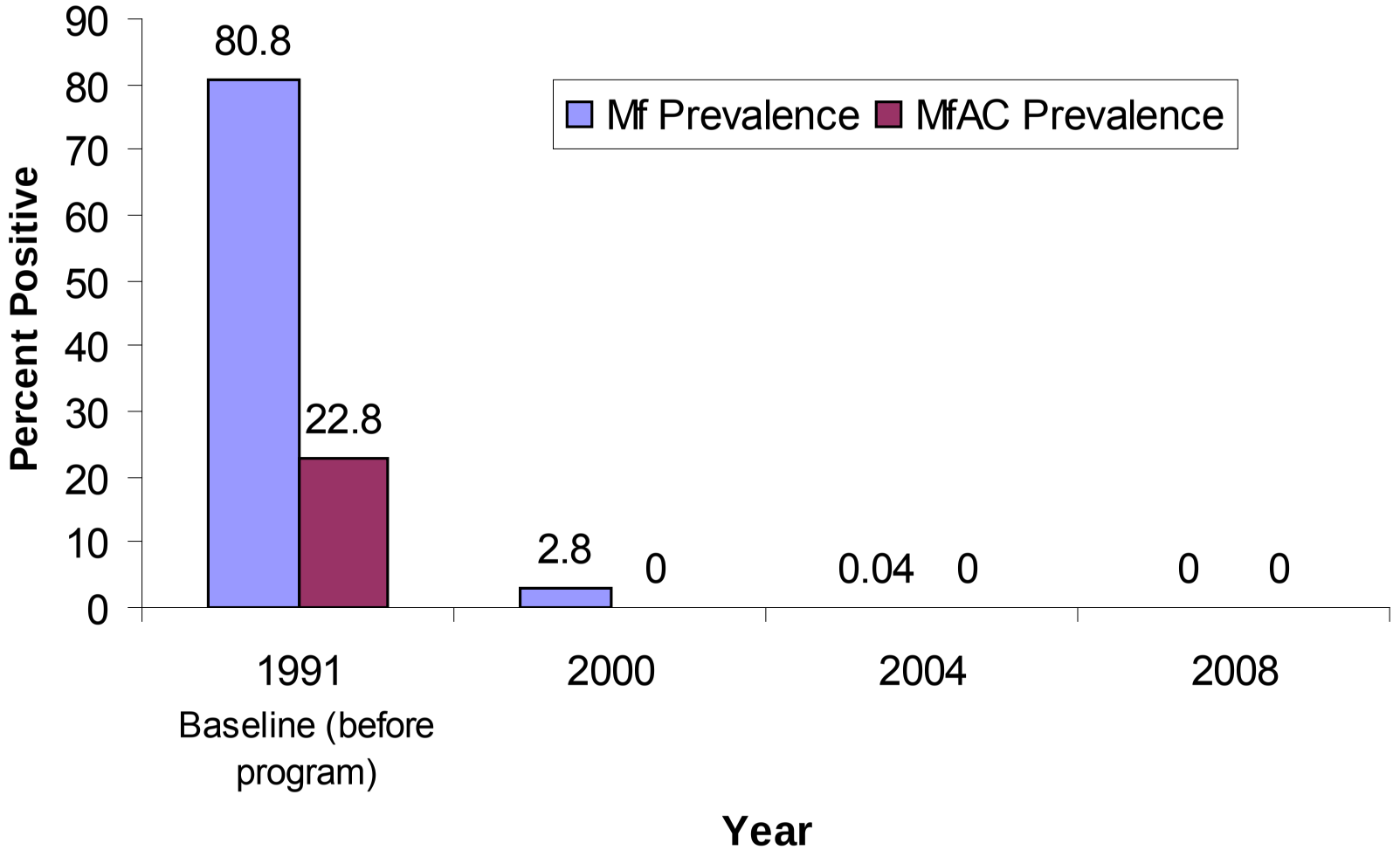


Figure 13

Total Cost of the OEPA Regional Initiative (in Millions of USD) and Contributions by Partners: 1991-2009

Source	1991-2008	2009	Total	%
Countries (counterpart funding from MOHs)*	34.48	3.8	38.28	35%
The Carter Center and its generous donors: Lions Clubs International Foundation, Bill & Melinda Gates Foundation, Merck & Co., Inc., Inter-American Development Bank, River Blindness Foundation, USAID and others	25.88	1.13	27.01	24%
Mectizan® Donation Program (in-kind)	43.24	2.6	45.84	41%
Total	**103.60**	**7.53**	**111.13**	**100%**

* Financial information provided by partner countries

UGANDA

Background: Onchocerciasis affects 29 of the 80 districts in Uganda. The Carter Center assists community-directed treatment with ivermectin (CDTI) in 23 (79%) of those endemic districts (Figure 14): Kabale, Kanungu, Kasese, Kisoro, Bushenyi, Kamwenge and Ibanda (in Southwest Uganda); Adjumani, Moyo, and Nebbi (in the West Nile region bordering Sudan and the Democratic Republic of the Congo or DRC); Amuru, Gulu, and Oyam Districts (in the Middle North areas); Bududa, Manafua, Mbale, and Sironko (in the Mount Elgon focus in the east, bordering Kenya); and Kitgum and Pader (in the north). The Carter Center also supports technical services and vector elimination activities in Bugungu, Kibaale, Hoima, and Masindi, which are operationally supported by Sight Savers International (SSI). In 2009, The Carter Center's UTG in Uganda accounted for about 71% of the national UTG target, and Carter Center-assisted areas provided about 84% of the country's total of just over 3 million treatments (see Figure 15).

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 partial funding to the program. Local Lions Clubs remain active participants in 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.

Onchocerciasis control in Uganda based on annual, mass treatment with Mectizan® began in 1992 with financial support from The River Blindness Foundation (RBF) and SSI. In 1996, The Carter Center assumed sponsorship of the RBF program, and in 1997, the African Programme for Onchocerciasis Control (APOC) began helping to support Ugandan efforts through the community-directed approach. APOC also supported apparently successful transmission elimination efforts in 2 foci (Itwara and Mpamba-Nkusi) using focal larvicide application and annual Mectizan® distribution. The Carter Center, with support from Merck & Co., Inc., through the non-governmental development organization (NGDO) group, helped launch semiannual treatments (every 6 months) to try to eliminate onchocerciasis from the Wadelai focus in Nebbi District in 2006.

Armed with these separate APOC and Carter Center elimination initiatives (and with the memory of a 1970s elimination victory in the Victoria focus based on vector control that liberated 3 million people from the threat of onchocerciasis), the government of Uganda launched a bold new elimination policy in January 2007, targeting 6 new endemic areas in Uganda, with an ultimate goal of eliminating onchocerciasis from all of Uganda. The strategy involves increasing from annual to twice-per-year Mectizan® treatments (every 6 months) and providing targeted ground larviciding for vector control or (where

technically feasible) complete vector elimination. The Center was invited to partner with the Ministry of Health (MOH) in this effort and has provided enhanced financial and technical assistance to the government made possible by various donors, including a generous donation from Mr. John Moores. New epidemiological and entomological surveys have been conducted in support of this elimination effort. The Mectizan® Donation Program (MDP) committed to providing sufficient Mectizan® for twice-per-year treatments. SSI also agreed to assist in intensified efforts in districts where it had traditionally worked that now are aiming for elimination.

The "Oncho Flag": The elimination strategy is illustrated in what is called the "oncho flag" (see Frontispiece Figure H): Dark green shows foci where onchocerciasis has been eliminated and interventions have ceased, grey-green shows foci where interruption is suspected, light green shows foci where transmission has been interrupted (although onchocerciasis disease may still be present) and where intervention could possibly be stopped, and yellow shows the foci where transmission continues while heightened interventions to achieve elimination have been launched and need to continue. The flag also shows blue areas, which are priority for further assessments to determine if elimination is feasible, and red areas, which are unlikely candidates for elimination at this time (primarily because a part of the transmission area crosses international borders into South Sudan or the DRC and would thus require international collaboration). The ultimate goal is to eventually move all onchocerciasis endemic communities from the yellow, blue, and red zones into the green zone, thus marking interruption of transmission, and subsequently, onchocerciasis elimination. During 2007, 2008 and 2009, the aim of onchocerciasis elimination activities was to work in the 'green and yellow areas' to demonstrate progress to the international health community. (See Frontispiece Figure I for a map of these green and yellow foci.)

Uganda laboratory activity: In support of the elimination effort, The Carter Center has funded equipment, reagents and training for a laboratory to provide state of the art diagnostic support to the MOH onchocerciasis 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 providing by Dr. Tom Unnasch's lab at the University of Southern Florida, Tampa, FL, and Ms. Nancy Cruz-Ortiz (Universidad del Valle de Guatemala/CDC in Guatemala).

Uganda MOH establishes a expert advisory committee for national onchocerciasis elimination: To ensure that the elimination decisions are supported with the best scientific and technical advice, the MOH established an international technical advisory committee, deemed the Ugandan Onchocerciasis Expert Elimination Advisory Committee (UOEEAC), formerly known as the Uganda Onchocerciasis Elimination Committee (UOEC). The UOEEAC's responsibilities are to review programmatic activities from each elimination targeted focus in Uganda (see 'Oncho Flag' section above), advising 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, UOEEAC is composed of "at large" members who are recognized for their international expertise in onchocerciasis, and institutional representatives from TCC, SSI and APOC. The World Health Organization (WHO) Uganda representative is given observer status since this institution will likely coordinate future certification of the elimination activities. Local Lions, MDP and other donors also attend as observers.

The UOEEAC held its second meeting on August 11-13, 2009, with support from The Carter Center. The meeting was opened by Dr. Dawson Mbulamberi on behalf of Dr. Sam Zaramba, The Director General of Health Services, MOH, Uganda. Dr. Frank Walsh, a seasoned medical entomologist and former director of entomology of the WHO Onchocerciasis Control Program chaired the meeting. The UOEEAC recommended to the MOH that interventions be halted in Itwara, Mt. Elgon and Wadelai foci, based on indicators and lab results demonstrating interruption of transmission. In addition, the committee recommended semiannual treatment in Mpamba-Nkusi where vector elimination had been implemented but failed to interrupt transmission. Further entomological and epidemiological data were requested for Imaramagambo focus.

After reviewing the recommendations, the MOH asked for the development of detailed, written national elimination 'stop treatment' guidelines that would be reviewed at the next meeting in 2010 before interventions are stopped. The MOH did agree to the UOEEAC recommendation for twice per year treatment in the Mpamba-Nkusi focus. The MOH also asked that the UOEEAC be reconstituted with increased MOH representation. (The reconstituted UOEEAC met in August 2010.)

Treatments: The UTG for 2009 in Carter Center-assisted areas in blue and red foci (e.g., a control strategy with annual ivermectin treatment) was 1,415,947 (Figure 16). In the yellow and green areas targeted for elimination the UTG was 836,910 (Figure 17); since the strategy in these areas is semiannual treatment, the UTG(2) index was used (twice the UTG) to calculate the coverage goal (1,673,820). The Carter Center Uganda assisted in 2,540,982 treatments in 2009, a 20% increase from 2,122,627 in 2008. All 3,434 high-risk villages were treated during the year (100% geographic coverage). Excluding passive and visitor treatments (totaling 6,067), Uganda reached 97% of its treatment goals. In elimination areas, UTG coverage was 96% and 97% for the first and second rounds of treatment, respectively. This was the twelfth straight year of more than 90% coverage of the UTG in Carter Center-assisted areas. The overall Carter Center Uganda treatment goal for 2010 is 2,897,533 treatments.

Training and Health Education: Uganda trained or retrained 77,600 Community-Directed Distributors (CDDs) and 7,098 Community-Directed Health Supervisors (CDHSs) in 2009 (Figures 18 and 19). Of these, 39% of the CDDs and 38% of the CDHSs were female. The current ratio of CDDs to population served is the best (lowest) of any Carter Center-assisted program at 1 to 28.

In 2009, all 3,434 affected communities in districts with annual and semi-annual districts implemented kinship enhanced CDTI.

Financial Contribution: Most financial support to Carter Center-assisted areas was provided by The Carter Center (See Figure 20 for APOC, Carter Center, and state, local and national financial contributions from 2001 to 2009). The Carter Center has increased its funding for Uganda as the result of the new elimination program. While all districts completed their 5 years of core APOC funding by the end of 2005, some APOC support continues to be provided, and 2009 saw increased funding from APOC for capital equipment purchases. The NGDO Coordination Group for Onchocerciasis Control (with funds from Merck & Co., Inc.) supported work in the Wadelai elimination focus. The national government's contribution has always been the payment of taxes on capital imports by The Carter Center, in addition to salary support for dedicated staff.

In 2009, some districts, health sub-districts, and sub-counties contributed a total of USD$ 9,301, about 50% less cash contributed towards CDTI activities than in 2008.

Sustainability and Integration: The community-directed intervention approach was adopted as national health policy in Uganda in 2001. Hence, political support for onchocerciasis control activities within the primary healthcare system is strong, although cash from the national government for CDTI activities has not been regular or sufficient to sustain CDTI activities without outside support..

The CDTI program actively promoted integration with lymphatic filariasis control in Adjumani and Moyo districts, reaching 253,315 persons with combination ivermectin and albendazole treatments for UTG coverage of 98%. Also, in other onchocerciasis endemic districts (Kabale, Kanungu, Manafua, and Mbale) The Carter Center assisted CDTI integration with intestinal helminth control (through semiannual albendazole distribution), and in Vitamin A supplement (also semiannually) to children 6 to 59 months of age. Albendazole treatments totaled 115,608 in the 2 rounds, while Vitamin A supplements totaled 48,621, reaching 81% and 83% of the respective targets.

2010 RECOMMENDATIONS FOR CARTER CENTER UGANDA

Elimination Efforts for Onchocerciasis

The Carter Center should support the third UOEEAC meeting, to be held in Kampala in August 2010. Elimination guidelines should be formally finalized during this meeting, and reapplied to the foci (Mt. Elgon, Itwara, and Wadelai) where the UOEEAC in 2009 recommended halting onchocerciasis interventions and commencing PTS activities.

Given differing intervention approaches in different areas, terminologies such as elimination, interruption and suppression should be revisited by UOEEAC in these Elimination Guidelines, within the context of Uganda.

When the government approves the UOEEAC 2010 meeting recommendations within the context of the final Elimination Guidelines, it is hoped that onchocerciasis interventions can be halted in Mt. Elgon, Itwara, and Wadelai foci, and perhaps in other foci as well, such as Imaramagambo.

The program should maintain the detailed table of epidemiological indicators (the "oncho flag") for each focus targeted for elimination. The foci numbers on the flag should correspond to those on the accompanying map.

S. damnosum invasion of areas cleared of *S. naevei* is an important area of research to explore.

Working with MOH partners, publish elimination experiences of Mt. Elgon and Wadelai.

Assist the MOH to implement semi-annual treatment in Mpamba-Nkusi focus, where interruption of transmission appears to have occurred, but OV-16 results in children are above the threshold recommended for halting ivermectin distribution.

At the 2009 UOEEAC meeting it was determined that the annual capacity of the Vector Control Division (MOH) laboratory is 14,000 OV-16 blood spots and 5,000 PCR tests. The Carter Center, through Dr. Tom Unnasch and the University of South Florida lab, will supply in 2010 the required reagents and materials to process this number of specimens. If such lab supplies are insufficient, 3 months notice is required to review justification for additional materials.

It was noted that there is still a laboratory backlog and reagents must be shipped to Uganda as soon as possible so that the backlog is cleared and new samples can be analyzed in advance of the UOEEAC meeting in August 2010. The MOH should appoint a full-time graduate-level molecular/microbiologist and qualified lab workers who can be dedicated to laboratory activities and reducing the backlog of specimens being generated by the elimination program. Results from the laboratory should be reviewed by Dr. Unnasch and Ms. Nancy Cruz-Ortiz (University del Valle/Guatemala).

It was suggested that skin snips continue to be read microscopically as well as be evaluated by PCR. The costs and processing of PCR in skin snips needs to be reviewed: due to the high cost of reagents, PCR of skin snips might only need to be employed in the absence of OV-16, or to validate OV-16 serology in cases where discrepancies arise. A protocol for doing this should be developed.

Other Recommendations

Evaluate the costs of once versus twice-per-year treatment in Mt. Elgon and/or Bwindi.

Conduct a cost study in Hoima district, on classical vs. kinship-enhanced CDTI.

Maintain Lions involvement to help maintain program visibility and support.

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

Conduct Carter Center monitoring protocol annually to assess and validate 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. CDD training (new and old) needs to be expressed in relation to annual training goals. Conduct research to measure costs and supervisory demands of conversion to the kinship strategy.

Expansion of Carter Center programs into other disease control efforts requires formal Carter Center Board of Trustees approval, adequate funding to participate, and possibly Emory IRB approval. If the government wants to support integration in areas where The Carter Center 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 integration/coimplementation activities within designated river blindness Mectizan® distribution areas and within the time period when such distributions are scheduled.

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

Encourage the national secretariat for onchocerciasis elimination to submit accurate Mectizan® applications at least 6 months in advance of desired date of shipment receipt. Treatments do not need to be complete to submit requests for the upcoming year.

Integrate semiannual Vitamin A supplement distribution into CDTI in areas where semiannual ivermectin treatment is being provided as part of the elimination effort. In areas where ivermectin is provided once per year, one round of Vitamin A supplementation (VAS) could be linked to CDTI, but The Carter Center cannot provide

financial support for a second round of VAS. The Carter Center also cannot support distribution in areas where we are not already assisting Mectizan® distribution.

Treatment Objective for onchocerciasis for 2010: 2,897,533

Semiannual UTG(2):	**1,689,316 treatments**
Annual UTG:	**1,208,217 persons**

Training Objective for 2010:

CDDs:	**77,600 (19,392 new)**
Community supervisors:	**9,887 (2,745 new)**

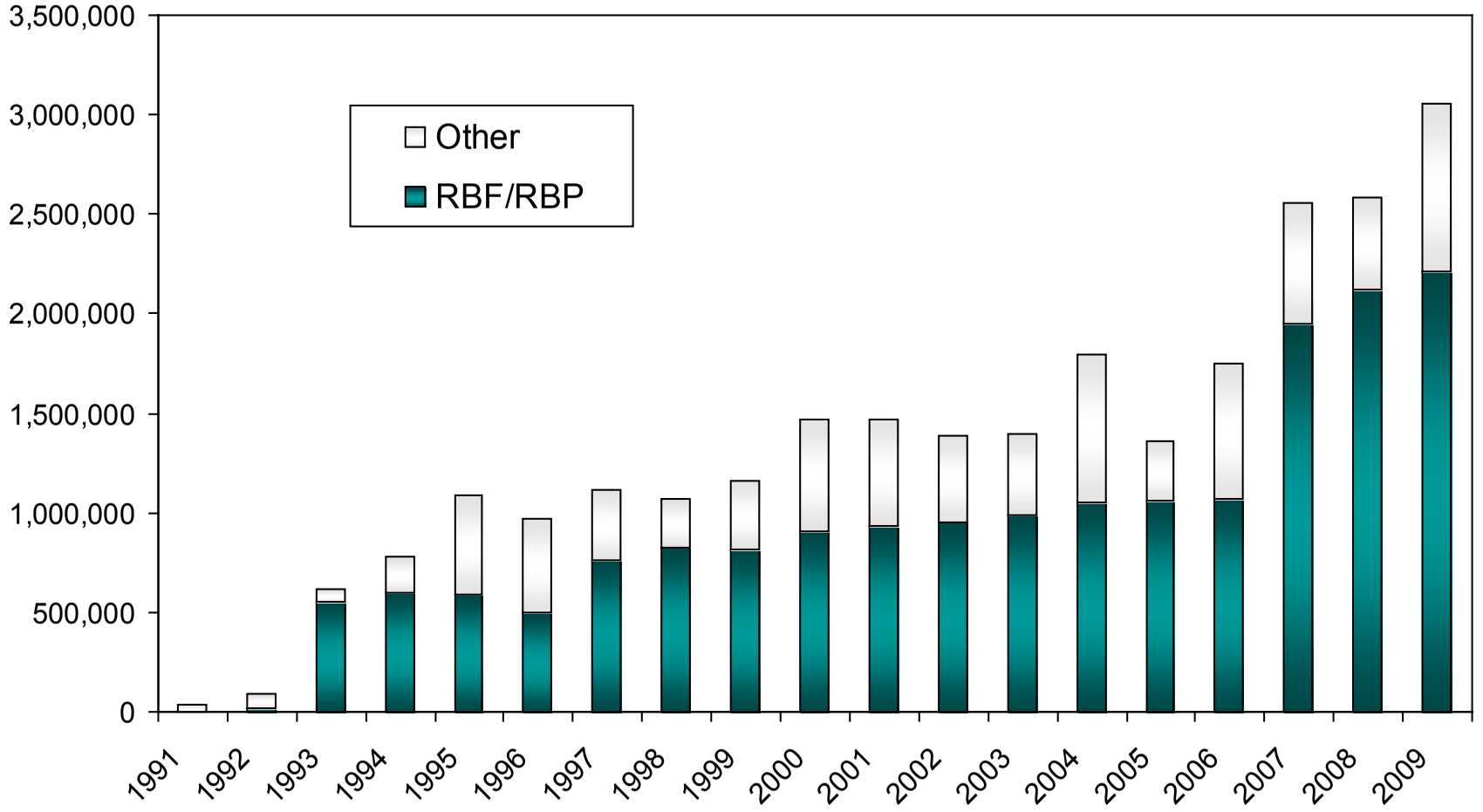
Figure 14

Uganda: Carter Center-Assisted Districts

Passive treatment was done in Kitgum and Pader districts.

Figure 15

Uganda: Carter Center-Assisted Treatments and Total Mectizan® RB Treatments Provided, 1991-2009*



* Treatments in 1992-1995 assisted by River Blindness Foundation.

Figure 16

Uganda: Treatment Coverage, 2009: Annual Treatment Areas

NGDO Support	Name of District	Total Popn (Project-ion)	Popn Treated Cumula-tive for 2009	Ultimate Tx Goal (UTG) for 2009	% of Total Popn Cov. for 2009	% Tx Cov. of UTG 2009	Active Villages Cumu-lative for 2009	Active Villages UTG for 2009	Active Villages % of UTG for 2009
TCC only	Adjumani	159,227	132,407	135,467	83	98	178	178	100
	Amuru	141989	107345	110886	76	97	77	77	100
	Gulu	113,536	90,050	91,664	79	98	90	90	100
	Kasese	122,502	100,620	110,356	82	91	131	131	100
	Moyo	154,543	120,908	124,913	78	97	189	189	100
	Nebbi	327,243	258,180	264,668	79	98	682	682	100
	Oyam	19,657	15,804	16,436	80	96	35	35	100
	Kyenjojo	63,850	50,823	51,191	80	99	83	83	100
	Kabarole	30,689	24,196	25,655	79	94	49	49	100
	Total	**1,133,236**	**900,333**	**931,236**	**79**	**97**	**1514**	**1514**	**100**
TCC & NTD	Pader	450,100	215,860	373,583	48	58	878	878	100
	Kitgum	133,888	72,034	111,128	54	83	569	569	100
	Total	**583,988**	**287,894**	**484,711**	**49**	**59**	**1447**	**1447**	**100**
Grand Total		**1,717,224**	**1,188,227**	**1,415,947**	**69**	**84**	**2,961**	**2,961**	**100**

Figure 17

Uganda: Treatment Coverage, 2009: Semiannual Treatment Areas

Name of Focus	Name of District	Total Popn Project-ion for 2009	Popn Treated Cumula-tive for 2009 for 1st Rd	Popn Treated Cumula-tive for 2009 for 2nd Rd	Popn Treated Cumula-tive for both Rounds	Ultimate Tx Goal (UTG 1) for 2009	Ultimate Tx Goal (UTG 2) 2009 for both Rounds	% Tx Cov. of (UTG 1) for 2009 1st Round	% Tx Cov. of UTG for 2009 2nd Round	% Tx Cov. of UTG 2 2009 for both Rounds	Active Villages Cumulative for 2009		Active Vill-ages UTG for 2009	Active Villages % of UTG for 2009	
											Rd 1	Rd 2		Rd 1	Rd 2
Elgon	Bududa	150,883	124938	129,942	254,880	130370	260,740	95.8	99.6	97.7	412	412	412	100	100
	Manafwa	37,904	30950	31,425	62,375	31457	62,914	98.4	99.8	99.1	98	98	98	100	100
	Mbale	44,381	35268	35,439	70,707	36,216	72,432	97.4	97.8	97.6	124	131	124	100	100
	Sironko	75,564	61345	62,845	124,190	65,215	130,430	94.1	96.3	95.2	191	184	191	100	100
Wadelai	Nebbi	17,139	13,515	13,815	27,330	13,896	27,792	97..3	99.4	98.4	34	34	34	100	100
Kashoya-Kitomi	Bushenyi	126,430	100509	102,764	203,273	104,184	208,368	96.5	98.6	97.6	207	207	207	100	100
	Ibanda	23,940	19216	19,657	38,873	19,846	39,692	96.8	99.0	97.9	60	60	60	100	100
	Kamwenge	39,940	31802	31,973	63,775	32,687	65,374	97.3	97.8	97.6	53	53	53	100	100
Bwindi	Kabale	26,800	21,087	21,028	42,115	21,844	43,688	96.5	96.2	96.4	38	38	38	100	100
	Kanungu	52,576	40626	40,956	81,582	42,746	85,492	95.0	95.8	95.4	105	105	105	100	100
	Kisoro	33,953	26410	26,084	52,494	27,917	55,834	94.6	93.4	94.0	45	45	45	100	100
Total		629,510	505,666	515,928	1,021,594	526,378	1,052,756	96.2	98.0	97.0	1367	1367	1367	100	100
Wambabya-Rwamarongo	Hoima	69,640	55824	56,682	112,506	58,858	117,716	94.8	96.3	95.6	70	70	70	100	100
Budongo	Hoima	70,589	55662	55,758	111,420	59,252	118,504	93.9	94.1	94.0	70	70	70	100	100
	Buliisa	24,289	19661	19,860	39,521	20,865	41,730	94.2	95.1	94.7	30	30	30	100	100
	Masindi	43,249	34448	34,972	69,420	35,968	71,936	95.8	97.2	96.5	60	60	60	100	100
Mpamba-Nkusi	Kibaale	166,110	131619	123,666	255,285	135589	271178	97.1	91.2	94.1	323	323	323	100	100
Total		373,877	297,214	290,938	588,152	310532	621064	95.7	93.7	94.7	553	553	553	100	100
Grand Total		1,003,387	802,880	806,866	1,609,746	836,910	1,673,820	96.0	96.4	96.2	1920	1920	1920	100	100

NOTE: The Carter Center provides technical and financial support for elimination to Buliisa, Hoima, and Masindi districts under Sight Savers International assistance.

Figure 18

Uganda: Number of CDTI Workers Available at the Community Level (2004-2009)

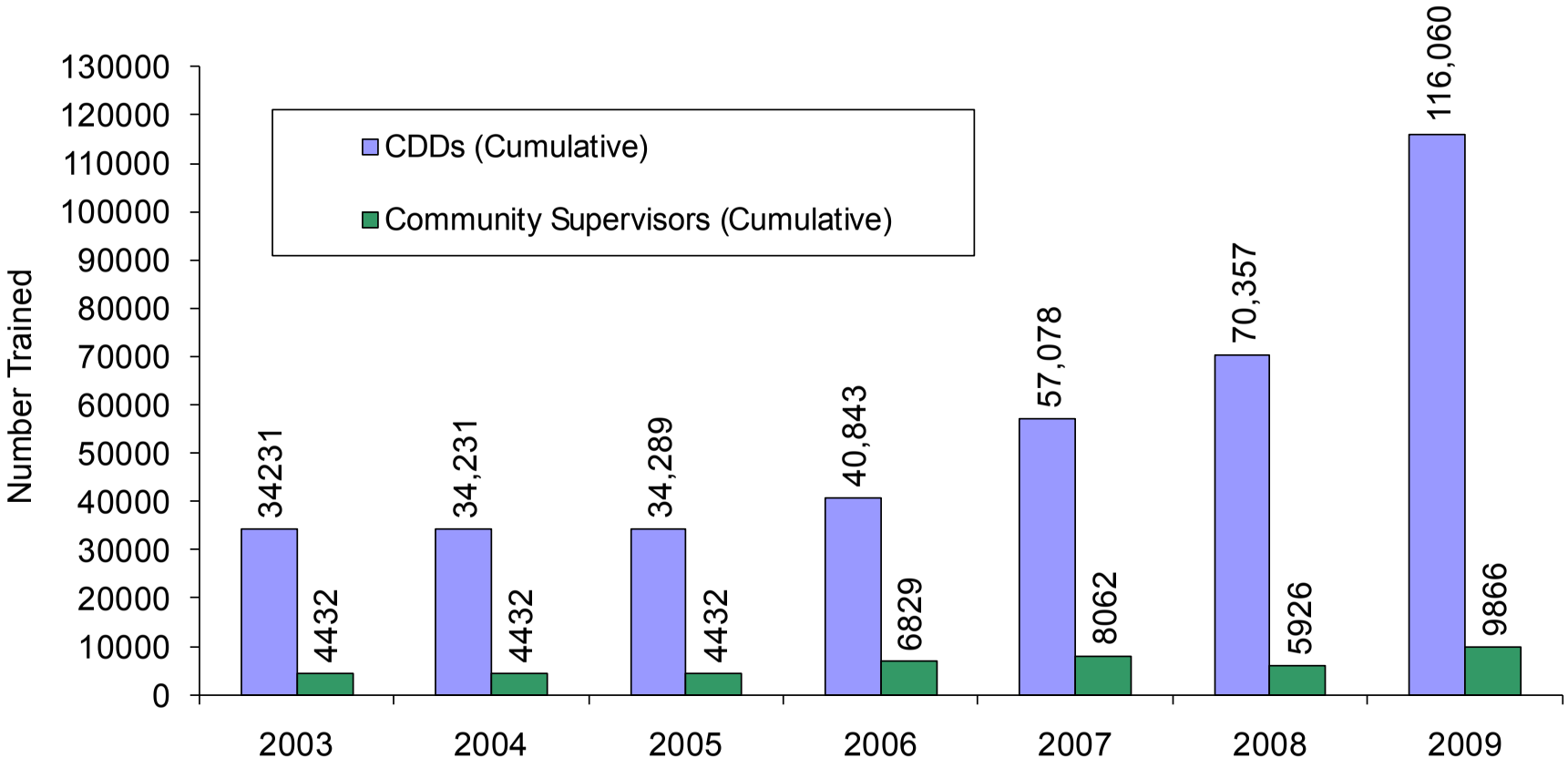


Figure 19

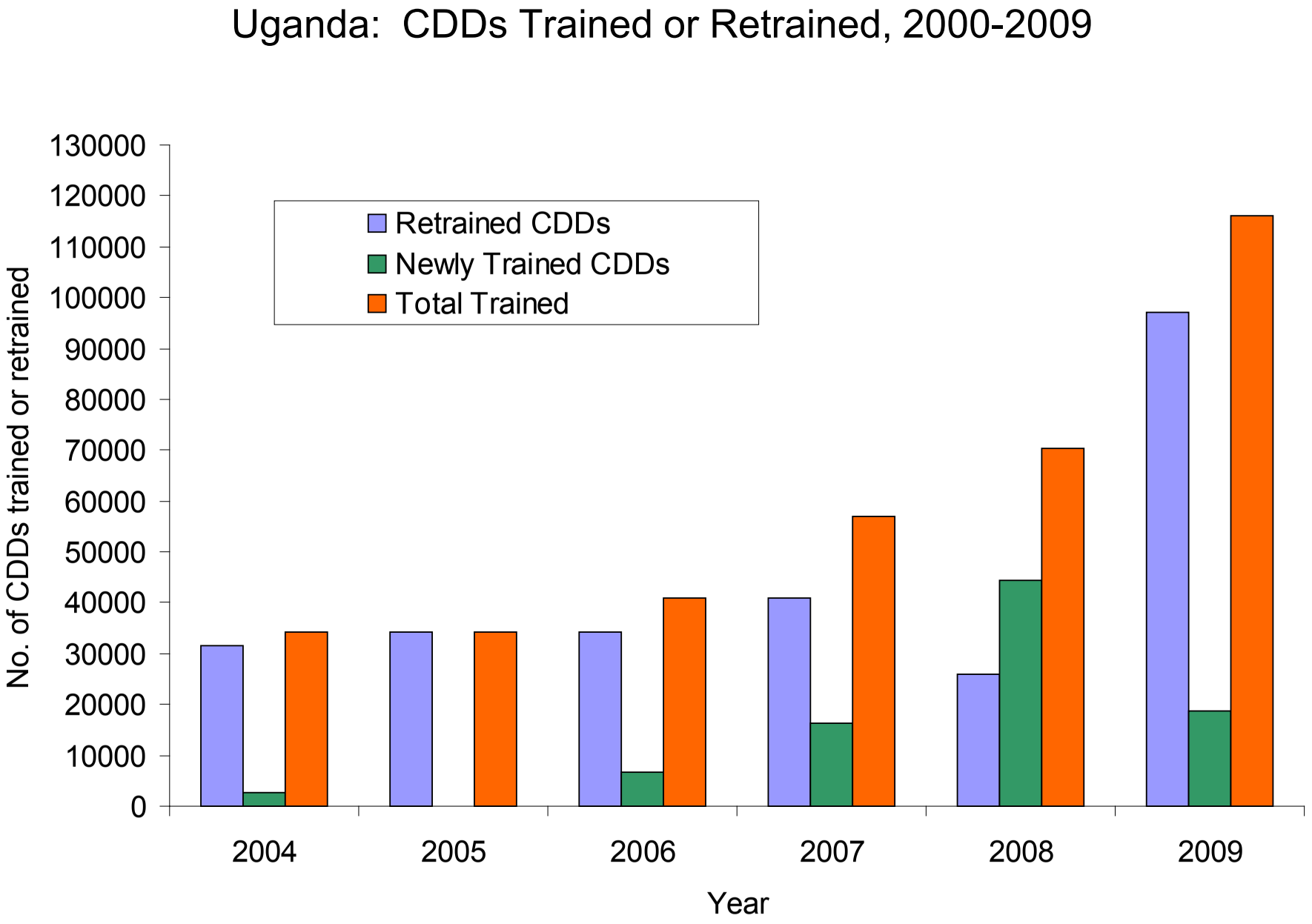
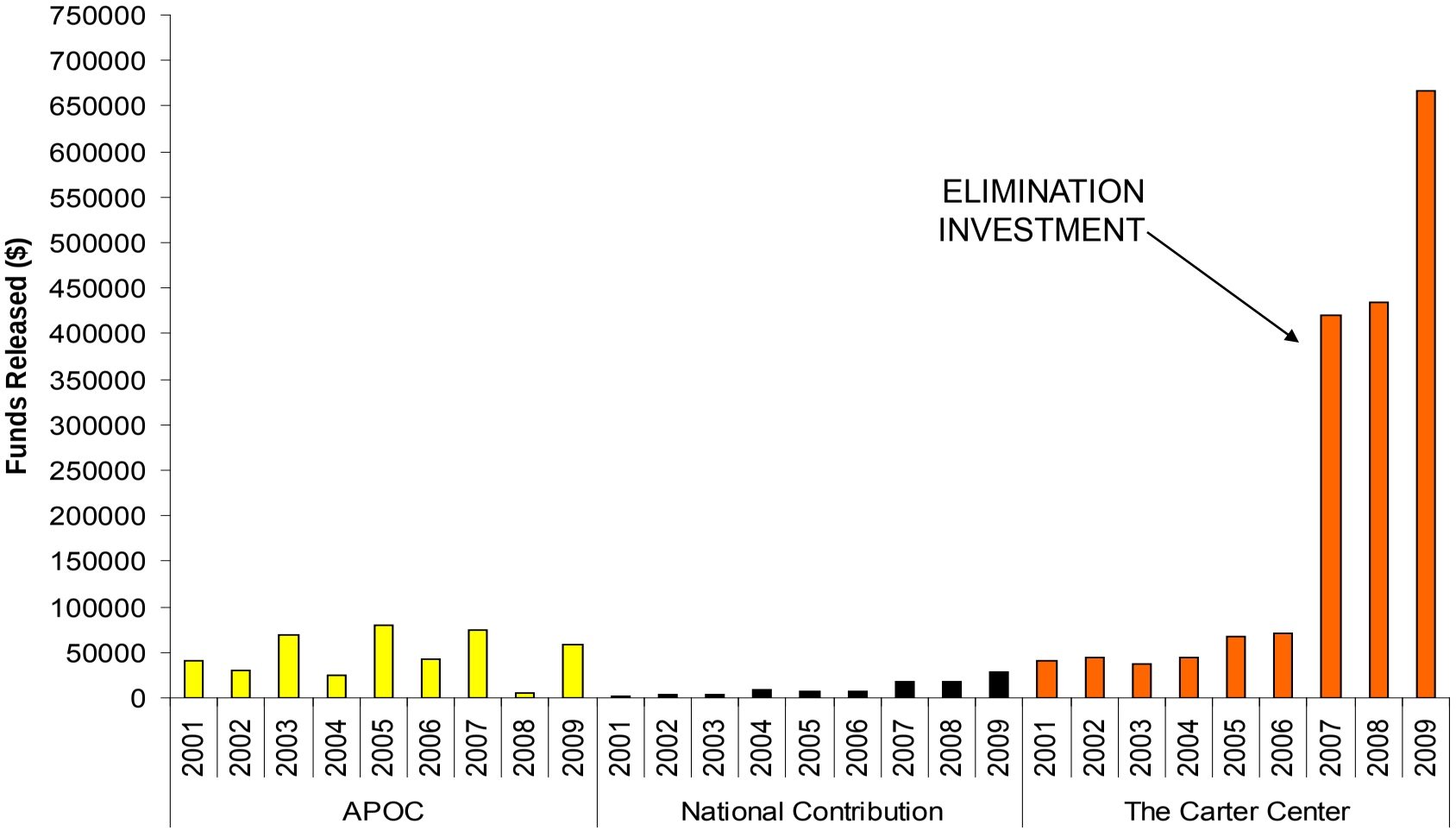

Uganda: CDDs Trained or Retrained, 2000-2009
No. of CDDs trained or retrained
130000
120000
110000
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
Retrained CDDs
Newly Trained CDDs
Total Trained
2004
2005
2006
2007
2008
2009
Year

Figure 20

Uganda: Financial Contributions in US Dollars (2001-2009)



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

NORTH SUDAN

Background: There are several endemic areas for onchocerciasis in the whole of Sudan, but The Carter Center and Lions Club International Foundation currently support river blindness activities only in Northern Sudan. Focus areas include Abu Hamad, Radom, and Galabat (Figure 21). The Comprehensive Peace Agreement, signed in January 2005, ended the decades-old civil war and also created the semi-autonomous Government of South Sudan (GOSS). The Carter Center ceased its activities in South Sudan at the request of the new GOSS shortly after the agreement was signed. The African Program for Onchocerciasis Control (APOC) no longer supports onchocerciasis control in Northern Sudan but does support activities in South Sudan, along with Christoffel Blindenmission (CBM).

In December 2006, the government of Sudan launched a new onchocerciasis elimination policy for the isolated desert focus of Abu Hamad in River Nile state. In Abu Hamad, the strategy changed to providing Mectizan® tablets every six months rather than annually. Broader treatment was also underaken in hopes of stopping transmission of the disease as well as halting blindness and skin disease. Expanded Lions-Carter Center assistance to the new elimination effort was likewise approved in 2006. Flooding caused by the new Merowe Dam on the Nile River in late 2008 displaced thousands of Abu Hamad residents. This added the new challenge of finding and treating displaced people as part of the elimination effort. In 2009 the program made progress in tracking the displaced, and most are now receiving treatment in their new communities.

The Lions Carter Center SightFirst Initiative also assists with annual Mectizan® distribution to control onchocerciasis in Radom, South Darfur state, and Galabat (formerly Sundus), Gedarif state.

Treatments: A total of 197,865 treatments were delivered in Abu Hamad (including to displaced persons), representing 99 percent of the ultimate treatment goal (UTG) for that focus area. In the first round, 96,658 persons (96 percent of the UTG) were treated, and 101,207 persons (101 percent) were treated in round two. Annual doses of Mectizan® were delivered in Radom and Galabat, resulting in 12,633 and 139,585 treatments, respectively. Thus, 350,083 total treatments were delivered in the northern Sudan program in 2009.

See Figure 22 for Carter Center-supported treatments from 1997 to 2009 in northern Sudan, and see Figures 23 and 24 for details on treatments in Sudan in 2009. The dramatic decrease of treatments in 2005 resulted from infected or at-risk persons in displaced camps situated in Khartoum repatriating to Southern Sudan.

Training and Health Education: The program trained 2,911 new community-directed distributors (CDDs) and retrained 1,363 CDDs in 2009 in Abu Hamad, Galabat and Radom. The number of CDDs per person averages 1:109. About 42 percent of the CDDs were female—an impressive increase from 23 percent in 2008 (Figure 25).

Health education covered all 294 communities in the Abu Hamad, Galabat, and Radom foci.

Mectizan®: During 2009, 1,074,558 tablets were distributed in the Abu Hamad, Galabat, and Radom foci with an average of 3 tablets per person. No severe adverse effects were reported. The program began 2010 with a balance of 1,464,216 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 seems to have improved training figures and UTG coverage, reducing demand for monetary incentives.

2010 RECOMMENDATIONS FOR THE CARTER CENTER SUDAN

The Carter Center/Lions support for the Sudan program should focus on elimination of onchocerciasis in the Abu Hamad focus. Abu Hamad requires more attention to detail and data, and program efficiency.

Complete field work for reassessment of Abu Hamad focus by skin snip, entomology and OV16. Include the population displaced by the Merowe Dam, and treat eligible individuals. Engage Northern State health authorities to participate in Mectizan® distribution.

Complete 2007 samples for OV16 serology at Tom Unnasch's lab at the University of South Florida while simultaneously training Khartoum lab personnel in the technique (training to be at USF)

Analyze the OV16 specimens collected in 2010 in Abu Hamad in Khartoum.

Publish a report on Abu Hamad in 2010 or early 2011.

Track the cumulative number of rounds with >90 percent UTG coverage. Assess treatment coverage by village.

Create and maintain detailed tables and maps of epidemiological indicators for Abu Hamad, as is done with the OEPA foci. Define the southern (western) limit of the focus. Given the backlog in the lab, skin snip surveys should be conducted together with serology and entomology.

The Carter Center is unable to fund in 2010 new expansion of ATO in South Darfur.

The Sudan program should continue to track government and Carter Center funding figures in 2010, including any additional funds coming in from APOC.

Work towards 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. CDD training (new and old) needs to be expressed in relation to annual training goals.

Expansion of Carter Center programs into other disease control efforts requires formal Carter Center Board of Trustees approval, adequate funding to participate, and possibly Emory IRB approval. If the government wants to support integration in areas where The Carter Center 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 integration/coimplementation activities within designated river blindness Mectizan® distribution areas and within the time period when such distributions are scheduled.

Ensure that the NOCP submits accurate Mectizan® applications at least six months in advance of desired date of shipment receipt. Treatments do not need to be complete to submit requests for the upcoming year.

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

Help to strengthen the official new Sudan Lions Club.

Treatment Objective for onchocerciasis for 2010: 383,581

Semiannual UTG(2):	**206,550 treatments**
Annual UTG:	**177,031 persons**

Training Objective for 2010:

CDDs:	**3,448 (537 new)**
Community supervisors:	**465 (177 new)**

Figure 21

Sudan Khartoum Office: Program Areas

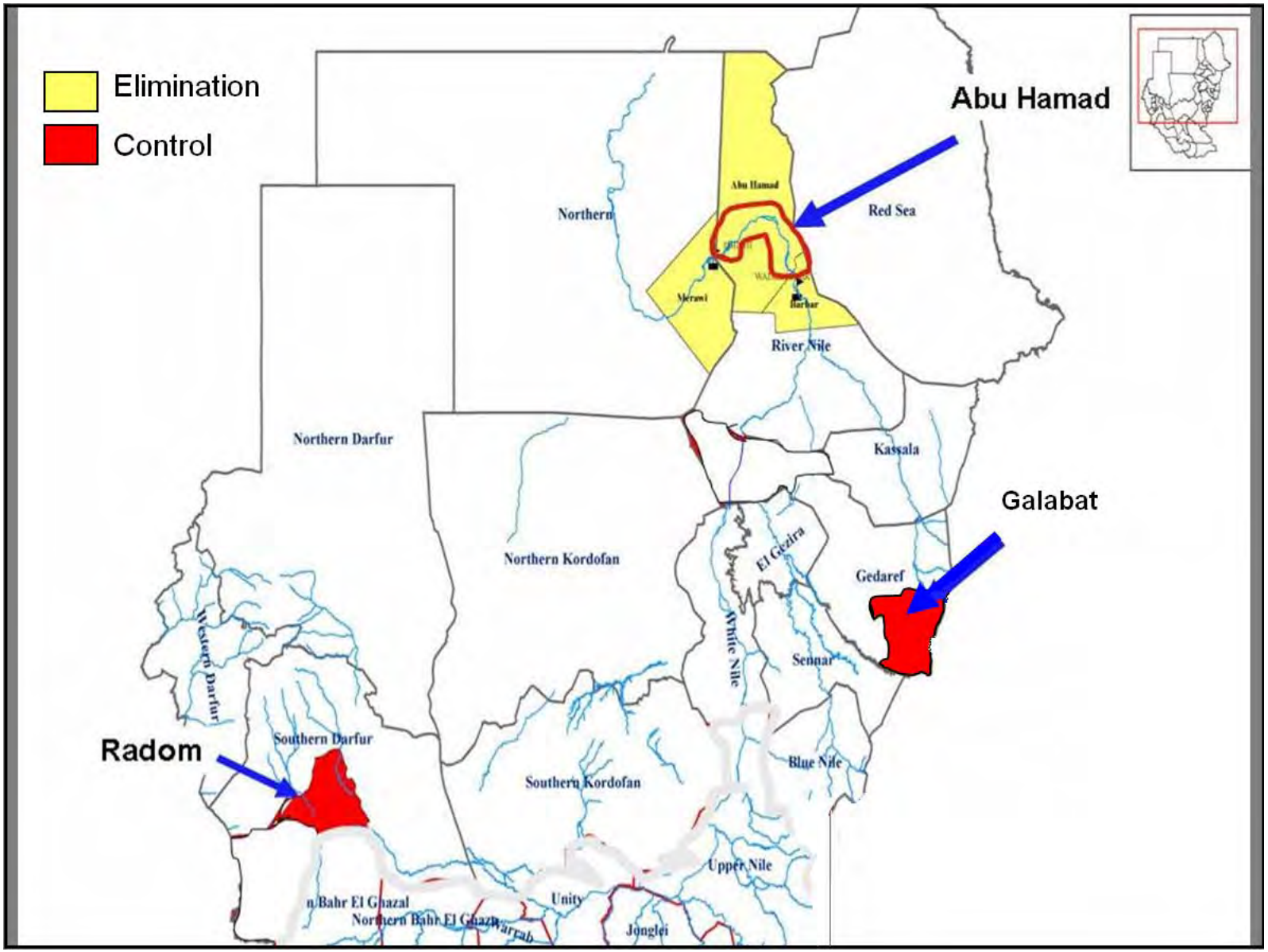
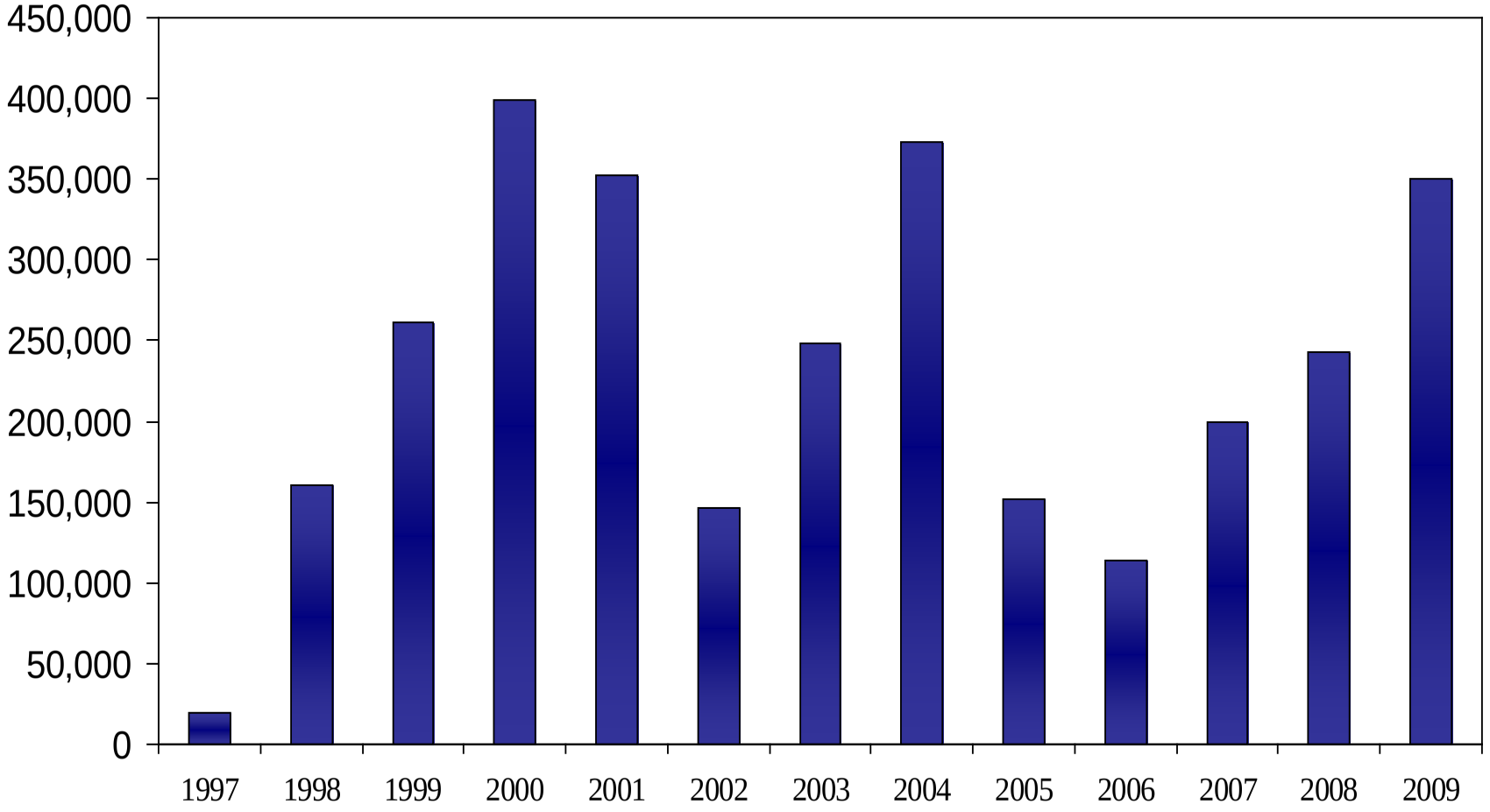


Figure 22

Sudan Khartoum Office: Lions-Carter Center-Assisted Mectizan® Treatments, 1997-2009*



* Since 1997, Carter Center activities in Sudan have been supported by Lions Clubs International Foundation.

Figure 23

Sudan: Lions-Carter Center-Assisted Areas: 2009 River Blindness Treatments

Annual Treatment (Control Projects)

State	Total Popn for 2009	Ultimate TX Goal (UTG) for 2009	Popn treated cumulative for 2009	Total Popn TX % for 2009	% of UTG treated for 2009	Active villages treated 2009	Active village UTG for 2009	% of active villages covered 2009
Gadarif (Galabat focus)	191,617	157,308	139,585	73%	73%	201	201	100%
South Darfur (Radom focus)	16,970	14,424	12,633	75%	88%	17	17	100%
Total	**208,587**	**171,732**	**152,218**	**73%**	**89%**	**218**	**218**	**100%**

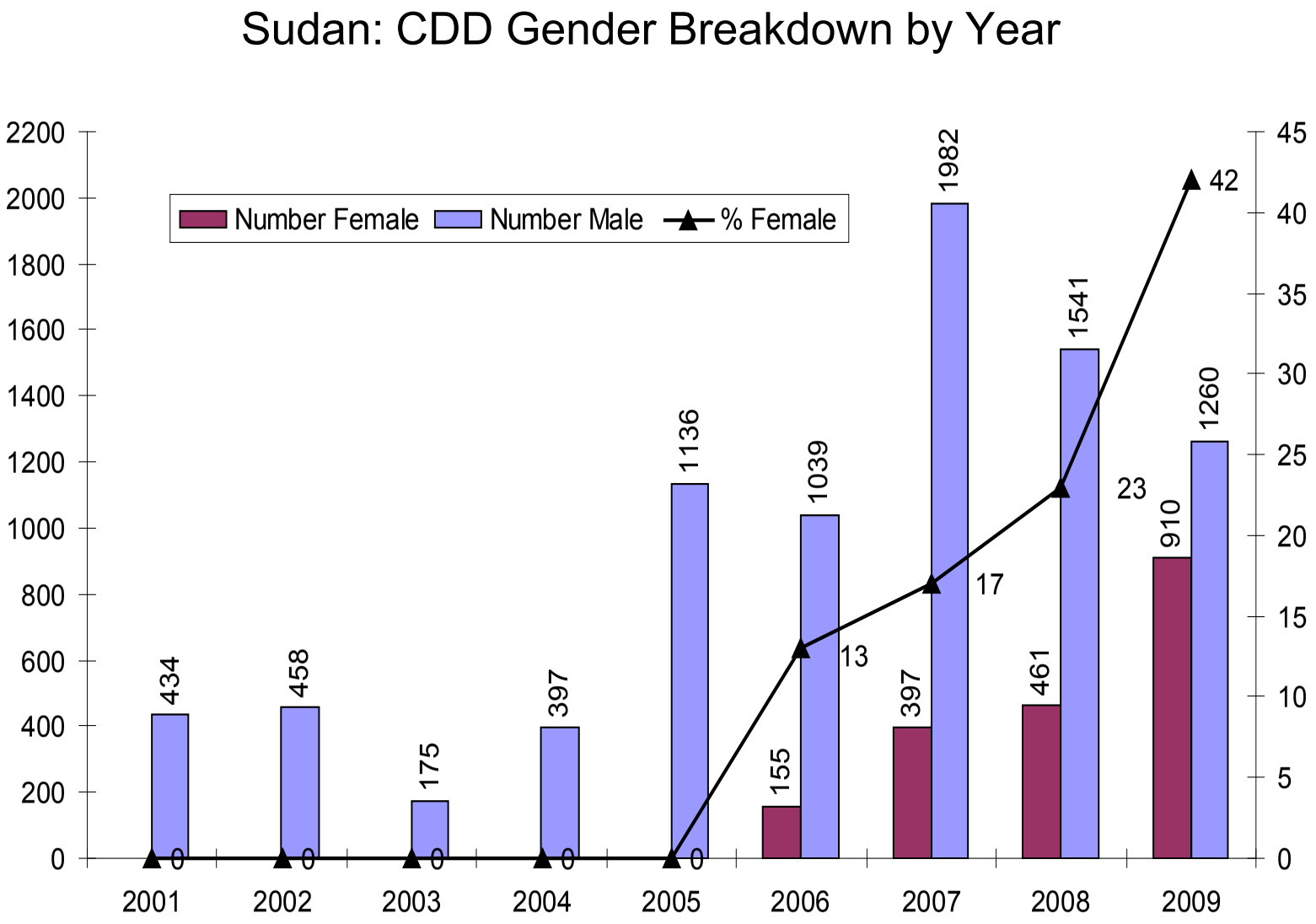
Figure 24

Sudan: Lions-Carter Center-Assisted Areas: 2009 River Blindness Treatments

Semi-annual Treatment (Elimination Project)

State	Focus	Pop at Risk	UTG1	Treated in Round 1	Treated in Round 2	UTG Covg Round 1	UTG Covg Round 2	Total Treated	UTG(2)	Covg UTG(2)	Active villages treated 2009	Active villages treated in 2009	% of active villages covered 2009
River Nile	Abu hamed	99,935	84,945	81,480	86,771	96	102	168,251	169,890	99	122	122	100
River Nile	Displaced persons	18,099	15,384	15,178	14,436	99	94	29,614	30,768	96	22	22	100
TOTAL		**118,034**	**100,329**	**96,658**	**101,207**	**96%**	**101%**	**197,865**	**200,658**	**99**	**144**	**144**	**100%**

Figure 25


Sudan: CDD Gender Breakdown by Year
Number Female
Number Male
% Female
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
45
40
35
30
25
20
15
10
5
0
434
458
175
397
1136
155
1039
397
1982
461
1541
910
1260
0
0
0
0
0
13
17
23
42
2001
2002
2003
2004
2005
2006
2007
2008
2009

CAMEROON

Background: The Lions-Carter Center partnership assists the Ministry of Health (MOH) of Cameroon to battle onchocerciasis in North and West Regions[5] (Figure 26). In 2009, the Carter Center's Ultimate Treatment Goal (UTG) in Cameroon accounted for 34% of the national UTG, slightly lower than the levels of previous years, as other partner onchocerciasis control programs improved their treatment coverage. North Region has had a strain of onchocerciasis (the 'savannah strain') with particularly high levels of blindness.

The Lions-Carter Center SightFirst Initiative project is supervised by Lions District 403B. Support from the African Program for Onchocerciasis Control (APOC) was phased out in North Region in 2003, and in West Region in 2008. LCIF support is slated to end in 2010, although local Lions District 403B members remain strong advocates for continued onchocerciasis control.

The road to onchocerciasis-endemic communities has never been smooth. Massangam Health District in West Region, Cameroon.

Treatments: Carter Center-assisted areas in Cameroon received 1,642,612 treatments in 2009 (Figures 27 and 28), or 90% of the UTG of 1,826,082. This included 1,268,176 treatments in West Region and 374,436 treatments in North Region. The North Region achieved UTG coverage of 89%, while the West Region achieved 90% UTG coverage.

No severe adverse events (SAEs) were reported as a result of Mectizan® treatments in Cameroon in 2009. Monitoring potential adverse reactions is given high priority in West Region because of the presence of *Loa loa* in that part of the country. *Loa loa* is a filarial parasite (similar to *O. volvulus)* that can cause SAEs when Mectizan® is administered. There have been no cases of SAEs potentially related to *Loa loa* in West Region for the past seven years. Mass treatment in West Region is in its fourteenth year.

Mectizan®: The Lions-Carter Center-assisted program received a total of 5,303,267 Mectizan® tablets from the Mectizan® Donation Program (MDP) for 2009 treatments. The program assisted in distributing 4,563,359 of these, with 12,016 tablets lost or expired during the period of distribution in both Regions. The balance of 727,892 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.

[5] Formerly known as "Provinces," the government of Cameroon now calls these administrative units "Regions."

Training and Health Education: Ivermectin distribution by community directed distributors (CDDs) has used the kinship strategy since 2004. This strategy calls for the training of more CDDs (to serve their kinship group rather than the larger 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 2009, the Program trained a total of 43,970 CDDs in the West and North Regions (83% of the 2009 training objective); of these 12,032 were newly trained (27%). This is a 17% decrease from the 53,242 trained in 2008, although still exceeding the ratio of 1 CDD per 100 persons served (Figure 29). The Lions-Carter Center assisted programs in Cameroon have made significant progress from a ratio of 1 CDD:575 persons in 2001 to 1:48 in 2009. Roughly 38% of the CDDs trained in West Region and 12% in North Region were female. Overall, 31% of the CDDs trained were female, with no significant change from 2008. Close supervision, and ensuring selection of more female CDDs, especially in North Region, remains a high priority for 2010. Since 2005, the number of CDDs has increased dramatically, from 5,037 to 43,970 in 2009, an increase of 773%! Trained community supervisors (trainers of trainees) increased during the same period, but to a lesser degree (420%). The supervisory demands of having so many CDDs needs further evaluation and costing.

Financial Contribution: The Lions-Carter Center SightFirst Initiative provided important support to the program in 2009. The regional governments invested $284,833 in the community-directed treatment with ivermectin (CDTI) program in 2009, which was a decrease of $15,595 from 2008 government support. See Figure 30 for APOC, Carter Center, and national (including state and local) financial contributions from 2001 to 2009.

Integration of Mectizan® Distribution with Other Activities: CDDs and community supervisors are involved with other community health activities, such as lymphatic filariasis (LF) elimination through mass drug administration (MDA) using combined Mectizan®/albendazole, 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. LF activities in North Region deserve special mention. The Cameroonian Ministry of Health policy is that LF elimination should be integrated into CDTI for onchocerciasis control. The LF MDA program is scheduled to launch in the entirety of North Region in 2010, including the six health districts where onchocerciasis is meso- and hyperendemic (and thus qualified for CDTI), and another four health districts that are outside CDTI areas. As a result, treatments are expected to at least double, and so considerable additional investment is needed to expand into areas with no MDA infrastructure. The Carter Center at this time does not have Board of Trustees approval to launch an LF program in Cameroon, or adequate funding to participate in LF MDA expansion activities in the rest of North Region, and so is unable to assist at this time in integrated interventions outside of the CDTI areas.

2010 RECOMMENDATIONS FOR THE CARTER CENTER CAMEROON

Write up assessment experiences of North Region, which includes the Vina Valley.

Follow the developments related to Prof. Andze Gervais' statement at the 2009 Program Review on a new MOH elimination policy based on semiannual treatment, with or without vector control. (see Annex 11)

TCC Cameroon should indicate in monthly reports activities related to lymphatic filariasis elimination and any other integration/NTD developments taking place at national level, as well as in Carter Center-assisted areas in North and West Regions.

The program should review the distribution of onchocerciasis in West Region.

Expansion of Carter Center programs into other disease control efforts requires formal Carter Center Board of Trustees approval, adequate funding, and possibly Emory IRB approval to participate. If the government wants to support integration in areas where The Carter Center 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 integration/coimplementation activities within designated river blindness Mectizan® distribution areas and within the time period when such distributions are scheduled.

The Carter Center will provide VAS if distribution can be simultaneous with Mectizan® distribution, but it cannot provide financial support for separate rounds of VAS or distribution in areas where we are not already assisting annual Mectizan® distribution. The Carter Center's priority is Mectizan® distribution, and it cannot delay Mectizan® distribution if VAS supplies are not readily available. The RBP should seek to publish our experience with VAS activities.

The Cameroon program should continue to track government and Carter Center funding figures in 2010, including any additional funds coming in from APOC.

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

Seek to increase training, supervision, involvement of kinship groups, and gender balance among CDDs and community supervisors as appropriate. CDD training and retraining needs to be expressed in relation to annual training goals. Continue research to evaluate challenges of increasing CDD numbers beyond 1:100 total population, with focus on supervisory issues and data flow. Continue to evaluate training costs (of CDDs and supervisors), transport demands of supervision (especially in North), coverage implications, and 'attrition and return' (people who leave and come back).

Ensure that the National Onchocerciasis Task Force (NOTF) submits accurate Mectizan® applications <u>at least six months in advance of desired date of shipment</u>

receipt. Treatments do not need to be complete to submit requests for the upcoming year.

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

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

Treatment Objective for onchocerciasis for 2010: 1,871,734 persons

Training Objective for 2010:

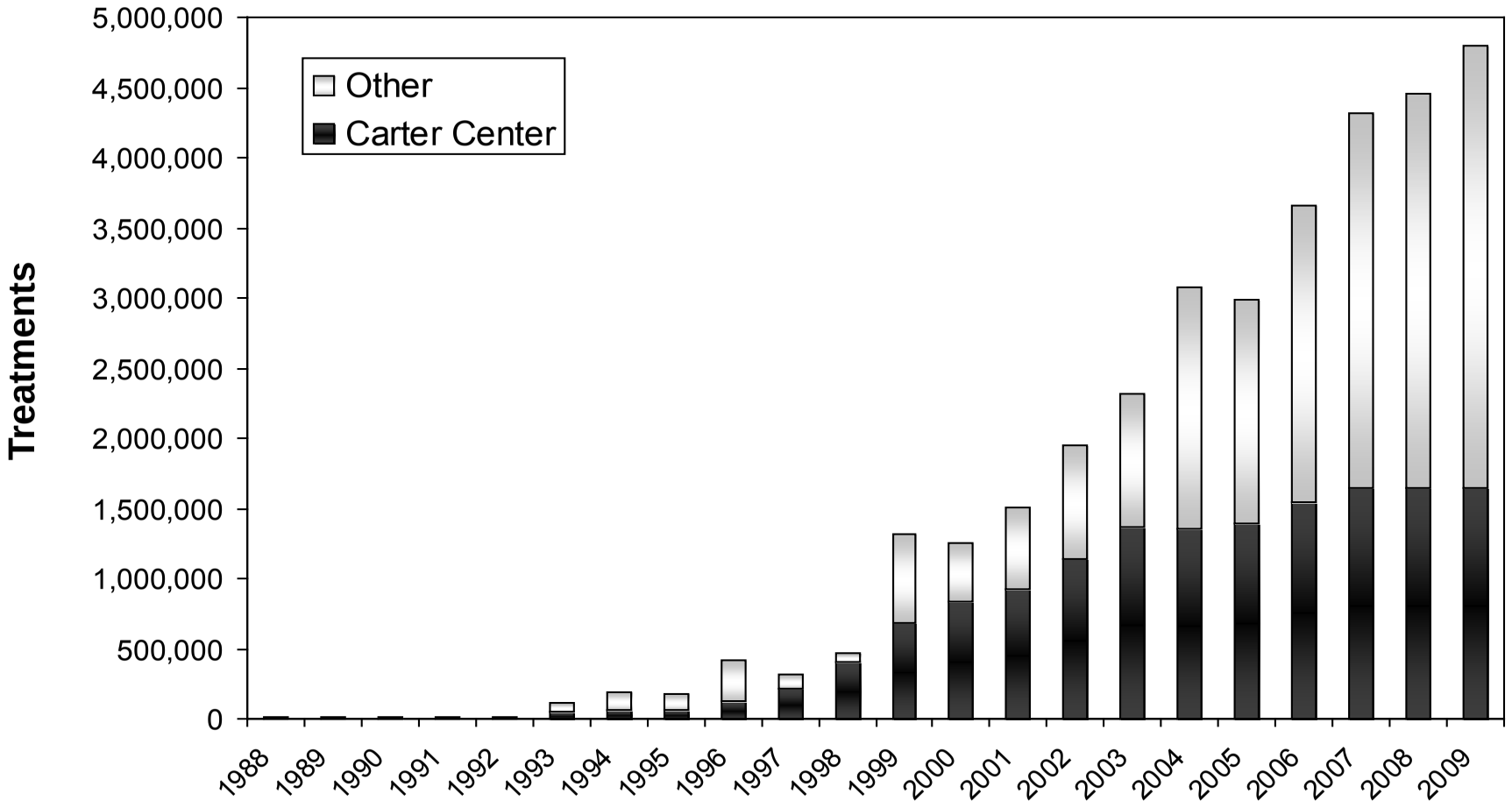
CDDs:	**40,000 (16,000 new)**
Community supervisors:	**12,000 (4,800 new)**

Figure 26

Cameroon
Lions-Carter Center - Assisted Regions

Figure 27

Cameroon: Lions-Carter Center-Assisted Mectizan® Treatments as Part of Total Treatments Provided, 1988-2009*



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

Figure 28

Cameroon: Lions-Carter Center-Assisted Areas: 2009 Mass and Passive River Blindness Treatments

Regions	Total population	UTG for 2009	Population treated cumulative for 2009	%Total pop. Treated	% UTG Treated	Active Comm Treated in 2009	Active Comm UTG for 2009	% Comm UTG Treated
West	**1,603,045**	**1,405,534**	**1,268,176**	**79.1**	**90.2**	**2,513**	**2,533**	**99.2**
North	**515,640**	**420,548**	**374,436**	**72.6**	**89.0**	**1,150**	**1,172**	**98.1**
Total	**2,118,685**	**1,826,082**	**1,642,612**	**77.5**	**90.0**	**3,663**	**3,705**	**98.9**

Comm=Communities

Figure 29

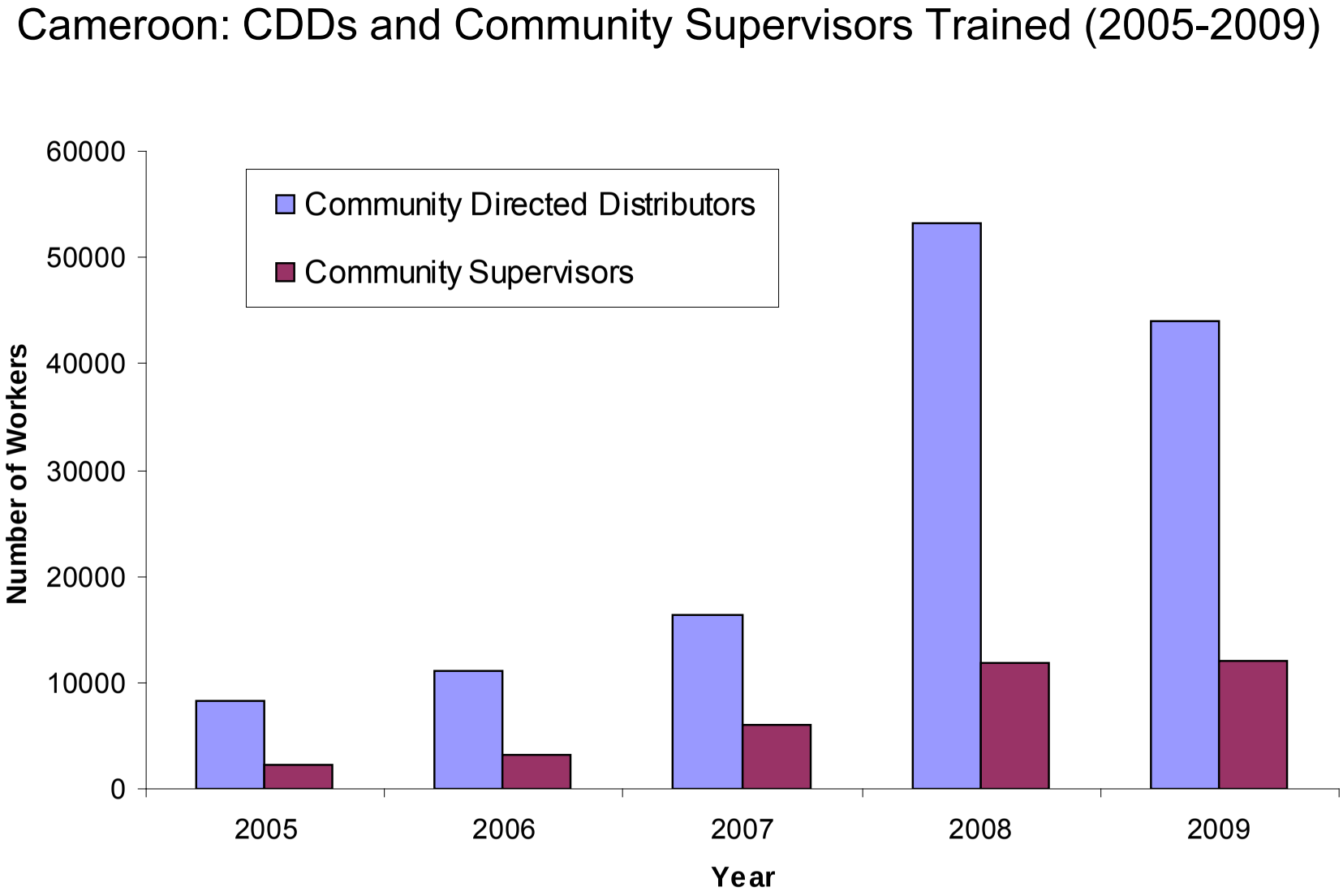
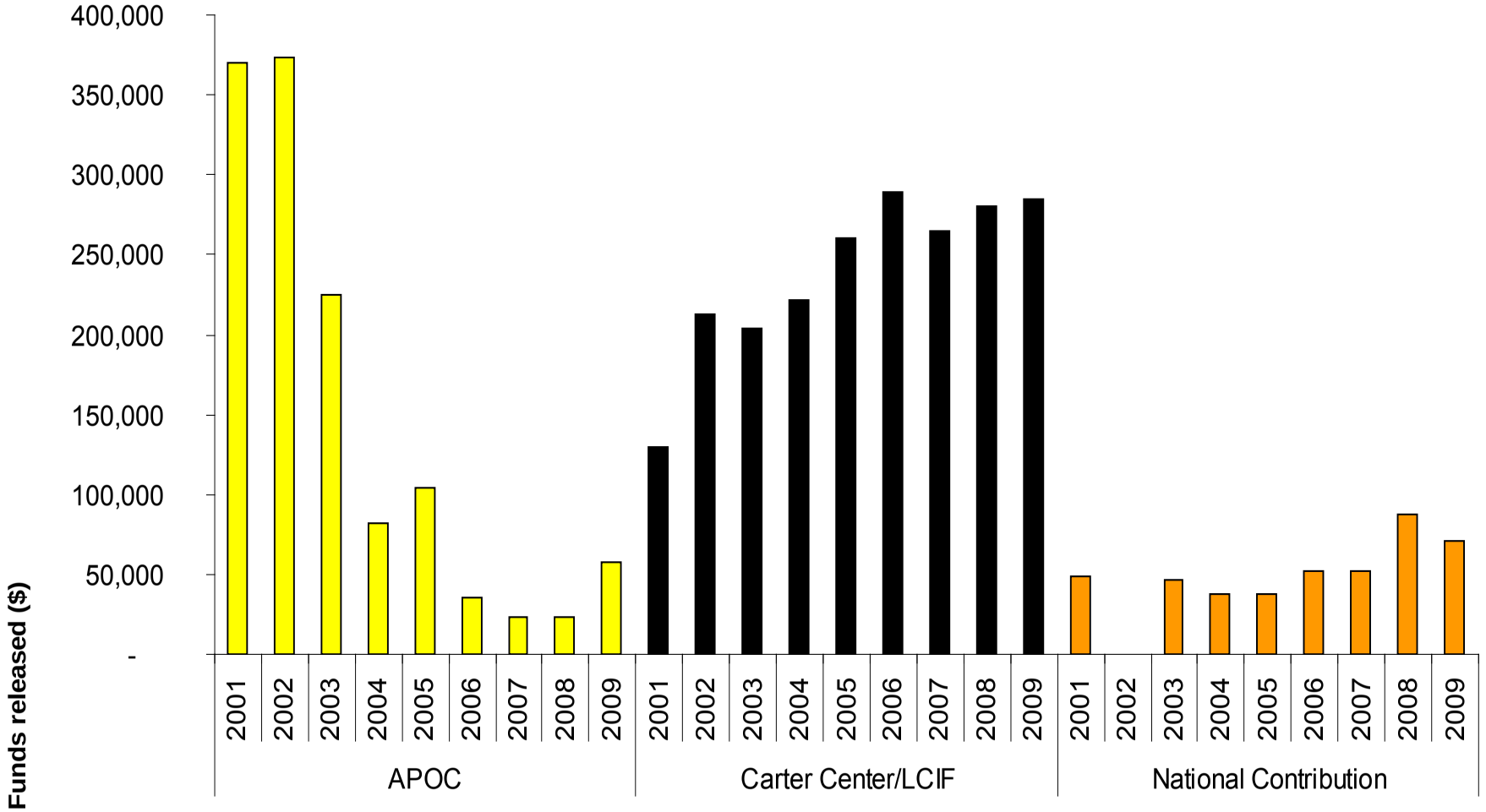

Cameroon: CDDs and Community Supervisors Trained (2005-2009)
Community Directed Distributors
Community Supervisors
Number of Workers
60000
50000
40000
30000
20000
10000
0
2005
2006
2007
2008
2009
Year

Figure 30

Cameroon: Financial Contributions (in USD), 2001 – 2009
North & West Regions



APOC trend is down, Carter Center/LCIF trend is stable, and national contribution is erratic

NIGERIA

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 UTG is estimated by the Nigerian Federal Ministry of Health (FMOH) to be between 22 and 27 million). The National Onchocerciasis Control Program (NOCP) is the largest Mectizan® distribution program in the world. According to FMOH estimates, NGOs and the NOCP provided more than 20 million treatments throughout Nigeria in 2009 (this estimate is subject to revision by the FMOH).

Background: The Carter Center program in Nigeria has its headquarters 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 31). These projects no longer enjoy LCIF or core APOC support. Local Lions (District 404) have been active participants in the Carter Center-assisted RB control activities in Nigeria since 1996. They remain involved in advocacy efforts.

Treatments: In 2009, the Carter Center-assisted program in Nigeria provided health education and Mectizan® treatments to 5,817,617 persons (Figure 32); 5,354,573 of those were mass (active) treatments; 463,044 passive treatments were delivered in hypo-endemic areas of states we assist in the 7 states located in the southeastern part of the country. Mectizan® was delivered to 9,905 villages. The treatments assisted by The Carter Center represented approximately 26% of the total estimated to have been reported so far by the FMOH in 2009 (a total of 20.6 million has been provisionally reported--Figure 33).

The Carter Center Nigeria Program had approximately 24 million Mectizan® tablets available for 2009, and the average number of Mectizan® tablets per person treated was 2.7. There were 740,412 Mectizan® tablets remaining at the end of 2009.

No severe adverse events (SAEs) were reported as a result of Mectizan® treatments in Nigeria in 2009. Particularly close monitoring for adverse reactions is done 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 it can give rise to SAEs when Mectizan® is administered.

Training and Health Education: The 9 states assisted by The Carter Center conducted training or retraining for 60,047 health workers involved in Mectizan® distribution in 2009. This is a 15%increase compared to the number trained in 2008 and reflects a continued effort in the Southeast especially to enhance Community-Directed Distributor (CDD) numbers by using the kinship strategy, which utilizes the extended family structure to provide treatment to small groups of related persons. Kinship-enhanced training in the Southeast included 33,933 CDDs, 12,998 Community

Supervisors, and 7,933 Frontline Health-Level Workers. The ratio of persons treated was 1 CDD per 108. This is a marked improvement compared to 2008 (1:137), and is close to the minimum goal of 1:100. In the Southeast states, nearly 50% of CDDs were female, while in Plateau and Nasarawa more than 8% were.

Financial Contribution: The funding for Carter Center-assisted river blindness programs in Nigeria during the 2001-2009 period has been characterized by diminishing APOC core funding (although special APOC initiatives are still being funded), and chronically insufficient government contributions. However, 2009 showed a greater than twofold increase in both APOC and government funding to projects (Figure 34). The APOC funding was related to special projects and capital purchases, so it was considered important but focal and temporary. Government support was mostly limited to Delta state programs and represented more than 21% of total expenditures for the year for Delta State. In 2009, The Carter Center published a short report in The Lancet that reported our experience in 2 states (Imo and Abia states) in the Southeast where government funding was shown to not yet have reached a point where the programs could be internally sustained (Rakers et al, 2009). Of note is that these 2 states had among the best sustainability scores of our programs by an APOC external review (Imo State with 3.6 out of 4, for a "highly sustainable" ranking, and Abia State with 2.6 out of 4, for a "moderately sustainable" ranking).

At the community level, 4,753 villages (or 44.5% of all at-risk villages receiving mass treatment) supported their CDDs with cash. Total village-level contributions equaled approximately 11.7 million Naira (USD 90,403). The amount contributed by a village to support a CDD averaged USD 4.52/CDD (at 130 Naira to the dollar). LGA-level contributions in 7 of the 9 states (neither Nasarawa nor Plateau LGAs contributed) totaled approximately 6.1 million Naira (USD 46,769), a 52% increase from 2008, but far below the aggregate support provided at the village level. State-level contributions in 7 of the 9 states (Plateau and Nasarawa did not contribute) totaled approximately 28.9 million Naira (USD 222,222), mostly limited to Delta State as noted above.

The Integrated Program in Plateau and Nasarawa: The Carter Center-assisted program in Nigeria pioneered the concept of integrated mass treatment in 2000, in which the logistics of a mass drug administration (MDA) program are shared across several programs. Integration presumably results in greater impact against diseases that can be addressed with similar strategies, lower costs and higher efficiency. The Center received a grant (titled "Proof of Concept for Integrated Health Intervention in Nigeria") from the Bill & Melinda Gates Foundation that is supporting our ability to determine if that statement can indeed be supported by data. The Gates funding enabled further expansion of the scope of the program to include assessing costs as well as management issues related to integrated interventions. The Center partners with Emory University and the CDC in the execution of the cost and managerial dimensions (respectively) of integration.

The initiative's central platform is an infrastructure and logistical system to deliver annual combination Mectizan®/albendazole community-based mass treatment with

health education for lymphatic filariasis (LF) to the entire population (about 4.7 million) throughout the two-state area. The LF treatment combination is also highly effective against several soil transmitted helminths (STH). Other partners include Nigeria's FMOH, the two state governments, the ministries of health of Plateau and Nasarawa, Merck & Co., Inc., the Izumi Foundation, Merck KGaA (E-Merck), and GlaxoSmithKline. The program began in 1999 with integrated RB and urinary schistosomiasis interventions, expanding into LF in 2000. Interventions now also include Vitamin A Supplementation (VAS) for young children, and two interventions that are currently not based on drug distribution (trachoma and malaria). Background information on LF and urinary schistosomiasis is provided in Annex 6.

Lymphatic Filariasis: 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. A total of 3,469,736 persons in the 2 states received health education and mass treatment for LF in 2009, which was 92% of the UTG of 3,763,267 treatments (see Figures 35 and 36). RB is simultaneously treated with LF combination therapy of Mectizan® and albendazole. However, ivermectin treatment for hyper-/meso-endemic RB is more limited than that of LF. Of the total LF treatments given, approximately 35% (1,211,770) were in co-endemic RB target areas, and the remaining 2,257,966 were in LF-only areas (some of which are also hypo-endemic for RB). Approximately 160,000 albendazole tablets remained at the end of 2009.

The goal of the LF program in Plateau and Nasarawa States is to demonstrate that LF transmission can be interrupted with combination MDA. The WHO elimination strategy is based on the assumption that 4-6 years of such MDA will interrupt LF transmission. After 5 years of treatment, in 2008, 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 LF antigenemia rate of <2 %. Some of these LGAs were hyperendemic at the start of the program; thus the findings are particularly exciting. The Federal MOH has approved cessation in 5 'LF-only' LGAs (Langtang South, Jos North, and Barkin Ladi in Plateau State, and Keffi and Keana in Nasarawa State) on the condition that long lasting insecticidal nets (LLIN) were distributed first in those LGAs to prevent recrudescence. Approximately 500,000 LLINs are needed for these LGAs. Unfortunately, these LLINs were not received in 2009, so MDA continued for another year in all LGAs in the 2 states.

Lymphatic Filariasis and River Blindness: Another 5 LGAs among the 10 that interrupted LF transmission were co-endemic for both LF and river blindness. That led to the question of whether Mectizan® MDA alone (e.g., as monotherapy) needed to continue to be administered for onchocerciasis if LLINs were distributed there. Another option would be to stop all MDA if we could demonstrate that onchocerciasis had also been eliminated. Accordingly, in 2009 we conducted assessments to determine if onchocerciasis transmission has been interrupted and if ivermectin could likewise be halted. Our skin snip study for microfilaridermia consisted of 2 elements: 1) sampling of school-aged children resident in the 5 co-endemic LGAs where LF transmission had

been interrupted to determine if any recent onchocerca infections had taken place, and 2) community-wide surveys conducted in 6 sentinel villages located in 4 other co-endemic LGAs where 1992 baseline surveys showed a mean skin snip prevalence of 72%. In the school surveys in 5 LGAs, preliminary analysis showed that only 1 skin snip positive occurred among 2779 children (0.04%). In the 6 sentinel villages in 4 additional LGAs, we found 8 (0.4%) infections among 1919 persons. This represents a 98% decrease compared to the 1992 river blindness baseline. We believe that interruption of transmission of onchocerciasis throughout all or most of the 2 state area has likely been achieved, and that both ivermectin and albendazole can be stopped in the 5 LF/onchocerciasis co-endemic LGAs. Discussions with the FMOH and state authorities on how to proceed will take place once final data analysis is available. However, the next step could be to stop all MDA in these LGAs and implement integrated post treatment surveillance (PTS) for recrudescence of one or both filarial diseases.

Malaria: In Africa, the same anopheline mosquitoes that transmit LF also transmit malaria. Insecticide treated bed nets (ITNs) are one of the most important prevention tools for malaria and should also be useful as an adjunct to mass drug treatment in the LF elimination program. With this in mind, The Carter Center partnered with the Nigerian Ministry of Health and linked ITN distribution with mass drug administration programs for LF on a pilot basis. Sharing resources will result in cost reductions, and protection from the mosquito vectors will reduce transmission of both diseases simultaneously. Having ITNs, particularly LLINs, distributed free of charge and at scale (e.g. full population coverage) in Plateau and Nasarawa States is the best way to protect from resurgence of LF after MDA is halted. Logistical systems have been developed to enable distribution of ITNs during the MDA for LF/ RB.

Since 2004, 300,650 ITNs have been distributed (most during MDA) in Plateau and Nasarawa (see Figure 37, which also includes Delta State). This is well short of the more than 3 million nets estimated to be needed for Plateau and Nasarawa. In 2009, 38,000 LLINs were distributed in Kanke LGA as part of a larger donation to the LGA by Clarke Mosquito Control. This, along with MOH-provided nets, helped to achieve a total of 74,408 LLINs distributed in the 2 states. The Global Fund to Fight AIDS, Tuberculosis and Malaria and other donors (prominently the United States Agency for International Development (USAID) and the UK Department for International Development (DFID)) will provide nets for the 2 state areas in 2010. Hopefully this will allow the program to stop LF treatments in the LF only LGAs of Langtang South, Jos North, Keffi, Barkin Ladi and Keana where LF transmission has been interrupted.

Schistosomiasis (Plateau, Nasarawa and Delta State*)*: In 2009, due to a large donation of praziquantel from E-Merck, through WHO, The Carter Center-assisted Schistosomiasis Control Program was once again able to treat more than 1 million persons (1,127,580, mostly children) in one year (Figure 35). The E-Merck/WHO donation was provided to Plateau and Nasarawa States, where the medicine was targeted for all school-aged children in the state. The program treated 973,358 persons from the 2 states in 2009, 94%of our annual treatment objective (ATO) of 1,034,873. In

Delta State, where the praziquantel used was largely purchased with support from other donors (largely the Izumi and John P. Hussman Foundations), 155,222 treatments were given, 98%of the ATO of 155,412. In Delta State, adults were treated in communities with urinary schistosomiasis prevalence greater than 50%. In total, nearly 2 million praziquantel tablets were used, at an average dose of 1.7 tablets per person, and 2,438,000 praziquantel tablets remained in stores at the end of 2009 for use in 2010.

This current strategy of full treatment of school-aged children in Plateau and Nasarawa States coincided with the publication of a cost study showing that universal treatment of schistosomiasis in children there would be more economical than conducting village by village diagnosis to exclude the 20 percent of villages that did not need praziquantel. The scope of our schistosomiasis work in the southeast has been limited to Delta State, primarily due to the lack of funding for program operations, including the purchase of praziquantel, which is not donated there. New funding from the Izumi Foundation will support a 2010 expansion into Edo State, one of the 6 states where The Carter Center assists in onchocerciasis MDA which has not yet benefited from praziquantel due to financial constraints.

Co-Administration (Triple Drug Administration): Praziquantel has been shown to be safe for combined treatment with Mectizan® and albendazole. The Carter Center launched extended Triple Drug Administration (TDA) treatment throughout the Plateau and Nasarawa integrated program areas in 2007, after a successful safety and implementation TDA monitoring trial in 5 communities in Mikang LGA, Plateau State in 2006 (Eigege et al., Annals of Tropical Medicine and Hygiene, March 2008). In 2009, the integrated program conducted TDA in all LGAs where separate rounds of treatment with praziquantel had already been given at least once, per WHO guidelines. In total, 25 of the 30 LGAs in the two states received TDA while 5 received stand-alone praziquantel and ivermectin+albendazole treatments. The cost-reducing benefits of TDA due to the ability to provide multiple treatments in a single village encounter are summarized in Annex 7 (Darin Evans). In 2010, TDA will be given in all LGAs except those in which LF treatment is approved for discontinuation by the Federal Government of Nigeria (pending). In those LGAs, praziquantel for schistosomiasis will be provided in a single MDA. It is also expected that Zithromax® (azithromycin, donated by Pfizer Inc) MDA will be given in some LGAs where trachoma is a public health problem. That treatment also will be given as a 'stand-alone' therapy since Zithromax® is not yet approved for combined treatment, and quadruple treatment (Zithromax®, Mectizan®, albendazole and praziquantel) has not been studied for the safety or feasibility of joint administration.

Integrated Programs in Southeast Nigeria: In Delta State, the schistosomiasis program is integrated with the onchocerciasis Mectizan® distribution program, but combination treatment (of Mectizan® and praziquantel) has not yet been given. There, the state uses a stand-alone praziquantel treatment in a rotation practice developed in 2006 for Plateau and Nasarawa States, where praziquantel "holidays" were given for 3 years after 3 to 5 years of annual treatment cycles. In studies done by The Carter Center, these rotations appear to extend our short supplies of praziquantel (Figure 38).

Our observations suggest that treatments can usually be withheld from an area for 3 years before recrudescence occurs. In 2008, praziquantel treatment in Delta State was rotated to 10 new LGAs as a part of this "praziquantel holiday" plan; treatments continued in the same 10 LGAs in 2009. Where possible, we will start to combine Mectizan® treatments with praziquantel treatments in Delta State in 2010 so that separate distribution rounds are not necessary. The first rounds of treatment in Edo State will be separate, however, until treatment patterns are established by the CDDs and parasite loads reduced in infected populations.

In 4 LGAs in Imo and Ebonyi States, LF elimination and malaria control are being integrated under a 2006 Bill & Melinda Gates Foundation grant entitled, "*Loa loa* Paralyzes LF MDA in Central Africa: Integration of LF and Malaria Programs Can Resurrect a Continental Initiative." LF cannot be treated with MDA in areas co-endemic for *Loa loa*, like southeast Nigeria, due to the risk of SAEs that can occur when persons with *Loa loa* receive the medicines used for treatment of LF. Therefore, it is desirable to find alternative methods to MDA for controlling LF. The goal of the project is to test whether LLINs alone, without adjunctive MDA, can interrupt LF transmission while improving the control of malaria. Carter Center staff are also investigating the cost of providing LLINs through stand-alone community distribution programs. In April and May 2008, the FMOH and The Carter Center distributed 200,000 LLINs in 4 LGAs in Imo and Ebonyi States to test their efficacy against LF. An additional 40,000 LLINs were purchased and distributed in 2009 to complete coverage in the 4 LGAs. Assessment of impact against LF and malaria is ongoing in sentinel villages and through cluster surveys, respectively. However, initial analysis of entomology results show that LF mosquito infection rates have decreased.

2010 RECOMMENDATIONS FOR CARTER CENTER NIGERIA

All States

It is urgent that all Carter Center Nigeria offices improve data collection, cleaning and reporting. Examples of data issues include, but are not limited to, the Likert scale of treatment coverage in the Southeast, and poor population denominators in Plateau and Nasarawa. More details follow in region-specific recommendations.

The Nigeria program should continue to track government and Carter Center funding figures in 2010, including any additional funds provided through APOC; and monitor trends for increased funding.

Conduct The Carter Center monitoring protocol annually in a sample of states to assess and validate coverage, health education, community involvement and ownership. The 'bed net modification' as developed for Ethiopia should be included in the protocol.

Expansion of Carter Center programs into other disease control efforts requires formal Carter Center Board of Trustees approval, adequate funding to participate, and possibly Emory IRB approval. If the government wants to support integration in areas where The Carter Center 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 integration/co-implementation activities within designated river blindness Mectizan® distribution areas and within the time period when such distributions are scheduled.

Work towards 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. CDD training and retraining needs to be expressed in relation to annual training goals. Conduct research to measure costs and supervisory demands of conversion to the kinship strategy where this transition is occurring.

Coordinate with national programs to ensure that the application for 2011 Mectizan® and albendazole is submitted <u>at least 6 months in advance of desired date of shipment receipt</u>. Albendazole applications require an annual report to be submitted by the national program and approved by the WHO regional office.

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

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

Pursue a high-level advocate (ideally, General Gowon) to help garner more political support for the link between integrated programs and malaria, in particular.

Work with national and state malaria authorities to advance the planned future delivery of LLINs by Global Fund (GF) Round 8 to TCC-supported states in coordination with drug deliveries where possible, and in particular in Plateau and Nasarawa, which are the TCC priority. Dr. Emmanuel Miri, Country Director, should seek to attend high level national malaria meetings whenever possible.

Seek to demonstrate impact of ivermectin treatment on ocular disease in sentinel villages in one or two assisted states.

Encourage local Lions Clubs to visit and be involved with program projects, as appropriate.

Plateau and Nasarawa States' Integrated Program:

Conclude data collection for cost study by January 2011 and begin final analysis for Gates integrated programs. Continue to improve on data quality and work in collaboration with Emory's Rollins School of Public Health to finalize product. Complete analysis of TDA activities and publish findings. Ensure that the costs of scale-up of stand-alone azithromycin MDA and LLIN distributions planned for 2010 are monitored.

Complete follow up evaluations and meetings with SMTC trainees. No new classes should be enrolled.

<u>Lymphatic Filariasis:</u>

Seek to provide universal LLIN coverage in order to sustain gains from 7 to 10 years of MDA for LF elimination in Plateau and Nasarawa States. Work in collaboration with the Ministry of Health (MOH) and partners to facilitate the delivery of 2.3 million LLINs from the Global Fund Round 8 in 2010.

Seek funds to resurvey the 13 LF-only LGAs with continuing LF transmission in 2011.

Based on the findings of the 2008 survey which found five LGAs (Jos North, Langtang South, Keffi, Barkin Ladi, and Keana) below the WHO recommended threshold for treatment of LF, and showing that transmission has been interrupted, we are now in a position to halt treatment in these areas. The Federal MOH has required that LLINs be distributed in these LGAs before treatment can be stopped. Carter Center staff should follow up on a promise by Dr. Michael Anibueze, FMOH Director of Public Health, to provide 500,000 nets for these 5 LGAs as soon as possible, and ahead of the Global Fund (GF) Round 8 nets due in late 2010.

Draft two manuscripts reporting the Plateau/Nasarawa LF experience (one on treatments, coverage, entomology, sentinel mf rates and ICT results, and another reporting the results of extensive cluster surveys).

Distribute second round of Duranets® to Kanke LGA as part of the collaborative project with Clarke Mosquito Control. Finalize the plan of action for distribution of a second donation of Clarke LLINs in Akwanga LGA.

Onchocerciasis:

Operationalize the new NTD lab. Complete construction and stocking of materials and begin work towards analysis of black flies by PCR and serologic enzyme-linked immunosorbent assay (ELISA) testing for onchocerciasis and LF. Establish technical assistance by University of Southern Florida (Tom Unnasch), the University del Valle/Guatemala (Nancy Cruz Ortiz), and Scripps (Tobin Dickenson).

There are 5 onchocerciasis-endemic LGAs that are now below the WHO threshold for treatment of LF (Jos East, Bassa, Bokkos, Kokona, and Karu). Analyze data from the recent study of these 5 LGAs to determine if transmission of onchocerciasis has been interrupted. Set "stop treatment for onchocerciasis" policy in consultation with the FMOH accordingly.

Mectizan® coverage has consistently been greater than 110% of the UTG. Use CDD household registers to update the 2010 UTG to reflect apparent population growth in both Plateau and Nasarawa.

Trachoma:

Finalize protocol for azithromycin distribution and plans for upcoming MDA due in June 2010. Treat approximately 700,000 persons with Zithromax® (preferably before end August 2010) in the targeted LGAs where TF>10%, as a separate treatment round. Monitor in detail the costs of this treatment round, with respect to the TDA cost study.

Work with federal MOH and other partners to submit International Trachoma Initiative (ITI) applications on time in 2010.

Due to cost constraints, latrine construction should be reduced from 7,500 to 3,500 for the current year.

Schistosomiasis:

Provide all praziquantel in Plateau and Nasarawa States in 2010 as part of a TDA.

Analyze and publish cost study data of savings due to TDA in 2009, compared to 2 separate treatment rounds in 2008.

Analyze baseline and recrudescence hematuria data from the praziquantel holiday rotation and draft a manuscript.

Develop protocol for assessments in hyper- and meso-endemic communities treated with the E-Merck/WHO praziquantel. These assessments should include adults as well as children. Modify IRB protocol accordingly.

Consider a special schistosomiasis assessment in the hyper-endemic Nasarawa LGA.

Vitamin A supplementation:

Vitamin A supplementation has been a challenge given the need to deliver VAS every 6 months, the erratic VAS supply chains, and other NGOs or agencies delivering Vitamin A in the same target villages. Nevertheless, the Plateau/Nasarawa project will do its best to provide VAS simultaneously with MDA, as this is an objective of the Gates integrated grant. However, we are not in a position to assist a second, separate round of VAS.

Treatment and Distribution Objectives for Plateau and Nasarawa States 2010:

Mectizan® and albendazole UTG:	**3,350,098 persons**
Praziquantel ATO:	**1,014,558 children**
LLIN:	**2,191,701 nets**

Training Objective for LF, RB and Schistosomiasis (SH) 2010:

River Blindness:

CDDs:	**5,890 (1,682 new)**
Community supervisors:	**2,347 (214 new)**

LF:

CDDs:	**12,812 (986 new)**
Community supervisors:	**6,094 (554 new)**

Schistosomiasis:

CDDs:	**12,812 (986 new)**
Community supervisors:	**6,094 (554 new)**

Southeastern States:

Assess impact of LLINs on LF antigenemia, mf prevalence and malaria. Prepare draft paper for publication on findings of Southeast LF/malaria study.

Complete paper with Dr. McFarland on the costs of implementation of the differing net distribution strategies (Vulnerable Groups and Complete Coverage).

Conduct fourth household cluster malaria survey in late 2010, and LF night survey in Jan/Feb 2011. Continue monthly entomological monitoring of sentinel site villages for LF.

Work in collaboration with MOH and partners to facilitate the delivery of LLINs from the GF Round 8 in 2010.

Conduct The Carter Center monitoring protocol in 2 states to assess and validate coverage, health education, community involvement and ownership.

Evaluate cause of spike in lower coverage cluster on Likert graphic for Anambra State (coverage of 70 – 79%), and evaluate Likert graphic overall. Justify how this spike is possible when high overall coverage is shown in other graphics.

Evaluate coverage change as it relates to kinship transition.

Map for schistosomiasis in community-directed treatment with ivermectin (CDTI) areas of Edo, and launch praziquantel treatment there if funding permits. Establish praziquantel ATOs for Edo State schistosomiasis expansion

Continued monitoring in Delta has not shown recrudescence of schistosomiasis infection to greater than the 20% threshold for treatment. Therefore, it is recommended that the praziquantel holiday continue, with continued monitoring in 2010.

Combine Mectizan® and praziquantel treatments where possible.

If possible, conduct evaluation of the impact of praziquantel on hookworm using an assessment of hookworm prevalence inside and outside of praziquantel treatment areas.

Treatment Objectives for Southeast States 2010:

Mectizan® UTG:	**4,752,428 persons**
Praziquantel ATO (Delta and Edo States):	**325,000 persons**

Training Objective for RB and SH, 2010:

River Blindness:

CDDs:	**66,942 (11,702 new)**
Community supervisors:	**14,850 (850 new)**

Schistosomiasis:

CDDs:	**3,671 (240 new)**
Community supervisors:	**96 (24 new)**

Figure 31

Nigeria: Carter Center-Assisted States

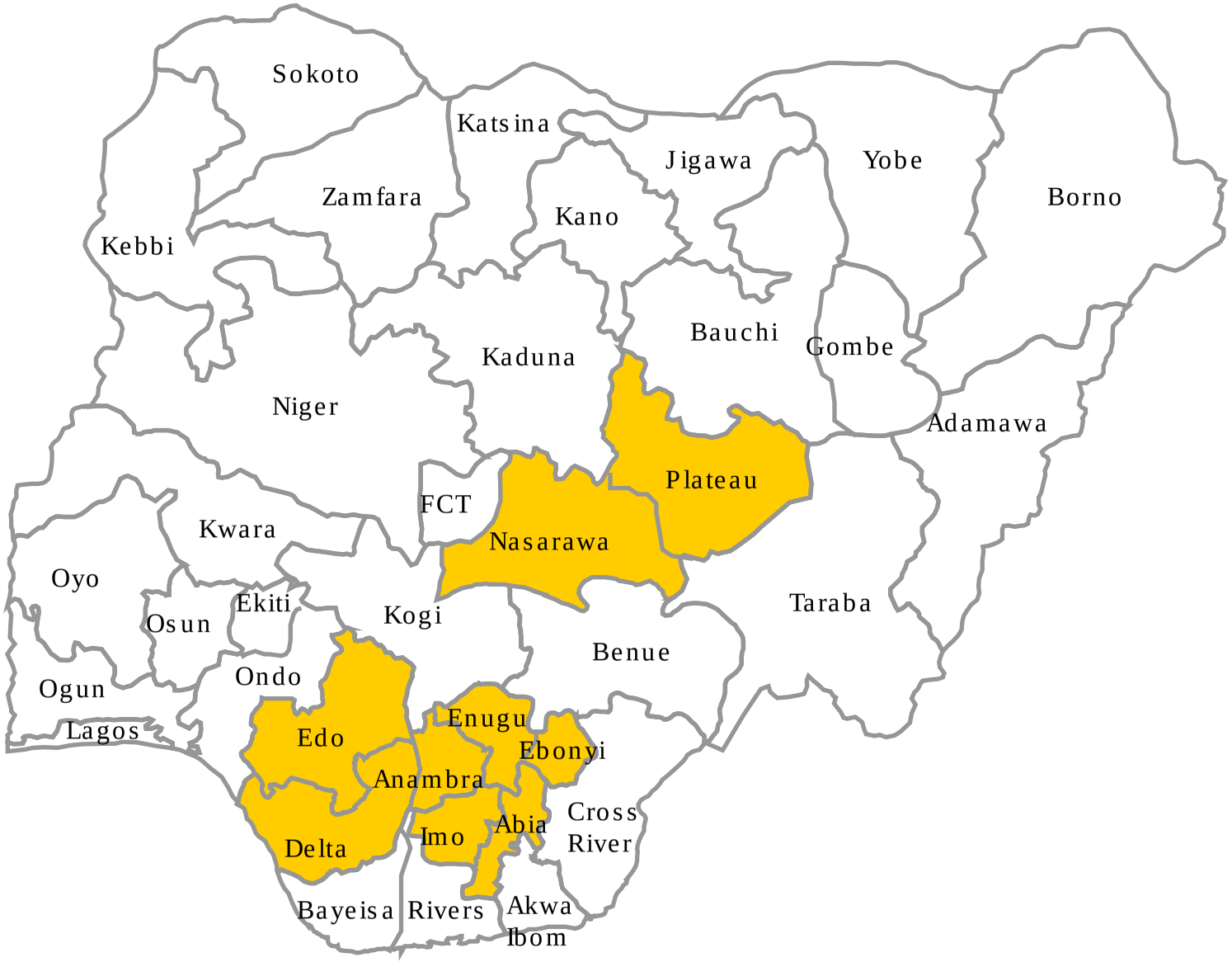


Figure 32

Nigeria: Carter Center-Assisted Areas: 2009 River Blindness Treatments (Active & Passive)

Active Treatments

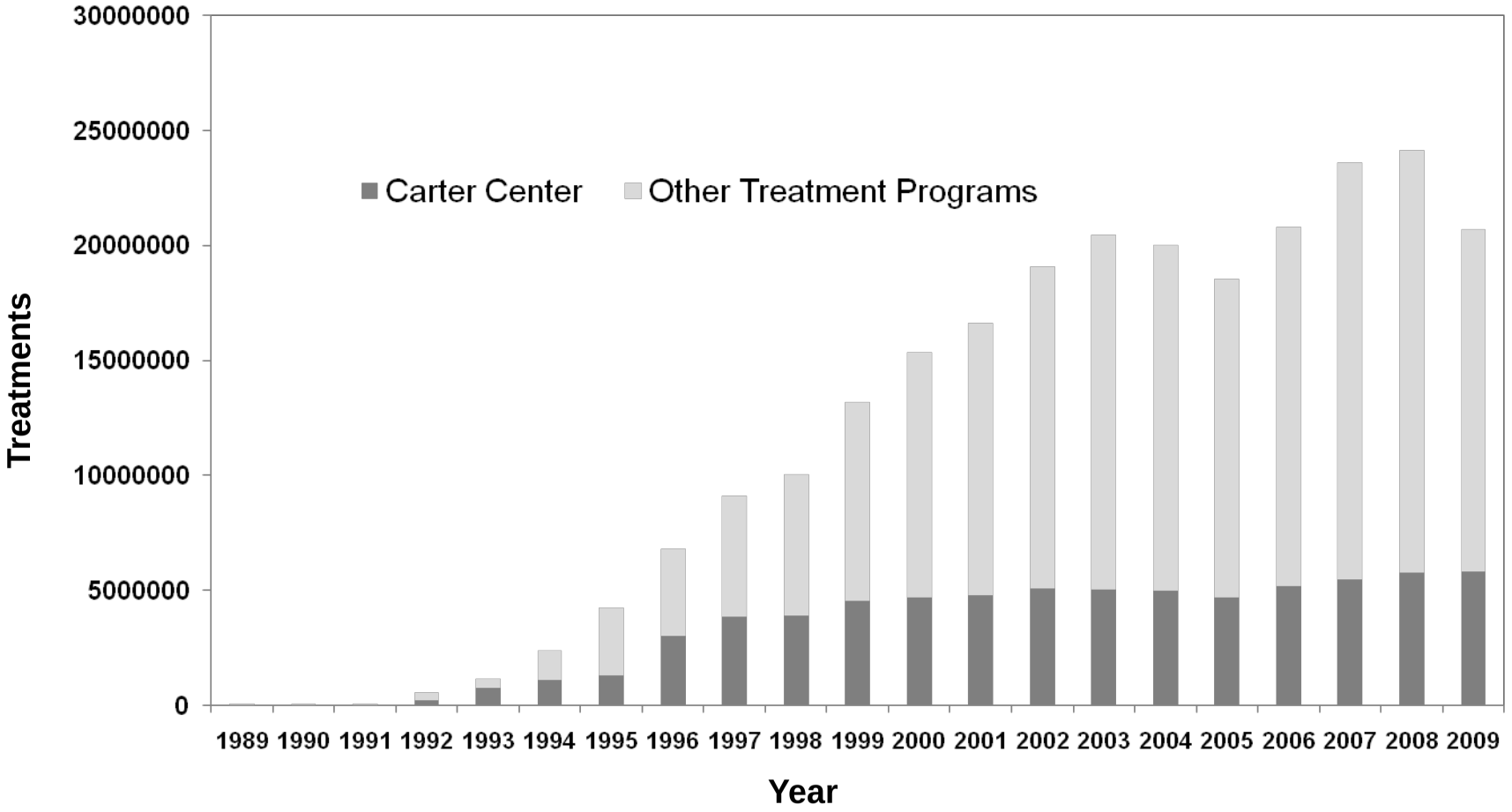
Name of State	No. of LGAs	Popn treated cumulative for 2009	Ultimate TX Goal (UTG) For 2009	% UTG treated in 2009	Total Popn for 2009	% of total popn treated in 2009	Active villages cumulative for 2009	Active villages UTG for 2009	Active villages % for UTG for 2009
ENUGU	16	801,959	812,083	98.8%	974,500	82.3%	1,373	1,373	100.0%
ANAMBRA	16	585,829	603,577	97.1%	724,294	80.9%	1,062	1,062	100.0%
EBONYI	10	486,742	505,902	96.2%	607,083	80.2%	973	973	100.0%
EDO	12	761,908	771,679	98.7%	964,743	79.0%	530	530	100.0%
DELTA	9	481,068	483,054	99.6%	611,325	78.7%	470	470	100.0%
IMO	20	662,571	664,485	99.7%	797,382	83.1%	1,940	1,940	100.0%
ABIA	12	362,726	364,082	99.6%	436,898	83.0%	684	684	100.0%
PLATEAU	5	355172	312264	113.7%	390330	91.0%	296	296	100.0%
NASARAWA	7	856598	764579	112.0%	955724	89.6%	589	589	100.0%
TOTAL	107	5,354,573	5,281,705	101.4%	6,462,279	82.9%	7,917	7,917	100.0%

Passive Treatments

Name of State	No. of LGAs	Popn treated cumulative For 2009	Annual TX Objective (ATO) for 2009	% of ATO treated in 2009	Passive villages cumulative for 2009	Passive villages ATO for 2009	Passive villages % ATO for 2009
ENUGU	2	15,951	8,868	179.9%	37	37	100.0%
ANAMBRA	5	40,291	50,670	79.5%	132	132	100.0%
EBONYI	3	22,083	22,725	97.2%	193	193	100.0%
EDO	6	96,362	161,600	59.6%	110	220	50.0%
DELTA	16	98,635	101,000	97.7%	280	280	100.0%
IMO	9	119,184	125,079	95.3%	696	738	94.3%
ABIA	9	70,538	93,168	75.7%	540	617	87.5%
TOTAL	50	463,044	563,110	82.2%	1,988	2217	89.7%

Figure 33

Nigeria: Carter Center-Assisted Treatments and Total Mectizan® Treatments Provided 1989-2009*



* Treatments from 1992-1995 by RBF. 2009 national figure provisional.

Figure 34

Nigeria Financial Contributions (in USD) 2001 – 2009 for River Blindness Program in 9 States

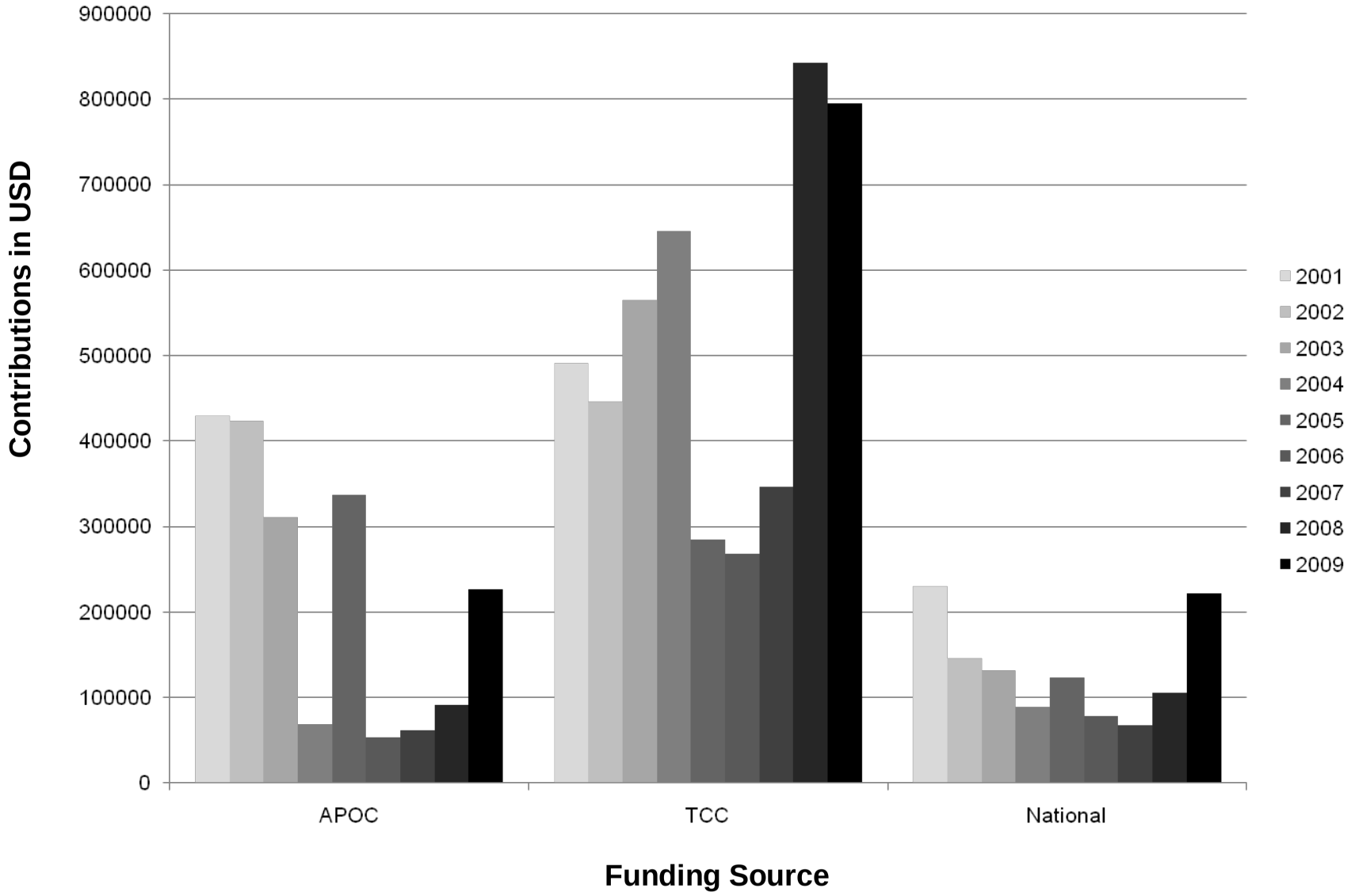


Figure 35

Nigeria: 2009 Lymphatic Filariasis and Schistosomiasis Treatments

Lymphatic Filariasis Treatments

Name of State	No. of LGAs	Popn treated cumulative for Y2009	Ultimate TX Goal (UTG) for Y2009	% UTG treated in 2009	Total Popn for Y2009	% of total Popn treated in Y2009	Active villages cumulative for Y2009	Active villages UTG for Y2009	Active villages % of UTG for 2009
Plateau	17	1,826,771	2,196,735	83.2%	2,745,919	66.5%	2,538	2,577	98.5%
Nasarawa	13	1,642,965	1,566,532	104.9%	1,958,165	83.9%	1,046	1,061	98.6%
Total	30	3,469,736	3,763,267	92.2%	4,704,084	73.8%	3,584	3,638	98.5%

Schistosomiasis Treatments

Name of State	No. of LGAs	Popn treated cumulative for Y2009	ATO for Y2009	% ATO for 2009
Plateau	17	571,269	618,713	92.3%
Nasarawa	13	402,089	416,160	96.6%
Delta	10	154,222	155,412	99.2%
Total	40	1,127,580	1,190,285	94.7%

Figure 36

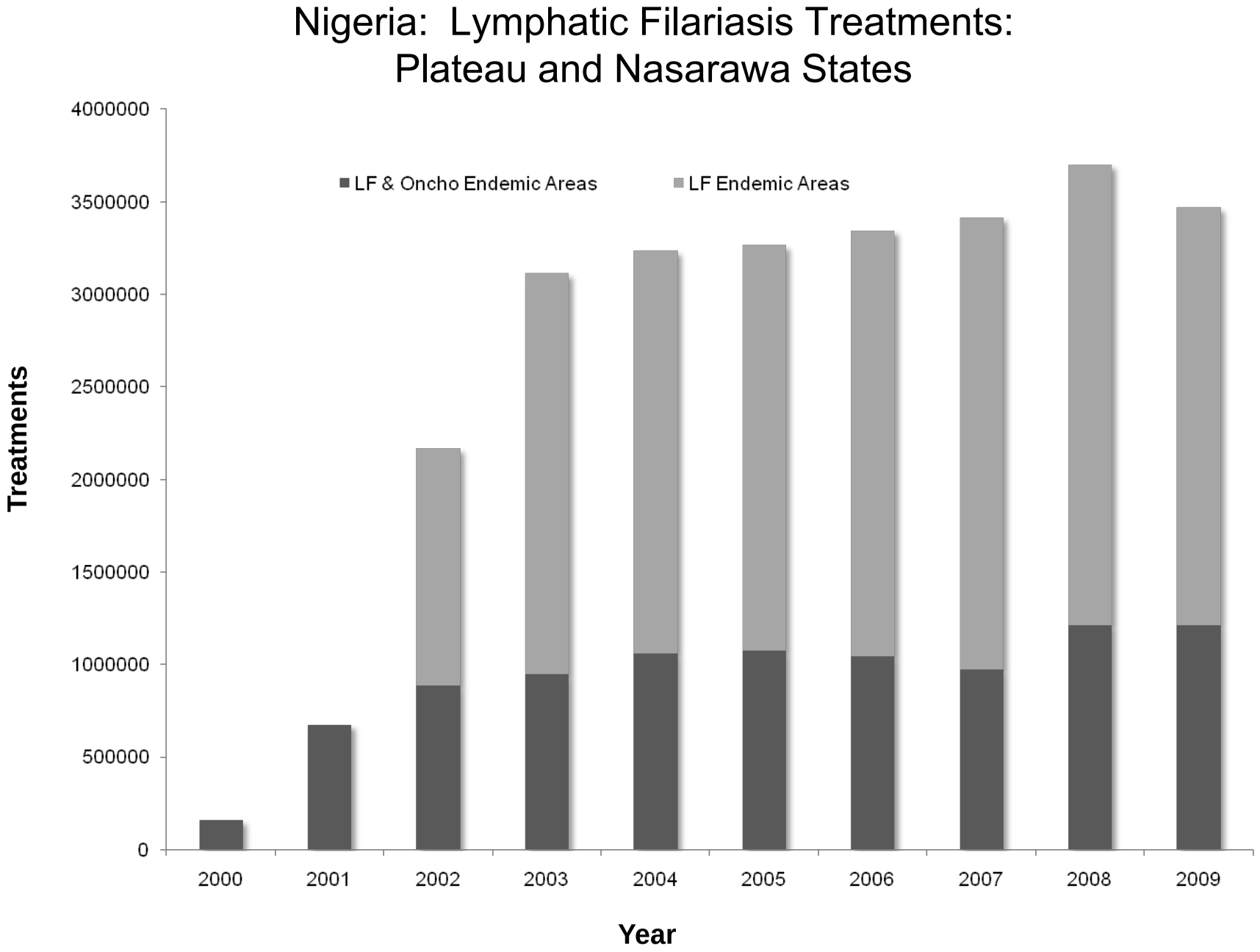

Nigeria: Lymphatic Filariasis Treatments:
Plateau and Nasarawa States
LF & Oncho Endemic Areas
LF Endemic Areas
Treatments
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Year

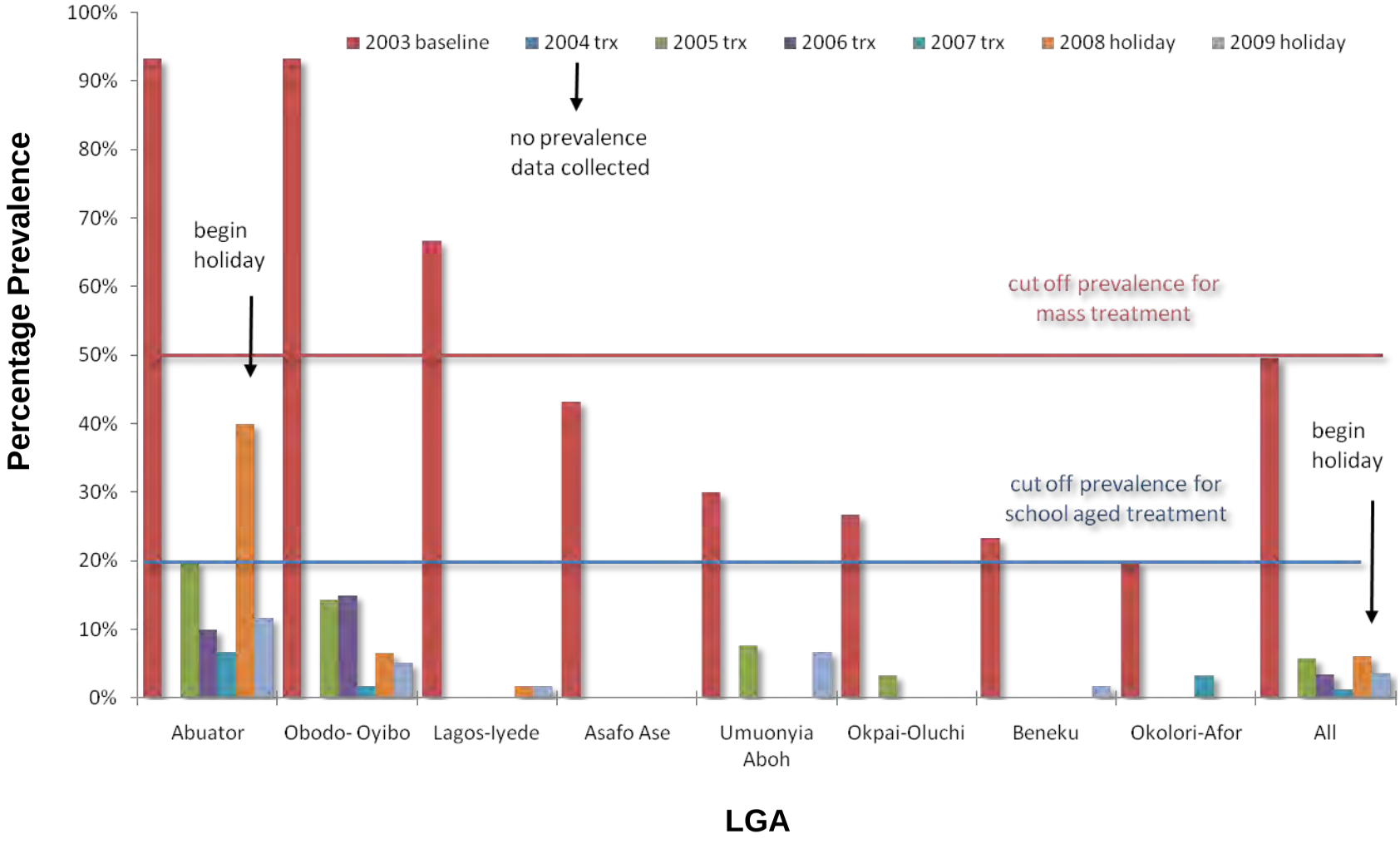
Figure 37

Nigeria: Malaria Insecticide Treated Bednet (ITN) Distribution In Plateau, Nasarawa, Imo and Ebonyi states 2004- 2009

Year	Bed Nets Distributed
2004	38,620
2005	18,447
2006	64,547
2007	96,270
2008	208,358
2009	114,408
TOTAL	**540,650**

Figure 38

Schistosomiasis Prevalence Rates among School Children in LGAs with "PZQ Holidays" in Delta State, Nigeria



ETHIOPIA

Background: Ethiopia is the largest, most populous country in the Horn of Africa with a population of approximately 75 million. Onchocerciasis was first reported in southwestern regions in 1939, while the northwestern part of the country was recognized to be endemic in the 1970's. The National Onchocerciasis Task Force (NOTF) was established in 2000 and functions through the Ministry of Health's (MOH) Malaria and Other Vector Borne Disease Control Unit (MOVDCU). APOC completed Rapid Epidemiological Mapping of Onchocerciasis in Ethiopia (REMO) in 2001 and 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 (Figure 39). The Carter Center and Lions Clubs partnered with MOVDCU and the APOC in 8 of these 10 projects, beginning with Kaffa and Sheka zones in 2001. Since then, the program has expanded to include Bench-Maji, North Gondar, Illubabor, Jimma, Metekel and Gambella.

Members of Lions District 411A play an important role in both The River Blindness and Trachoma Control Programs in the Lions-Carter Center-assisted areas of Ethiopia. The Carter Center country representative, Mr. Teshome Gebre is co-chair of the NOTF, chair of the NGDO coalition and a Lion. He represents the Lions both on the NOTF and the National Committee for the Prevention of Blindness (NCPB) and is SightFirst Committee Vice Chairman for Ethiopia. Ethiopian Lions participate actively in the annual Carter Center Ethiopian staff retreat. The Honorable Dr. Med. World Laureate Tebebe Y. Berhan attended the Program Review in Atlanta.

Treatments: During 2009, 3,143,181 people were treated in 13,897 targeted villages in the assisted zones (Figure 40 and 41), reaching 95% of the UTG and surpassing the 3 million mark for the first time. This is a 5% increase compared to the 2,983,055 treatments assisted in 2008, and 69% of the total Mectizan® treatments given in Ethiopia. In 2010, the program aims to treat 3,283,594 persons. Monitoring treatment coverage surveys were conducted by randomly selecting communities for household interviews about acceptance of treatment during the last treatment round. Those surveys showed that more than 90% of those questioned who were eligible to take ivermectin tablets reported taking treatment. About 85% reported attending health education sessions prior to the mass drug administration activity.

Mectizan®: A total of 8,861,000 tablets were received from NOTF in 2009. Together with a balance of 616,573 tablets remaining from 2008, these were made available for distribution to Lions-Carter Center assisted areas. Through the course of the year, 8,609,245 tablets were distributed, while 39,161 (0.4%) were damaged and none expired. The average number of tablets per person treated was 2.7. The balance at year's end was 829,167.

Training and Health Education: Training was provided to 40,594 community-directed distributors (CDDs); of these, 31,679 were returning CDDs (retrained) and 8,915 were newly recruited and trained for the first time (Figures 42 and 43). The ratio of CDDs per population improved from 1:113 in 2008 to 1:98 in 2009 (Figure 44). The percent of female CDDs is still low (9.9%) with no significant change from 2008. A total of 2,925 community supervisors were trained, a 19% increase from 2008 (2,456), similar to the percent increase in 2008 from 2007. On average, a supervisor was responsible for 5 communities and 15 CDDs. The steady and significant rise in the percentage of community supervisors who are female is noteworthy: more than 50% of community supervisors trained in 2009 were female; compared to 0% just 7 years ago. In 2009, the program plans to increase training to 45,821 CDDs (with 5,227 new CDDs) and 3,431 community supervisors. Ethiopia has been progressively adopting kinship structures in selecting and training CDDs. An estimated 90% of communities are now using the kinship structure.

Health education was provided in all 13,851 targeted communities, representing 100% 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 other individual donors to The Carter Center. The 5 year core funding from APOC ended for Lions-Carter Center assisted RB programs in 2009 (see Annex 8). Figure 45 shows government contributions in support of the onchocerciasis program by zone, as best as can be determined in what is a pooled allocation system, where it is difficult to disaggregate individual program costs and expenditures. In 2009, the national investment was $181,958, compared to $132,425 reported in 2008. APOC contributed about $78,929 in the CDTI projects in 2009, based on available data, while The Carter Center's 2009 contribution was $302,968.

Integration: The malaria plus onchocerciasis program (known as MALONCHO) includes 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 includes Carter Center trachoma control activities. Malaria prevention activities are now included in integrated CDD training courses. CDDs are trained to record the number and condition of long lasting insecticidal nets (LLIN) at the household level when updating household registers in the communities annually. An analysis of the quality of those data, and how they might help with malaria programmatic decision making on LLIN coverage and replacement strategies, is ongoing.

With GSK support, The Carter Center assisted in the launching of a Ministry of Health LF elimination program in the Gambella Region in 2009. The first of its kind in Ethiopia, the program administered 77,442 combined Mectizan®/albendazole treatments for LF elimination in onchocerciasis endemic areas of Gambella Region, reaching 93% of the ultimate treatment goal of 83,271.

2010 RECOMMENDATIONS FOR CARTER CENTER ETHIOPIA

Onchocerciasis

Publish the onchocerciasis disease indicator results from Humera and Jimma.

Review REMO data and provide a list of villages that had high nodule rates for consideration for sentinel village surveys in 2010.

Coordinate onchocerciasis treatments with LF treatments in Gambella, awaiting the delivery of both Mectizan® and albendazole prior to launching treatments.

Coordinate with NOCP to ensure that the application for 2011 Mectizan® and albendazole is submitted at least 6 months in advance of desired date of shipment receipt. Albendazole applications require an annual report to be submitted by the NOCP and approved by the WHO regional office.

Conduct The Carter Center 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. CDD training for both new and returning CDDs needs to be expressed in relation to annual training goals. Conduct new research to measure costs and supervisory demands of conversion to the kinship strategy where this transition is occurring. Focus on Kaffa, Sheka, Bench Maji and Gambella, as these zones have the greatest training need.

Expansion of Carter Center programs into other disease control efforts requires formal Carter Center Board of Trustees approval, adequate funding to participate, and possibly Emory IRB approval. If the government wants to support integration in areas where The Carter Center 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 integration/co-implementation activities within designated RB Mectizan® distribution areas and within the time period when such distributions are scheduled.

Lymphatic Filariasis

Publish LF mapping paper as soon as possible in collaboration with the MOH and Addis Ababa University.

Continue GSK-supported LF activities in 4 Gambella Region CDTI woredas in 2010.

Consider a lymphedema survey in villages surveyed by Immunochromatographic Card Test (ICT) to determine if podoconiosis is occurring (nonfilarial lymphedema due to silicates in the soils).

Integration with the Malaria Control Program (MALONCHO)

Ensure that the CDDs have malaria messages and the knowledge to deliver them when they distribute ivermectin (integrated health education for malaria and onchocerciasis).

Utilize the results of the MIS 2007 and the onchocerciasis ongoing monitoring survey to assess message penetration and improve/refine malaria messages.

Train CDDs to record the number of nets per household in the household registers when they deliver ivermectin, and to monitor and evaluate these data.

Publish paper on how CDDs can increase their role in identifying LLIN gaps and replacement needs.

Investigate how CDDs can facilitate gap filling and replacement strategies (actual delivery of LLINs to households deemed in need).

Evaluate malaria work in tandem with onchocerciasis and trachoma programs in North Gondar.

General

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

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

Treatment Objectives for 2010:

Mectizan® only UTG:	**3,365,247 persons**
Mectizan® and albendazole (Gambella) UTG:	**84,611 persons**

Training Objective for 2010:

CDDs:	**45,821 CDDs (5,227 new)**
Community supervisors:	**3,431 community supervisors (739 new)**

Figure 39

Ethiopia: Lions-Carter Center-Assisted CDTI Projects

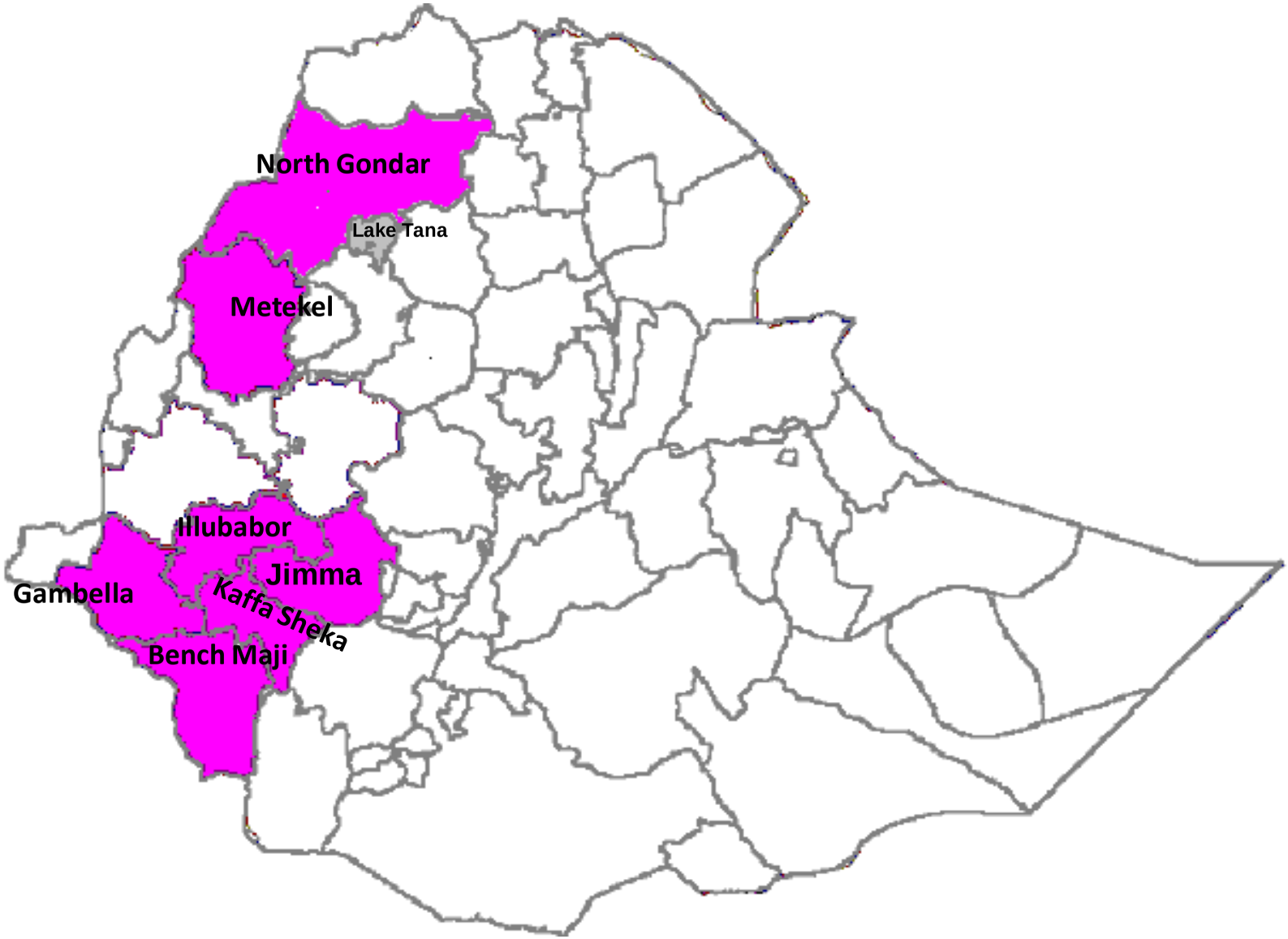


Figure 40

Ethiopia: Lions-Carter Center-Assisted Mectizan® Treatments as Part of Total Treatments Provided, 2001-2009

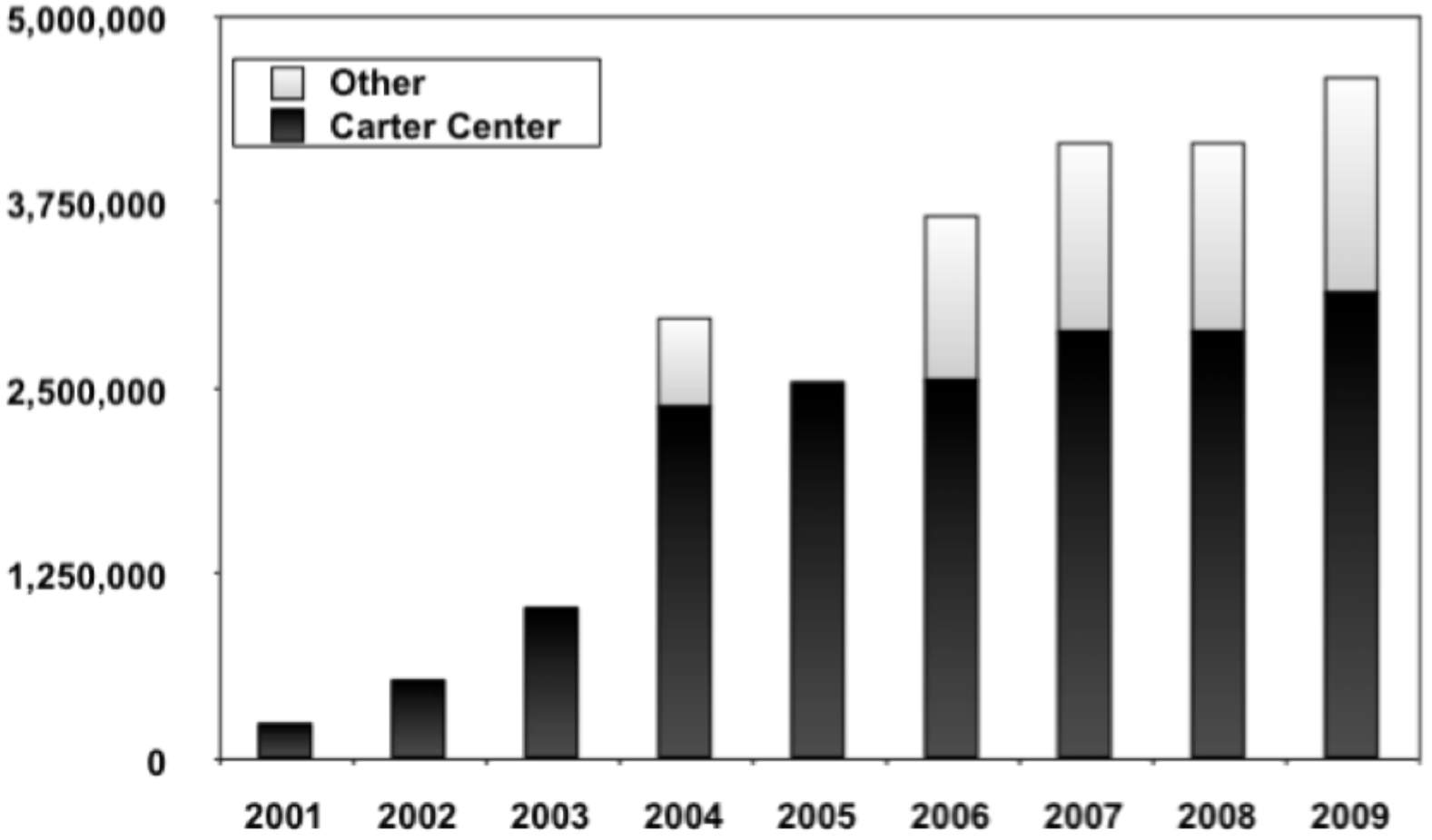


Figure 41

Ethiopia: Lions-Carter Center-Assisted Areas: 2009 River Blindness Treatments

CDTI Zone	Total Popn 2009	Ultimate TX Goal (UTG)	% UTG Treated	Popn Treated 2009	% Total Popn Treated
Kaffa	948,859	797,042	95	753,811	79
Sheka	212,414	178,428	96	171,168	81
Bench Maji	674,954	566,961	91	518,070	77
N. Gondar	280,259	235,418	92	215,805	77
Illubabor	730,035	613,229	97	594,051	81
Jimma	887,344	745,369	98	728,471	82
Metekel	147,524	123,920	84	104,363	71
Gambella	99,037	83,191	93	77,442	78
TOTAL	3,980,426	3,343,558	95	3,143,181	79

Figure 42

Ethiopia: Training of CDDs: 2001-2009

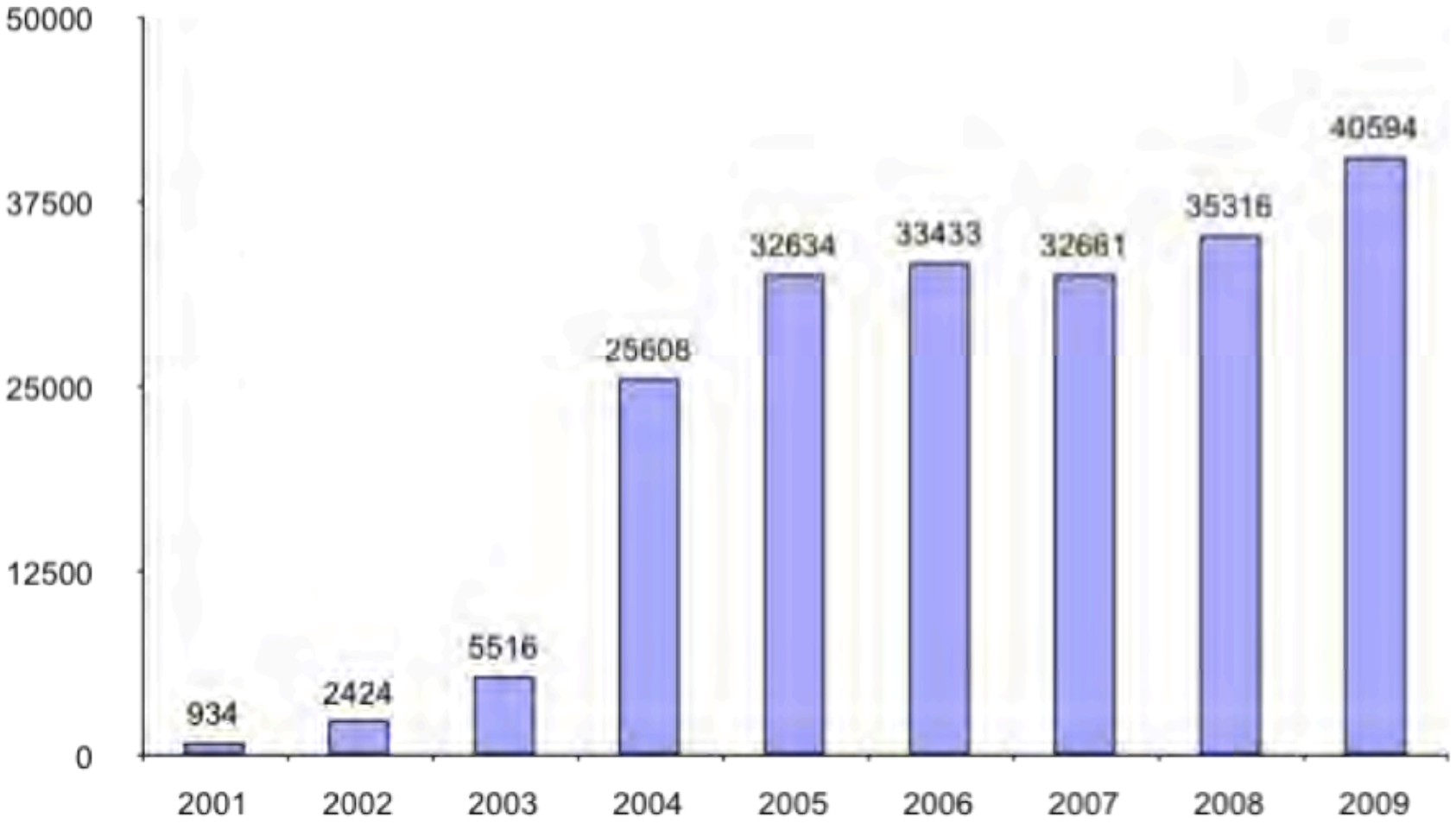


Figure 43

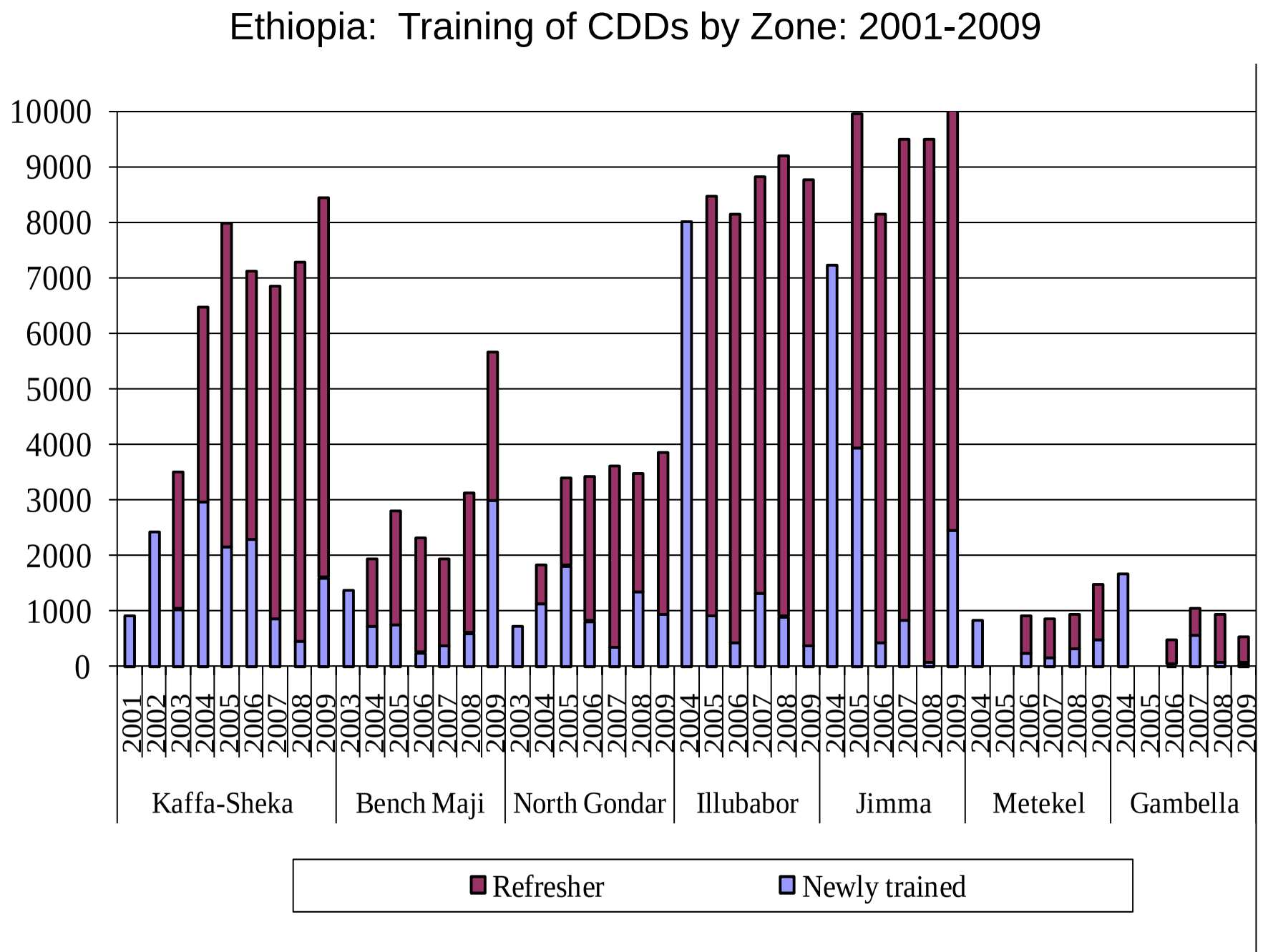

Ethiopia: Training of CDDs by Zone: 2001-2009
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
2001 2002 2003 2004 2005 2006 2007 2008 2009
2003 2004 2005 2006 2007 2008 2009
2003 2004 2005 2006 2007 2008 2009
2004 2005 2006 2007 2008 2009
2004 2005 2006 2007 2008 2009
2004 2005 2006 2007 2008 2009
2004 2005 2006 2007 2008 2009
Kaffa-Sheka
Bench Maji
North Gondar
Illubabor
Jimma
Metekel
Gambella
Refresher
Newly trained

Figure 44

Ethiopia: Ratio of CDDs and Community Health Supervisors to Population and Community, 2009

Name of Zone	Total Population for 2009	No of Villages/ Communities	Number of CDDs	Number of Community Supervisors	Ratio of Communities per CDDs	Ratio of CDDs to Population	Number of Communities per Supervisor
Kaffa	948,859	2,575	6,686	579	1:2.6	1: 142	4
Sheka	212,414	627	1,755	109	1:2.8	1:121	6
B. Maji	674,954	1,275	5,654	417	1:4.4	1:119	3
N. Gondar	280,259	848	3,856	719	1:4.5	1:73	1
Illubabor	730,035	3,791	8,778	363	1:2.3	1:83	10
Jimma	887,344	4,125	11,773	390	1:2.9	1:75	11
Metekel	147,524	290	1486	215	1:5	1:98	1
Gambella	99,037	366	606	133	1:2	1:163	2
TOTAL	3,980,426	13,897	40,594	2,925	1:3	1:98	**5**

Figure 45

Government Financial Contribution at Zonal Level, 2009
Ethiopia

Zone	No. of Persons Treated	Total Amount Released from Government (USD)*	District Level	
			No. of Woredas	% Released to the Woredas
Kaffa	753,811	18,888	11	NA
Sheka	171,168	20,888	5	NA
B. Maji	518,070	38,464	10	NA
N. Gondar	215,805	NA	4	NA
Illubabor	594,051	56,815	12	NA
Jimma	728,471	42,494	4	NA
Metekel	104,363	4,409	4	NA
Gambella	77,442	NA	5	NA
TOTAL	3,143,181	181,958	55	NA

* The totals amount released includes government and APOC contributions.
NA: Not Available

ACRONYMS

APOC ..... African Program for Onchocerciasis Control
arvs..... at-risk villages (villages requiring community-wide active mass therapy)
ATO ..... Annual Treatment Objective
CBM…….. ……. ..... .Christoffel Blindenmission
CDC..... Centers for Disease Control and Prevention
CDTI ..... Community-Directed Treatment with Ivermectin
earp ..... eligible at-risk population
DEC..... diethylcarbamazine
FMOH..... Federal Ministry of Health
GOSS ..... Government of South Sudan
GSK..... GlaxoSmithKline
HE ..... Health Education
HQ..... Headquarters
IACO..... InterAmerican Conference on Onchocerciasis
IEC ..... Information, Education, and Communication
JAF..... Joint Action Forum
LCCSFI..... Lions-Carter Center SightFirst Initiative
LF ..... Lymphatic Filariasis
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)
MOH ..... Ministry of Health
NTDs ..... Neglected Tropical Diseases
NGDO..... Non-Governmental Development Organization
NOCP ..... National Onchocerciasis Control Program
NOTF..... National Onchocerciasis Task Force
OCP..... Onchocerciasis Control Program of West Africa
OEPA ..... Onchocerciasis Elimination Program for the Americas
PAC..... Preschool Age Children
PAHO ..... Pan American Health Organization
PBD ..... Department of Prevention of Blindness and Deafness
PCC..... Program Coordinating Committee of OEPA
RBF ..... River Blindness Foundation
RBP..... River Blindness Program of The Carter Center
REMO..... Rapid Epidemiological Mapping of Onchocerciasis
RTA ..... Resident Technical Advisor
SAC..... School Age Children
SH ..... *Schistosomiasis haematobium* (urinary schistosomiasis)
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
UTG..... Ultimate Treatment Goal
VAS ..... Vitamin A Supplementation
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, and due to the high disease rates near rivers has been called "river blindness." The adult parasites develop in humans, and reside in non-painful 'nodules,' of about one to two centimeters in diameter, have the consistency and dimensions of cooked lima beans, that often can be easily felt under the skin. The parasites are very 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 4-5X 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, metamorphosize into infectious larvae and are re-transmitted by infectious black flies when they bite humans. 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®), which is donated by Merck & Co., Inc., prevents eye and skin disease by killing the microfilariae. Unfortunately ivermectin is not curative, as it does not kill the adult *O. volvulus*. Annual treatment reduces transmission of the parasite by lowering the amount of microfilariae available to black flies, which are infected when they bite an infected person. Twice per year treatment (e.g., every six months) is more certain to completely 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.

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 the Merck donation of Mectizan® in 1987. Vector control approaches have always focused on 'larviciding,' meaning putting chemicals into water that kill that 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 aircraft to deliver larvicides for many years; that program closed in 2003. Larviciding on a smaller scale (administered by ground based field teams, hence know 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 80 million treatments per year, and has cumulatively provided over 800 million treatments valued at more than three quarters of a billion U.S. dollars during the 24 years that it has been in existence. The donation has stimulated what is widely considered a model of public/private partnership and 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 know 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 (E-Merck through WHO), and Children without Worms (Johnson & Johnson). All these programs are based at, or have a strong linkage to, 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 that process. RBP also seeks to eliminate onchocerciasis where possible, when MOHs request our assistance to do so. Currently, RBP assists parts of five countries in Africa: Cameroon, Ethiopia, Nigeria, Sudan and Uganda. A program of the RBP is the Onchocerciasis Elimination Program for the Americas (OEPA), which coordinates activities to eliminate the infection in all six onchocerciasis-endemic countries in the Americas (Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela). OEPA coordinates the elimination effort based on a series of 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 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 Sudan. 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, and 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 also 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.

Northern Sudan and Uganda launched elimination strategies in 2006 and 2007 respectively. In Sudan, the elimination strategy targets the Abu Hamad focus on the River Nile. In Uganda, the strategy is to phase in a country-wide policy of elimination which 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.

In 2007, The Carter Center and its partners celebrated its 100 millionth (cumulative) assisted Mectizan® treatment, and 2009 marked the first year in which the program exceeded 14 million treatments.

Integration: While the Nigeria program began funding integrating programs of onchocerciasis, schistosomiasis and lymphatic filariasis in 1999, other country programs have, in more recent years, begun to support government programs which can be integrated with ivermectin distribution in areas targeted for onchocerciasis control or elimination. These additional interventions include albendazole distribution for intestinal helminths and lymphatic filariasis, Vitamin A supplementation for young children and insecticide treated bednet distribution and health education in the battle against malaria.

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 provides financial and technical assistance as well as information, education, and communication (IEC). 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, Merck & Co., Inc., 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 nongovernmental development organizations (NGDOs) through the NGDO Coalition for Mectizan® Distribution that includes, among others, Christoffel Blindenmission, Helen Keller International, Interchurch Medical Assistance,

LCIF, Merck & Co., Inc., SightSavers International, 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 by 2015 aims to establish country-sustained river blindness treatment programs with a "community-directed" approach 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.

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 the Onchocerciasis Elimination Program for the Americas (OEPA) through a matching grant mechanism that drew additional funding from LCIF, Merck & Co., Inc., and more than 70 other donors.

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 $\geq$ 20 percent in adults (which roughly corresponds to a microfilariae in skin prevalence $\geq$ 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 that are located in 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 $\geq$ 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 areas where there may be onchocerciasis, but given that nodules rates are under 20 percent (the so-called 'hypodendemic areas'), CDTI is not offered. As the policy shifts from control to elimination, the role of hypoendemic areas in *Onchocerca volvulus* transmission is being critically re-examined. The RBP has been engaged in this area of investigation in Cameroon, Uganda, Sudan, and Ethiopia. Based on evidence we have collected, we believe that transmission occurs in some hypoendemic areas and that they must therefore be treated with CDTI. The position is controversial.

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 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 $\geq$ two percent) are considered "at-risk," and 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 River Blindness Program (RBP) research in Nigeria.

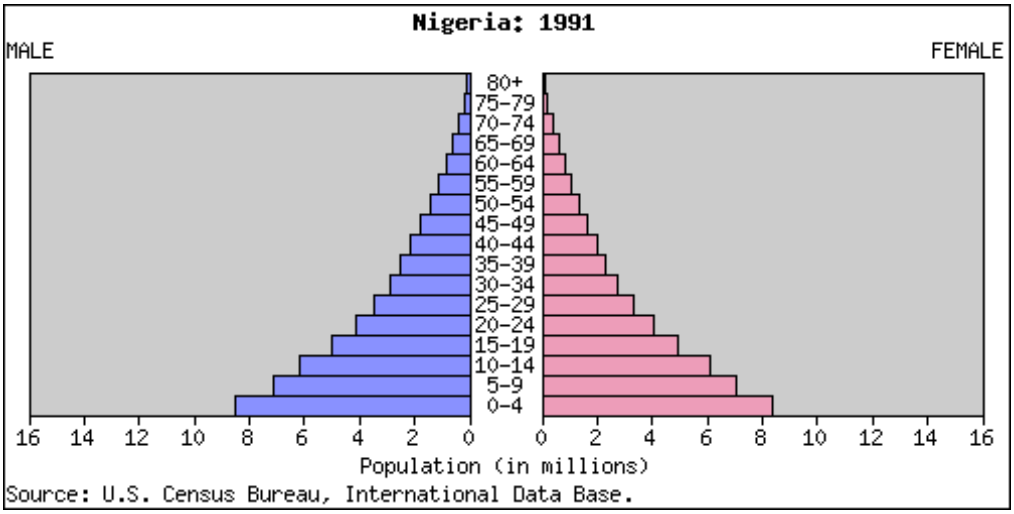
Data Reporting: The Carter Center program offices report monthly to The Carter Center headquarters in Atlanta. These reports include: 1) numbers of villages and persons treated during the previous month (reporting of treatments are updated quarterly for the Americas); 2) the status of the Mectizan® tablet 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 Jos (Nigeria), Kampala (Uganda), Yaoundé (Cameroon), Addis Ababa (Ethiopia) and Khartoum (Sudan). 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 annual Weekly Epidemiological Record (WHO) articles. African MOHs report their annual results directly to WHO and APOC.

The data from monthly reports are supplemented with additional information at an 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 & Co., and 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 treated for the month, by state or province. 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 has the Plateau/Nasarawa LF and Schistosomiasis (SH) programs; the SH program in southeast Nigeria is at scale in one of the seven states assisted. The LF Mass Drug Administration (MDA) activities in southeast Nigeria are paralyzed by the *Loa loa* issue.

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 ATO/UTG calculation. In practice, the ATO and UTG are established by arv census from the most recent treatment rounds. The ATO/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 (ATO/UTG) and coverage of total population ('therapeutic coverage') to satisfy those program's needs. The rationale for RBP's focus on the ATO/UTG denominator have 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 ATO/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) denominator is used by elimination programs where semiannual treatments are delivered: its value is twice the UTG, and represents 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); 85 percent coverage is the goal set by the PCC 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 percent) in the control program strategy. In elimination programs supported by RBP, hypoendemic villages receive mass treatment (not passive).

ANNEX 3: List of Program Review Participants

The Carter Center Atlanta
Ms. Becky Brookshire
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Ms. Shandal Sullivan
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Dr. Asrat Genet – Ethiopia
Dr. Michael Anibueze – Nigeria
Dr. Tong Malek Deran – Sudan
Dr. Kamal Osman – Sudan
Mr. Thomas Lakwo – Uganda
Dr. D.W.K Lwamafa - Uganda

University and NGDO Personnel and Special Guests
Mr. David Lindsay - CIELO
Dr. Julie Jacobson – Bill & Melinda Gates Foundation
Dr. Jan Agosti - Bill & Melinda Gates Foundation
Ms. Nancy Cruz Ortiz – Centro de Estudios en Salud
Dr. Danny Haddad – Children Without Worms
Ms. Kim Koporc - Children Without Worms
Mr. William Jany – Clarke Mosquito Control
Dr. Julie Gutman – Emory University
Dr. Deborah McFarland - Emory University
Mr. Jonathan Schultz - Emory University
Dr. Paul Spearman - Emory University
Ms. Minne Iwamoto – GlaxoSmithKline PLC
Dr. Rafe Henderson – Independent Consultant
Ms. Kristen Eckert – Lions Clubs International
Hon. Tebebe Y. Berhan – Lions Clubs of Ethiopia
Dr. Adrian Hopkins - Mectizan® Donation Program
Mr. Kisito Ogoussan - Mectizan® Donation Program
Dr. Yao Sodahlon - Mectizan® Donation Program
Dr. Babatunde Ipaye – National Malaria Control Program
Dr. Simon Bush – Sightsavers International
Dr. Dominique Kyelem – Task Force Global Health
Dr. Eric Ottesen – Task Force for Global Health
Dr. Mark Rosenberg - Task Force for Global Health
Dr. Lester Chitsulo - World Health Organization
Dr. Tony Ukety – World Health Organization

African Program for Onchocerciasis Control
Dr. Grace Fobi

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Annex 5

Fourteenth Annual River Blindness Program Review Agenda
Tuesday March 23 – Thursday March 25, 2010
The Carter Center, Atlanta, GA

Day 1: Tuesday March 23, 2010

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 Day 1	Dr. Donald Hopkins Dr. Frank Richards (chair)

Part 1: 2009 Treatment Activity Summary

9:45 – 10:15 10:15 – 10:30	OEPA presentation *Discussion*	Dr. Mauricio Sauerbrey
10:30 –11:00 11:00 – 11:15	Nigeria: Onchocerciasis *Discussion (Comments by Dr. Emmanuel Miri)*	Dr. Emmanuel Emukah
11:15 – 11:30	*Coffee Break*	
11:30 – 12:00 12:00 – 12:15	Nigeria: Lymphatic Filariasis, Schistosomiasis and Malaria *Discussion (Comments by Dr. Miri)*	Dr. Abel Eigege
12:15 –12:45 12:45 – 1:00	Recap of WHO Ouagadougou Meeting on NGO Project Management *Discussion*	Dr. Frank Richards Dr. Emmanuel Miri
1:00 – 2:00	*Lunch*	
2:00 – 2:30 2:30 – 2:45	Uganda presentation *Discussion*	Ms. Peace Habomugisha
2:45 – 3:15 3:15 – 3:30	Ethiopia presentation *Discussion*	Mr. Teshome Gebre
3:30 – 3:45	*Coffee Break*	
3:45 – 4:15 4:15 – 4:30	Sudan presentation *Discussion*	Dr. Tong Chor Malek
4:30 – 5:00 5:00 – 5:15	Cameroon presentation *Discussion*	Dr. Albert Eyamba
5:15	*Session Adjourned*	

Day 2: Wednesday March 24, 2010

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

Part 2: Sustainability through Integration and Kinship Systems in Africa, Strengthening Partnership in the Americas

9:00 – 9:05	Introduction to Day 2	Dr. Moses Katabarwa
9:05 – 9:35 9:35 – 9:50	Cameroon presentation *Discussion*	Dr. Albert Eyamba
9:50 – 10:20 10:20 – 10:35	Nigeria presentation (Plateau and Nasarawa Gates integration activities) *Discussion*	Dr. Abel Eigege
10:35 – 11:00	*Coffee Break and Group Photo*	
11:00 – 11:45 11:45 – 12:00	Nigeria presentation (Southeast Gates Integration Activities and Impact Surveys) *Discussion*	Dr. Emmanuel Emukah Dr. Patricia Graves
12:00 – 12:15 12:15 – 12:30	Gates Cost Studies *Discussion (comments by Dr. Deborah McFarland)*	Mr. Darin Evans
12:30 – 12:40 12:40 – 12:45	Development presentation *Discussion*	Ms. Nicole Kruse
12:45 – 1:45	*Lunch*	
1:45 – 2:15 2:15 – 2:30	Ethiopia presentation *Discussion*	Dr. Zerihun Tadesse
2:30 – 3:00 3:00 – 3:15	OEPA presentation *Discussion*	Dr. Mauricio Sauerbrey
3:15 – 3:30 3:30 – 3:45	Mectizan® Issues *Discussion*	Dr. Adrian Hopkins
3:45 – 4:00	*Coffee Break*	
4:00 – 4:30 4:30 – 4:45	Uganda presentation *Discussion*	Ms. Peace Habomugisha
4:45 – 5:15 5:15 – 5:30	Sudan presentation *Discussion*	Dr. Tong Chor Malek
5:30	*Session Adjourned*	

Day 3: Thursday March 25, 2010

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

Part 3: Research and reports on specialized program activities

9:00 – 9:05	Introduction to Day 3	Ms. Lindsay Rakers
9:05 – 9:35 9:35 – 9:50	OEPA: Evidence for 4x/year Ivermectin Treatment *Discussion (Comments by Dr. Richards)*	Dr. Mauricio Sauerbrey
9:50 – 10:20 10:20 – 10:35	Uganda: Elimination Program Progress *Discussion (Comments by Dr. Katabarwa)*	Dr. Thomas Lakwo
10:35 – 10:50	*Coffee Break*	
10:50 – 11:20 11:20 – 11:35	Nigeria: Onchocerciasis/Lymphatic Filariasis Surveys and Schistosomiasis Impact Surveys *Discussion (Comments by Dr. Richards)*	Dr. Abel Eigege
11:35 – 11:50 11:50 – 12:00	Nigeria: Southeast Schistosomiasis Expansion *Discussion (Comments by Dr. Emukah)*	Dr. Emmanuel Emukah
12:00 – 1:00	*Lunch*	
1:00 – 1:30 1:30 – 1:45	Cameroon: Impact Studies in North Region *Discussion (Comments by Dr. Eyamba)*	Dr. Moses Katabarwa
1:45 – 2:00 2:00 – 2:15	Treatment coverage and CDD gender balance summary *Discussion*	Ms. Lindsay Rakers
2:15 – 2:45 2:45 – 3:00	Ethiopia: Humera Jimma Study *Discussion (Comments by Dr. Katabarwa)*	Dr. Tekola Endeshaw
3:00 – 3:15	*Coffee Break*	
3:15 – 3:45 3:45 – 4:00	Sudan: Abu Hamad: Baseline Lab Data and Detailed Plan for 2010 Reassessment *Discussion (Comments by Dr. Richards)*	Dr. Nabil Aziz
4:00 – 5:00	Summary and Closure of Fourteenth Session	Dr. Don Hopkins Dr. Frank Richards
5:00	*2009 Carter Center River Blindness Program Review Adjourned*	

ANNEX 6: The Nigeria Lymphatic Filariasis (LF) Elimination Program and Schistosomiasis Control Program, with a note on soil transmitted helminths (STH)

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 & Co., Inc.) 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.

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®. In limited areas, HE and drug combination therapy is supplemented with the distribution of impregnated bed nets (donated through the FMOH). The manufacturers of the drugs have global donation programs for LF: GlaxoSmithKline donates albendazole, and Merck & Co., Inc. donates Mectizan®. Through a grant from the Bill & Melinda Gates Foundation, The Center is also conducting field research to elimination LF using long-lasting insecticide treated nets (LLINs) alone in Imo and Ebonyi state, which are areas where LF MDA is not currently possible due to the presence of *Loa loa*. The national programs are actively involved in The Carter Center-assisted program.

The Carter Center's schistosomiasis control program operates in Plateau, Nasarawa and Delta states (See maps in Nigeria section). In 2010, the Schistosomiasis Control Program will expand into Edo state, which borders Delta. The strategy is similar to the RBP and LF programs: HE and mass annual treatments with safe and effective oral drugs, in this case a medicine called praziquantel. Until 2007, praziquantel was not routinely donated to the program, although in past years, The Carter Center did 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. In late 2007, WHO in collaboration with Merck KGaA (E-Merck), announced that they would begin to donate praziquantel tablets to our Plateau and Nasarawa projects in 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. The new strategy in those two states is to treat all the estimated one million children. This major development removes the hurdle of the price of praziquantel (approximately U.S. $0.20 per treatment) for those two states, which has restricted the growth of the schistosomiasis program in the past. Up until now, praziquantel was purchased through a generous grant from the Izumi Foundation and support from individual donors. The schistosomiasis program in Delta state received support in 2009 from the Hussman Foundation, and continues to receive funding from the Izumi Foundation, which will allow expansion to Edo state in 2010.

The change in approach to treatment in Plateau and Nasarawa addresses coendemic intestinal *Schistosomiasis mansoni* (SM), in addition to urinary schistosomiasis (*Schistosomiasis haematobium* or SH), an approach determined by Carter Center-supported studies in collaboration with Emory University School of Medicine that 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.

The soil transmitted helminths (STH), primarily Ascaris lumbricoides, hookworms (Necator americanus and Ancyclostoma duodenale), and Trichuris trichiura, are highly prevalent in most of sub-Saharan Africa. They are responsible for significant morbidity and mortality worldwide, causing an estimated loss of 39 million Disability Adjusted Life Years (DALYs). This disability burden is greater than that due to malaria (35.7 million DALYs), yet in comparison, STH are amongst the most neglected of the 'neglected tropical diseases.' STH infections disproportionately affect those living in the most resource poor settings, where the infections' effects contribute to the continued cycle of poverty. Although the ultimate goal involves elimination of STH infections through improved hygiene and sanitation, achieving this goal will take time and considerable resources. In the meantime, reductions in morbidity and mortality can be achieved through mass treatment programs, similar to those in place for onchocerciasis and lymphatic filariasis. Treatment of intestinal helminths has been shown to have beneficial effects on growth and nutrition, child mortality, and school performance. Working in collaboration with Emory University School of Medicine (Dr. Julie Gutman), we evaluated in Imo state, Nigeria, the effect of annual Mectizan® distribution for onchocerciasis on the prevalence of STH infections in school age and preschool age children (PAC) by comparing children in villages that had received treatment for 13 years to those from socioeconomically similar villages in untreated (hypoendemic) areas. We enrolled 1031 SAC and 211 PAC for Kato Katz examinations. Treated areas had a statistically significantly lower prevalence of Ascaris and Trichuris, but not hookworm. The prevalence of Ascaris or Trichuris in treated areas was below the WHO threshold for mass antihelminthic treatment (MDA), but not for hookworm. We concluded that benzimidazole MDA in Mectizan® treatment areas is indicated to effectively control hookworm. This study, now in press in the American Journal of Tropical Medicine and Hygiene, was the first Carter Center study devoted completely to STHs.

ANNEX 7: Report on the progress of cost studies in Plateau and Nasarawa States

As part of The Carter Center program on integration in Nigeria, supported by a grant from The Gates Foundation, costs are being tracked to assess cost-efficiencies gained through integrated delivery of six interventions for onchocerciasis, lymphatic filariasis, schistosomiasis, trachoma, malaria, and vitamin A deficiency. Costing of the programs was done through the use of work and travel logs, retrospective surveys and financial records for both MOH and partner organizations. Data collected included capital costs, salaries, transportation, supplies, per diems, intervention materials, overheads, and time. Operational data were also collected in terms of specific activities. These include advocacy, data management and reporting, drug delivery and distribution, field supervision, health education and community mobilization, M & E, morbidity control, planning and budgeting, procurement, and training.

Integration is accomplished in this project through the joint or 'bundled' delivery of services approved by the World Health Organization (WHO) and the Nigerian Federal Ministry of Health. Integration occurs at both the programmatic and managerial levels; activities such as training, health education and community mobilization, data collection, and distribution are done concurrently for all of the interventions while state and local government personnel work across multiple platforms as integrated 'health teams,' as opposed to individuals in vertical programs. Some activities which are exclusive to specific interventions cannot be integrated,, such as latrine construction or entomology surveillance, and external logistics, such as resource acquisition or drug delivery.

Preliminary data using Carter Center expenses (no labor costs yet) have shown as much as a 35% reduction in costs from 2007 to 2008, likely due to the integration of praziquantel delivery with ivermectin and albendazole in certain LGAs. These reductions were most noted in transportation and recurrent costs such as office support and supplies.

Two sub-studies have also come out of the analysis. The first is a study on the cost of integrated mapping. In 2007, disease mapping for trachoma and urinary schistosomiasis took place in Plateau and Nasarawa. LGAs that conducted the mapping separately spent an average of 41,900 Naira ($300 USD) per LGA surveyed while LGAs that conducted integrated mapping averaged 36,173 Naira ($258 USD), a difference of 14%. The second study has been on the cost of integrated delivery of the drugs ivermectin, albendazole, and praziquantel. In 2008, nine LGAs conducted two separate, stand-alone distributions, one of IVR+ALB and the other of PZQ. In 2009, these LGAs integrated delivery of the drugs in what has come to be known as triple drug administration (TDA). While the number of treatments remained relatively stable at about 1.6 million, expenses (no labor costs yet) reduced by about 50%. Economies of scale were witnessed in urban areas where centralized health services and easy transportation were available.

As part of the TDA study, we are also examining efficiency in labor by measuring relative time and cost per person treated in each of the LGAs being examined. Using a tool called data envelopment analysis (DEA), we are able to examine the efficiency with which each LGA uses resources to achieve their treatment goals. The advantage to this approach is that it allows us to move from single inputs and single outputs, such as cost per treatment, and measure the effect of multiple inputs such as cost, time, level of education, population size, etc., with multiple outputs, such as treatments, DALYs, etc. Using the formula:

$$efficiency = \frac{\sum_{output-1}^{Outputs} W_{output} N_{output}}{\sum_{input-1}^{Inputs} W_{input} N_{input}}$$

Where W is the relative weight and N is the number of inputs or outputs, we are able to plot a "frontier" of efficient LGAs by which to compare all other LGAs. Efficient LGAs which lie on the frontier have an efficiency value of 1, while all other LGAs will have an efficiency value of 0<x<1. As an example, we can look at a model with two inputs, per diems paid and number of health personnel, and a single output, number of persons treated. This gives the values:

	2008 Stand Alone	2009 TDA
LGA 1	0.946	0.905
LGA 2	1.000	1.000
LGA 3	0.978	1.000
LGA 4	0.927	0.898
LGA 5	0.951	0.974
LGA 6	1.000	1.000
LGA 7	1.000	1.000
LGA 8	1.000	1.000
LGA 9	1.000	0.726
Mean	0.978	0.945

This gives a snapshot of LGA performance during a given year: the overall efficiency is slightly less than optimal (efficiency < 1.0) for each year. However, the values are relative only to the year that is measured and not between years. In order to compare LGAs across time, we use the Malmquist Index (MI) which compares the "frontier" of year A (all those with value=1) with the values of year B. Any value >1 has moved toward greater efficiency and any value <1 has moved away from efficiency. Using the data above we get:

LGA 1	0.850
LGA 2	1.619
LGA 3	1.464
LGA 4	0.728
LGA 5	0.885
LGA 6	2.982
LGA 7	0.315

LGA 8	1.321
LGA 9	1.069
Mean	1.062

Thus we see that, while some LGAs have moved away from efficiency, the overall move from stand alone to TDA is more efficient, MI= 1.062. We now know that the LGAs <1.0 are using an inefficient mix of health personnel and per diem relative to the number of people treated.

ANNEX 8: 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 (see Figure 7) 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 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 withdrawal of core APOC support for distribution activities. The RBP is monitoring Ultimate Treatment Goal (UTG) coverage by post-APOC treatment year as well (Table B), and have 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 is to see Mectizan® delivery handed over to the full fiscal responsibility of the national, state, and local governments.

Table B: Carter Center/Lions-Assisted project coverage as it relates to year of APOC funding

				Coverage (UTG)									
COUNTRY	PROJECT	Overall APOC Sustainability Score	First year with APOC	5th year funding ends	1 Year before APOC stopped funding	Year when APOC funding stopped	Year after APOC funding stopped	Second year after APOC funding stopped	Third year after APOC funding stopped	Fourth year after APOC funding stopped	Fifth year after APOC funding stopped	Sixth year after APOC funding stopped	Seventh year after APOC funding stopped
Cameroon	North*	2.9	1998	2003	98	110	100	89	91	87	88	89	-
	West	2.5	2001	2006	94	96	93	93	90	-	-	-	-
Ethiopia	Illubabor	n/a	2004	2008	97	98	97	-	-	-	-	-	-
	Jimma	n/a	2004	2008	99	99	98	-	-	-	-	-	-
	Kaffa	3.0	2000	2005	91	96	94	93	95	-	-	-	-
	Sheka	3.0	2000	2005	95	98	95	95	96	-	-	-	-
	Bench Maji	n/a	2002	2007	91	84	91	91	-	-	-	-	-
	North Gondar	n/a	2002	2008	83	93	92	-	-	-	-	-	-
	Metekel	n/a	2004	2008	85	88	84	-	-	-	-	-	-
	Gambella	n/a	2004	2008	97	90	93	-	-	-	-	-	-
Nigeria	Enugu	1.9	1998	2003	86	93	99	100	100	98	100	99	-
	Anambra	3.2	1998	2003	86	88	100	93	94	96	104	97	-
	Ebonyi	2.4	1998	2003	86	88	100	87	94	102	100	96	-
	Edo	3.1	1999	2004	92	93	100	100	99	110	102	99	-
	Delta	2.5	1999	2004	85	91	99	97	99	100	99	100	-
	Imo*	3.6	1998	2003	90	92	76	55	86	96	99	100	-
	Abia*	2.6	1998	2003	90	92	76	39	84	98	100	100	-
	Plateau	2.4	1998	2003	94	90	97	95	108	100	115	114	-
	Nasarawa	2.4	1998	2003	100	96	108	109	99	90	114	112	-
South Sudan	Juba	n/a	n/a	2003	63	63	38	not known	not known	not known	not known	not known	not known
Sudan	Khartoum	2.4	1997	2003	78	60	96	37	36	92	86	94	-
Uganda	Kasese	2.9	1997	2002	99	100	100	99	97	99	98	95	91
	Kisoro*	2.5	1997	2002	93	94	94	89	84	85	96	96	94
	Mbale*	3.1	1998	2003	100	100	100	97	100	98	100	98	-
	Kabale	2.4	1998	2003	93	92	90	88	85	94	94	96	-
	Kanungu	2.6	1998	2004	98	97	97	97	97	97	95	-	-
	Nebbi	3.0	1998	2004	100	100	98	97	99	97	98	-	-
	Moyo	n/a	1999	2005	99	99	99	97	98	97	-	-	-
	Gulu	n/a	1999	2005	93	96	97	94	93	98	-	-	-
	Apac	n/a	1999	2005	100	97	99	N//A	N//A	N//A	-	-	-
	Adjumani	n/a	1999	2005	98	97	95	93	98	98	-	-	-
Average performance with respect to APOC year					**92**	**93**	**93**	**89**	**92**	**97**	**99**	**99**	**93**

* projects which performed the post-APOC, post-NGDO sustainability trial
A "-" indicates information that the program has not yet reached this year

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ANNEX 10: Acknowledgements

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Annex 11: Statement by the Cameroonian Ministry of Health on Onchocerciasis Eliminaton

REPUBLIQUE DU CAMEROUN
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REPUBLIC OF CAMEROON
Peace - Work – Fatherland

MINISTRY OF PUBLIC HEALTH

SECRETARIAT GENERAL

DEPARTMENT OF DISEASE CONTROL

Cameroon, Onchocerciasis and Vector Control

(Atlanta 2010)

Mr. Chair,

Dear Colleagues,

Ladies and Gentlemen.

I would like to start by expressing gratitude to The Carter Center for having honored my country, Cameroon, by inviting me to attend the 14th annual meeting of the River Blindness Program of The NGDO Carter Center organized in this magnificent and beautiful city of Atlanta in the United States.

I would like to limit my opening remarks by addressing in turn the conceptual framework, then the philosophy underlying the planned integration of community-based activities and the scaling up from control to elimination of Onchocerciasis or River Blindness in Cameroon.

I - CONCEPTUAL FRAMEWORK

Cameroon, through His Excellency the Minister of Public Health, took the commitment at the 14th Joint Action Forum of the African Program for Onchocerciasis Control (APOC), held in Kampala in December 2008 to shift from control to elimination of onchocerciasis through targeted vector control and semi-annual mass distribution of Ivermectin.

This solemn commitment by His Excellency The Minister of Public Health is justified by the outcomes of impact studies which were conducted in other endemic countries as well as those conducted by The Carter Center in the West Region of Cameroon. These studies revealed that the distribution of an annual dose of Ivermectin can eliminate Onchocerciasis as a public health problem, but that the mass distribution of Ivermectin must continue indefinitely in view of avoiding the risk of recrudescence of the disease. The elimination strategy is therefore a better alternative to rapidly put an end to the transmission of the disease.

To materialize this commitment, a Working Group to reflect on the implementation of a vector control project in Cameroon was set up with the following mandate:
- The development of a national vector control policy;
- The finalization of the draft vector control plan proposed by the Yaounde Initiative Foundation;
- The conception of the organizational framework regulating vector control;
- The identification of priority actions and evaluation of all charges related thereto;
- The search for local and external sources of financing.

To this end, a meeting on vector control was held on Wednesday, 17th February 2010, at the conference hall of the Ministry of Public Health, with national and international partners.

It should be recalled that the black fly, beyond the transmission of filariasis, has a very high capacity of nuisance that cause people to abandon fertile land and to become unproductive, thereby making life impossible to the already very poor population living around infestation areas namely the outskirts of hydro-electric dams.

Also, at the time the Government of Cameroon has opted to embark on an extensive program of construction of dams, namely those of Menvélé in the South Region and

Lom-Pangar in the East Region to meet its energy deficit, these insects fan out mostly during the day when people are supposed to go about their business.

In view of their elimination, the Ministry of Public Health intends, thanks to informed contributions of various targeted stakeholders namely the civil society and NGDOs, to develop a policy organizational framework as well as an integrated vector control project for Cameroon.

This concerted approach represents the first phase of a process that will be extended to other sectors and administrations concerned by this vector control which is in this respect, one of the components of the elimination strategy.

II - INTEGRATION OF COMMUNITY-BASED HEALTH ACTIVITIES

The Ministry of Public Health of Cameroon is aware of significant achievements by studies carried out in hypo-endemic areas of the Ngong health district in the North Region of Cameroon. These studies have indeed established the transmission of onchocerciasis in this area which is not yet included in the CDTI area. The mapping results having shown that the entire North Region is endemic for lymphatic filariasis, we believe that there is an opportunity to treat hundreds of thousands of people living in onchocerciasis hypo-endemic areas by combining albendazole to ivermectin throughout the North Region. For us, all this is a real advocacy for the extension of the mass distribution to the entire North Region of Cameroon.

Furthermore, Cameroon is presently also preparing to organize a national consultation on the integration of community-based health activities.

This aims to reach a national consensus on the integration of community-based health activities and to make the health policy more reliable by strengthening the versatility of activities of Community Relay Workers (CRW), who, in recent years, were demotivated.

In this regard, it is worthy of note that the budgetary availability of State in financing activities conducted by community members was not questioned.

Only the distribution of these funds raised some organizational problems which almost affected their regularity. The planned national consultation with the support of WHO aims primarily at reaching a consensus on the criteria for appointing and managing Community Relay Workers (CRW), as well as the principles and modalities for financing activities integrated at the Community level. In this perspective, a convention with the Association of United Towns and Cities of Cameroon is being studied at the Ministry of Public Health, in view of a better understanding of the organizational framework and facilitating the decentralization of grants allocated by the State to the benefit of activities carried out by Community Relay Workers (CRW).

I seize this opportunity to thank once again, on behalf of the Government of Cameroon, The Carter Center in general for its multiform, technical, financial and logistic support to Cameroon within the framework of Onchocerciasis control and especially for the implementation of the kinship strategy which is now accepted and funded by APOC.

All of this will, undoubtedly, contribute in enabling Cameroon to achieve the targeted objective which is to shift from control to elimination of Onchocerciasis and to integrate strategies for the control of other Neglected Tropical Diseases (NTDs) whose common denominator is poverty.

Thanks for your kind attention.