THE
CARTER CENTER

Waging Peace. Fighting Disease. Building Hope.

Summary
2008 Program Review for The Lions-Carter Center SightFirst
River Blindness Programs
Cameroon, Ethiopia, Nigeria, OEPA, Sudan, and Uganda
16 – 18 February 2009
The Carter Center
Atlanta, GA

LIONS CLUBS INTERNATIONAL FOUNDATION

THE CARTER CENTER
RIVER BLINDNESS PROGRAM

September 2009

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And to many others, our sincere gratitude

Figure A

Group Photo: 2008 Program Review for The Carter Center River Blindness Program

Figure B

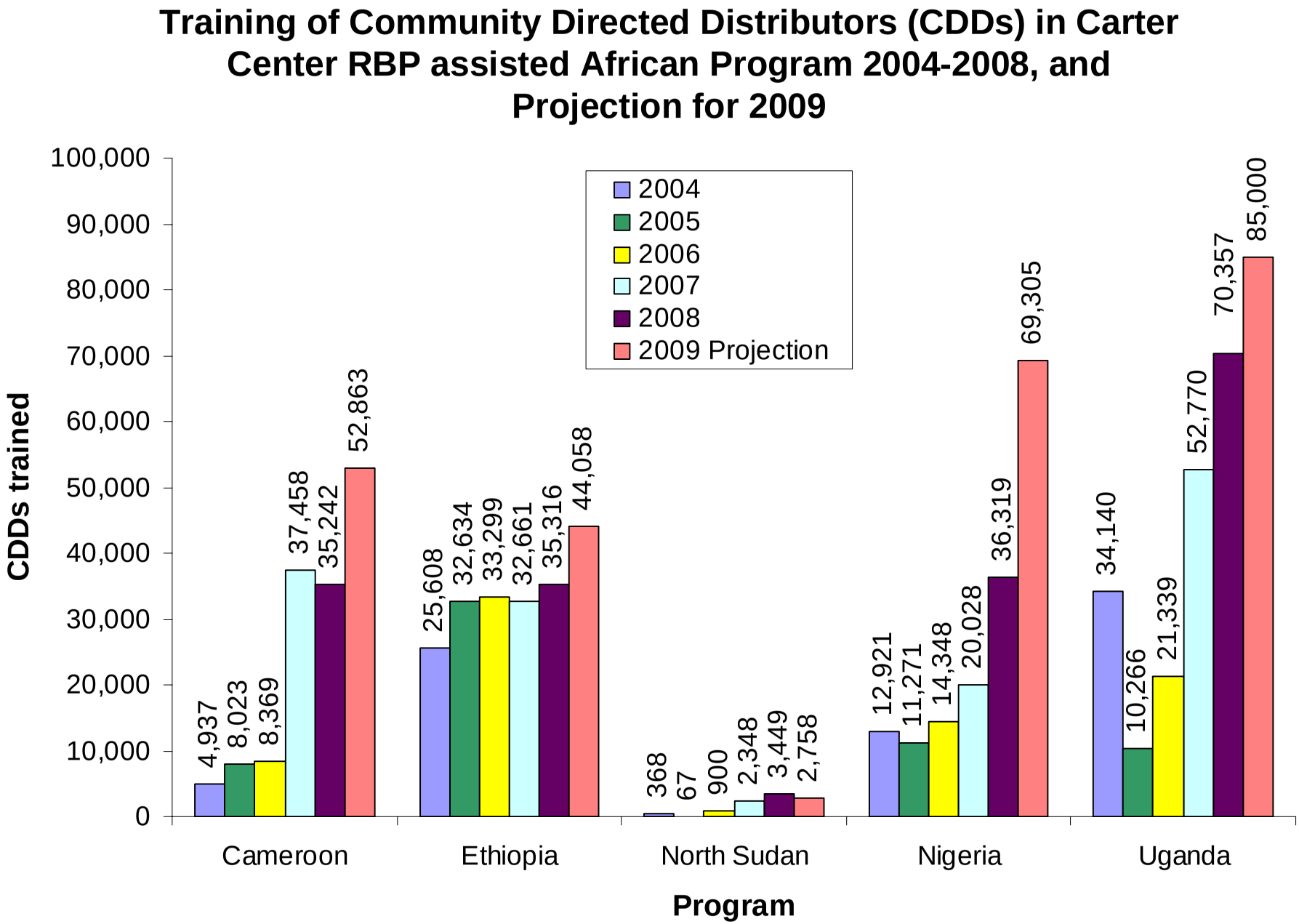
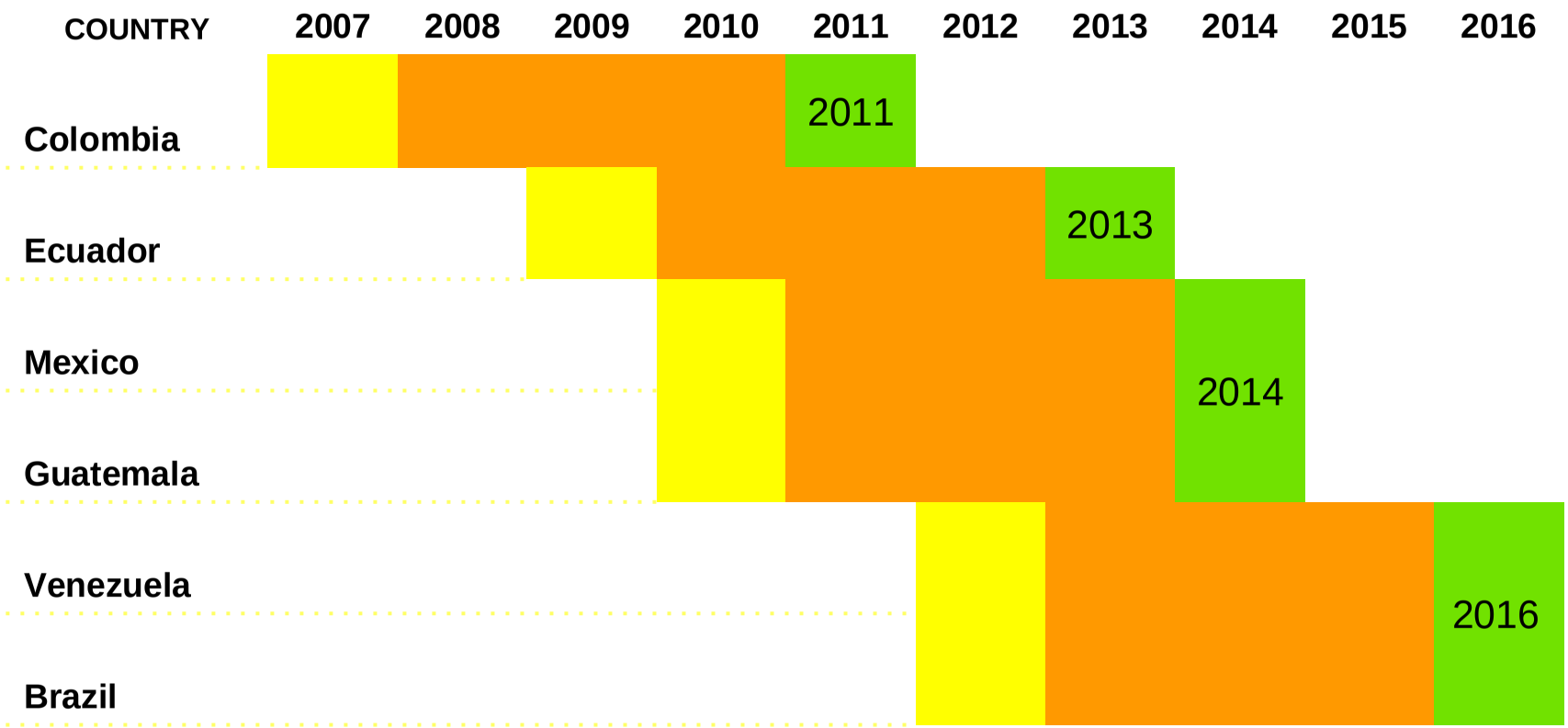

Training of Community Directed Distributors (CDDs) in Carter Center RBP assisted African Program 2004-2008, and Projection for 2009
CDDs trained
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
2004
2005
2006
2007
2008
2009 Projection
4,937
8,023
8,369
37,458
35,242
52,863
25,608
32,634
33,299
32,661
35,316
44,058
368
67
900
2,348
3,449
2,758
12,921
11,271
14,348
20,028
36,319
69,305
34,140
10,266
21,339
52,770
70,357
85,000
Cameroon
Ethiopia
North Sudan
Nigeria
Uganda
Program

Figure C

The Americas: Projected Year for Request for Certification by Country for Elimination of Onchocerciasis, 2009-2016



Shown is projection of the year in which all foci in a given country in the OEPA program have stopped or are projected to stop Mectizan treatment and complete the three-year Post-Treatment Surveillance (PTS) period, fulfilling the conditions to officially request the World Health Organization process of certification of elimination of onchocerciasis. Yellow bars are the last year of mass drug administration with ivermectin, brown bars are the minimum period of PTS, and green bars are the year when WHO certification could be requested by the endemic country.

Figure D

The First Meeting of the Uganda Onchocerciasis Elimination Committee

Row 4: Dr. Richard Ndyomugyenyi, Dr. Tom Unnasch, Dr. Moses Katabarwa

Row 3: Dr. Tony Ukety, Ms. Elizabeth Nyamayarwo, Mr. Edson Byamukama, Mr. James Katamanywa, Mr. Tom Lakwo

Row 2: Ms. Peace Habomugisha, Mr. Ben Male, Mr. David Oguttu, Mr. Ephraim Tukesiga

Row 1: Dr. Frank Richards, Dr. Frank Walsh, Chairman, UOEC, Dr. D. W. Lwamafa, Ms. Stella Agunyo

Figure E

Partners in Sudan: Carter Center and Lions

We are pleased to report that there is a newly established Khartoum Lions Club, chaired by Lion Dr. Al Khair Khalef Allah. We look forward to working on the ground with this new Lions Club. Left to Right: Mr. Craig Withers (Carter Center Atlanta), Dr. Nabil Aziz (Carter Center Sudan), Dr. Sarah Carter, Dr. El Khier Khalfalla (Lions Clubs), Dr. Frank Richards (Carter Center Atlanta), Drs. Tong Malek (FMOH) and Kamal Osman (FMOH), Front: Dr. Moses Katabarwa (Carter Center Atlanta).

Figure F

Nigeria: 2008 LF Antigenemia in Plateau and Nasarawa States showing 5 LGAs that may warrant cessation of treatment

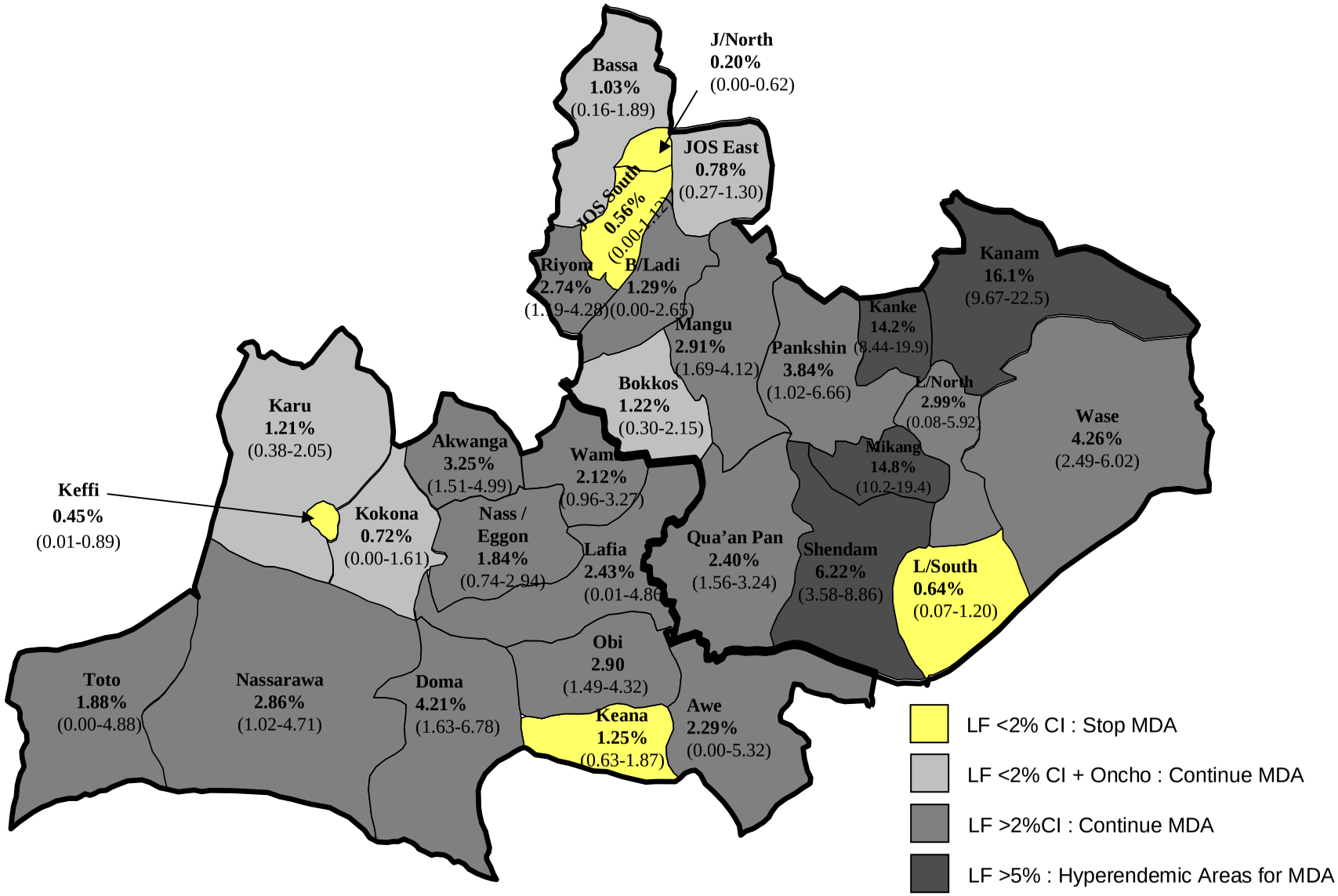
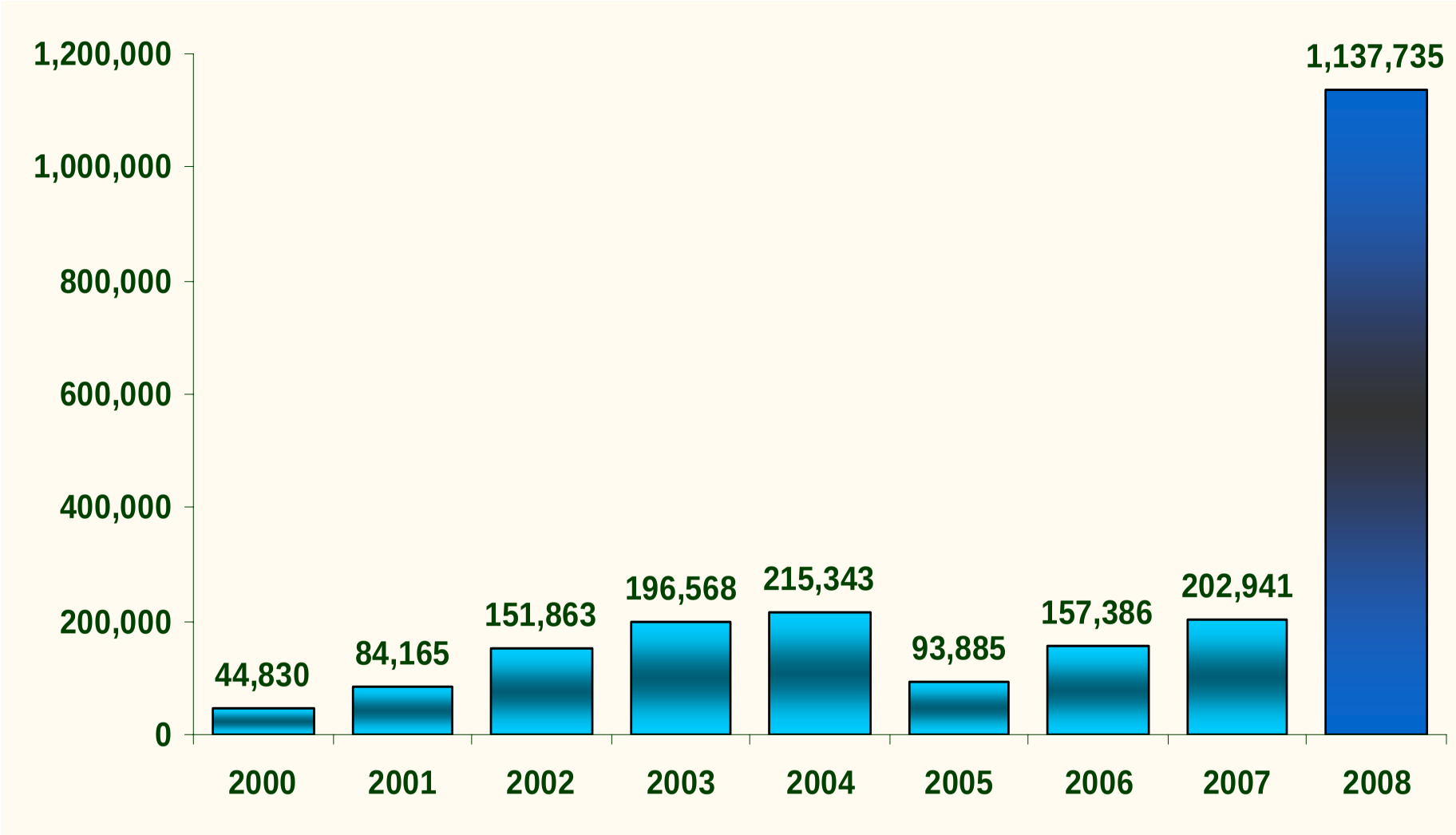


Figure G

Delta, Plateau and Nasarawa States, Nigeria: Markedly Increased Praziquantel Treatments for Schistosomiasis in 2008 as a result of the E-Merck/WHO donation to Plateau and Nasarawa



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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 2008, the RBP and its partners provided over 13 million Mectizan® treatments. Cumulative Mectizan® treatments since the program was launched in 1996 number nearly 115 million.

Human onchocerciasis, caused by the parasite *Onchocerca volvulus,* is an infection by a worm that causes chronic skin disease and severe itching, as well as eye lesions that can progress to visual loss and complete blindness. The worms live under the skin in nodules. 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 percent 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 frequency of treatment per year and the geographic extent of the distribution programs. (See Annex 1 and 6 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 the former, Mectizan® distribution will likely need to continue indefinitely because onchocerciasis transmission persists; sustainability of programs is vital and integration with other similar disease control activities is an important element in this scenario. In the latter case (elimination), Mectizan® treatment is used more intensively so that it can eventually be halted when evidence indicates that the parasite population has disappeared. Trying to eliminate onchocerciasis where feasible is an important goal of the RBP, and current RBP elimination efforts include all six countries in the Americas and designated foci in Uganda and Sudan.

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 through their SightFirst Initiative to The Carter Center for the control or elimination of RB. Through the Lions SightFirst I Initiative, LCIF and The Carter Center expanded their partnership to encompass controlling RB in five countries in Africa (Cameroon, Ethiopia, Nigeria, Sudan, and Uganda) and eliminating RB altogether in the six endemic countries of the Americas (Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela).

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

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 RBP partners include the U.S. Centers for Disease Control and Prevention (CDC), WHO, the African Program for Onchocerciasis Control (APOC)[2], and The World Bank, as well as other foundations, corporations, governments, and nongovernmental development organizations (NGDOs). Of course, the RBP would not be possible without the Merck donation of Mectizan.

The River Blindness Program (RBP) hosted the thirteenth annual review of its February 16 – 18, 2009, at Carter Center headquarters in Atlanta. The meeting focused on the achievements, challenges and research of Carter Center-assisted onchocerciasis control and elimination programs. The Review also addressed other diseases and public health initiatives with which The Carter Center integrates river blindness efforts: 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, beginning with Pakistan in 1988.

Program Review participants included the following: Carter Center country representatives Dr. Nabil Aziz (Sudan), Dr. Albert Eyamba (Cameroon), Mr. Teshome Gebre (Ethiopia), Ms. Peace Habomugisha (Uganda), and Dr. Emmanuel Miri (Nigeria). Dr. Mauricio Sauerbrey, director of the OEPA, presented progress made in the six endemic countries in the Americas. Other technical staff members included Dr. Abel Eigege and Dr. Emmanuel Emukah (Nigeria); and Dr. Zerihun Tadesse and Mr. Abate Tilahun Habtemariam (Ethiopia). MOH representatives included Mr. Thomas Lakwo (Uganda); Dr. Ousmanou Dawaye (Cameroon); Dr. Jonathan Jiya and Prof. Abdulsalami Nasidi (Nigeria); and Dr. Tong Chor Malek Duran (Sudan). Special guests included Honorable Dr. World Laureate Tebebe Y. Berhan (Lions – Ethiopia); Mr. Karim Bengraine (Lions Clubs International Foundation); Ms. Erin Shutes (BMGF); Dr. Adrian Hopkins, Dr. Yao Sodahlon, and Dr. Kisito Ogoussan (Mectizan® Donation Program); Ms. Minne Iwamoto (GlaxoSmithKline); Dr. Laurent Yameogo (APOC); Dr. Tony Ukety (WHO); Mr. J. Lyell Clarke (Clarke Mosquito Control); Ms. Simone Nikoladsen (Vestergaard Frandsen); and Ms. S. Eliza Petrow (Izumi Foundation). Also represented were the Centers for Disease Control & Prevention (CDC), partner organizations (Sightsavers International, the Task Force for Global Health), and four universities (Emory University, University of South Florida, Universidad del Valle de Guatemala, and Bernhard Nocht Institute). 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

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

meeting. (See Frontispiece Figure A for the photo from this meeting and Annexes 7, 8 and 9 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 4 for a discussion of The Carter Center reporting process and treatment indices used by the program and in this report. Important terms include the **Ultimate Treatment Goal** (**UTG**), which is the eligible population in a program area; 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 percent achievement of the UTG established for active mass treatment, or, for elimination programs, 90 percent of the UTG(2) (85 percent 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, hypoendemic villages receive mass treatment (not passive).

Mectizan tablets are distributed in Africa at the community level by 'grassroots' community volunteers know as 'Community Directed Distributors,' or 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 what we call kinship-enhanced CDTI, which 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. This kinship approach seeks to 1) attain at least 1 CDD per 100 persons to be treated in all communities, 2) sustain treatment coverage of at least 90 percent of the eligible persons living in all onchocerciasis-endemic communities and 3) encourage involvement of women as CDDs. 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) grouping community health workers and those they serve within their own kinship clans to reduce the demand for "incentives"; and 4) letting community members choose their own health workers and the location of treatment centers. 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. See Frontispiece Figure B for a summary of training in the five countries we assist in Africa.

Summary of the Meeting

In 2008, The Carter Center assisted 13,490,741 Mectizan® (donated by Merck & Co., Inc.) treatments in 11 countries, reaching 98 percent of the 2008 UTG. This was an increase of four percent from 2007 treatments and the largest number ever for the Center's program (Figures 1 and 2). Overall, nearly 115 million cumulative treatments have been provided since the RBP was launched in 1996. About 66% of the 2008 treatments were supported by Lions (Figure 3). Figure 4 shows the achievement of UTG by country in 2007 and 2008. In areas where the goal is onchocerciasis control (characterized by annual Mectizan treatments with the goal of preventing eye disease), about 11.3 million treatments occurred in 2008. In areas where complete elimination of the disease is the goal (twice per year treatment to interrupt transmission) 2.2 million treatments took place. Elimination goals are currently the target for the Abu Hamad focus in north Sudan, six foci in Uganda, and all six countries in the Americas where the disease is endemic. About 40% of 2008 treatments took place in Nigeria (Figure 5). Nearly 200,000 community directed ivermectin distributors (CDDs) working at the grass roots community level were trained during the year to accomplish these 13.49 million treatments.

Americas: The Lions-Carter Center's Onchocerciasis Elimination Program for the Americas (OEPA) assists all six endemic Latin American countries in the quest to eliminate river blindness from the Western Hemisphere. In 2008, 736,983 treatments were given in 9 endemic foci, 93 percent of the UTG(2) regional treatment target. Treatments and the treatment target decreased in 2008 as more foci halted Mectizan treatments as transmission was interrupted. The Santa Rosa focus of Guatemala was first of the 13 foci in the Americas to stop mass treatment in 2007, being joined in 2008 by Lopez de Micay (Colombia), Escuintla (Guatemala), Northern Chiapas (Mexico) and the Rio Santiago subfocus (Ecuador). In 2009, Huehuetenango (Guatemala) and Oaxaca (Mexico) will join the ranks of foci where treatments have stopped. A newly accepted resolution (CD48R12) by the Pan American Health Organization (PAHO) aims to halt transmission (and subsequently, treatment) in all 13 American foci by 2012. A three year observation period follows the cessation of treatment in each focus prior to a declaration of 'elimination.' Only countries (not foci) currently can request WHO certification of elimination. To date, Colombia is the only endemic country in the Americas to halt mass treatment on a national scale.

Uganda: Uganda's RBP exceeded two million treatments in one year for the first time in 2008, assisting 835,687 Mectizan treatments in control areas and 1,286,940 treatments in elimination areas. The Uganda RBP achieved 96 percent of its UTG/UTG(2) treatment targets. The integrated Vitamin A distribution effort also provided 59,259 supplements to young children in our assisted areas through integrated Mectizan/ vitamin A distribution activities. During 2008, Uganda program trained 70,357 CDDs. Uganda also launched its Ugandan Onchocerciasis Elimination Committee (UOEC) meeting in August of 2008 with support from The Carter Center, and two members of that committee (Professor Rolf Garms, Bernhard Nocht Institute for Tropical Medicine and Dr. Tom Unnasch, University of South Florida) gave presentations at the

Atlanta Review. Uganda was recognized for its leadership in Africa onchocerciasis elimination by the Fourteenth Session of the Joint Action Forum of the African Program for Onchocerciasis Control.

Sudan: In 2008, the Lions-Carter Center effort based in Khartoum reported 78,637 treatments in control areas and 163,738 treatments in the elimination focus of Abu Hamad, reaching 93 percent of its UTG/UTG(2) treatment targets. Sudan trained 1,447 CDDs. Sudan also held its first national program review meeting on onchocerciasis in 2008.

Cameroon: A total of 1,639,710 persons in North and West Provinces received Lions-Carter Center-assisted mass Mectizan® treatments in 2008, 92 percent of the UTG. The RBP also assisted in half a million Vitamin A treatments in the two Provinces, integrated with the system of community-directed treatment with ivermectin. In Cameroon, 35,242 CDDs were trained.

Nigeria: In 2008, the Carter Center assisted over 5.2 million Mectizan® treatments for river blindness in Nigeria (100 percent UTG). Lions SightFirst no longer assists the Nigeria program. In Plateau and Nasarawa states, the RBP is integrated with the LF elimination program, with funding from BMGF and GSK. Mectizan® treatments for river blindness were combined with albendazole to interrupt LF transmission, and a total of 3.7 million combined treatments were assisted. The Nigerian program also increased schistosomiasis treatments over *five times* compared to 2007 treatments (Frontispiece Figure G) thanks to a generous donation of praziquantel to the program supplied by Merck KGaA (E-Merck), Germany, through WHO. Further, 207,187 long-lasting insecticide treated bed nets (LLINs) were distributed by our assisted programs. The vast majority of these (200,000) were purchased with support by BMGF and distributed with assistance by the Center's malaria team in limited areas of Imo and Ebonyi states. Finally, 95,440 Vitamin A supplements (VAS) to young children were provided in Plateau and Nasarawa. Nigeria trained 59,788 CDDs.

Ethiopia: The Lions-Carter Center partnership operates in eight of the ten RB endemic zones in Ethiopia. This program assisted in treating 2,983,055 persons, representing 95 percent of the 2008 UTG, and a three percent increase over 2007. The Carter Center malaria program, which provided LLIN in 2007 throughout the RBP-assisted areas, continued integrated health education and monitoring efforts with our the RBP in 2008. Community-directed distributors of ivermectin were trained to ensure that LLINs distributed in 2007 were being used and properly maintained. During 2008, 31,589 CDDs were trained. In 2009, thanks to new funding from GlaxoSmithKline (GSK), Ethiopia plans to commence combined albendazole and ivermectin treatments to over 75,000 persons in order to begin to eliminate Lymphatic Filariasis (LF) as well as control onchocerciasis in Gambella Region.

GENERAL 2009 RECOMMENDATIONS FOR THE CARTER CENTER'S RIVER BLINDNESS PROGRAM

The shift in interest from onchocerciasis (river blindness) control to onchocerciasis elimination in Africa by the African Program for Onchocerciasis (APOC) was noted at the Review, but with the thinking (expressed by APOC at the JAF14 held in December, 2008 in Kampala) that once per year Mectizan treatment (rather than twice) can eliminate onchocerciasis in some areas, if coverage is sufficient. All Carter Center assisted African programs should begin to assemble and show coverage data (annually) since 1996 related to the 90 percent eligible population (UTG) coverage goal for ivermectin distribution in Africa. This is consistent with the Management of APOC request that all CDTI projects work toward achieving 80 percent therapeutic coverage, up from the previous target of 65 percent (this therapeutic coverage goal corresponds to 90 percent of UTG coverage that Carter Center assisted programs in Africa have already been using). OEPA should continue to use at least 85 percent UTG coverage as its goal, however.

In addition, Carter Center assisted programs should:

- Refine epidemiological indices more precisely where we have launched onchocerciasis elimination efforts in Africa (Sudan and Uganda). More work is needed to operationally define and then 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. Some of these issues need to be addressed in ministerial meetings on cross border health issues.

The Review noted the challenges in providing laboratory support of onchocerciasis elimination programs attempting to use molecular techniques. To accommodate the growing number of assessments being conducted (particularly in relation to elimination programs), rapid diagnostics are urgently needed. However, until they are available, the assisted programs also should:

- Work to expand capacity of laboratories in Guatemala, Sudan and Uganda, and establish new laboratory capacity in Jos, Nigeria.
- Encourage recruitment or assignment of graduate level skills or seek qualified lab workers who can be dedicated full time to their laboratory activities.
- Continue collaborations with University del Valle/Guatemala, University of Southern Florida, CDC, Scripps Research Institute and Oregon Health and Science University. The Ministries of Health in Sudan and Uganda should provide dedicated personnel to staff MOH labs.

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, The Carter Center cannot move to assist in areas where we are not already assisting annual Mectizan® distribution or invest in integration efforts with other diseases unless we first obtain formal Carter Center Board of Trustees approval, adequate funding to participate, and, if required, Emory IRB approval.

Further general recommendations for Carter Center assisted programs:

- Seek more Lions involvement to help maintain program visibility and support.
- Apply The Carter Center monitoring protocol annually in Carter Center-assisted African health programs (outside of Gates supported project areas) to assess and validate coverage, health education, community involvement, and ownership.
- Submit drug applications as early as possible. Treatment reports do not need to be complete to submit for the following year.
- Work towards a target of a minimum 1 CDD to 100 population ratio in our assisted African programs.
- Seek to increase training, supervision, involvement of kinship groups, and gender balance among CDDs and community supervisors.
- CDD training (new and old) 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.
- Seek to determine and publish results of programmatic improvement resulting from conversion to the kinship strategy.
- Cost per CDD trained and change in coverage as displayed on the treatment category scale should be examined.

All Carter Center-assisted programs active in Vitamin A supplementation (VAS) have been challenged by the need to deliver VAS every six months, VAS supply chains, and other NGOs or agencies delivering Vitamin A. Above all we seek safety, by providing WHO recommended spacing of VAS of at least thirty days when other mechanisms for VAS are active in the same areas. 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 hold up Mectizan® distribution if VAS supplies are not readily available. The RBP should seek to publish our experience with VAS activities.

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 2009 for onchocerciasis: 13,959,146 annual and semiannual treatments.

Training Objective for 2009: 253,984 CDDs (73,054 new), and 40,840 community supervisors (12,269 new).

Figure 1

2008 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 TX
NIGERIA	***UTG=**	**5,040,206**		**UTG(arv)=**	**7,917**										
Treatments	320	59,371	69,405	381,210	398,072	1,101,016	1,215,768	1,015,869	537,009	232,774	108,244	91,207	**5,210,265**	103%	40%
Villages treated	1	70	67	297	395	1,771	1,742	1,344	1,276	604	263	68	**7,898**	100%	26%
UGANDA	***UTG=**	**864,949**		**UTG(arv)=**	**1,398**										
Treatments	0	0	0	0	55,375	102,888	179,173	251,415	0	0	246,836	0	**835,687**	97%	6%
Villages treated	0	0	0	0	65	190	172	320	0	0	651	0	**1,398**	100%	5%
UGANDA ELIMIN	***UTG(2)=**	**1,336,974**		**UTG(arv)=**	**1,676**										
Treatments	0	0	0	0	118,813	519,163	0	0	0	0	648,964	0	**1,286,940**	96%	10%
Villages treated	0	0	0	0	343	912	0	0	0	0	1,676	0	**1,676**	100%	5%
CAMEROON	***UTG=**	**1,790,425**		**UTG(arv)=**	**3,631**										
Treatments	0	0	0	0	0	0	221,002	183,108	427,003	785,212	23,385	0	**1,639,710**	92%	13%
Villages treated	0	0	0	0	0	0	400	349	1,122	1,505	255	0	**3,631**	100%	12%
OEPA	***UTG(2)=**	**792,954**		**UTG(arv)=**	1,642										
Treatments	0	0	0	0	0	364,845	0	0	0	0	0	372,138	**736,983**	93%	6%
Villages treated	0	0	0	0	0	1,557	0	0	0	0	0	1,566	**1,562**	95%	5%
ETHIOPIA	***UTG=**	**3,144,532**		**UTG(arv)=**	**14,336**										
Treatments	0	0	0	0	628,082	2,301,220	0	53,753	0	0	0	0	**2,983,055**	95%	23%
Villages treated	0	0	0	0	2,350	11,685	0	233	0	0	0	0	**14,268**	100%	46%
SUDAN	***UTG=**	**91,745**		**UTG(arv)=**	**150**										
Treatments	0	0	0	0	0	0	13,154	0	46,978	0	1,942	16,563	**78,637**	86%	1%
Villages treated	0	0	0	0	0	0	17	0	130	0	3	20	**170**	113%	1%
SUDAN ELIMINA	***UTG(2)=**	**169,890**		**UTG(arv)=**	**144**										
Treatments	5,759	0	0	1,990	0	49,947	6,467	0	27,309	0	0	72,266	**163,738**	96%	1%
Villages treated		0	0	4	0	85	38	0	17	0	0	121	**265**	92%	1%
TOTALS	***UTG=**	**13,231,675**		**UTG(arv)=**	**30,894**										
Treatments	**6,079**	**59,371**	**69,405**	**383,200**	**1,200,342**	**4,439,079**	**1,622,410**	**1,504,145**	**991,321**	**1,090,252**	**852,859**	**535,611**	**12,935,015**	**98%**	
Villages treated	**1**	**70**	**67**	**301**	**803**	**4,515**	**2,352**	**2,013**	**2,415**	**2,109**	**2,194**	**1,755**	**30,698**	**99%**	

Cumulative RBP-assisted treatments (1996 - 2008) = 114,832,664

2008 Mass Treatments	12,935,015
2008 Passive Treatments	555,726
2008 TOTAL TREATMENTS	**13,490,741**

***UTG**: Ultimate Treatment Goal

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

Figure 2

Carter Center-Assisted Programs: Annual Mectizan® Treatments, 1996 - 2008

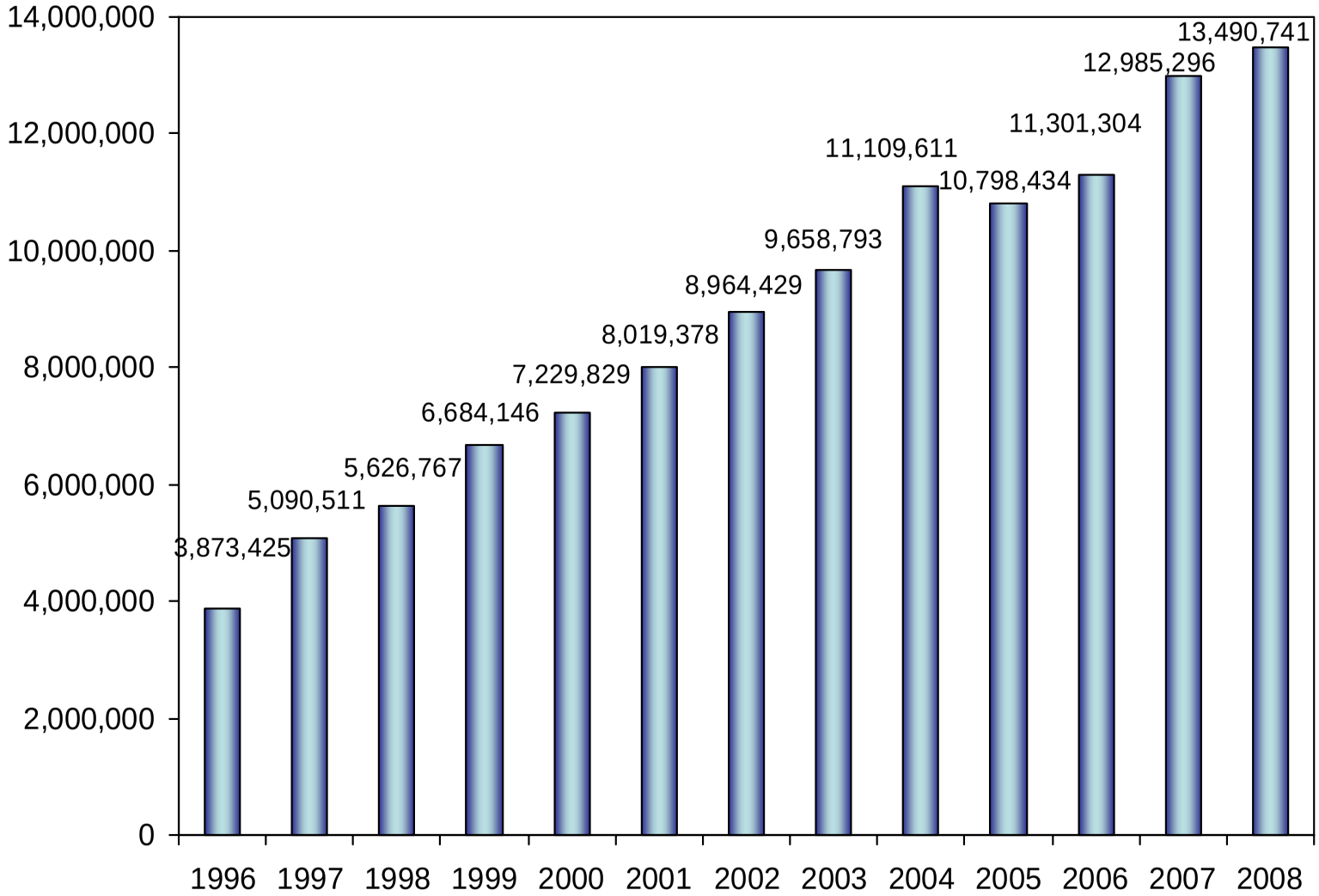
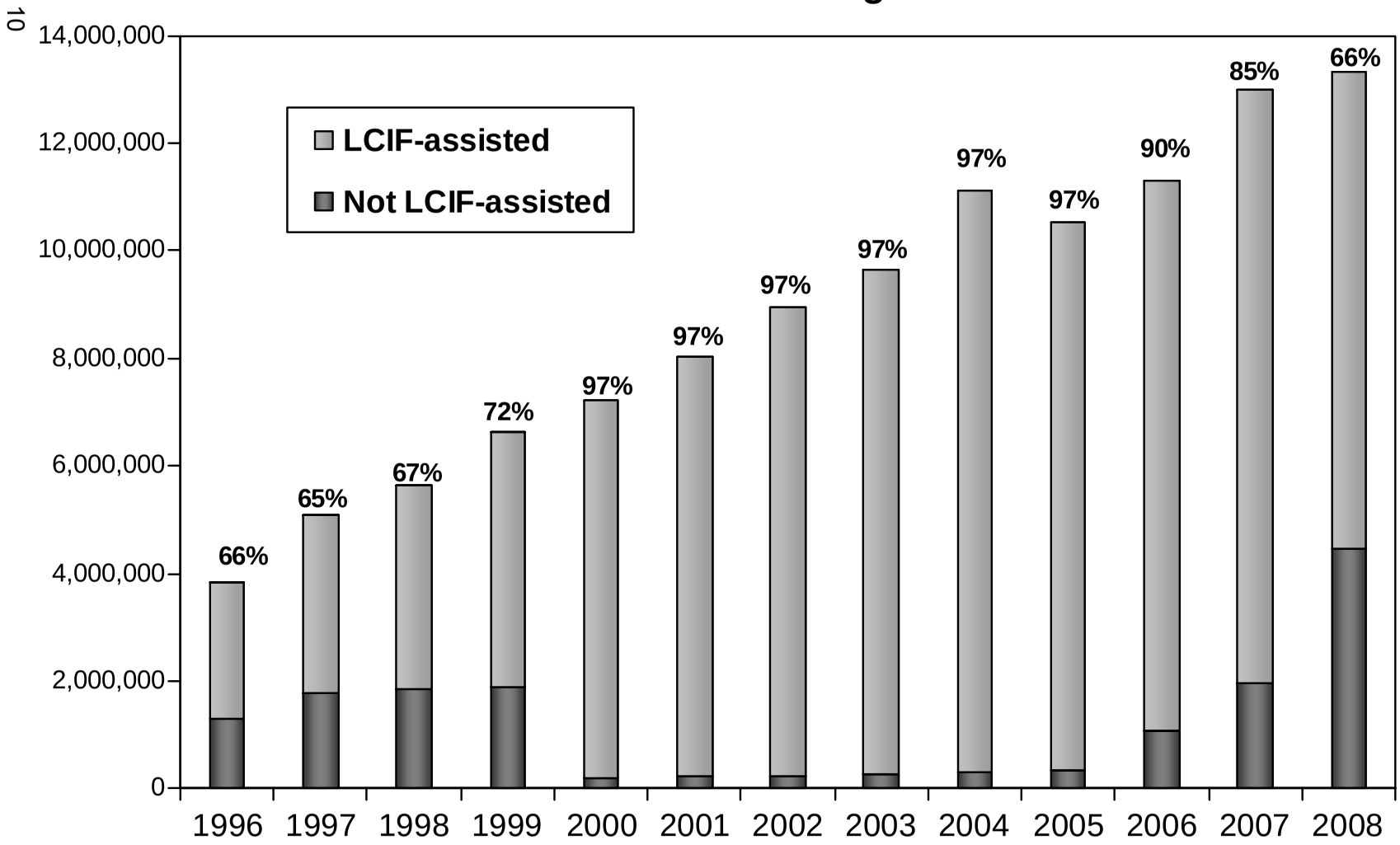


Figure 3

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



* In 2008, treatments in Nigeria and Uganda were not supported by Lions:
Percentage is percent of treatments that are LCIF-assisted

Figure 4

Carter Center-Assisted Programs: Percent of Ultimate Treatment Goals Reached in 2007 and 2008

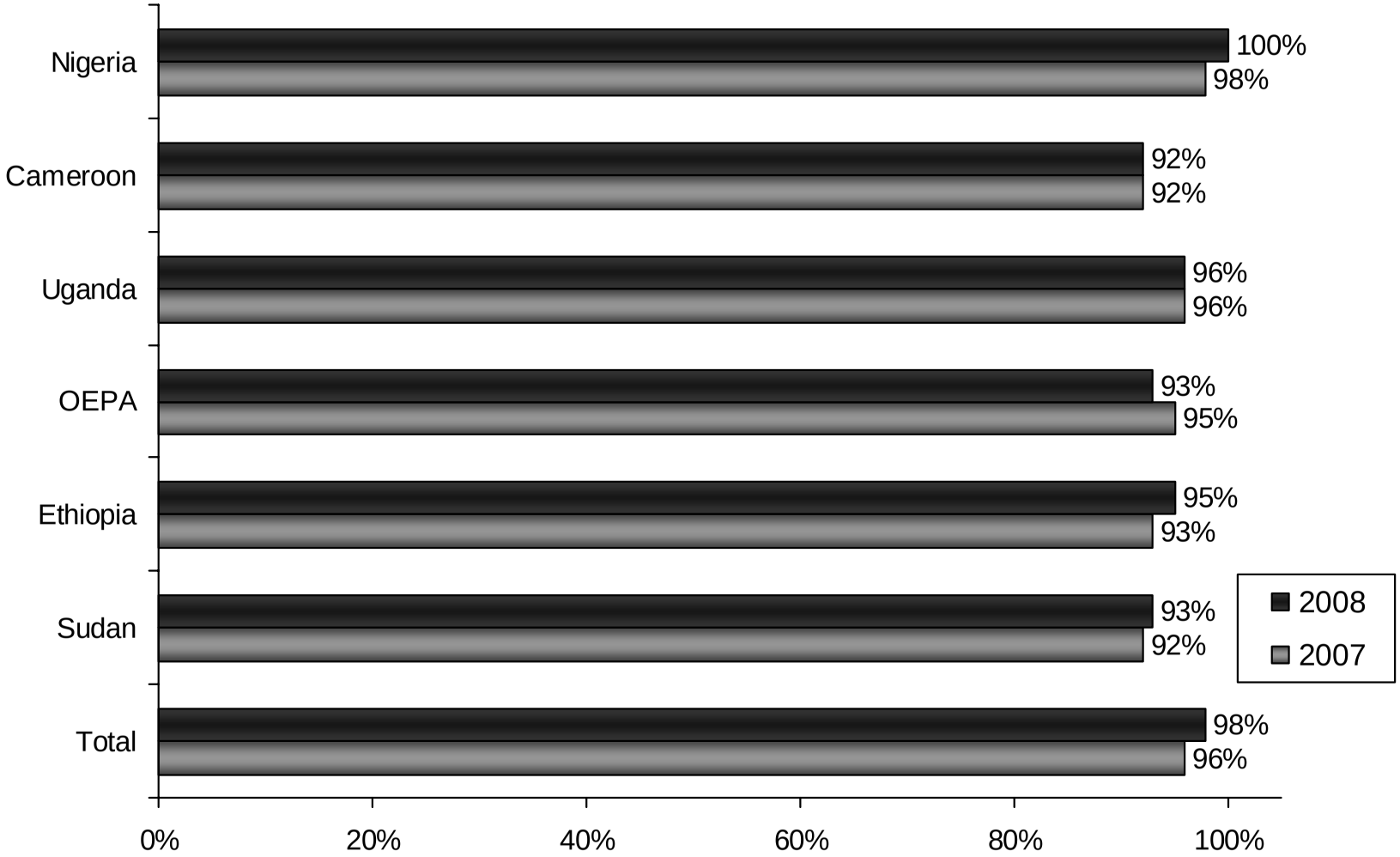
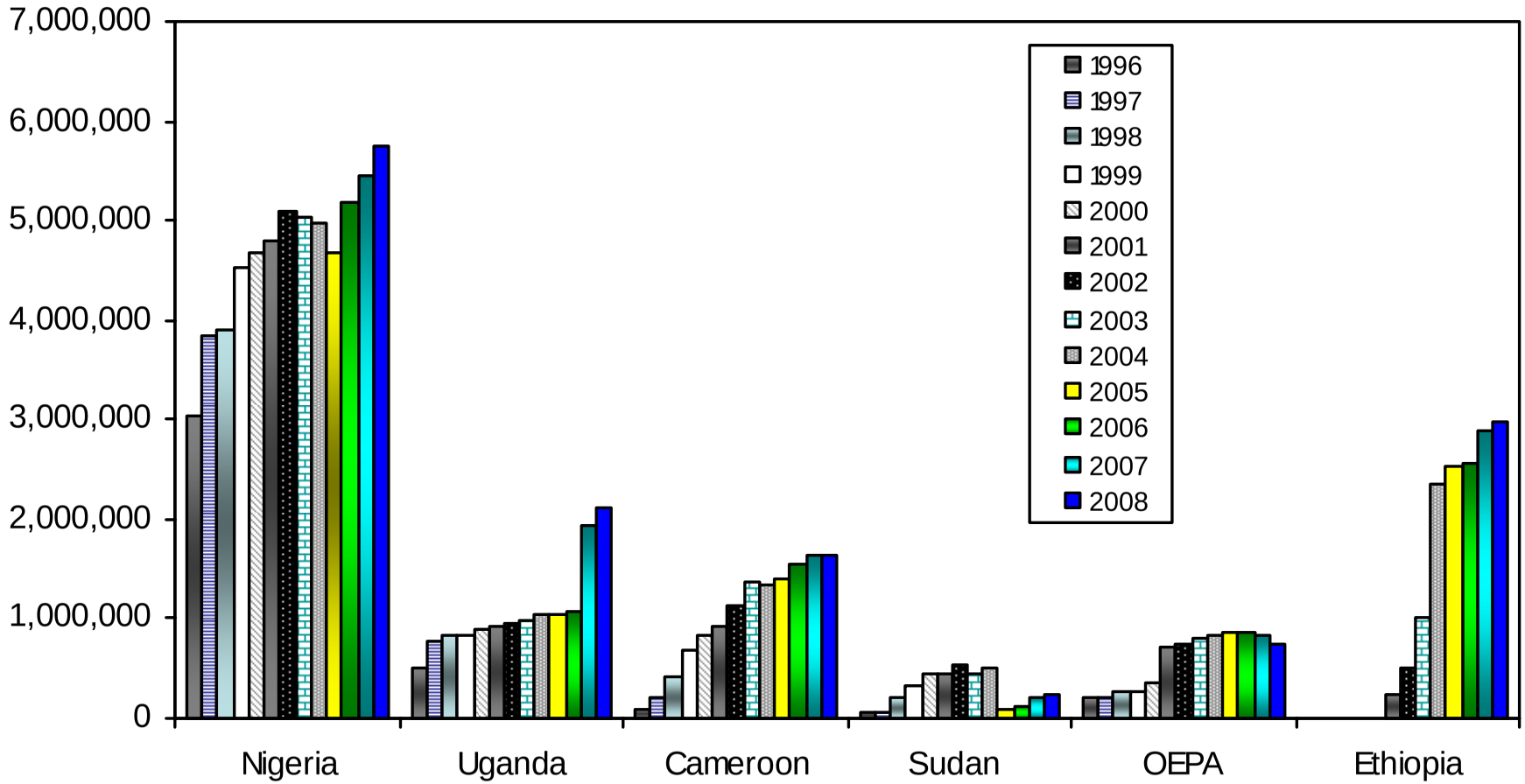


Figure 5

Carter Center-Assisted Programs: 1996 - 2008 Mectizan® Treatments by Program



ONCHOCERCIASIS ELIMINATION PROGRAM FOR THE AMERICAS (OEPA)

The Onchocerciasis Elimination Program for the Americas (OEPA) is a regional initiative working to eliminate both morbidity and transmission of onchocerciasis from the Americas through semi-annual (i.e., every six months) distribution of Mectizan® in the endemic areas of the region (Figure 6). The initiative began 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 OEPA coalition includes ministries of health (MOHs) of the six countries with onchocerciasis in the Americas (Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela), The Carter Center, Lions Clubs and the Lions Clubs International Foundation (LCIF), 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. The Carter Center coordinates technical and financial assistance to the six countries through the OEPA office. The MOHs provided 36% of costs of this program in 2008, contributing over $3 million.

The OEPA strategy is to help the six national onchocerciasis elimination programs provide mass treatment with ivermectin twice per year, reaching at least 85 percent treatment coverage of the treatment eligible population. Mass treatment is sustained until onchocerciasis ocular morbidity has disappeared and transmission is interrupted.

Interruption of Transmission in some Foci has led to a Reduction in Treatments: The total number of foci under MDA in the region dropped from the original 13 in 2006 to nine in 2008; with the number of ivermectin treatments administered decreasing from 852,721 in 2006 to 736,983 in 2008. The four foci no longer receiving MDA in 2008 were Santa Rosa (Guatemala), Escuintla-Guatemala (Guatemala), North Chiapas (Mexico), and Lopez de Micay (Colombia). In 2008, based on the OEPA steering committee review of recent transmission data, the Program Coordinating Committee (PCC) recommended to the governments of Guatemala and Mexico that treatments be suspended in Huehuetenango and Oaxaca, respectively, as transmission had been interrupted in those foci. Both countries accepted those recommendations and MDA will be stopped there in 2009. As recommended in WHO's onchocerciasis elimination certification guidelines, foci removed from MDA should conduct post-treatment surveillance (PTS) for a minimum of three 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 for individual foci.

In sum, at the end of 2008, of the original 13 endemic foci in the region, transmission had been interrupted in half (6.5 foci, the half-focus being the Río Santiago in Ecuador), all of which have now started the three-year period of PTS. However, it is only in Colombia where the entire country is under PTS, being the first country in the region to have achieved country-wide interruption of the transmission of the parasite. As such,

the PTS period is actually (in the terminology of WHO certification guidelines) a 'precertification period,' after which the country may request formal certification procedures. The proposed timeline leading to such a request to WHO by each endemic country is shown in Frontispiece Figure C. Based on the progress being made, and the projections of time needed to achieve interruption of transmission in each remaining focus, it is believed that all countries should have requested WHO certification procedures by 2016. The Yanomami Area, a focus which overlaps parts of both Brazil and Venezuela, is projected to be the last to reach this point.

A New Resolution from PAHO: A new PAHO resolution for onchocerciasis was issued in 2008 to replace the outdated 1991 PAHO resolution. Resolution (CD48.R12) was made by PAHO's Directing Council and called for the regional elimination of all ocular morbidity caused by onchocerciasis and interruption of transmission of the parasite by 2012. Figure 7 shows the progress thus far. This resolution is consistent with projections that PTS would end in 2015 and key to maintaining the political support that sustains the OEPA initiative.

Treatments: Denominator data used to calculate treatment coverage was based on censuses conducted during the second treatment round in 2007 in each endemic community in the nine foci where MDA continued in 2008. The total number of people eligible for ivermectin treatment in the Americas region was 396,477 (the ultimate treatment goal or UTG). The number of eligible people and percentage of the region's UTG by country in descending order for 2008: Mexico 143,202 (36.1 percent), Guatemala 126,964 (32 percent), Venezuela 101,682 (25.6 percent), Ecuador 16,059 (4 percent), Brazil 8,570 (2.2 percent) and Colombia 0 (0 percent). Since ivermectin treatment is provided twice a year, the treatment coverage denominator (called the UTG(2)) is twice the ultimate treatment goal, or 792,954 treatments. Treatment coverage is calculated as the total number of treatments delivered during the year divided by the UTG(2). In 2008, the nine foci that remained under treatment reported a total of 736,983 treatments, or 92.9 percent coverage. Country-specific treatment activities are described individually below. See Figures 8 and 9 for details.

Country specific information:

Brazil's endemic population inhabits one 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 enormous area of 90,000 km^2 but a sparse population with a combined UTG(2) of only 27,978. Overall, the Yanomami Area reached 92 percent of its UTG(2) (25,665 treatments). Brazil provided 15,576 treatments in 2008, 91 percent of its UTG(2) of 17,140, and surpassed the 85 percent treatment coverage goal for the eighth consecutive year. The Venezuelan side of the Yanomami Area, delivered 10,089 treatments (93 percent of its UTG(2) of 10,838), but achieved its coverage goal for only the third 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 three-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 (Frontispiece Figure C).

Ecuador has a single endemic focus in Esmeraldas Province (the Esmeraldas–Pichincha focus), which failed to reach the 85 percent coverage goal during the first treatment round of 2008. The inability to reach the 85 percent coverage goal was due to delays in government fund release and was the first time that the program had missed its treatment goal in 14 consecutive treatment rounds spanning from 2001 to 2007. UTG coverage was only 76.6 percent due to failure to reach nine endemic communities (out of a total of 84). The program recovered treatment operations during the second round and reached 93.8 percent UTG coverage; overall the program provided a combined total of 27,372 treatments in 2008 of the UTG(2) of 32,118, thereby managing to achieve a treatment coverage of 85 percent despite the poor first round performance. Within the Esmeraldas-Pichincha focus, a subfocus on the Río Santiago had MDA suspended 2008 following a conclusion by the PCC that transmission was interrupted along that river.

Guatemala has four endemic foci (the Central endemic zone – CEZ, Escuintla, Huehuetenango and Santa Rosa) of which only one (the CEZ) remains under ivermectin MDA. Santa Rosa was the first focus in the Americas to declare interruption of transmission and stop treatments at the end of 2006; that focus has been under PTS since January 2007. In January 2008, MDA was suspended in a second focus in Guatemala, the Escuintla focus. In the other two foci, the coverage goal has been surpassed for the seventh consecutive year by providing 234,745 ivermectin treatments in 2008, 92 percent of a UTG(2) of 253,928. Based on epidemiologic evaluations conducted in 2008 in the Huehuetenango focus, the PCC concluded that onchocerciasis transmission had been interrupted and recommended to the Guatemalan Ministry of Health that treatment could be halted in that focus in 2009. The ministry of health announced it had accepted that recommendation and will halt MDA in the Huehuetenango focus beginning in 2009.

Mexico has three endemic foci (Oaxaca, Southern Chiapas and Northern Chiapas) of which only two (Oaxaca and Southern Chiapas) were under MDA in 2008. In 2007, the Mexican Ministry of Health agreed to stop ivermectin treatment in the North Focus of Chiapas in 2008, based on a PCC recommendation that transmission had been interrupted there. In the remaining two foci, 268,761 treatments were provided in 2008, 94 percent of the UTG(2) of 286,404. Coverage was >85 percent for the eighth consecutive year. Since 2003, Mexico has also been providing ivermectin quarterly in 50 of its most highly endemic communities in the Southern Chiapas focus as part of a trial aimed at hastening onchocerciasis elimination. In 2008, the PCC concluded that onchocerciasis transmission had been interrupted in the Oaxaca focus, and recommended that treatments be stopped in that focus. The Mexican Ministry of Health accepted the PCC recommendation and will suspend ivermectin treatments in Oaxaca in 2009.

Venezuela has three endemic foci, North–Central, Northeast and South (part of the Yanomami Area discussed in the section on Brazil). The North–Central and Northeast foci reached their treatment coverage goals for the sixth consecutive year. Overall, Venezuela provided 190,529 treatments, 94 percent of the UTG(2) of 203,364. Transmission is ongoing in Northeast and South foci, but may be suppressed in North-Central. Ongoing discussions and cooperation between Brazil and Venezuela are key to the success of the attack on onchocerciasis transmission in the Yanomami area, which includes the South Venezuela focus.

IACO 2008: 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 eighteenth annual IACO (IACO 2008) was held in Oaxaca, Mexico, 12-14 November 2008. The meeting was organized by the Government of the State of Oaxaca, the Ministry of Health (Secretary of Health) of Mexico and OEPA, and over 90 people attended.

The main theme of IACO 2008 was "Last call to interrupt transmission of *Onchocerca volvulus* by 2012," a reflection of the new resolution CD48.R12 issued in 2008 by PAHO's Directing Council. Key conclusions and recommendations from IACO 2008 included:

1. Active eye disease attributable to onchocerciasis (defined as a >1 percent prevalence microfilariae in the cornea or anterior chamber of the eye) is now only found in Brazil and Venezuela, and there has been no incident blindness attributable to onchocerciasis since 1995 in the Americas region.
2. In 2009, active transmission continues in seven foci (Brazil, Ecuador, Guatemala's Central endemic zone, Mexico's South Chiapas focus, and all three foci in Venezuela).
3. Strategies and actions are needed that will accelerate the elimination of the disease from Venezuela and Brazil, particularly for the Yanomami area.
4. Ministries of Health, political leaders and donors must recognize that onchocerciasis programs do not cease when ivermectin treatments are halted. Programmatic activities must continue for a minimum of three years in Post-Treatment Surveillance (PTS), in accord with WHO guidelines.
5. When ivermectin treatments are halted, Ministries of Health should consider instituting other programs in formerly endemic onchocerciasis villages, using the onchocerciasis infrastructure established for MDA. The most obvious candidate program to launch would be an MDA effort against soil transmitted helminthes using albendazole or mebendazole.
6. Continued support is needed for the established OEPA structures and the PCC. The resolution recognized the importance of political will by national authorities and OEPA partners as fundamental to reaching the goal of elimination of onchocerciasis from the Americas.

2009 RECOMMENDATIONS for OEPA

It was noted that national programs in the Americas were provided 72 percent of costs of the elimination effort (exclusive of the value of the Merck donation). Heads of state need to remain engaged in the effort. Ecuador failed to reach 85 percent coverage in the first treatment round of 2008 due to no release of government funds.

Work to expand capacity of laboratories with which we work, in order to accommodate the growing number of assessments being conducted as part of the post treatment surveillance (PTS) activities.

Complete evaluations on the rest of the Ecuadorian focus, aiming to obtain a PCC resolution/recommendation to stop treatment there in 2010.

Continue epidemiological evaluations in Northeast Venezuela to correlate ophthalmology results with other results to determine if that focus (scheduled to stop treatment in 2010) must extend treatment.

Complete the final analysis of the 4-times-per-year treatment study in South Chiapas Mexico, and support the MOH decision to increase the number of communities under this treatment scheme.

Create a standardized version of Post Treatment Surveillance (PTS) guidelines. Implement recrudescence monitoring plans for foci where treatments have been stopped: Santa Rosa, Escuintla and Huehuetenango (in Guatemala), N. Chiapas and Oaxaca (Mexico), Rio Santiago (Ecuador), and Colombia.

Publish results of certification exercises leading to the PCC recommendation to stop treatment in N. Chiapas and Oaxaca (Mexico), Rio Santiago (Ecuador), and Colombia.

Complete the IRB process and launch the Gates-supported six-week Doxycycline treatment study in Guatemala, in collaboration with the MOH, CDC, University del Valle/Guatemala, Scripps and Oregon Health and Science University.

Encourage strengthening of the health infrastructure in Yanomami focus (shared between Venezuela and Brazil). Continue with reinforced efforts to obtain a bi-national agreement and bi-national operations between Venezuela-Brazil to treat the Yanomami focus more efficiently, based upon the mandate of the new PAHO resolution.

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

Continue to develop antigen detection tests in collaboration with Scripps Research Institute and Oregon Health and Science University.

Submit Mectizan applications as early as possible. Reports do not need to be complete to submit for the following year. Work with the Ministry of Health and CDC (using recently updated census data) to suppress transmission as soon as possible in the central endemic zone of Guatemala.

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 Lions involvement to help maintain program visibility and support.

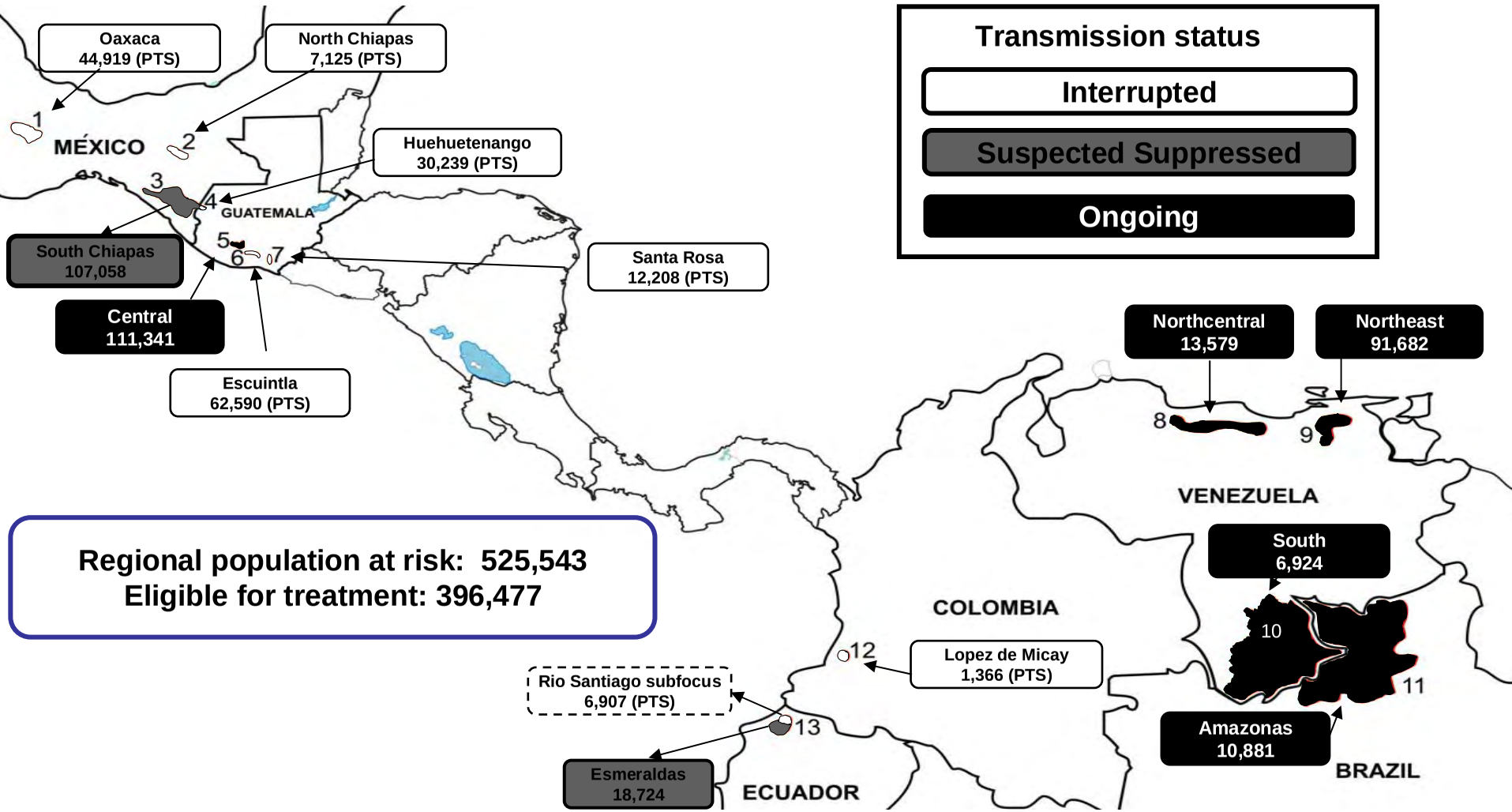
Promote routine community surveys for validating the level of community involvement, health education, training and coverage.

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

Treatment Objective for 2009 (UTG(2)): 742,078 treatments.

Figure 6

2008 Transmission Status in the 13 Foci of the Americas



Regional population at risk: 525,543
Eligible for treatment: 396,477

Figure 7

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)
Huehuetenango, GU	Yes	Yes (2008)
Oaxaca, MX	Yes	Yes (2008)
North Chiapas, MX	Yes	Yes (2007)
South Chiapas, MX	Yes	Transmission suppressed
Central focus, GU	Yes	No
Esmeralda, EC	Yes	Transmission suppressed (interrupted in Rio Santiago 2007)
North Central, VZ	No	No
North Eastern, VZ	No	No
Amazonas, BR	No	No
South, VZ	No	No

Figure 8

OEPA: Treatments with Mectizan® in the Americas 1989-2008

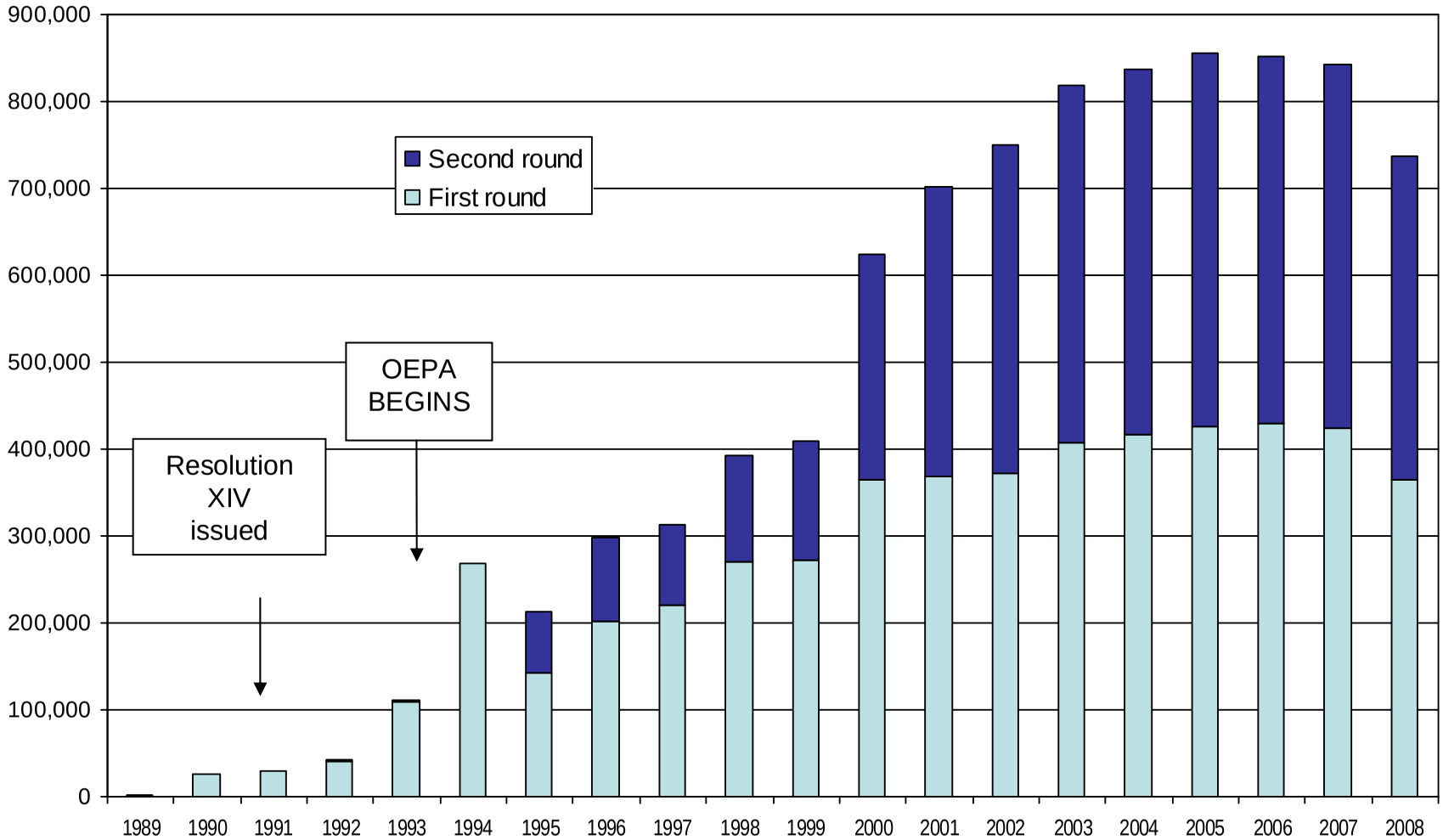


Figure 9

Treatment Coverage (UTG(2)) by Focus 2005 –2008

UGANDA

Background: Onchocerciasis affects 29 of the 80 districts in Uganda. The Carter Center assists community-directed treatment with ivermectin (CDTI) in 17 (59 percent) of those endemic districts (Figure 10): Kabale, Kanungu, Kasese, Kisoro, Bushenyi, Kamwenge and Ibanda (in Southwest Uganda); Adjumani, Moyo, and Nebbi (in the West Nile region bordering Sudan and DRC); Amuru, Gulu, and Oyam Districts (in the Middle North areas); and Bududa, Manafua, Mbale, and Sironko (in the Mount Elgon focus in the east, bordering Kenya). In 2008, the Carter Center's UTG in Uganda accounted for about 70 percent of the national UTG, compared to 66 percent in 2007. In 2008, Carter Center-assisted areas provided about 82 percent of the country's total of 2,587,463 treatments (see Figure 11).

Although LCIF funding to Uganda ended in 2002, the Local Lions Clubs have remained active participants in the Carter Center-assisted river blindness control activities. Local Lions engaged and mobilized members of parliament and other government officials. They provided onchocerciasis education and advocated for regular and sustained government support of CDTI activities. The Carter Center's Country Representative in Uganda, Ms. Peace Habomugisha, is a Lions Club member.

Onchocerciasis control commenced in Uganda in 1992 with large scale, annual, mass treatment with Mectizan®. The River Blindness Foundation (RBF) and Sight Savers International (SSI) provided the initial financial support to the government. In 1997, The Carter Center and the African Programme for Onchocerciasis Control (APOC) helped support those RBF established projects. APOC also supported apparently successful transmission elimination efforts in two foci (Itwara and Mpamba-Nkusi) using focal larvicide application and annual Mectizan® distribution. Armed with this success (and the memory of a 1970s elimination victory in the Victoria focus, which liberated three million people from the threat of onchocerciasis), the government of Uganda and its partners launched a bold new elimination policy in 2007 targeting six 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 six months) and providing targeted ground larviciding for vector control or vector elimination where technically feasible. New epidemiological and entomological surveys in support of this elimination effort are being conducted. The Carter Center, with support from Merck and Co., Inc., through the NGDO group, helped launch semiannual treatments in the Wadelai focus in Nebbi District in 2006 (see details below). The Center also partnered with the Ministry of Health by providing financial and technical assistance to the government of Uganda, made possible by a generous donation from Mr. John Moores. The Mectizan® Donation Program committed to provide sufficient Mectizan® for twice-per-year treatments. SSI also agreed to assist in intensified efforts planned for 2007 in districts in which it has traditionally worked that now are aiming for elimination.

Uganda establishes a technical steering committee for national onchocerciasis elimination: To ensure that the elimination efforts are rigorously carried out and supported with good scientific data, the ministry of health (MOH) established an international technical advisory committee, deemed the Uganda Onchocerciasis Elimination Committee (UOEC). The UOEC held its first meeting on August 11-12, 2008 with support from The Carter Center (Frontispiece Figure D). The meeting was opened by Dr. D K W Lwamafa, Commissioner for Health Services, Department of National Disease Control. Dr. Frank Walsh, a seasoned medical entomologist and former director of entomology of the WHO Onchocerciasis Control Program was unanimously elected by the committee members (other international experts on the UOEC include Professor Rolf Garms and Dr. Thomas Unnasch.

The terms of reference for the UOEC draw heavily upon the experience of the steering committee of the Onchocerciasis Elimination Program for the Americas (OEPA). The UOEC works as an advisory committee to the MOH, and its responsibilities involve reviewing programmatic activities from each elimination targeted focus in Uganda (see 'Oncho Flag' section below), advising the MOH on focus specific monitoring, evaluation activities, certification activities and making recommendations on prioritizing activities to reach national goals. UOEC also serves as a forum for the partners to discuss key issues related to the national initiative. The UOEC is composed of ten voting members: four "at large" members; one member from the MOH; two district representatives; and one institutional representative each from TCC, SSI, and APOC. The MOH and The Carter Center provide two non-voting co-secretaries to the UOEC. The World Health Organisation (WHO) Uganda representative is given observer status since this institution will likely coordinate future certification of the elimination activities. Local Lions are also represented as observers.

The "Oncho Flag": The elimination strategy is illustrated in color in what is called the "oncho flag" (see Figure 11): Dark green shows foci where onchocerciasis has been eliminated, light green shows foci where transmission has already been interrupted (although onchocerciasis disease may still be prevalent), and yellow shows the foci where new elimination activities are ongoing. 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 foci cross international borders into South Sudan or the Democratic Republic of the Congo (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 and 2008, the aim of onchocerciasis elimination activities was to work in the 'green and yellow areas' to demonstrate progress to the international health community.

The six elimination areas (shown in yellow) where semi-annual treatment with Mectizan® and ground larvicide application were conducted are: 1. Wadelai (Nebbi District); 2. Wambabya-Rwamarongo (Hoima District); 3) Mt. Elgon (Bududa, Manafua, Mbale and Sironko districts), 4. Budongo (Bulisa and Masindi districts); 5. Kashoya-Kitomi (Bushenyi, Kamwenge and Ibanda districts); and 6. Bwindi (Kabale, Kanungu and

Kisoro districts). In Wambabya-Rwamarogo and Budongo foci, Sight Savers International provides direct support while technical support is provided by The Carter Center. See Figure 13 for a map of these foci.

As for the light green areas of the flag, the UOEC 2008 review of the flag led to agreement that transmission was interrupted in Itwara and Mpamba-Nkusi foci (where GTZ and APOC-supported vector elimination along with annual ivermectin treatment appears to have been successful in interrupting the transmission of onchocerciasis). UOEC recommended moving Wadelai and Imaramagambo foci to the light green 'transmission interrupted' status since in both cases there is good evidence that transmission has ceased in the absence of larviciding. Further entomological and epidemiological data are needed in 2009 from Itwara, Mpamba-Nkusi, Wadelai, and Imaramagambo to allow consideration at the next UOEC meeting for a possible recommendation for withdrawal of interventions in some of these foci.

In a presentation at the Atlanta Program Review, there is also indication that transmission in Mt. Elgon focus may have been interrupted as no *S. neavei spp* have been caught since July 2008, and the last positive crab for larvae of *S. neavei spp* was caught in August 2008.

Treatments: The UTG for 2008 in Carter Center-assisted areas in blue and red foci (e.g., a control strategy with annual ivermectin treatment) was 835,687 (Figure 14). In the yellow areas targeted for elimination the UTG was 637,976 (Figure 15); since the strategy in these areas is semiannual treatment, the UTG(2) index was used (twice the UTG) to calculate the coverage goal (1,275,952). The Carter Center Uganda assisted in 2,122,627 treatments in 2008, a 9.1 percent increase from 1,945,986 in 2007. All 3,074 high-risk villages were treated during the year (100 percent geographic coverage). Excluding passive and visitor treatments (totaling 14,446), Uganda reached 96 percent of its treatment goals. In elimination areas, UTG coverage was 95.4 percent and 97.1 percent for the first and second rounds of treatment, respectively. This was the 12th straight year of more than 85 percent coverage of the UTG in Carter Center-assisted areas, and the eleventh successive year of coverage exceeding 90 percent of the UTG.

The overall Carter Center Uganda treatment goal for 2009 is 2,687,205 treatments.

Training and Health Education: Uganda trained or retrained 70,357 Community-Directed Distributors (CDDs) and 5,926 Community-Directed Health Supervisors (CDHSs) in 2008 (Frontispiece Figure B, and Figures 16 and 17). Of these, 45 percent of the CDDs and 38 percent of the Community Supervisors were female. The current ratio of CDDs to population served is the best (lowest) of any Carter Center assisted program at 1 to 26.

The Uganda program continued in 2008 with the final year of a three-year grant from Lavelle Fund to further improve the kinship system. In 2008 all 3,074 affected communities in districts with annual and semi-annual districts implemented the kinship enhanced CDTI. A special focus was to establish kinship-enhanced CDTI in the 230 communities in the elimination foci under SSI assistance which previously were implementing classic CDTI introduced in 1998 with APOC support.

Financial Contribution: Most financial support to The Carter Center assisted areas was provided by The Carter Center (See Figure 18 for APOC, Carter Center, and state, local, and national financial contributions from 2001 to 2008). The Carter Center has increased its funding for Uganda as the result of the new elimination program. While all districts completed their five years of core APOC funding by the end of 2005, some APOC support was provided in 2008 for capital equipment purchases. The NGDO Coordination Group for Onchocerciasis Control (with funds from Merck and Co., Inc.) supported work in the Wadelai elimination focus. The national government's contribution has always been to pay the taxes on capital imports by The Carter Center, in addition to salary support for dedicated staff.

In 2008, some districts, health sub-districts, and sub-counties contributed US$18,238 in cash towards CDTI activities. Although this amount was US$684 more than 2007 contributions, it was insufficient to sustain CDTI activities.

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 real cash from government for CDTI activities has not been regular or up to expected amounts.

The CDTI program actively promoted integration with lymphatic filariasis control in Adjumani and Moyo districts with treatment coverage of UTG over 90 percent. Also, in five other onchocerciasis endemic districts (Kabale, Kanungu, Kisoro, Manafua, and Mbale) The Carter Center assisted CDTI integration with intestinal helminth control (through semiannual albendazole distribution -Figure 19), and in vitamin A supplement (also semiannually) to children six to 59 months of age. (Figure 20)

Monitoring, Evaluation and Research: Annual monitoring of CDTI activities during 2008 was not carried out. Those funds were used instead for implementation of monitoring of elimination foci per the recommendations by Uganda Onchocerciasis Elimination Committee (UOEC). The report of the preliminary results of this monitoring is found in Annex 3.

Uganda laboratory activity: The purpose of the laboratory is to provide state of the art diagnostic support to the Uganda ministry of health and its onchocerciasis elimination program. The lab provides PCR testing for black flies and skin snips, and serological testing (ELISA) for OV16 antibodies. The Carter Center helped establish a laboratory at the Ministry of Health's Vector Control Division (VCD) in Kampala in 2007 by providing equipment, reagents, and training in Dr. Tom Unnasch's lab at the University of Alabama, Birmingham. In 2008, the Dr. Unnasch and Ms. Nancy Cruz-Ortiz (Universidad del Valle de Guatemala) provided additional consultation and technical assistance in Kampala (see Annex 1). There are still challenges regarding timely requests of supplies and reagents, and need to continue ensuring high quality performance in sample analysis (see Annex 1, Nancy Cruz-Ortiz).

2009 RECOMMENDATIONS FOR CARTER CENTER UGANDA

Elimination Efforts for Onchocerciasis

Report on accomplishments relative to the inaugural (2008) Uganda Onchocerciasis Elimination Committee (UOEC) recommendations. Priority should be given to collecting entomological and epidemiological data for the four foci in the light green zone (Itwara, Mpamba-Nkusi, Wadelai, and Imaramagambo) of the Flag to allow a satisfactory impact assessment at the next UOEC meeting in 2009. It is important for that meeting to have complete information available to allow deliberations and potentially recommendations for withdrawal of interventions in some of these foci.

Given the difficulty with laboratory backlog and quality control, assessments need to include standard parasitological techniques of skin snips and black fly dissections. UOEC noted that until its next meeting, it is recommended that ivermectin distribution continue at current levels in Itwara and Mpamba-Nkusi unless there is an unsatisfactory situation recognized in these foci, in which case UOEC recommended immediate switch from annual to semi-annual treatment.

The Carter Center should support the second UOEC meeting to be held in Kampala in August 2009.

TCC together with MOH should inform Atlanta office about the required reagents and other materials for the laboratory, at least three months before supplies are exhausted. Such requests will be reviewed in consultation with Tom Unnasch and Nancy Cruz Ortiz.

Assist in the purchase of ABATE® for vector control/elimination work in foci targeted for onchocerciasis elimination efforts.

Key definitions/measureable criteria are needed for 1) isolated focus and 2) distinguishing features of 'vector control' versus 'vector elimination.' New invasion of areas cleared of *S. naevei* with *S. damnosum* is an important area of research.

Carry out semi-annual treatment with ivermectin in onchocerciasis endemic districts targeted for elimination. Begin tracking, by focus, the number of cumulative rounds with >90 percent UTG coverage.

Create and maintain detailed tables of epidemiological indicators for each focus targeted for elimination, as is done with the OEPA foci.

Work to expand capacity of laboratories with which we work, in order to accommodate the growing number of assessments we are conducting (particularly in relation to elimination programs). Request that the Ministry of Health appoint 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. Maintain collaboration with University del Valle/Guatemala (Nancy Cruz-Ortiz) and University of Southern Florida (Tom Unnasch) for technical assistance.

Monitor government and APOC financial contribution to the elimination efforts.

Other Recommendations

The severe onchocerciasis skin disease recognized in the 2008 surveys completed in Kitgum and Pader Districts requires launching of MDA there now that the security situation has improved.

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

The Uganda program should continue to refine government and Carter Center funding figures in 2009, including any additional funds coming in from APOC. Monitor trends for increased funding, especially as related to how The Carter Center might be asked to fill the 'post APOC funding gap.'

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. CDD training (new and old) 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.

If the government wants to support integration in areas where The Carter Center assists, we will not refuse to participate as these are government owned programs. However, The Carter Center cannot move to assist in areas where we are not already assisting annual Mectizan® distribution or invest in integration efforts with other diseases unless we first obtain formal Carter Center Board of Trustees approval, adequate funding to participate, and possibly Emory IRB approval.

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 the latest, in September of every year. Reports do not need to be complete to submit for the following year.

Integrate semiannual treatment with 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, at least 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, or for distribution in areas where we are not already assisting Mectizan® distribution.

Albendazole treatments donated by GSK for LF have been integrated with onchocerciasis treatments in Moyo and Adjumani districts. Shortages of (non-donated) albendazole for STH (deworming) persist throughout Uganda. The Carter Center is not involved in LF or STH assessment activities in Uganda and is unable to provide financial support for the LF or STH efforts. The Center can assist in albendazole distribution in areas where we are already assisting Mectizan® distribution through CDTI when treatments are provided during the same treatment rounds.

Treatment Objective for 2009: 2,687,205 persons.

Annual = 895,223 persons.

Semiannual (UTG(2)) = 1,791,982 treatments.

Training Objective for 2009: 85,000 CDDs (14,643 new), and 7,606 Community Supervisors (1,680 new).

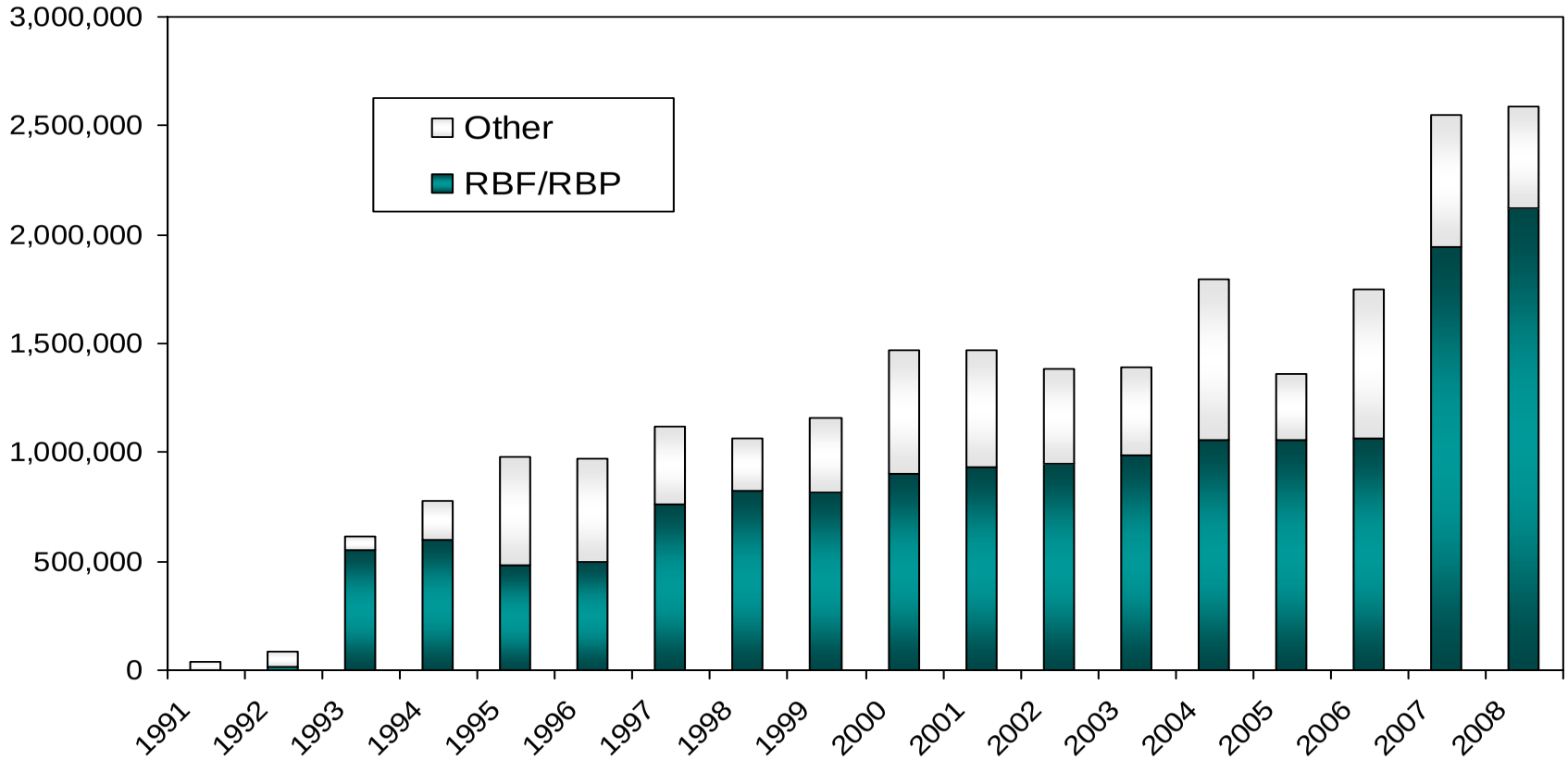
Figure 10

Uganda: Carter Center Assisted Districts

Passive treatment was done in Kitgum and Pader districts

Figure 11

Uganda: Carter Center-Assisted Treatments and Total Mectizan® RB Treatments Provided, 1991-2008*



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

Figure 12

Uganda: Plan for Onchocerciasis Elimination

No.	Focus	Vector	District	# MDA annual rounds	MDA semi an rounds	Total Pop	2008 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	Itwara	*S. neavei*	Kabarole	18	N/A	23,881	23,881		Interupted		Annual	*Status post*	*/2003*
			Kyenjojo	18	N/A	58,382	50,788		Interupted		Annual	*Status post*	*/2003*
3	Mpamba-Nkus	*S. neavei*	Kibale	15	N/A	128,456	124,655		Interupted		Annual	*Status post*	*/2006*
4	Wadelai	*S.neavei*	Nebbi	13	5	15,300	12,838	25,676	Interupted		Semi-Annual	*not done*	*No need*
5	Imaramagamb	*S.neavei(?)***	Bushenyi	16	N/A	84,119	65,408		Interupted		Annual	*not done*	*No need*
6	Kashoya-Kitom	*S.neavei*	Bushenyi	14	3	120,897	99,860	199,720	uncertain		Semi-Annual	*ector Eliminatio*	*2007/*
			Ibanda	14	3	21,218	17857	35,714	uncertain		Semi-Annual	*ector Eliminatio*	*2007/*
			Kamwenge	16	3	28,294	31,582	63,164	uncertain		Semi-Annual	*ector Eliminatio*	*2007/*
7	Mt. Elgon	*S.neavei*	Manafwa	13	3	36,622	30,393	60,786	uncertain		Semi-Annual	*ector Eliminatio*	*2008/*
			Mbale	13	3	42,880	34,991	68,074	uncertain		Semi-Annual	*ector Eliminatio*	*2008/*
			Sironko	13	3	68,212	57,810	115,620	uncertain		Semi-Annual	*ector Eliminatio*	*2008/*
			Bududa	13	3	139,996	115,666	231,372	uncertain		Semi-Annual	*ector Eliminatio*	*2008/*
8	Wambabya-Rw	*S. neavei*	Hoima	14	3	67,285	56,868	113,736	ongoing		Semi-Annual	*ector Eliminatio*	*pending*
9	Budongo	*S.neavei*	Masindi	14	3	41,786	34,752	69,504	ongoing		Semi-Annual	*ector Eliminatio*	*pending*
			Buliisa	14	3	23,468	20,159	40,318	ongoing		Semi-Annual	*ector Eliminatio*	*pending*
			Hoima	14	3	68,211	57,248	114,496	ongoing		Semi-Annual	*ector Eliminatio*	*pending*
10	Kigezi-Bwindi	*S.neavei/ S. da*	Kabale	13	3	26,121	21,294	42,588	ongoing		Semi-Annual	*Vector Control*	*pending*
			Kanungu	13	3	50,798	41,300	82,600	ongoing		Semi-Annual	*Vector Control*	*pending*
			Kisoro	13	3	32,504	26,618	53,236	ongoing		Semi-Annual	*Vector Control*	*pending*
11	Maracha-Tere	*S.neavei/S.dar*	Maracha-Tere	16	N/A	170,377	136,302		ongoing		Annual		
12	Okoro/Nyagak	*S.neavei*	Nebbi	15	N/A	218,891	175,145		ongoing		Annual		
13	Bondo /Arua	*S.neavei/S.dar*	Arua	16	N/A	314,948	307,266		ongoing		Annual		
14	Obongi / Moyo	*S.neavei*	Moyo	15	N/A	17,349	13,778		ongoing		Annual		
15	Lubilila	*S.damnosum*	Kasese	15	N/A	105,253	94,303		ongoing		Annual		
16	Nyamugasani	*S.damnosum*	Kasese	15	N/A	9,221	8,436		ongoing		Annual		
17	Madi	*S.damnosum*	Moyo	15	N/A	172,882	134,188		ongoing		Annual		
			Adjumani	15	N/A	179,791	153,983		ongoing		Annual		
18	West Nile	*S.neavei/ S. da*	Yumbe	16	N/A	286,615	229,292		ongoing		Annual		
			Koboko	16	N/A	167,076	133,661		ongoing		Annual		
			Arua	16	N/A	138,063	134,696		ongoing		Annual		
			Nebbi (Padyer	15	N/A	89,574	71,660		ongoing		Annual		
19	Mid-North	*S.damnosum*	Oyam	15	N/A	16,466	13,467		ongoing		Annual		
			Gulu	15	N/A	99,898	82,678		ongoing		Annual		
			Amuru	15	N/A	102,236	84,163		ongoing		Annual		
			Pader	N/A	N/A	??????	??????		ongoing		Annual		
			Kitgum	N/A	N/A	??????	??????		ongoing		Annual		
	Total					4,320,262	2,696,986	1,316,604					

Onchocerciasis eliminated

Transmission interrupted

Implement elimination policy

Priority for Epi surveys

Low priority: Not much is known

Figure 13

Uganda: Foci where Onchocerciasis Elimination Policy is being Implemented

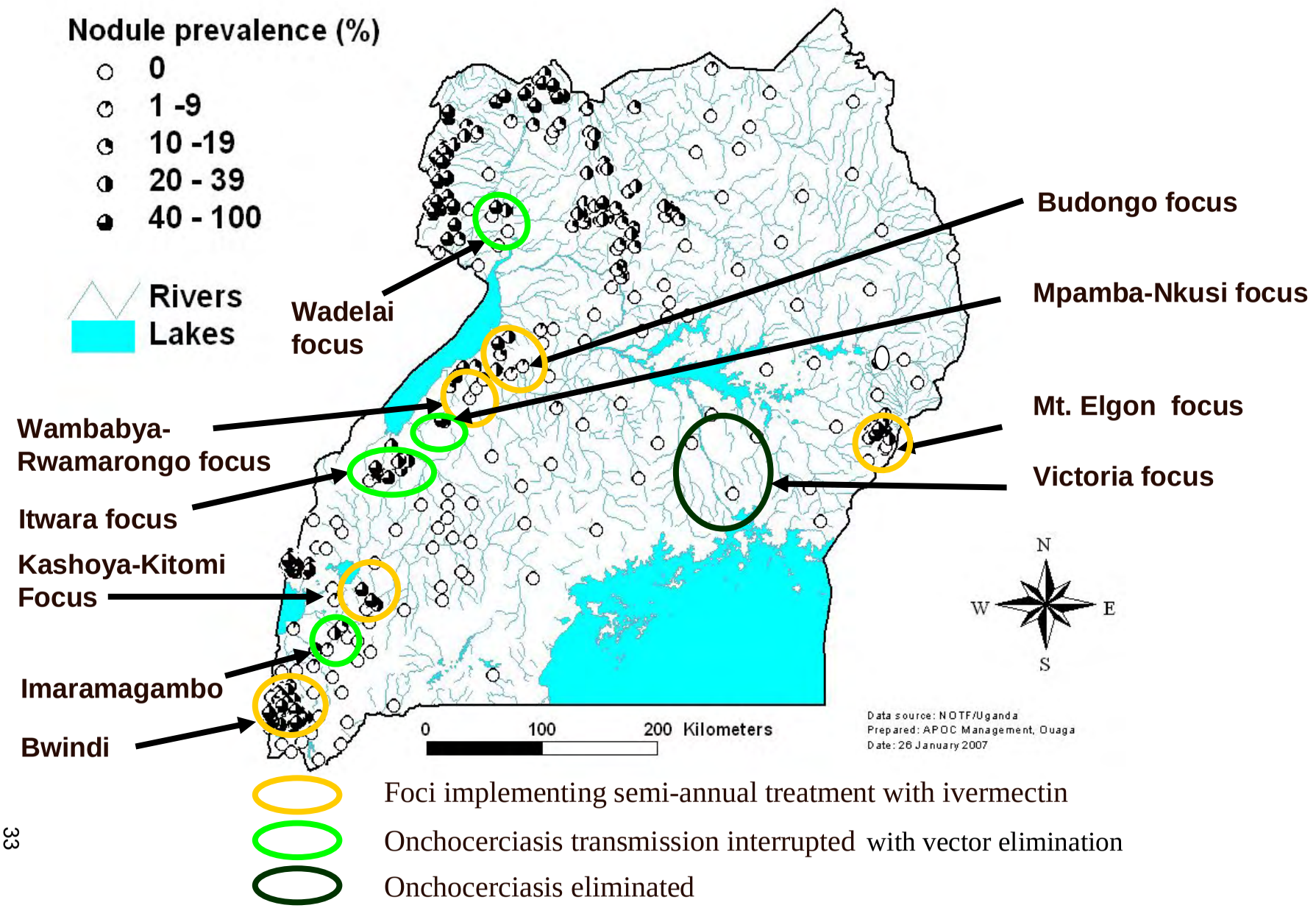


Figure 14

Uganda: Treatment Coverage, 2008: Annual Treatment Areas

Name of district	Total Popn 2008	Ultimate Tx Goal UTG-2008	Popn Treated cumulative 2008	Popn TX % of UTG-2008	Active Villages UTG-2008	% of Active Villages covered 2008
Adjumani	174,165	147,905	144,324	97.6	204	100
Amuru	102,847	91,965	90,224	98.1	98	100
Gulu	110,629	94,105	87,854	93.4	90	100
Kasese	118,359	106,624	101,519	95.2	131	100
Moyo	196,245	152,752	149,896	98.1	189	100
Nebbi	316,177	255,718	246,836	96.5	651	100
Oyam	18,992	15,880	15,034	94.7	35	100
Total	**1,037,414**	**864,949**	**835,687**	**96.6**	**1,398**	**100**

Figure 15

Uganda: Treatment Coverage, 2008: Semiannual Treatment Areas

Focus	Name of District	Ultimate Tx Goal (UTG) 2008	Popn Treated Cumulative (RD1) 2008	Popn Treated Cumulative (RD2) 2009	Popn Tx % of UTG (Rd1) 2008	Popn Tx % of UTG (Rd2) 2009	Active Villages Treated 2008	% of Active Villages Covered 2008
	Bududa	117,243	114,938	116,855	98	99.7	491	100
	Manafwa	30,393	30,014	30,086	98.8	99	98	100
	Mbale	34,991	34,904	34,713	99.8	99.2	124	100
Mt Elgon	Sironko	63,010	56,715	60,233	90	95.6	191	100
Wadelai	Nebbi	12,838	12,315	12,246	95.9	95.4	34	100
	Bushenyi	100,661	96,363	97,926	95.7	97.3	207	100
	Ibanda	19,175	17,577	18,909	91.7	98.6	60	100
Kashoya- Kitomi	Kamwenge	31,582	30,805	30,652	97.5	97.1	53	100
	Kabale	21,294	19,955	20,209	93.7	94.9	38	100
	Kanungu	41,300	40,194	39,669	97.3	96.1	105	100
Bwindi	Kisoro	26,973	24,985	26,963	92.6	100	45	100
Sub Total		**499,460**	**478,765**	**488,461**	**95.9**	**97.8**	**1,446**	100
Wambabya-Rwamarongo	Hoima	56868	53543	54425	94.2	95.7	70	100
	Hoima	57,248	54,520	54,299	95.2	94.8	70	100
	Buliisa	20,159	18,915	19,041	93.8	94.5	30	100
Budongo	Masindi	34,752	32,233	32,738	92.8	94.2	60	100
Sub Total		**169,027**	**159,211**	**160,503**	**94.2**	**95**	**230**	100
Grand Total		**668,487**	**637,976**	**648,964**	**95.4**	**97.1**	**1,676**	100

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

Figure 16

Uganda: Number of CDTI Workers Available at the Community Level (2004-2008)

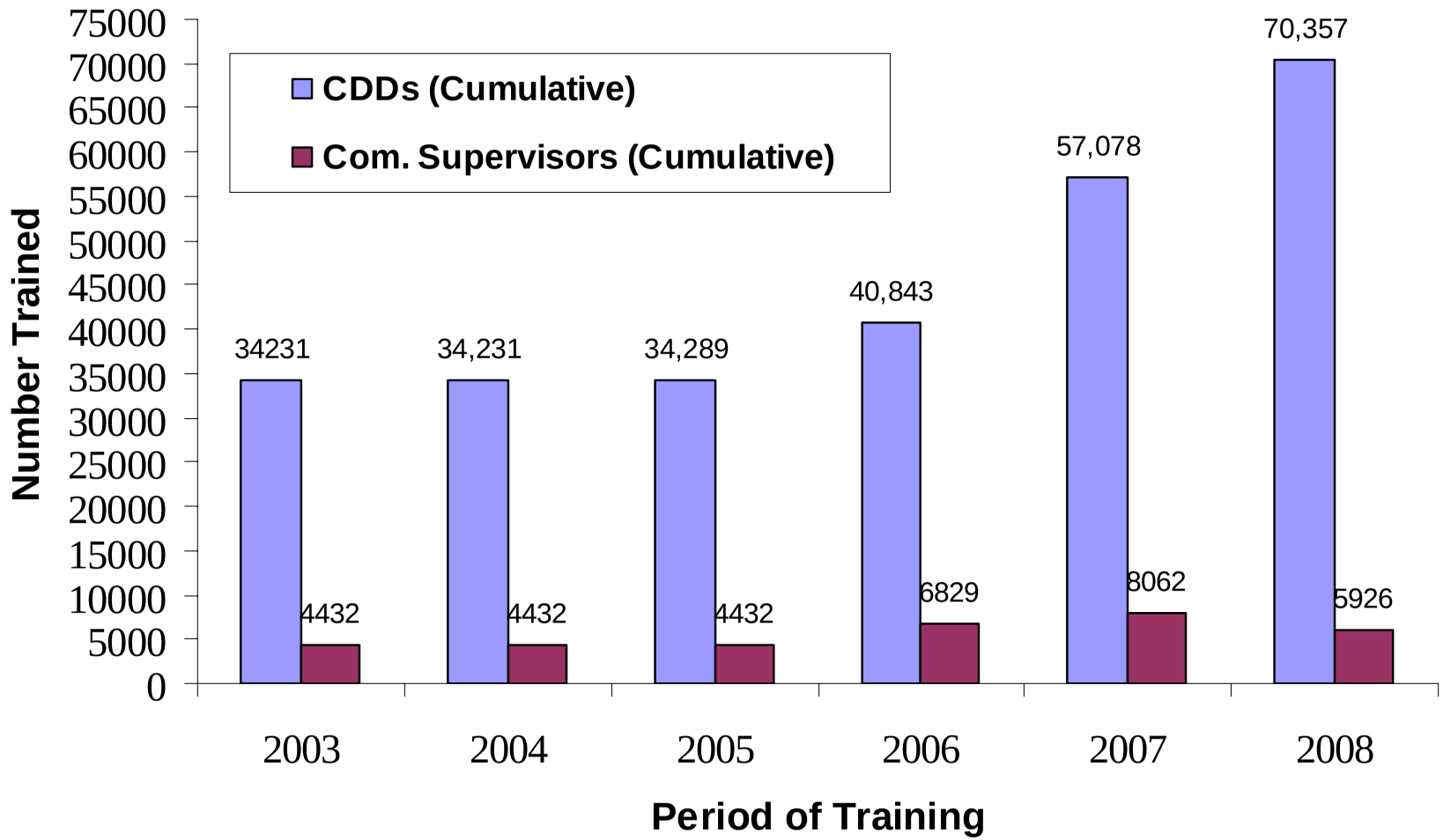


Figure 17

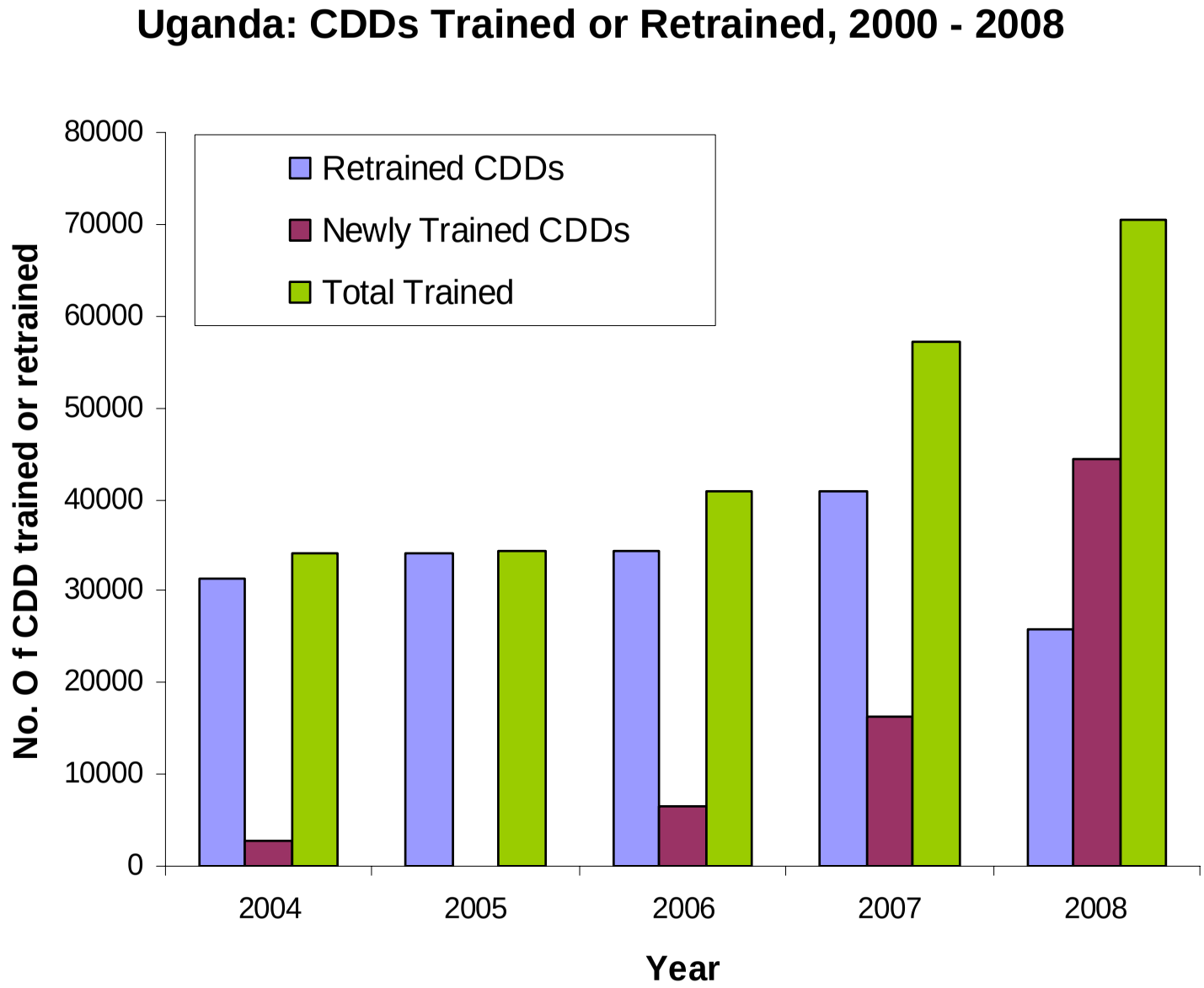
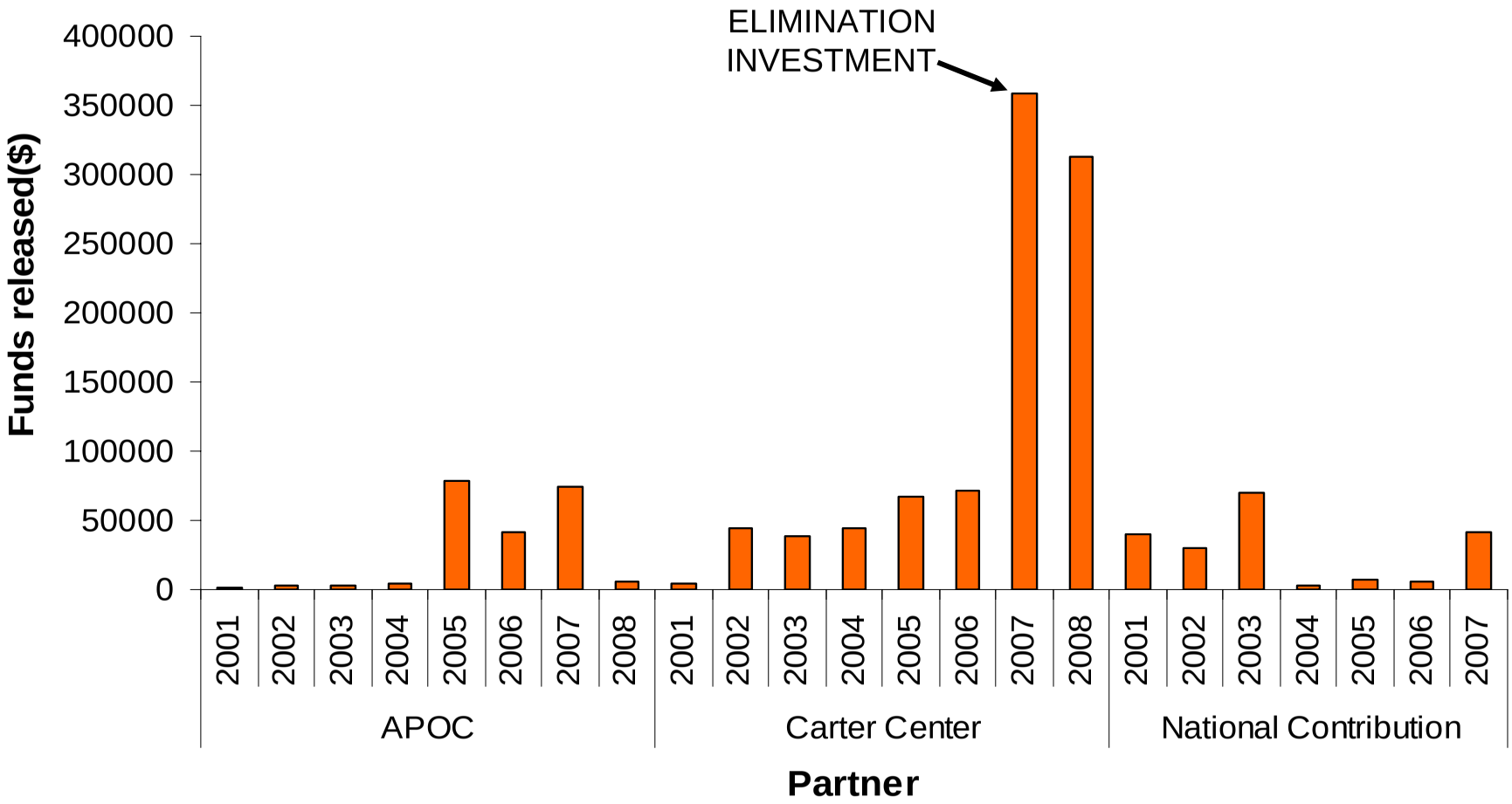

Uganda: CDDs Trained or Retrained, 2000 - 2008
Retrained CDDs
Newly Trained CDDs
Total Trained
No. O f CDD trained or retrained
80000
70000
60000
50000
40000
30000
20000
10000
0
2004
2005
2006
2007
2008
Year

Figure 18

Uganda: Financial Contributions in US dollars (2001 – 2008)



NOTE: The above contribution does not include staff salaries which the government usually includes in their budgets.

Figure 19

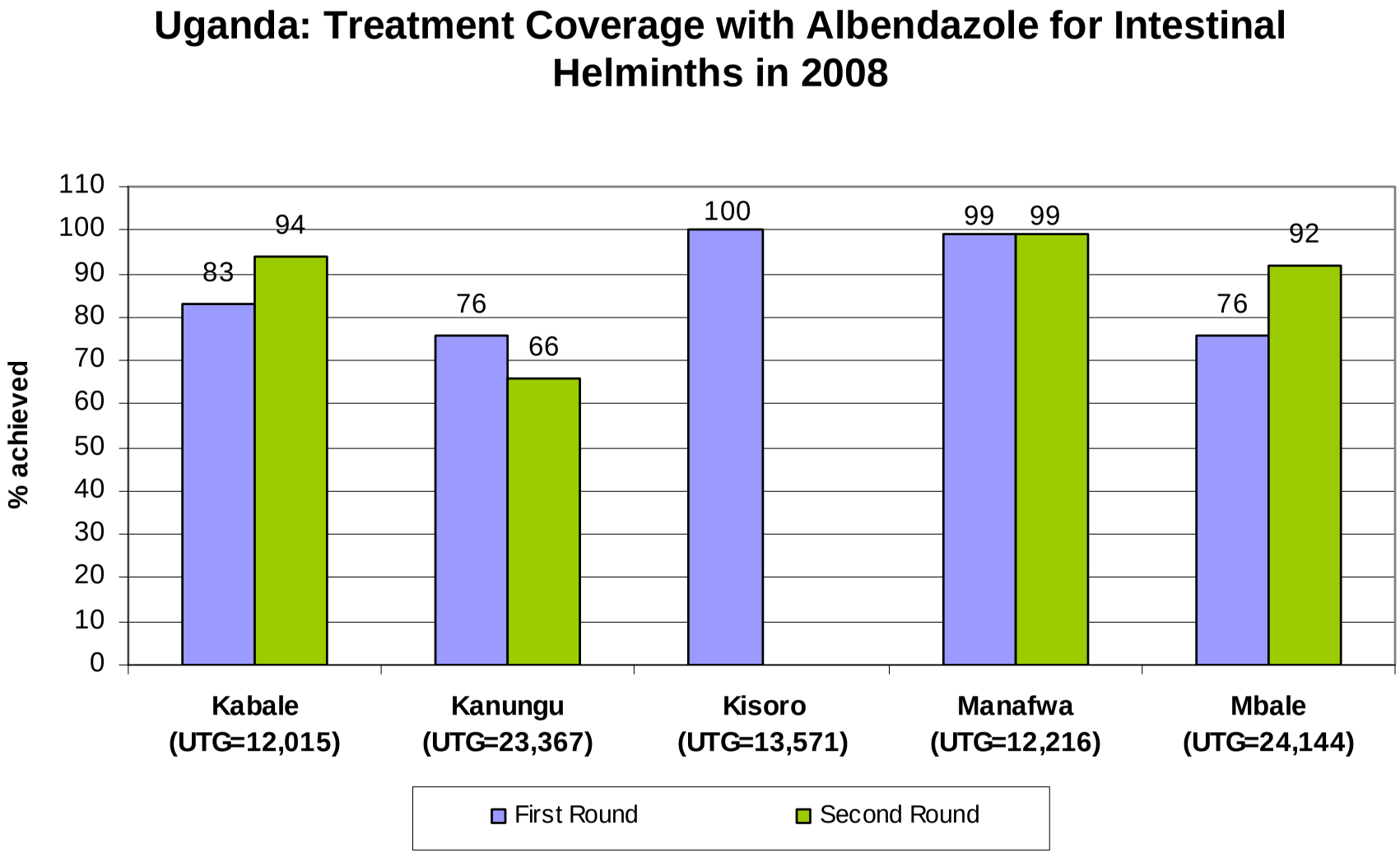
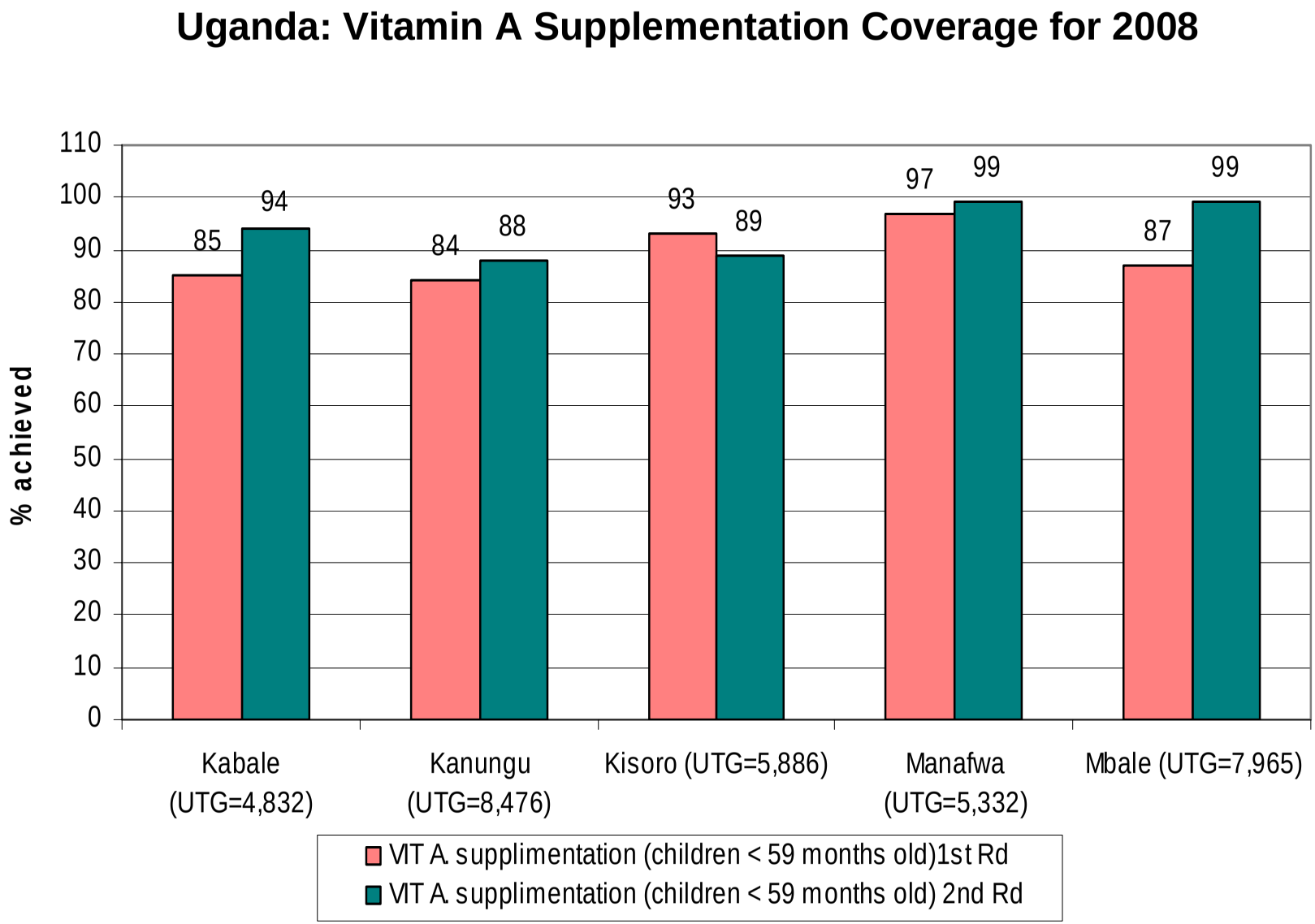

Uganda: Treatment Coverage with Albendazole for Intestinal Helminths in 2008
% achieved
110
100
90
80
70
60
50
40
30
20
10
0
83
94
76
66
100
99
99
76
92
Kabale (UTG=12,015)
Kanungu (UTG=23,367)
Kisoro (UTG=13,571)
Manafwa (UTG=12,216)
Mbale (UTG=24,144)
First Round
Second Round

Figure 20


Uganda: Vitamin A Supplementation Coverage for 2008
% achieved
110
100
90
80
70
60
50
40
30
20
10
0
85
94
84
88
93
89
97
99
87
99
Kabale (UTG=4,832)
Kanungu (UTG=8,476)
Kisoro (UTG=5,886)
Manafwa (UTG=5,332)
Mbale (UTG=7,965)
VIT A. supplimentation (children < 59 months old)1st Rd
VIT A. supplimentation (children < 59 months old) 2nd Rd

NORTH SUDAN

Background: There are several endemic areas for onchocerciasis in the whole of Sudan (in both the north and south sectors). The Comprehensive Peace Agreement (CPA), signed in January 2005, put an end to the decades-old civil war, and also created the semi-autonomous Government of South Sudan (GOSS). The Lions-Carter Center currently supports river blindness activities only in the northern part of Sudan. The African Program for Onchocerciasis Control (APOC) and Christoffel Blinden mission (CBM) support GOSS areas river blindness activities. The Carter Center ceased its activities in GOSS areas of the country shortly after the CPA was signed, and APOC no longer supports onchocerciasis control in the northern part of Sudan.

In 2006, the Government of Sudan (GOS) launched a new onchocerciasis elimination policy directed toward the isolated desert focus of Abu Hamad in River Nile State (Figure 21). In Abu Hamad, the strategy changed to providing Mectizan® tablets twice per year (every six months) rather than annually, and treating more broadly in hopes of stopping transmission of the disease as well as halting blindness and skin disease. An expanded Lions-Carter Center assistance to the new elimination effort was likewise approved in 2006. One of the big challenges to the elimination effort in Abu Hamda is the new Merowe dam, which is resulting in flooding of some of the endemic areas in Abu Hamad and displacement of infected populations. CDTI activities are particularly affected in Shiri, an administrative unit of Abu Hamad focus where the entire population went into a phase of re-establishing homes at a higher elevation. Through diligent interaction with the affected population, the impact of the dam on treatment coverage by the end of 2008 was less than expected.

Another potential elimination focus, Galabat (of Gedarif state, formerly called the Sundus focus) was evaluated but shown to likely extend across the Sudan-Ethiopia border. Elimination activities have therefore been deferred there, and in 2007, annual treatment for onchocerciasis control was launched. The Carter Center also assists in annual ivermectin delivery in Radom in South Darfur.

Treatments: A total of 163,738 treatments were delivered, for 96.4 percent coverage of the UTG (2) of 169,890 in the Abu Hamad focus. In the first round, 85,713 persons (or 101 percent of the UTG) were treated, and 78,025 persons (92 percent) were treated in round two. An annual dose of Mectizan® was delivered in Radom in South Darfur with 16,563 treatments, and in Galabat (formerly Sundus) in Gedarif State, with 62,074 treatments. Thus, 242,375 total treatments were delivered in the northern Sudan program in 2008.

See Figure 22 for Carter Center-supported treatments from 1997 to 2008 in the northern sector of Sudan, and see Figure 23 for a summary of treatments in Sudan in 2008. The dramatic decrease of treatments in 2005 was as a result of infected or at-risk persons in displaced camps situated in Khartoum leaving for Southern Sudan, their original home.

Training and Health Education: The program trained 2,002 Community-Directed Distributors (CDDs) and retrained 1,447 during 2007 in Abu Hamad, Galabat and Radom focus (Frontispiece Figure B). In the northern sector of Sudan, the number of persons per CDD in Abu Hamad, Galabat and Radom were 122, 82, and 158, respectively (overall average for northern Sudan is 1:101). About 18 percent of the CDDs were female, which is unchanged from 2007. Health education covered all 294 communities in the Abu Hamad, Galabat, and Radom foci.

Mectizan®: During 2008, 742,500 tablets were distributed in the Abu Hamad, Galabat, and Radom foci with an average of 3.1 tablets per person. No severe adverse effects were reported. In 2007, Sudan received sufficient Mectizan® to treat Galabat (Sundus) focus twice per year before it was determined that only annual treatment was needed. Therefore, the program had carried a balance of 1,082,000 tablets forward for 2008 treatments and no order from the Mectizan® Donation Program (MDP) was required.

Sustainability and Integration: The northern sector of Sudan has had issues with high demand for monetary incentives as a condition for distributing Mectizan®, which threatens the sustainability of CDTI activities. 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 ivermectin. It is hoped that this policy will lead to both high UTG treatment coverage and reduced demand for monetary incentives in 2009.

The Sudan River Blindness Program Review: The first Sudan River Blindness Program Review was held on July 7, 2008 in Khartoum in a beautiful facility called the Oil House, which overlooks the Nile River. Thirty-nine participants attended, representing all known endemic states and involved partners in the program, including several Khartoum laboratories and international universities including Michigan State University and the University of South Florida. The Honorable Federal Minister of Health, Dr. Tabita Shukai, opened the meeting by conveying her appreciation of the reliable support provided by The Carter Center and the Lions Clubs to the FMOH. A special guest was Dr. Sarah Carter (granddaughter of President and Mrs. Carter).

The meeting, which was supported by Lions Clubs International Foundation/SightFirst (LCIF), was chaired by Dr. Kamal Hashim, the Federal Ministry of Health's (FMOH) Director of Prevention of Blindness (See Frontispiece Figure E). Topics discussed at the Program Review included: Mectizan® treatments and treatment coverage, health education and community involvement in the distribution process through the family/kinship system, and training and equipping personnel. Much discussion focused on the onchocerciasis elimination effort in Abu Hamed. It was noted during the Review meeting that the Abu Hamad focus has made significant progress in reducing microfilaria prevalence compared to published baseline data from 1984, indicating progress toward the goal of elimination of onchocerciasis in that focus.

A number of challenges were noted, such as increasing field activities to support twice-per-year treatments and establishing laboratory training for PCR and ELISA testing for

the backlog of black fly and serum specimens. Such sensitive testing is needed to assess progress toward elimination. The construction of the Merowe Dam poses a unique threat to Abu Hamad program activities. As this dam is completed, flooding and displacement of some endemic communities will complicate program field work. These communities will be followed to their final settlement areas so that treatments can continue to be administered. The Program Review produced key recommendations that will help the program in Northern Sudan towards successful onchocerciasis control and (where feasible) elimination programs.

2009 RECOMMENDATIONS FOR THE CARTER CENTER SUDAN

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

- Continue to implement twice per year treatment in Abu Hamad focus.

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

- Track the population displaced by the Merowe Dam and treat eligible individuals. Since displacement is into a new state (Northern State), the program should engage Northern State health authorities to participate in Mectizan distribution.

- Create and maintain detailed tables of epidemiological indicators for Abu Hamad, as is done with the OEPA foci. Given the backlog in the lab, skin snip surveys should be conducted together with serology and entomology.

- Define precise limits of the Abu Hamad focus using serology and skin snips. Create tables and maps of epidemiological indicators for Abu Hamad to help define the southern (western) limit of the focus.

- Determine the potential disruption that the discovery of gold in Abu Hamad may cause the program.

- Seek to publish a paper on the Abu Hamad story in 2009.

- The Government of Sudan has promoted the use of the Khartoum lab for testing Sudanese specimens for OV-16 serology and Polymerase Chain Reaction (PCR) black fly analysis. Work with consultants to develop and expand the capacity of the MOH laboratory in Khartoum in order to accommodate the growing number of serum and black fly specimens that have been collected in the Abu Hamad focus elimination program. Request the Ministry of Health to provide full time and qualified lab workers who can be dedicated to this program and reduce the backlog of specimens. The key collaboration for lab support and technical assistance in 2009 will be from Dr. Tariq Kagazi, with some support from the University del Valle/Guatemala (Nancy Cruz Ortiz), and University of Southern Florida (Tom Unnasch) for technical assistance.

- Work to implement the other recommendations from Khartoum's July 2008 Program Review, without losing focus on Abu Hamad.

The Sudan program should continue to refine government and Carter Center funding figures in 2009, including any additional funds coming in from APOC. Monitor trends for increased funding, especially as related to how The Carter Center might be asked to fill the 'post APOC funding gap.'

Other recommendations include:

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

If the government wants to support integration in areas where The Carter Center assists, we will not refuse to participate since these are indeed government owned programs. However, The Carter Center cannot move to assist in areas where we are not already assisting annual Mectizan® distribution or invest in integration efforts with other diseases unless we first obtain formal Carter Center Board of Trustees approval, adequate funding to participate, and possibly Emory IRB approval. In addition:

- Ensure that the national secretariat for onchocerciasis elimination submits accurate Mectizan applications, at the latest, in September of every year. Reports do not need to be complete to submit for the following 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 (obtain a copy of the certificate of registration).

Treatment Objective for 2009: 261,635 persons.

Annual = 91,745 persons.

Semiannual (UTG(2))= 169,890 treatments.

Training Objective for 2009: 2,758 CDDs (756 new), and 275 Community supervisors (77 new).

Figure 21

Sudan Khartoum office: Program Areas

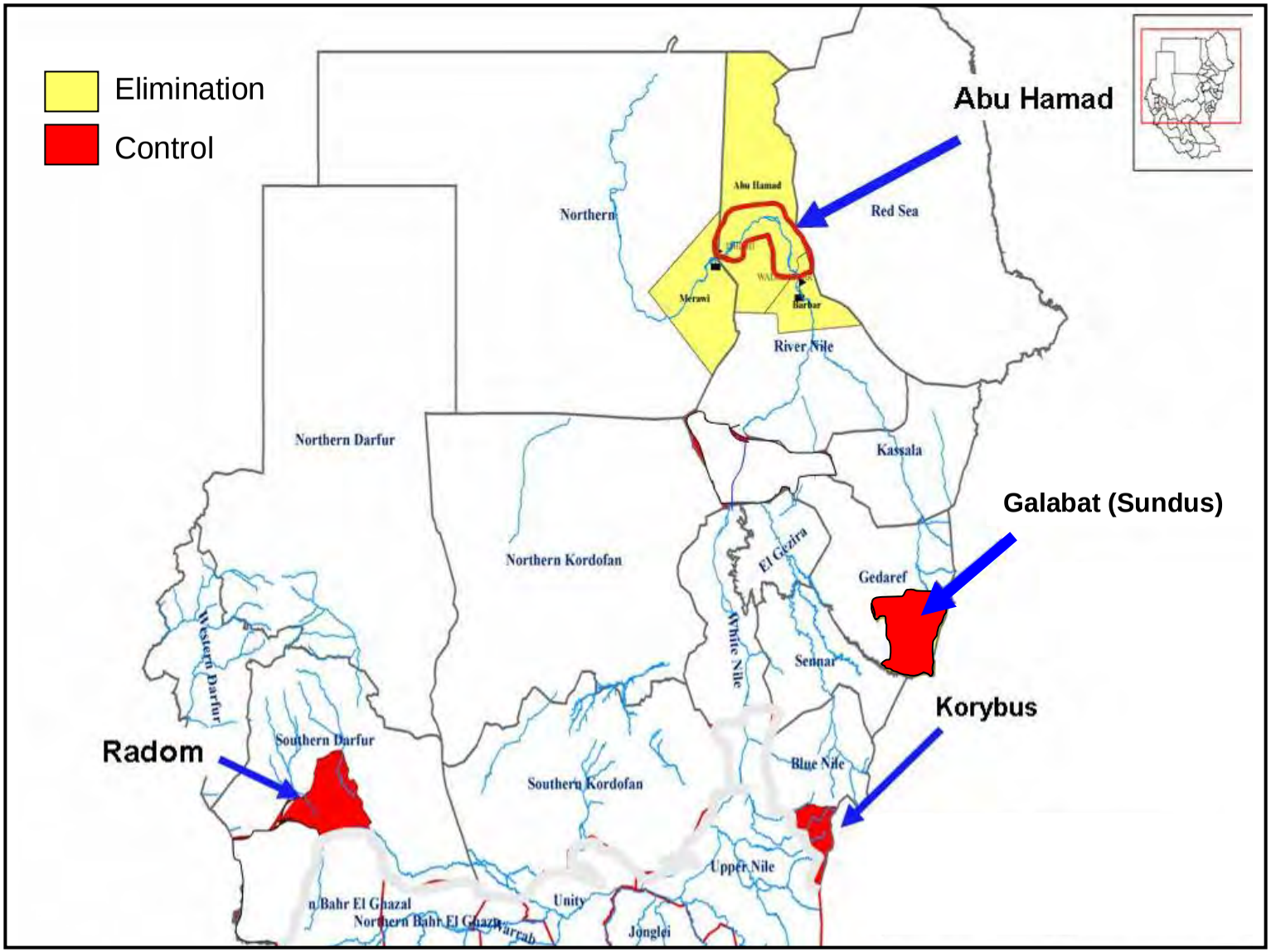
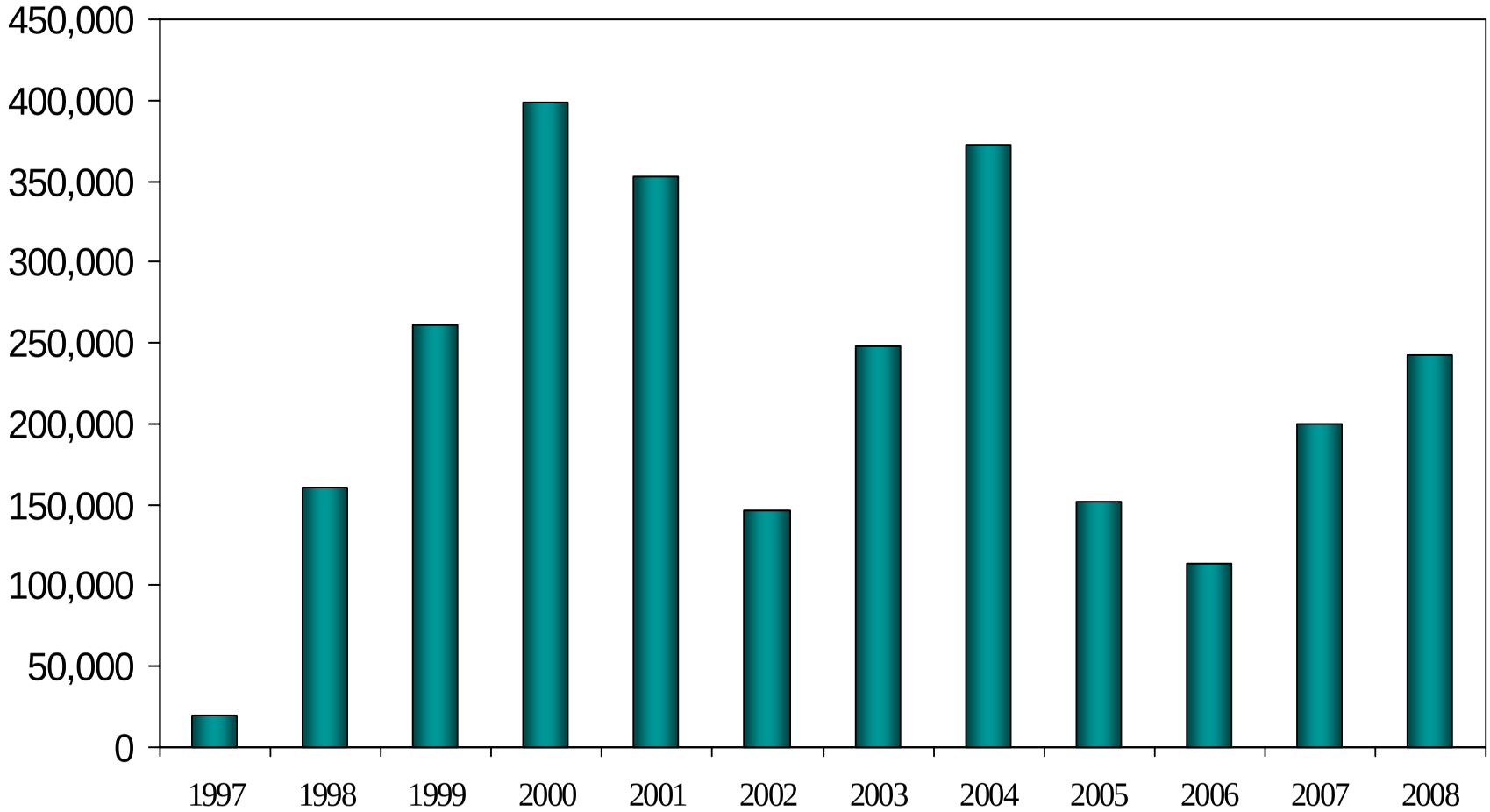


Figure 22

Sudan Khartoum Office: Lions-Carter Center-Assisted Mectizan® Treatments, 1997-2008*



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

Figure 23

Sudan: Lions-Carter Center-Assisted Areas: 2008 River Blindness Treatments

48

Annual Treatment (Control Projects)

State	# Adm. unit	Total Popn for 2008	Popn treated cumulative for 2008	Ultimate TX Goal (UTG)/ ATO for 2008	% UTG treated in 2008	% of total popn treated in 2008	Active village UTG/ ATO for 2008	Active villages cumulative for 2008	Active village % for UTG/ ATO for 2008
South Darfour	1	23,203	16,563	19,723	84%	72%	17	17	100%
Gadaref	2	84,731	62,174	72,022	86%	73%	130	130	100%
Total	**3**	**107,934**	**78,737**	**91,745**	**89%**	**72%**	**147**	**147**	**100%**

Semi-annual Treatment (Elimination Project)

State	Focus	Pop at Risk	UTG	Treated in Round 1	Treated in Round 2	UTG Coverage Round 1	UTG Cov Round 2	Total Treated	UTG(2)	Coverage UTG(2)
River Nile	Abu hamed	99,935	84,945	85,713	78,025	101%	91%	163,738	169,890	96%

CAMEROON

Background: The Lions-Carter Center partnership assists the Ministry of Health (MOH) of Cameroon to battle onchocerciasis in North and West Provinces (Figure 24). In 2008, the Carter Center's Ultimate Treatment Goal (UTG) in Cameroon accounted for 37 percent of the national UTG, similar to the 38 percent accounted for in 2007. North Province has historically had a high rate of blinding onchocerciasis, although there has been no recent ocular morbidity assessment. The Lions-Carter Center SightFirst Initiative project is supervised by Lions District 403B. The original SightFirst Cameroon project ended in early 2001, when an extension was granted to supplement new African Program for Onchocerciasis Control (APOC) projects in LCIF-assisted zones. Support from the African Program for Onchocerciasis Control (APOC) was phased out in North Province in 2003, and in West Province in 2008. The LCIF support is slated to end in 2010, but local Lions District 403B remain strong advocates for onchocerciasis control (Figure 25).

Treatments: Carter Center-assisted areas in Cameroon received 1,639,710 treatments in 2008 (Figure 26 and 27), or 91.6 percent of the ultimate treatment goal (UTG) of 1,790,425. This included 1,255,251 treatments in West Province and 384,459 treatments in North Province. The North Province achieved UTG coverage of 87.7 percent, while the West Province achieved 92.8 percent UTG coverage.

No severe adverse events (SAEs) were reported as a result of Mectizan® treatments in Cameroon in 2008. Monitoring potential adverse reactions is given high priority in West Province because of the presence of *Loa loa* in that part of the country. *Loa loa* is a parasite similar to *O. volvulus*, but it can cause SAEs when Mectizan® is administered. There have been no cases of serious adverse events potentially related to *Loa loa* for the past six years. Mass treatment in West Province is in its thirteenth year.

Mectizan®: The Carter Center/Lions assisted program received a total of 4,348,000 Mectizan® tablets from the Mectizan® Donation Program (MDP) for 2008 treatments. The program assisted in distributing 5,286,410 tablets with 28,523 (0.5 percent) tablets lost or expired during the period of distribution in both provinces. The balance of 911,697 tablets was returned through the health system to the Drug Procurement and Delivery Agency (DPDA). The program reported an average of 2.7 tablets per treatment.

Training and Health Education: In 2008, the Program trained a total of 35,242 community-directed distributors (CDDs) in West and North Provinces (108 percent of the training 2008 objective); of these 28,786 were newly trained (82 percent). This compares to 16,286 trained in 2007, a 77 percent increase (Frontispiece Figure B, and Figure 28). This success was attained as a result of setting minimum goals for selection and training of CDDs depending on number of communities and population for each health area in affected health districts. This was followed by close supervision of health

workers at all levels in affected health districts by the provincial and The Carter Center teams in order to ensure that set goals were attained or even exceeded with maximum community involvement. The Carter Center/Lions assisted programs in Cameroon have been consistent in progress from a ratio of 1 CDD:575 persons in 2001 to 1:60 in 2008. Roughly 42 percent of the CDDs trained in West Province and 10 percent in North Province were female. Overall, 33 percent of the CDDs trained were female.

Financial Contribution: The Lions-Carter Center SightFirst Initiative provided important support to the program in 2008. Major APOC funding stopped for North Province (in 2003) and West Province (in 2006). There was welcome evidence of increase in government investment in the community-directed treatment with ivermectin (CDTI) program in both the West Province (from US $30,376 in 2007 to $150,270 in 2008) and North Province (from $22,073 to $28,741). See Figure 29 for APOC, Carter Center, and national (including state and local) financial contributions from 2001 to 2008.

Sustainability and Integration: In 2004, the Cameroon program began to implement the kinship strategy in Carter Center-assisted areas to reduce the expectation that CDDs would demand payment. About 80 percent of communities are now using the kinship strategy. The number of trained CDDs increased dramatically from 5,037 in 2004 to 35,242 in 2008, a 600 percent increase! Also, trained community supervisors (trainers of trainees) increased from 2,277 in 2005 to 8,049 in 2008 (a 253 percent increase). Close supervision, and ensuring selection of more female CDDs, especially in North Province, is critical during 2009.

Figure 30 shows a comparison of annual performance on community sustainability factors in Carter Center-assisted areas in Cameroon. During 2008, improvement in desired outcomes is noted as CDD numbers increase in several areas, especially health education, and selection of distribution time and method. Fortunately, demand for monetary incentives by CDDs as a condition for treatment remained insignificant, and the perceived need for treatment with Mectizan® remained very high, at 99 percent. This is taken as evidence that kinship-enhanced CDTI improves program effectiveness, although the costs and supervisory demands of having so many CDDs needs further evaluation.

Integration

Integration of Lymphatic Filariasis and onchocerciasis control in North Province: Although The Carter Center is not currently assisting the LF program in North Province, LF control was integrated by the Ministry of Health into CDTI (for onchocerciasis control). The LF program involves the entirety of North Province, including the six health districts where onchocerciasis is meso- and hyperendemic (and thus qualified for CDTI); and so considerable additional investment is needed in the LF program there. The Carter Center at this time does not have Board of Trustees approval or adequate funding to participate in LF MDA activities in the four onchocerciasis hypoendemic health districts which are outside CDTI areas but targeted by the LF program.

Integration of Mectizan® Distribution with Vitamin A Distribution: CDDs and community supervisors are involved with other community health activities, such as 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. Vitamin A Supplementation (VAS) was provided through National Immunization Days (NIDs) for children between 12-59 months and through the Expanded Program for Immunization (EPI) for children between 6-12 months. Because NIDs are coming to an end (the successful elimination of polio has resulted in decreased NID funding), new mechanisms for VAS need to be identified. It is widely believed that VAS can help strengthen the sustainability of CDTI programs in the post APOC funding era, if an adequate supply of Vitamin A capsules can be obtained in a timely manner for distribution with ivermectin.

All 26 CDTI health districts in West and North Province began integrating VAS with Mectizan® distribution in 2007. However, adequate and timely supply of capsules have remained an issue in 2008. In addition, since VAS is recommended twice per year (every six months), a second round of VAS (independent of the CDTI round) is needed. The Carter Center is unable to financially support this second round. In 2008, the second VAS round was supported by the MOH, using community structures in place thanks to CDTI activities. While high VAS treatment (70-90%) was maintained in both rounds in West Province, North Province only reached 49 percent VAS coverage in the second round of 2008 (Figure 31), due to inadequate supply of Vitamin A.

2009 RECOMMENDATIONS FOR THE CARTER CENTER CAMEROON

2009 was the best year on record for government counterpart funding for Carter Center assisted areas in Cameroon.

Continue *Simulium* entomological data collection in Ngong health district in North Province since collections in 2008 were insufficient. Conduct both dissections and preservation (per protocol) of collections to allow PCR analysis.

Our office 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 Provinces.

If the government wants to support integration in areas where The Carter Center assists, we will not refuse to participate since these are indeed government owned programs. However, The Carter Center cannot move to assist in areas where we are not already assisting annual Mectizan® distribution, or invest in integration efforts with other diseases unless we first obtain formal Carter Center Board of Trustees approval, adequate funding to participate, and possibly Emory IRB approval. Currently, albendazole treatments for LF have been integrated with ivermectin treatments in LF endemic CDTI areas in North Province where The Carter Center assists. However, The Carter Center does not have the financial resources at hand to support LF expansion to non-CDTI areas (which would expand treatments by a factor of three); this would require considerable investment in infrastructure and capital equipment. The Carter Center is also not able to provide the costly technical assistance needed to assess the impact of LF treatments in sentinel areas. If other institutions have those resources to develop programs for other diseases such as LF and wish to assist the government in North and West Provinces, The Center would welcome such activities if they were done in a collaborative and coordinated way.

The Cameroon program should continue to refine government and Carter Center funding figures in 2009, including any additional funds coming in from APOC. Monitor trends for increased funding, especially as related to how The Carter Center might be asked to fill the 'post-APOC funding gap.'

Conduct The 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. Conduct new research to measure costs and supervisory demands of conversion to the kinship strategy where this transition is occurring. It is of great interest how the APOC 'community self-monitoring' grant to North Cameroon will help in these analyses.

The Carter Center also cannot provide financial support for a second round of VAS, or for distribution in areas where we are not already assisting Mectizan® distribution. If two rounds of VAS are planned, spacing of the second (non-CDTI) VAS dose should be as close to six months later as possible. That is, where the ivermectin implementation plan is for the first semester, the extra VAS round should be provided in the second semester, and vice versa.

Ensure that the national secretariat for onchocerciasis elimination submits accurate Mectizan® applications by October 15 of every year. Reports do not need to be complete to submit for the following 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 2009: 1,801,438 persons

Training Objective for 2009: 52,863 CDDs (17,621 new), and 12,074 Community Supervisors (4,024 new)

Figure 24

Cameroon
Lions-Carter Center - Assisted Provinces

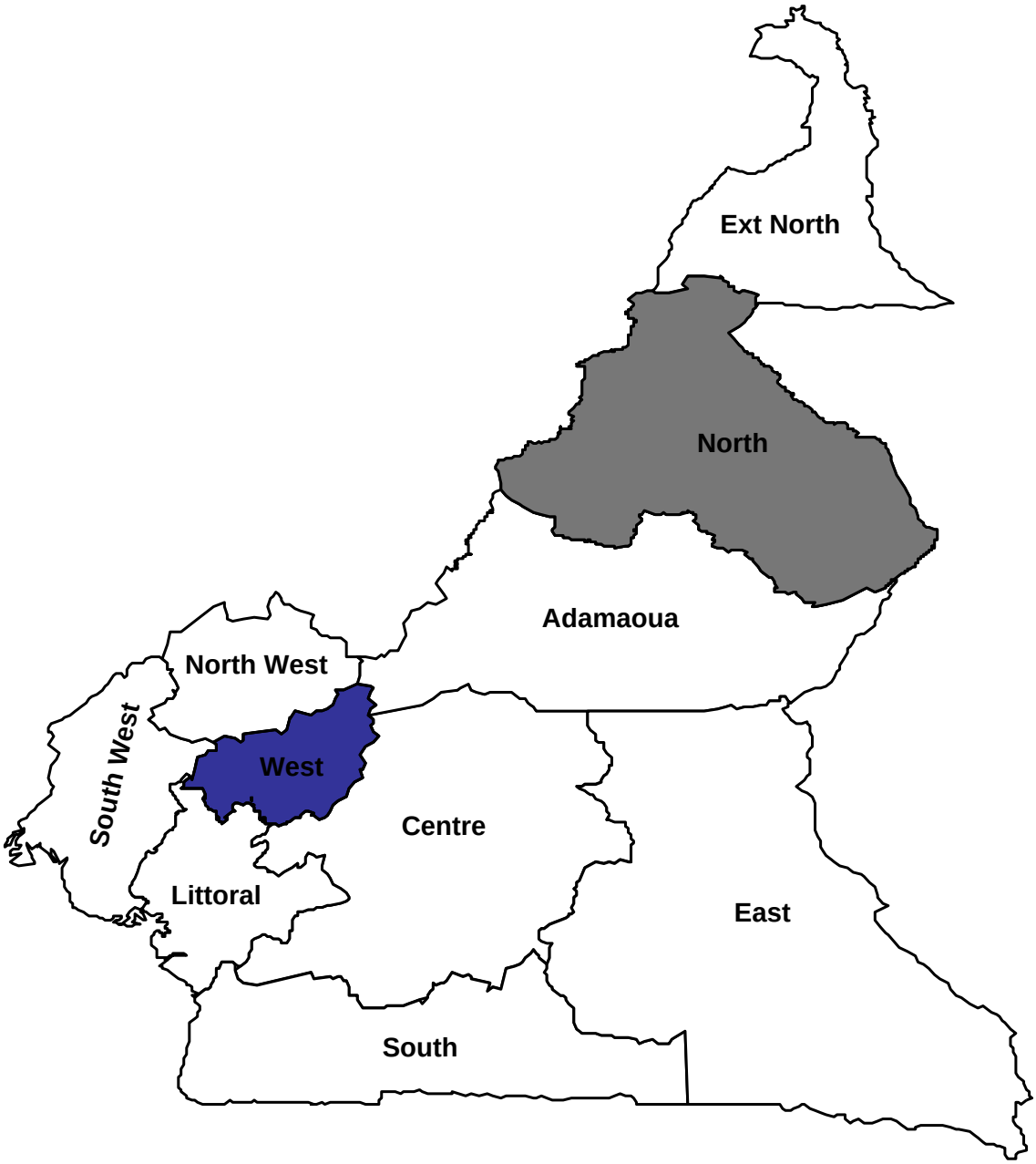


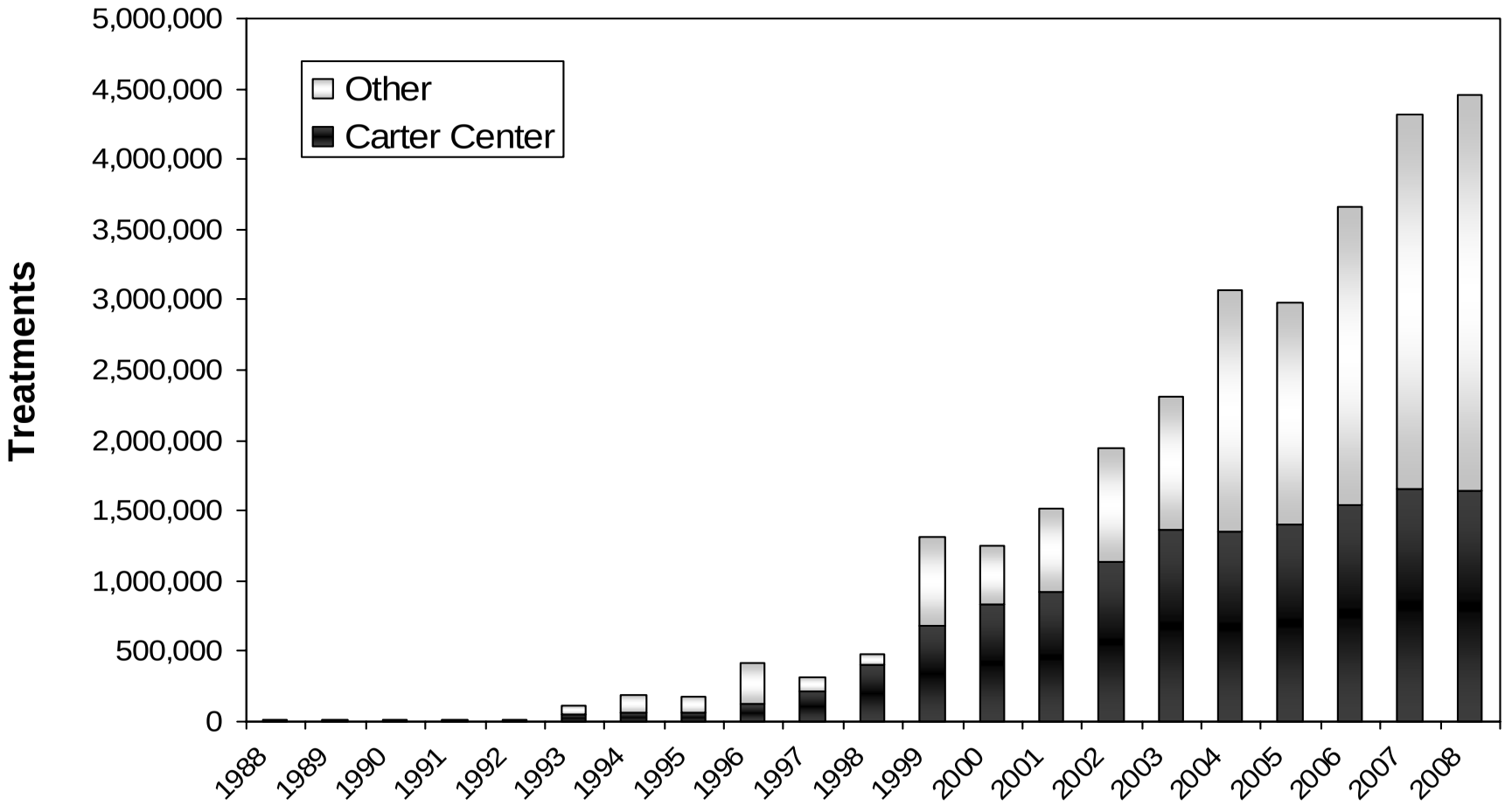
Figure 25

Cameroon: Local Lions Involvement

Dr. Albert Eyamba, Carter Center Cameroon Country Director, reviews advocacy materials at a meeting with Ministry of Health officials and Lion Club members in Fosset health area of Foumbot Health District in West Province

Figure 26

Cameroon: Lions-Carter Center-Assisted Mectizan® Treatments as Part of Total Treatments Provided, 1988-2008*



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

Figure 27

Cameroon: Lions-Carter Center-Assisted Areas: 2008 Mass and Passive River Blindness Treatments

Provinces	Total population	UTG for 2008	Population treated cumulative for 2008	%Total pop. Treated	% UTG Treated	Active Comm. Treated in 2008	Active Comm. UTG for 2008	% Comm UTG Treated
West	1,603,045	1,352,131	1,255,251	78.3	92.8	2,439	2,477	98.5
North	515,640	438,294	384,459	74.6	87.7	1,105	1,157	95.5
Total	2,118,685	1,790,425	1,639,710	77.4	91.6	3,544	3,634	97.5

Comm=Communities

Figure 28

Cameroon: Training 2005-2008 for CDDs and Community Supervisors

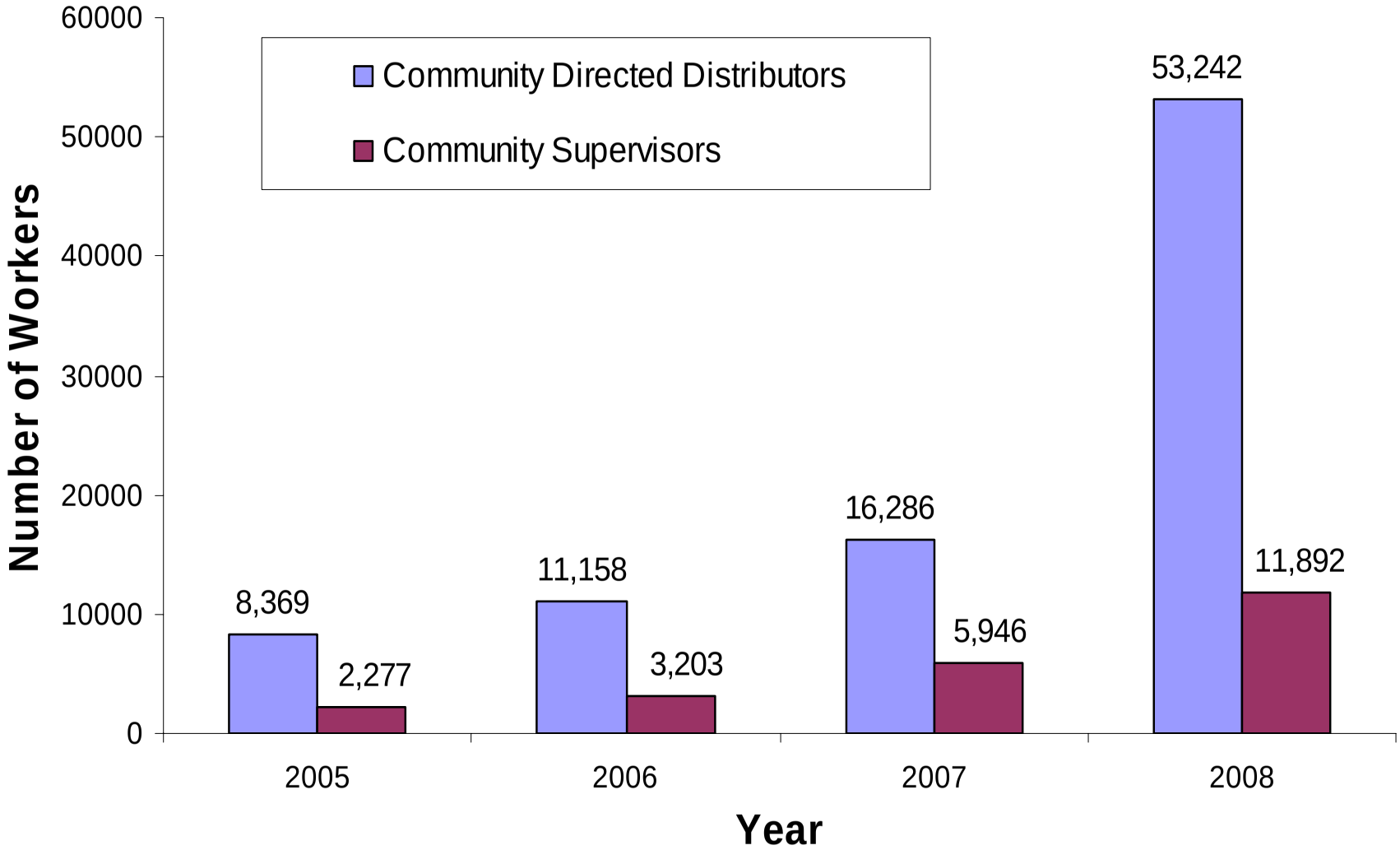
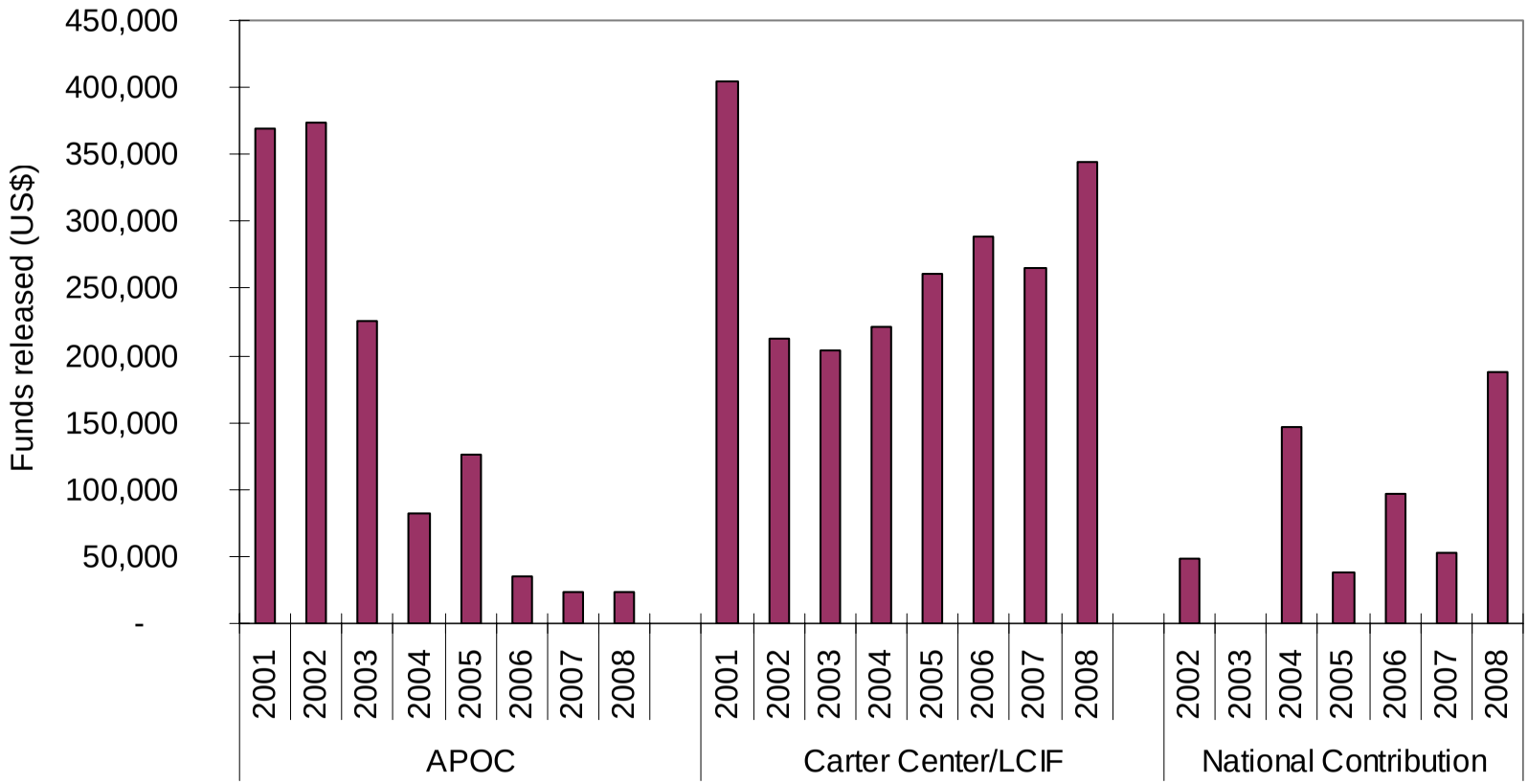


Figure 29

Cameroon: Financial Contributions (in USD), 2001 – 2008



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

Figure 30

Cameroon: Comparison of Annual Performance on Community Policy Factors in Lions-Carter Center-Assisted Areas (2004-2008)

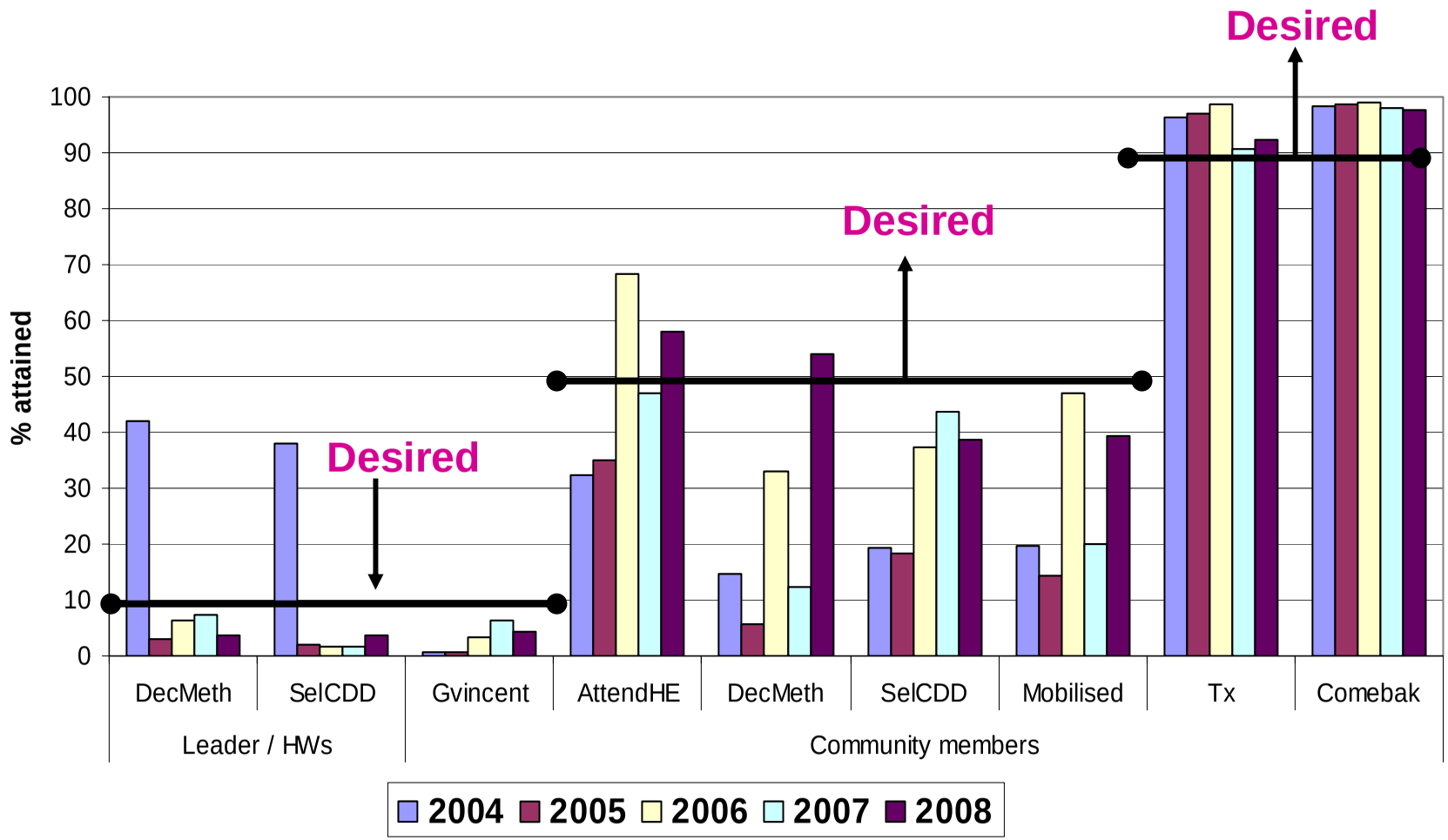


Figure 31

Cameroon: Vitamin A Supplementation 2008 (North and West)

Province	Round	Children UTG	Children Treated	% UTG treated	UTG for Comm	Comm treated	% Comm treated
West	1st	256,487	177,677	69.3	2,477	2,474	100
	2nd	256,487	221,426	86.3	2,477	2,474	100
North	1st	82,502	80,825	98.0	1,157	1,157	100
	2nd	82,502	40,098	48.6	1,157	1,157	100

Comm = Communities

NIGERIA

Nigeria is the most endemic country in the world for river blindness (RB), having as much as 40 percent of the global disease burden. It is estimated that up to 27 million Nigerians living in 32 endemic states need curative or preventative treatment with Mectizan® for RB (the UTG is estimated by the Nigerian Federal Ministry of Health [FMOH] to be between 22-27 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 approximately 15 million treatments throughout Nigeria in 2008 (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 nine RB endemic states: Abia, Anambra, Delta, Ebonyi, Edo, Enugu, Imo, Nasarawa, and Plateau (see Figure 32). These projects no longer enjoy LCIF or substantial APOC support. Local Lions (District 404) had been active participants in the Carter Center-assisted RB control activities in Nigeria since 1996. They remain involved in advocacy efforts.

Treatments: In 2008, The Carter Center-assisted program in Nigeria provided health education and Mectizan® treatments to 5,760,068 persons (Figure 33); 5,210,265 of those were mass treatments. Overall, there was a five percent increase in the number of treatments delivered over 2007. Mectizan® was delivered to 7,874 villages. The treatments assisted by The Carter Center represented approximately 39 percent of the total estimated to have been reported so far by the FMOH in 2008 (15 million provisionally reported--Figure 34).

The Carter Center Nigeria Program received approximately 13 million Mectizan® tablets for 2008, and the average number of Mectizan® tablets per person treated was three. There were 113,214 Mectizan® tablets remaining at the end of 2008.

No severe adverse events (SAEs) were reported as a result of Mectizan® treatments in Nigeria in 2008. Particularly close monitoring for adverse reactions is given in the southeastern states because of the presence of *Loa loa* in that part of the country. *Loa loa* is a parasite similar to *O. volvulus*, but it can give rise to SAEs when Mectizan® is administered. MDA has been under way in Imo and Abia since 1992, and the other five Southeast states since 1994.

Training and Health Education: The nine states assisted by The Carter Center conducted training or retraining for 52,314 health workers involved in Mectizan® distribution in 2008. This is more than double the number trained in 2007 and reflects a strong effort in the southeast to enhance Community-Directed Distributor (CDD) numbers by using the kinship strategy. The kinship strategy entails utilization of the extended family structure to recruit and training more health workers who serve smaller areas). This year's training total included 36,319 CDDs (See Frontispiece Figure B), 12,470 Community Supervisors, and 3,525 Frontline Health-Level Workers. The ratio of

persons treated per one CDD was 137. Although this is a marked improvement over 2007 (1:365), it still did not reach the minimum goal of 1:100. In the Southeast states, nearly 50% of CDDs were female; gender data were not immediately available for Plateau and Nasarawa.

Financial Contribution: The funding for Carter Center-assisted river blindness programs in Nigeria during the period 2001-2008 (Figure 35) has been characterized by diminishing APOC core funding (although special APOC initiatives are still being funded), and chronically insufficient government contributions. On a positive note, 2008 showed a 56 percent increase in government funding to projects. The government total made up less than 13 percent of the funding that went towards the programs, suggesting that the government funding has not increased to allow these programs to become internally sustained. APOC contributed 11 percent (for non-core purposes), and The Carter Center contributed the remaining 76 percent.

At the community level, 2,094 villages, or 27 percent of all at-risk villages receiving mass treatment, supported their CDDs with cash. Total village-level contributions equaled approximately 2.3 million Naira (U.S. $16,425), about $4,000 less than in 2007. The amount contributed per CDD averaged only U.S. $0.44 (at 145 Naira to the dollar) because there were so many more CDDs in 2008 than 2007; the amount villages contributed *per* CDD plummeted by over a dollar. This drop could be offset by the effect of kinship-style CDTI, wherein persons treating their extended family do not expect payment. In addition, more CDDs meant less work per CDD, so the time demand was also reduced. LGA-level contributions in seven of the nine states (neither Nasarawa nor Plateau LGAs contributed) totaled approximately 3.8 million Naira (U.S. $30,714), a 60 percent decrease from 2007. State-level contributions in seven of the nine states (again, Plateau and Nasarawa did not contribute) totaled approximately 4.5 million Naira (U.S. $30,714), a $4,000 increase from 2007.

The Integrated Program in Plateau and Nasarawa: The Carter Center-assisted program in Nigeria has pioneered the concept of integrated mass treatment, in which the logistics of a mass drug administration (MDA) program are shared across several programs since 2000. Integration results in greater impact against diseases that can be addressed with similar strategies, lower costs and higher efficiency.

The initiative's central platform has been 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 throughout the two-state area. The LF treatment combination is also highly effective against several soil transmitted helminths (STH). The initiative partners include Nigeria's FMOH, state governments, the ministries of health of Plateau and Nasarawa, Merck & Co., Inc., and GlaxoSmithKline. The program began in 1999 with integrated RB interventions and urinary schistosomiasis, 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). Another important goal is to establish LF's potential for eradication in sub-Saharan Africa, in *Anopheles*

transmission zones. Background information on LF and urinary schistosomiasis (*Schistosomiasis haematobium* or SH) is given in Annex 5.

In 2006, the Bill & Melinda Gates Foundation awarded The Carter Center a grant ("Proof of Concept for Integrated Health Intervention in Nigeria") for Plateau and Nasarawa States. The funding enabled further expansion of the scope of the program to include assessing cost-effectiveness and management issues related to integrated interventions, as well as advocacy for national replication of the integrated approach. Replication depends on whether support can be secured from the government of Nigeria. The Center partners with Emory University and CDC in the execution of the cost and managerial dimensions (respectively) of integration. President Carter is a strong and vocal advocate for expansion with the Nigerian government.

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 3,701,925 persons in the two states received health education and mass treatment for LF in 2008, which was 99.8 percent of the UTG of 3,707,652 treatments (see Figures 36 and 37). RB is simultaneously treated with LF combination therapy of Mectizan® and albendazole. However, ivermectin treatment for hyper/mesoendemic RB is more limited than that of LF. Of the total treatments given, approximately 33 percent (1,214,332) were in RB target areas, and the remaining 2,487,593 were in LF-only areas (some of which are also hypo-endemic for RB). The WHO elimination strategy calls for at least four years of treatment to eliminate LF. Approximately 247,000 albendazole tablets remained at the end of 2008.

The goal of the LF program in Nigeria has been to eliminate transmission of LF. In 2008, a two state survey for LF prevalence was conducted using the Filariasis Immunochromatographic Card Tests (ICT), to determine levels of microfilaremia antigen to establish if LF had been eliminated by the MDA program. Of the 30 LGAs surveyed, at least 6 have achieved an LF antigenemia rate of <2 percent (see Frontispiece Figure F) and may warrant cessation of LF treatment in 2009 (pending Federal MoH approval).

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 long lasting insecticidal nets (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, 262,242 ITNs have been distributed (most during MDA) in Plateau and Nasarawa (see Figure 38). For the first 3 years, these donated nets were conventionally impregnated (insecticidal action lasting less than one year), not LLIN (insecticidal action lasting up to five years, or the lifespan of the net itself). We have adopted a policy to retreat the conventional nets (using retreatment sachets) during MDA, but funding for the kits has been limited, and moreover, the process of reimpregnation is complicated and not easily done during the MDA treatment exercise. The FGN donated 100,000 LLIN in 2007 but has not donated nets since. In 2008, due to a lack of nets only 8,358 LLINs were distributed in Plateau and Nasarawa States, just 4 percent of the 2008 annual distribution objective (ADO) of 206,667.

Schistosomiasis (program includes also Delta State): In 2008, due to a large donation of Praziquantel (PZQ) from Merck KGaA (eMerck), administered through WHO, The Carter Center assisted Schistosomiasis Program was able to treat over one million persons (1,137,735, mostly children) in just one year (Figure 36). This is five times the number treated in 2007. See Frontispiece Figure G for a visual depiction of this striking change in scale of treatments provided as a result of the donation. The eMerck/WHO donation was provided to Plateau and Nasarawa States, where the medicine was targeted for all school aged children in the state. The program achieved the treatment of 991,080 persons from the two states in 2008, exceeding our ATO of 926,913. In Delta State, where PZQ used was largely purchased with support from other donors (such as the Izumi Foundation) 146,665 treatments were given, 81 percent of the ATO of 155,412. In total, nearly two million PZQ tablets were used, at an average dose of 1.6 tablets per person, and 93,946 PZQ tablets remained in stores at the end of 2008 for use in 2009.

This new 2008 strategy of full treatment of school aged children in Plateau and Nasarawa States coincided with the publication of a study supporting the need for universal mass treatment of school aged children for schistosomiasis in Plateau and Nasarawa. Emory University consultant Dr. Julie Gutman demonstrated that the prevalence of *S. haematobium* (causing urinary schistosomiasis) and *S. mansoni* (causing intestinal schistosomiasis) was high enough in the two states to warrant treatment everywhere. In fact, the cost of universal treatment would be lower than conducting village by village diagnosis to exclude the 20 percent of villages that did not need PZQ. The scope of our schistosomiasis work in the southeast is much more limited in Delta State due primarily to the lack of donated praziquantel. Six states where The Carter Center assists in onchocerciasis MDA are not yet benefiting from PZQ due to financial constraints.

Co-Administration (Triple Drug Administration): PZQ has been shown to be safe for combined treatment with Mectizan® and albendazole. This benefits our integrated programs, where we are able to reduce costs thanks to the ability to provide multiple treatments in a single village encounter. The Carter Center launched extended Triple Drug Administration (TDA) treatment throughout the Plateau and Nasarawa integrated program areas in 2007, after monitoring a successful safety and implementation TDA monitoring trial in five communities in Mikang LGA, Plateau State in 2006 (Eigege et al.,

Annals of Tropical Medicine and Hygiene, March 2008). In 2008, the integrated program conducted TDA in all LGAs where separate rounds of treatment with PZQ have already been given at least once, per WHO guidelines. In total, 16 LGAs received TDA while 14 received stand alone PZQ and Ivermectin+Albendazole treatments. In 2009, TDA will be given in all LGAs except those in which LF treatment is approved for discontinuation by the FGN (pending). In those LGAs, PZQ for schistosomiasis will be provided in single drug MDA.

Integrated Programs in Southeast Nigeria: In Delta State, the schistosomiasis program is integrated with the onchocerciasis Mectizan® distribution program. There, the state uses a PZQ rotation practice developed in 2006 for Plateau and Nasarawa States, where PZQ "holidays" were given for three years after three to five years of annual treatment cycles. These rotations were needed given the short supply of PZQ. Our observations suggested that treatments can usually be withheld from an area for three years before recrudescence occurs. In 2008, PZQ treatment in Delta State was rotated to 10 new LGAs as apart of the "PZQ holiday" plan. We are also investigating the combining of Mectizan® treatments with PZQ treatments in Delta so that separate distribution rounds are not necessary.

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 coendemic 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 four LGAs in Imo and Ebonyi States states to test their efficacy against LF. An additional 40,000 LLINs are needed to complete coverage in the four LGAs in 2009. The average number of mosquitoes caught per site per month has declined significantly by 60 to 90 percent, and the percent of mosquitoes infected (all larval LF stages) also declined significantly.

Consultant Dr. Julie Gutman of Emory University conducted a study in Imo State, looking at the effect of annual Mectizan® treatment on the three types of intestinal round worms (soil transmitted helminths-STHs) of major public health importance. The study found that *Ascaris* and *Trichuris* prevalence were reduced by Mectizan® MDA, but not that of hookworm (Annex 1). The result showed that Mectizan® alone for onchocerciasis could not be counted on to have an impact on all intestinal worms of public health importance, and that additional treatment (with albendazole or mebendazole) was required.

2009 RECOMMENDATIONS FOR CARTER CENTER NIGERIA

All States

GENERAL

The Nigeria program should continue to refine government and Carter Center funding figures in 2009, including any additional funds provided through APOC; monitor trends for increased funding, especially as related to how The Carter Center might be asked to fill the 'post-APOC funding gap.'

Given the work demands in Gates supported states, the onchocerciasis treatment monitoring protocol (to assess coverage, health education, and community involvement) should be suspended. Annual application of The Carter Center monitoring protocol should be done in non-Gates supported states in the southeast, especially in Anambra and Edo. The 'bednet modification' as developed for Ethiopia should be included in the protocol.

In non-Gates supported states, 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 new research to measure costs and supervisory demands of conversion to the kinship strategy where this transition is occurring. Given the work load, this goal is not required in Gates supported states.

Develop the laboratory at Jos to allow analysis of black flies by PCR and serologic 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).

Ensure that the national secretariat for onchocerciasis control and LF elimination submits accurate Mectizan® and Mectizan®/albendazole applications by July 31 of every year. Reports do not need to be complete to submit for the following year.

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

SPECIFIC

Advocate for the Nigeria federal government to provide more financial support to the treatment program and also for the release of counterpart funding from states and LGAs.

Pursue a high-level advocate like 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 LLIN by Global Fund Round 8 to TCC supported states in coordination with drug deliveries where possible, and in particularly in Plateau and Nasarawa, which are the TCC priority. Carter Center senior staff should seek to attend high level national malaria meetings whenever possible.

Plateau and Nasarawa States' Integrated Program:

It is urgent that the integration cost study be improved, in close collaboration with the Emory School of Public Health (Prof D. McFarland). Remove integrated latrine building approaches from MDA work as the costs of latrines and the 'different' nature of the work compared to MDA elements will make our results difficult or impossible to compare with other Gates funded integration costing.

Continue collaboration with the Office of Global Health, CDC, in management training to promote integration.

Work with Carter Center headquarters to get drugs, bednets and lab materials where they are needed in a timely and coordinated fashion.

Lymphatic Filariasis:
Seek to provide universal LLIN coverage in order to sustain gains from six to nine years of MDA for LF elimination in Plateau and Nasarawa States. In order to do this the program must promptly find a source of LLINs. In this regard, all LLINs we believe will be needed are scheduled to be provided through the Global Fund Round 8 in 2010, which is later than we would wish.

Based on a US$100,000 survey of over 36,000 persons scientifically conducted in all 30 LGAs in the two-state region, The Center and MOH documented in 2008 that the program has interrupted LF transmission in three LGAs (Jos North, Langtang South and Keffi). The program should notify the proper national authorities in writing as soon as possible about that conclusion and gain agreement to withdraw MDA treatment in those LGAs in 2009 and begin post treatment surveillance activities. MDA should not be offered in those LGAs until a decision has been agreed to. Two additional LGAs (Barkin Ladi and Keana) need microfilaremia follow-up as soon as possible as treatments could also be stopped there as well. LLINs are very important in LGAs where such MDA is withdrawn, as priority. The second priority for LLINs is those LGAs where it appears that LF transmission remains intense despite years of MDA.

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

Finalize a plan of action (training, timeline, and delivery tracking mechanisms) for the delivery of 38,000 Duranets® LLINs to Kanke LGA as part of the collaborative project with Clarke Mosquito Control Company.

Onchocerciasis:
Increase involvement of local Lions.

Among LGAs where MDA treatments are given for both LF and onchocerciasis, the LF survey determined that LF treatment could be suspended in three (Jos East, Bassa, Bokkos, and Keffi). However, MDA (with Mectizan only) must continue until onchocerciasis transmission has been determined to be likewise interrupted.

In 2009, with the help of a consultant, establish an evaluation scheme to determine if there is ongoing onchocerciasis transmission in Jos East, Bassa, Bokkos, and Keffi. The consultant will secondarily evaluate sentinel villages where baseline data for onchocerciasis are available.

Of lesser importance, seek to demonstrate impact of ivermectin treatment on ocular disease in one or two other assisted states. In those areas having baseline data, conduct surveys for anterior segment disease using the slit lamp provided in 2007.

Trachoma:
Design and launch a study of the added impact of trachoma latrines on the prevalence of soil transmitted helminthes (in LGAs where LF treatment is withdrawn) and on schistosomiasis (praziquantel with and without latrines). The best place to carry out this work would be Keana, followed by Barkin Ladi, based on final results of LF (microfilaremia) surveys (see LF section above).

The FMOH of Nigeria should urgently inquire about the need to register azithromycin for mass drug administration where indicated to eliminate blinding trachoma, in accord with WHO recommendations and guidelines. TCC Nigeria should provide support to the Nigerian Blindness Prevention Program and other Federal authorities to obtain registration of and clearance to use azithromycin for trachoma with the aim of launching azithromycin treatments in the six LGAs where TF$\geq$10% in 2010; azithromycin treatments would be given as a separate round from TDA.

Schistosomiasis:
Provide all praziquantel in Plateau and Nasarawa States in 2009 as part of triple drug administration (TDA).

Perform a cost study of savings due to TDA by comparing costs in selected LGAs of delivering two rounds in 2008 with a single round in 2009.

Publish the Schistosomiasis Cost study paper showing that presumptive treatment is cheaper than undertaking the expensive mapping exercises.

Publish the integrated schistosomiasis (with trachoma) mapping study.

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

Vitamin A supplementation:

Vitamin A supplementation (VAS) has been a challenge given the need to deliver VAS every six 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 Mectizan® distribution, as this is an objective of the Gates integrated grant. However, we are not in a position to provide for a second, separate round of VAS, or to distribute in areas where we are not already assisting Mectizan® distribution. Above all we seek safety, by providing WHO recommended spacing of VAS of at least thirty days when other mechanisms for VAS are active in the same areas.

Treatment Objectives for Plateau and Nasarawa States, 2009:

Ivermectin/Albendazole: 3,192,703 persons

PZQ: 1,028,601 persons

ITN: 206,667 persons

VAS: 315,000 treatments

Training Objective for 2009: 11,647 CDDs for LF, RB and SH (2,464 new, 5,355 for RB) and 4,001 community supervisors (628 new).

Southeastern States:

The priority focus of the Southeast Owerri Office, and the Director of Southeast programs, is the Bill & Melinda Gates Foundation-supported Malaria/LF Integration Project in Imo and Ebonyi States. (See separate section below).

Return to annual application of The Carter Center monitoring protocol to assess and validate coverage, health education, community involvement and ownership in states not involved in Gates' projects, and particularly in Edo and Anambra States.

Publish the report of the Imo and Abia Post-APOC Post-NGDO scenario study.

Integrate with Vitamin A delivery if possible, but this is dependent upon prompt and adequate supply.

Gates Malaria/LF Integration Project in Imo and Ebonyi States:

Provide data management training for Owerri Office staff.

Deliver 40,000 LLINs as mop-up in the four target LGAs (two LGAs targeting vulnerable groups, two full coverage) in early 2009.

Implement the system we are developing for resupply of nets to future pregnant women in the 'vulnerable populations" (group A) LGAs.

Closely monitor the number of nets delivered using a tracking and reporting system.

Complete the analysis of the 2007 and 2008 Malaria Household Cluster Surveys and prepare draft paper for publication. Complete a companion paper with Dr. McFarland on the costs of implementation of the differing net distribution strategies (Vulnerable Groups and Complete Coverage).

Conduct third household cluster malaria survey in late 2009.

Conduct LF sentinel site survey in April/May 2009.

Continue monthly entomological monitoring of sentinel site villages for LF.

Publish the Imo State study that evaluated the impact of ivermectin MDA for onchocerciasis on soil-transmitted helminthes.

Treatment Objectives for Southeast States, 2009:

Ivermectin: 4,204,862 persons

LLIN distribution: 40,000 persons

PZQ: 155,412 persons

Training Objective for 2009: 63,950 CDDs (28,740 new), and 13,680 new community supervisors (3,445 new)

Figure 32

Nigeria: Carter Center-Assisted States

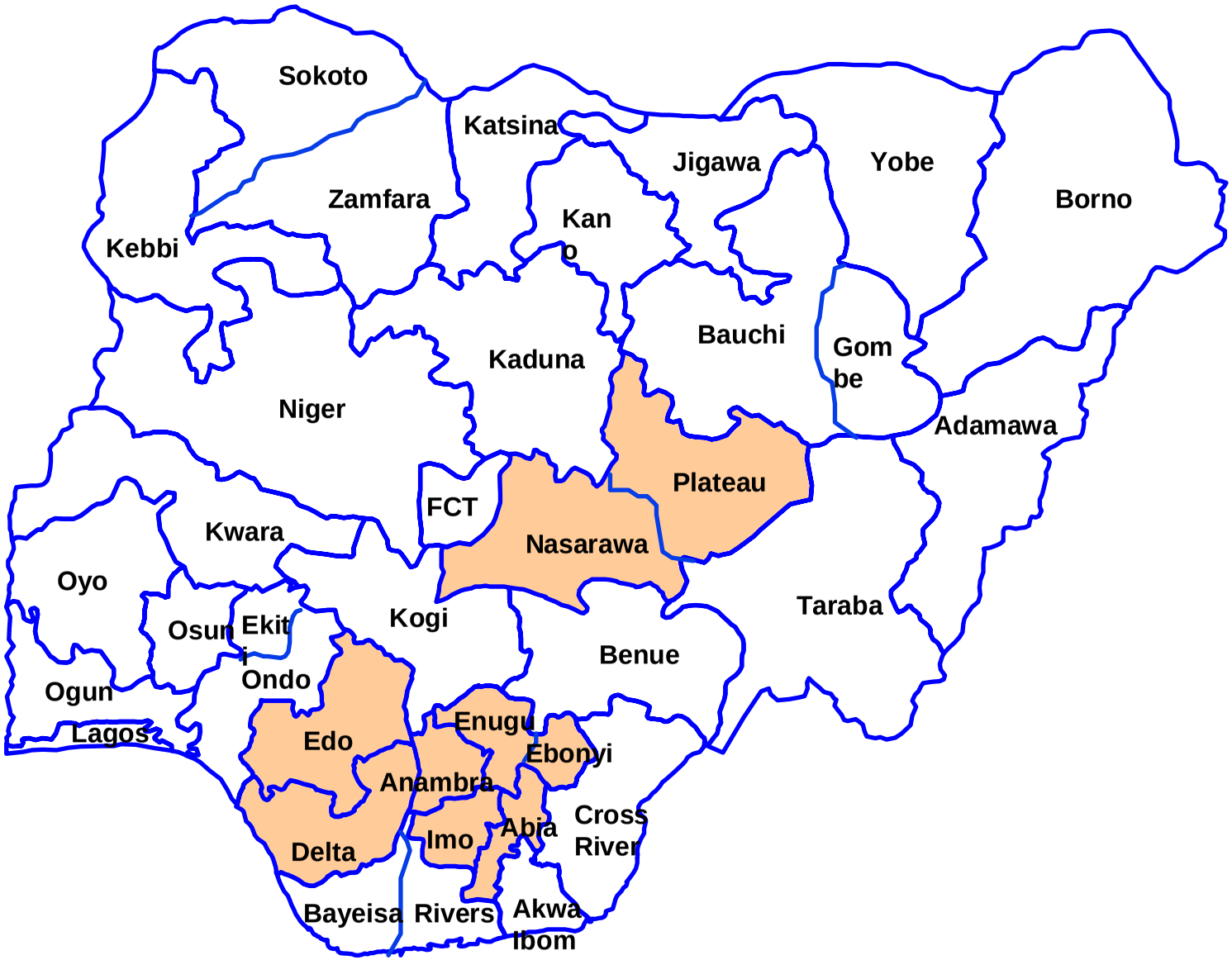


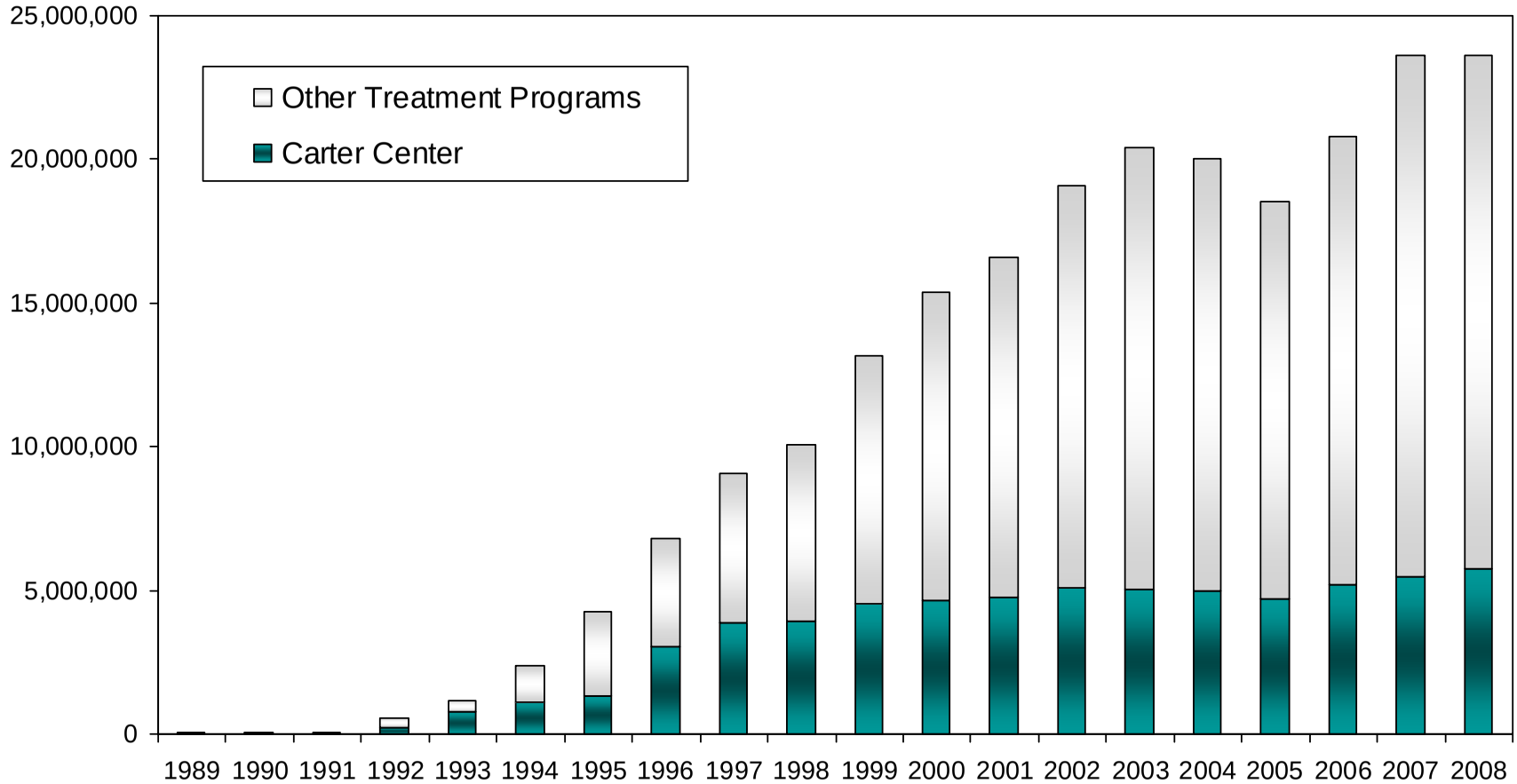
Figure 33

Nigeria: Carter Center-Assisted Areas: 2008 River Blindness Treatments (includes passive)

Name of State	District	Total Popn for 2008	Ultimate TX Goal (UTG) for 2008	Popn treated cumulative for 2008	% UTG treated in 2008	% of total Popn treated in 2008	Active villages treated for 2008	Active villages UTG/ATO for 2008	Active villages % for UTG for 2008
ENUGU	16	1,003,423	812,823	815,843	100.37	81.31	1,329	1,373	96.80
ANAMBRA	16	846,024	647,769	675,786	104.33	79.88	1,062	1,062	100.00
EBONYI	10	645,526	523,393	524,953	100.30	81.32	972	973	99.90
EDO	12	1,078,668	751,467	761,966	101.40	70.64	530	530	100.00
DELTA	9	681,128	566,890	560,760	98.92	82.33	470	470	100.00
IMO	20	929,049	781,747	760,597	97.29	81.87	1,917	1,940	98.81
ABIA	12	515,266	452,823	445,831	98.46	86.52	709	684	103.65
PLATEAU	5	384,561	307,649	354,764	115.31	92.25	296	296	100.00
NASARAWA	7	941,600	753,280	860,168	114.19	91.35	589	589	100.00
TOTAL	107	7,025,245	5,597,841	5,760,068	102.90	81.99	7,874	7,917	99.46

Figure 34

Nigeria: Carter Center-Assisted treatments and total Mectizan® treatments provided 1989-2008*



* Treatments from 1992-1995 by RBF. 2008 national figure provisional.

Figure 35

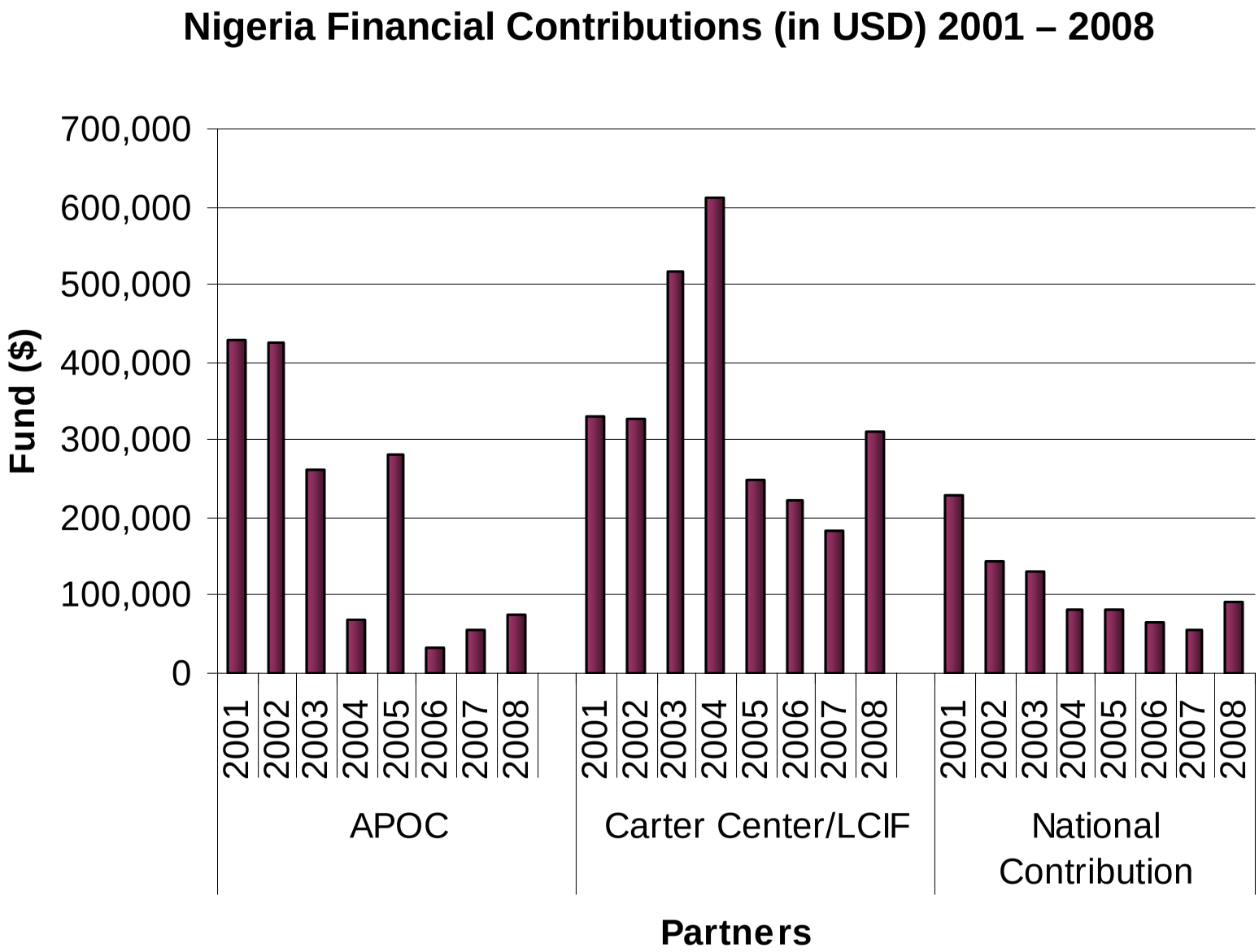

Nigeria Financial Contributions (in USD) 2001 – 2008
Fund ($)
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
2001
2002
2003
2004
2005
2006
2007
2008
APOC
Carter Center/LCIF
National Contribution
Partners

Figure 36

Nigeria: 2008 Lymphatic Filariasis and Schistosomiasis Treatments

Lymphatic Filariasis Treatments

Name of State	No. of LGAs	Popn treated cumulative for Y2008	Ultimate TX Goal (UTG) for Y2008	% UTG treated in 2008	Total Popn for Y2008	% of total Popn treated in Y2008	Active villages cumulative for Y2008	Active villages UTG for Y2008	Active villages % of UTG for 2008
Plateau	17	2,085,708	2,164,271	96.37	2,705,339	77.10	2,571	2,577	99.77
Nasarawa	13	1,616,217	1,543,381	104.72	1,929,226	83.78	1,050	1,061	98.96
Total	30	3,701,925	3,707,652	99.85	4,634,565	79.88	3,621	3,638	99.53

Schistosomiasis Treatments

Name of State	No. of LGAs	Popn treated cumulative for Y2008	ATO for Y2008	% ATO for 2008
Plateau	17	609,568	541,068	110.7
Nasarawa	13	381,512	385,845	101.3
Delta	10	146,655	155,412	94.4
Total	40	1,137,735	1,082,325	105.1

Figure 37

Nigeria: Lymphatic Filariasis Treatments: Plateau and Nasarawa States

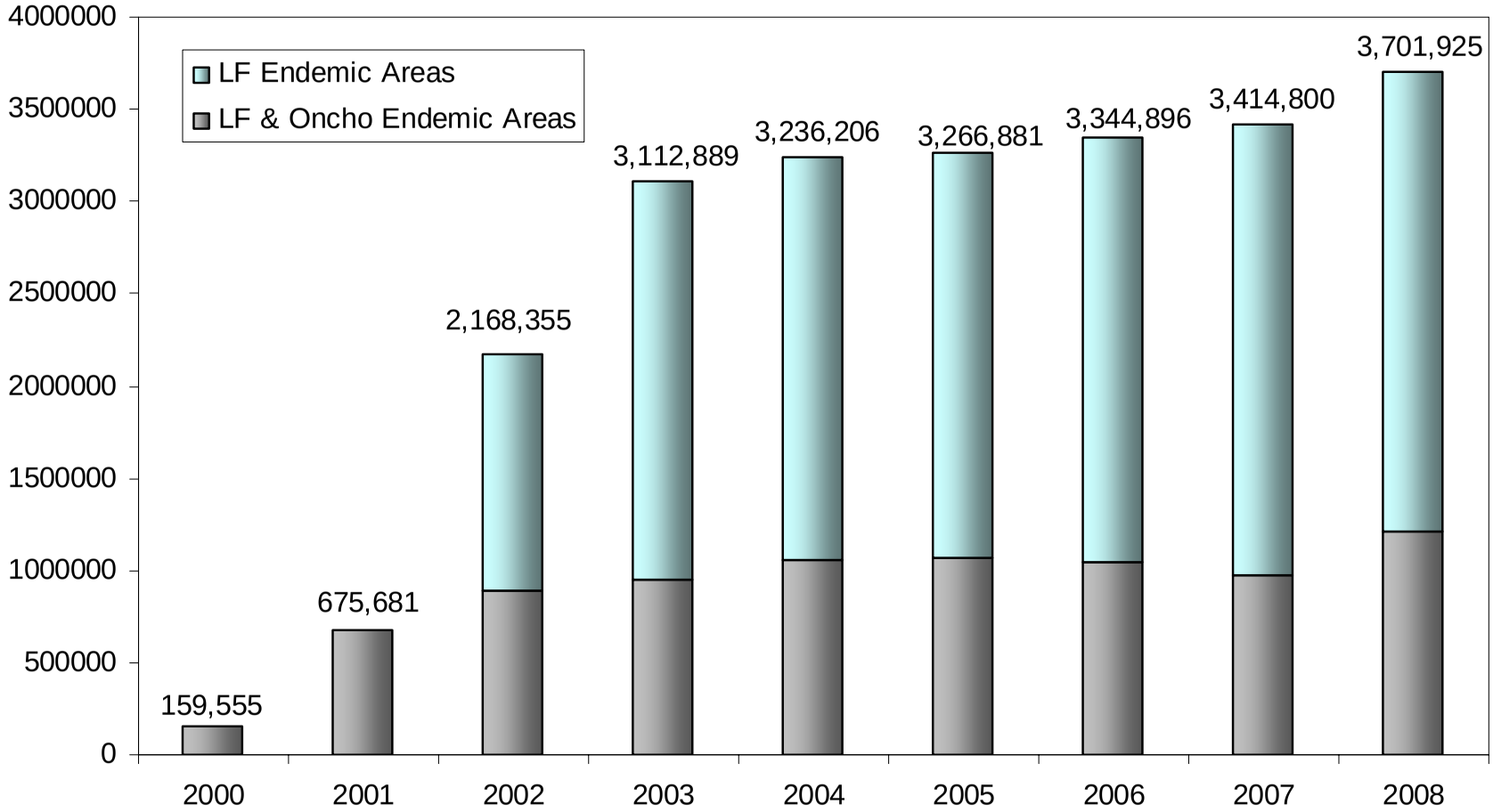


Figure 38

Nigeria: Disappointing Bednet (ITN) Distribution Results for Plateau and Nasarawa States in 2008

Bed Net Distribution in 2008

Name of State	No. of LGAs	ITN distributed cumulative for Y2008	ITN Distribution objective (ADO) for Y2008	Total Popn for Y2008 of LGA
Plateau (Jos North)	1	500	145,765	1,480,170
Nasarawa (Wamba)	1	7,858	60,902	779,506
Total	2	8,358	206,667	2,259,676

Cumulative Net Distribution, 2004-2008

	Bed Nets Distributed
2004	38,620
2005	18,447
2006	64,547
2007	96,270
2008	8,358
TOTAL	**226,242**

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 in 2001 and targeted ten areas where the prevalence of onchocerciasis was estimated to be over 40 percent (≥20 percent 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 APOC and the MOVDCU in eight of these ten projects, beginning with Kaffa and Sheka zones in 2001. Since then, Lions-Carter Center assistance has expanded to include Bench-Maji, North Gondar, Illubabor, Jimma, Metekel and Gambella. The 2008 total population in the assisted areas was 3,869,149 people, with a UTG of 3,144,532 people. Mectizan® treatment is very popular in Ethiopia, in part because of its widely recognized ancillary benefit of purging intestinal helminthes. In 2008, the Carter Center accounted for 69 percent of Mectizan® treatments given in Ethiopia.

Members of Lions District 411A play an important role in both The Carter Center's 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 the incoming SightFirst Committee Vice Chairman for Ethiopia. Ethiopian Lions participate actively in the annual Carter Center Ethiopian staff retreat. The Honorable Dr. World Laureate Tebebe Y. Berhan attended the Program Review in Atlanta.

Treatments: During 2008, 2,983,055 people were treated in 14,268 targeted villages (95 percent of the UTG) in assisted zones of Kaffa, Sheka, Bench-Maji, North Gondar, Illubabor and Jimma (Figure 40 and 41). This is a 3.3 percent increase over the 2,883,468 treatments assisted in 2007. There were no severe adverse events (SAEs) associated with treatments given in 2008. In 2009, the program aims to treat 3,185,085 persons.

Mectizan®: In 2008, a total of 8,451,500 tablets were received from NOTF and together with a balance of 621,104 tablets from 2007, were made available for distribution to Lions-Carter Center assisted areas. Through the course of the year, 8,319,443 tablets were distributed, while 30,588 (0.3 percent) were damaged and none expired. The average number of tablets per person treated was 2.8. The balance available for 2009 treatments was 616,573.

Training and Health Education: Training was provided to 35,316 community-directed distributors (CDDs); of these, 31,589 were returning CDDs (retrained) and 3,727 were newly recruited and trained for the first time (Frontispiece Figure B, and Figures 42 and 43). This is a 7.5 percent increase from CDDs trained in 2007 (32,661), and 86 percent of the goal for 2008. The ratio of CDDs per population was 1:113, equal to the 2007 ratio. Of the CDDs trained, nine percent were female. A total of 2,456 community supervisors were trained, a 20 percent increase from 2007 (1,977) and exceeding the 2008 target of 2,198. Health education was provided in all 14,268 targeted communities, representing 100 percent geographical coverage. In 2009, the program plans to increase training to 41,220 CDDs (with 8,830 new CDDs) and 2,465 community supervisors. Ethiopia has been progressively adopting kinship structures in selecting and training CDDs. An estimated 90 percent of communities are now using the kinship structure. Figures 44 and 45 show the progress Ethiopia has made in community ownership and a lower population served per CDD. (Figure 46 shows the training plan for 2009.)

Financial Contribution: Although CDTI is being implemented through government health care delivery structures, key funding comes from the Lions Clubs International Foundation, John Moores and many other individual donors. The five year funding from APOC ended for Lions-Carter Center assisted RB programs in 2008 (see Annex 3). As in all African programs, there is need for the government to begin allocating and releasing more funds in support of the onchocerciasis program. In 2007, the first report was received of Ethiopian government investment in the program of almost $122,000, and in 2008 it was reported to be over $132,000 (Figure 47), although in an increasingly integrated funding environment, these funds may not have been dedicated totally to onchocerciasis. Also, APOC funding is integrated fully in the government finance system from the national to woreda level.

Mr. Estifanos Biru of The Carter Center Ethiopia office reviews a community register with a CDD.

The MALONCHO Integration Initiative: 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. The effort is coordinated through collaboration between The Carter Center, regional health bureaus, zonal health departments and woreda health offices. Since the malarious parts of these areas had already received long lasting insecticidal nets (LLINs) during the scaled up distribution in 2007, the focus this year was on assisting CDDs and their supervisors (including health extension workers) to become fully engaged in behavioral change communication regarding malaria and its prevention. Malaria prevention messages were included in the integrated CDD training courses described above and each was provided with pictorial materials showing four key “do-able” messages for malaria, to be delivered when providing health education in

villages. CDDs were also trained to record the number of nets per household when completing the CDTI registers each year. The resulting data from 94 percent of the target villages indicated that the average number of LLINs per household in MALONCHO areas was 1.3, ranging from 1.2 in Jimma zone to 1.9 in Sheka zone. In addition, questions on net ownership were included in the ongoing monitoring survey, which estimated that the average number of nets per household was 1.5.

The Lymphatic Filariasis Mapping Initiative: The occurrence of lymphatic filariasis (LF) in Ethiopia was first documented in 1971 in Gambella. Unfortunately, there had been no effort to comprehensively map LF in Ethiopia. In 2007, The Carter Center began supporting an expert team at the University of Addis Ababa. The results of initial surveys are reported in Annex 5.

2009 RECOMMENDATIONS FOR CARTER CENTER ETHIOPIA

Onchocerciasis

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

Conduct an onchocerciasis transmission study in hypoendemic (untreated) non-CDTI areas in 2009.

Ensure that the national secretariat for onchocerciasis control submits accurate Mectizan® applications, at the latest, in September of every year. Reports do not need to be complete to submit for the following year. Work to reduce the number of damaged tablets.

Conduct Carter Center monitoring protocol (with appropriate revision) annually to assess and validate coverage, health education, community involvement, and ownership.

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 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 SNNPR as the region with greatest shortfall of CDDs and thus the greatest training need.

Lymphatic Filariasis

Complete LF mapping in western Ethiopia in collaboration with the MOH and Addis Ababa University and urge publication of findings. It was of interest to note the high nocturnal LF microfilaremia rates in CDTI areas of Gambella.

Introduce GlaxoSmithKline-supported LF activities by adding albendazole treatments in four Gambella region CDTI woredas in 2009.

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

Integration with the Malaria 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 monitor and evaluate these data.

Investigate how CDDs can increase their role in identifying LLIN gap and replacement needs.

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

Determine whether it would be more beneficial for malaria to work in tandem with onchocerciasis or trachoma (MALONCHO or MALTRA) in North Gondar, and implement the program accordingly.

GENERAL

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

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

Mectizan Only Treatment Objective for 2009: 3,185,085 persons

Albendazole and Mectizan Treatment Objective for 2009 (Gambella): ATO = 76,380, (Eligible population = 95,476)

Training Objective for 2009: 44,058 CDDs (8,830 new), and 3,204 community supervisors (739 new)

Figure 39

Ethiopia: Lions-Carter Center-Assisted CDTI Projects

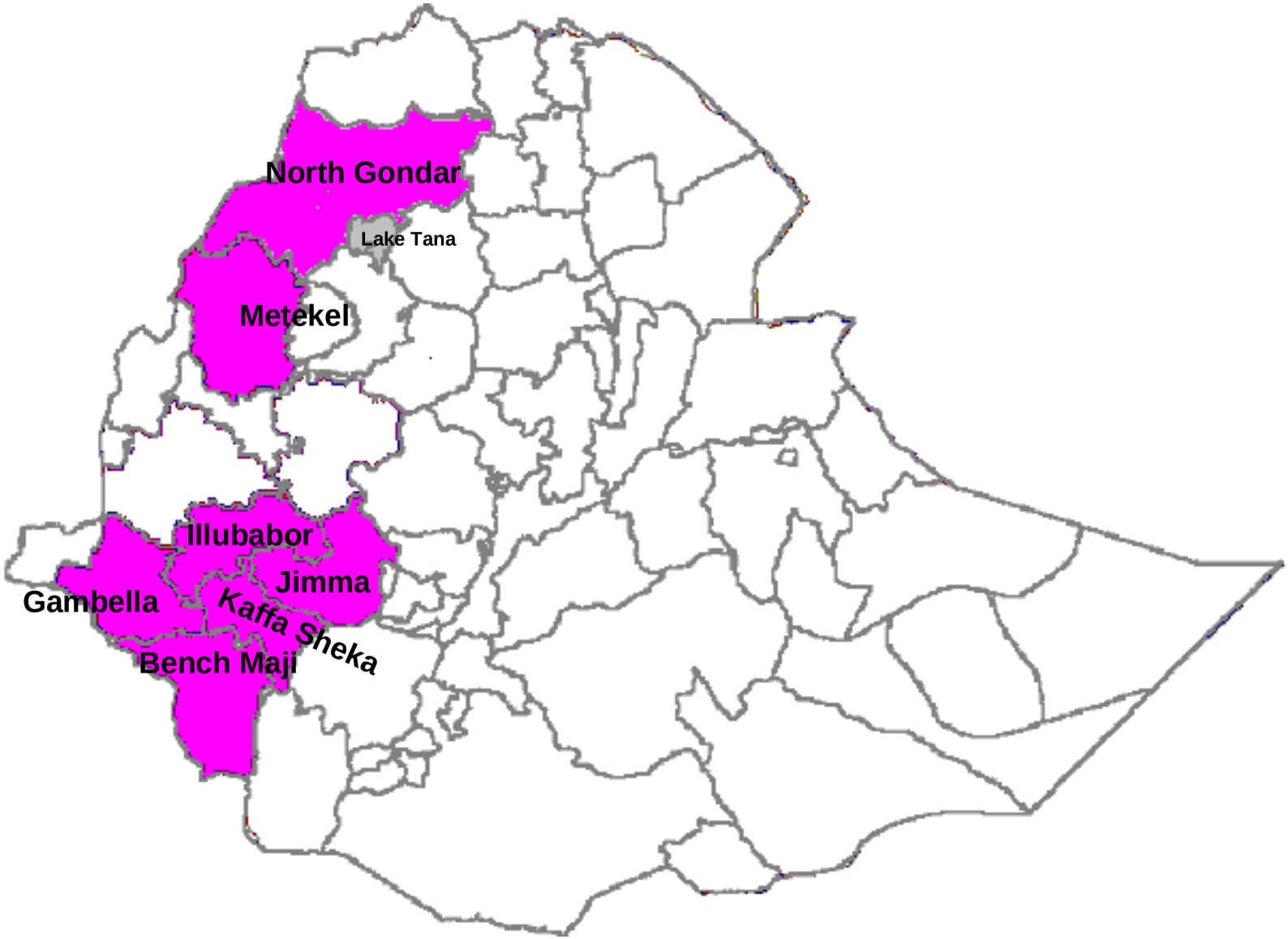


Figure 40

Ethiopia: Lions-Carter Center-Assisted Areas: 2008 River Blindness Treatments

CDTI Zone	Popn treated 2008	Ultimate TX Goal (UTG)	% UTG treated	Total Popn 2008	% total Popn treated
Kaffa	691,439	744,467	93	930,584	74
Sheka	161,832	170,531	95	213,164	76
Bench Maji	460,334	505,628	91	632,035	73
N. Gondar	210,604	225,637	93	282,046	75
Illubabor	556,106	567,693	98	692,309	80
Jimma	735,879	742,702	99	884,169	83
Metekel	100,149	113,645	88	142,056	70
Gambella	66,652	74,229	90	92,786	72
TOTAL	2,983,055	3,144,532	95	3,869,149	77

Figure 41

Ethiopia: Lions-Carter Center-Assisted Mectizan® Treatments as Part of Total Treatments Provided, 2001-2008

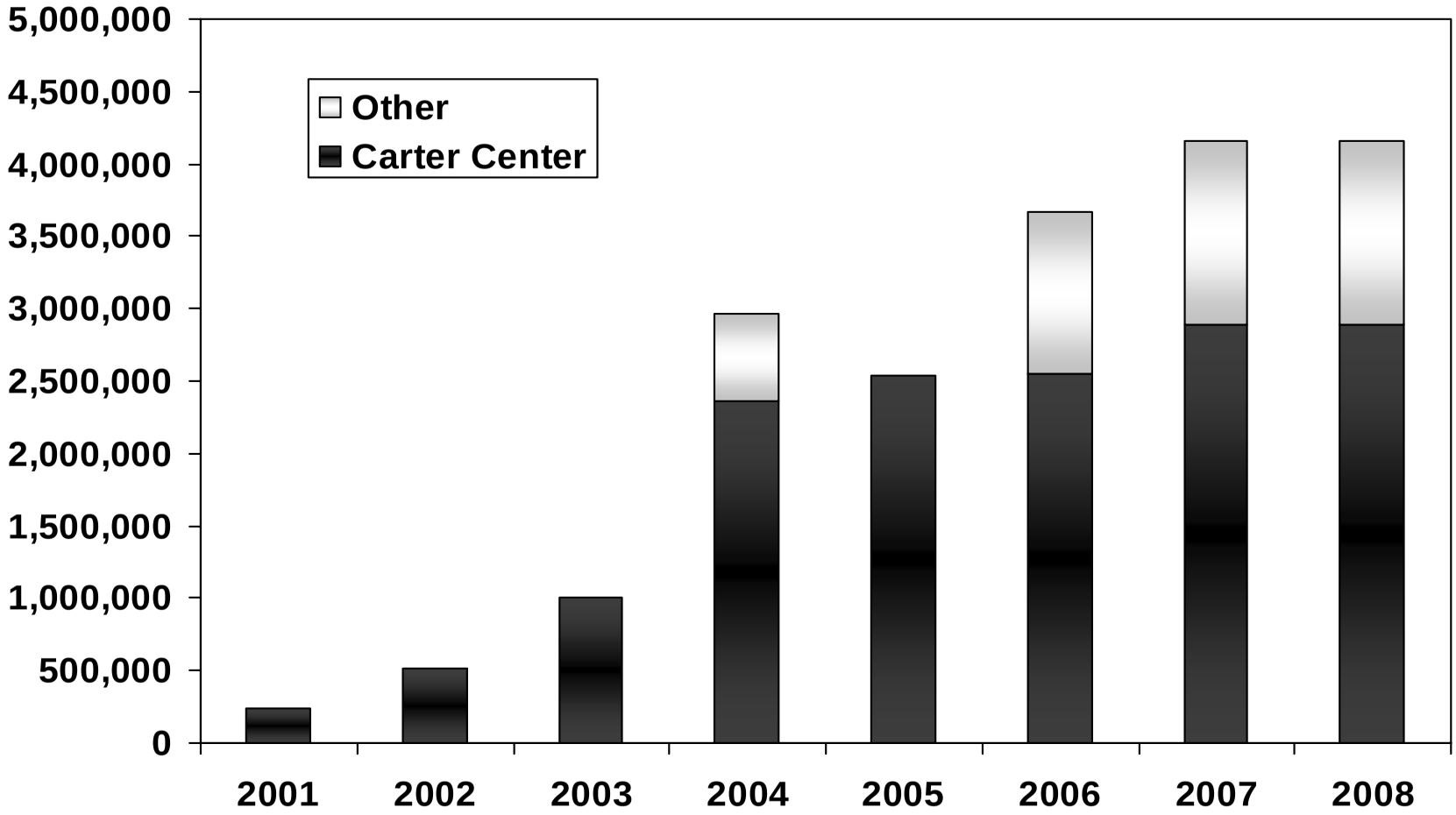


Figure 42

Ethiopia: Training of CDDs 2001-2008

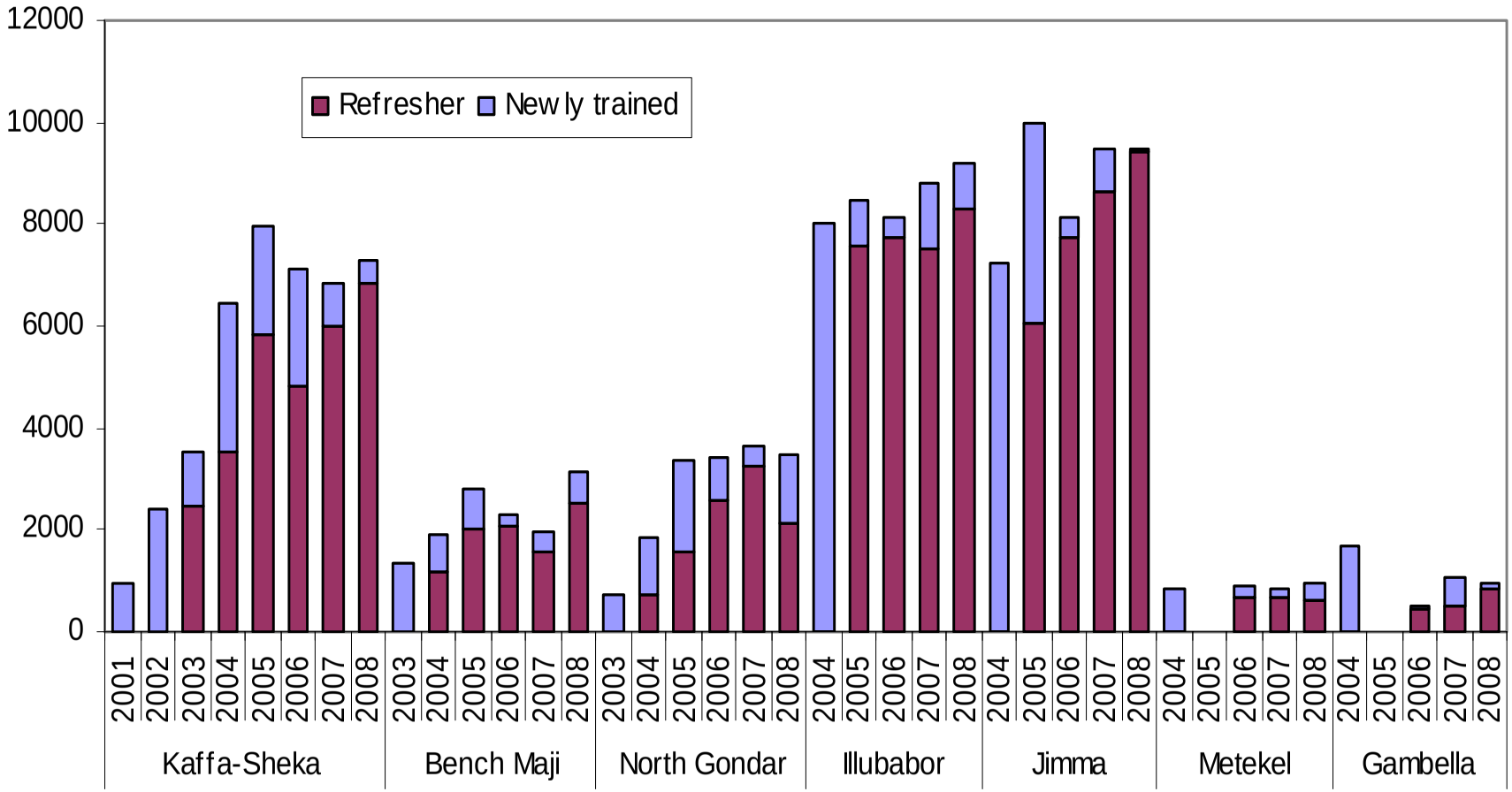


Figure 43

Ethiopia: Training of CDDs 2001-2008

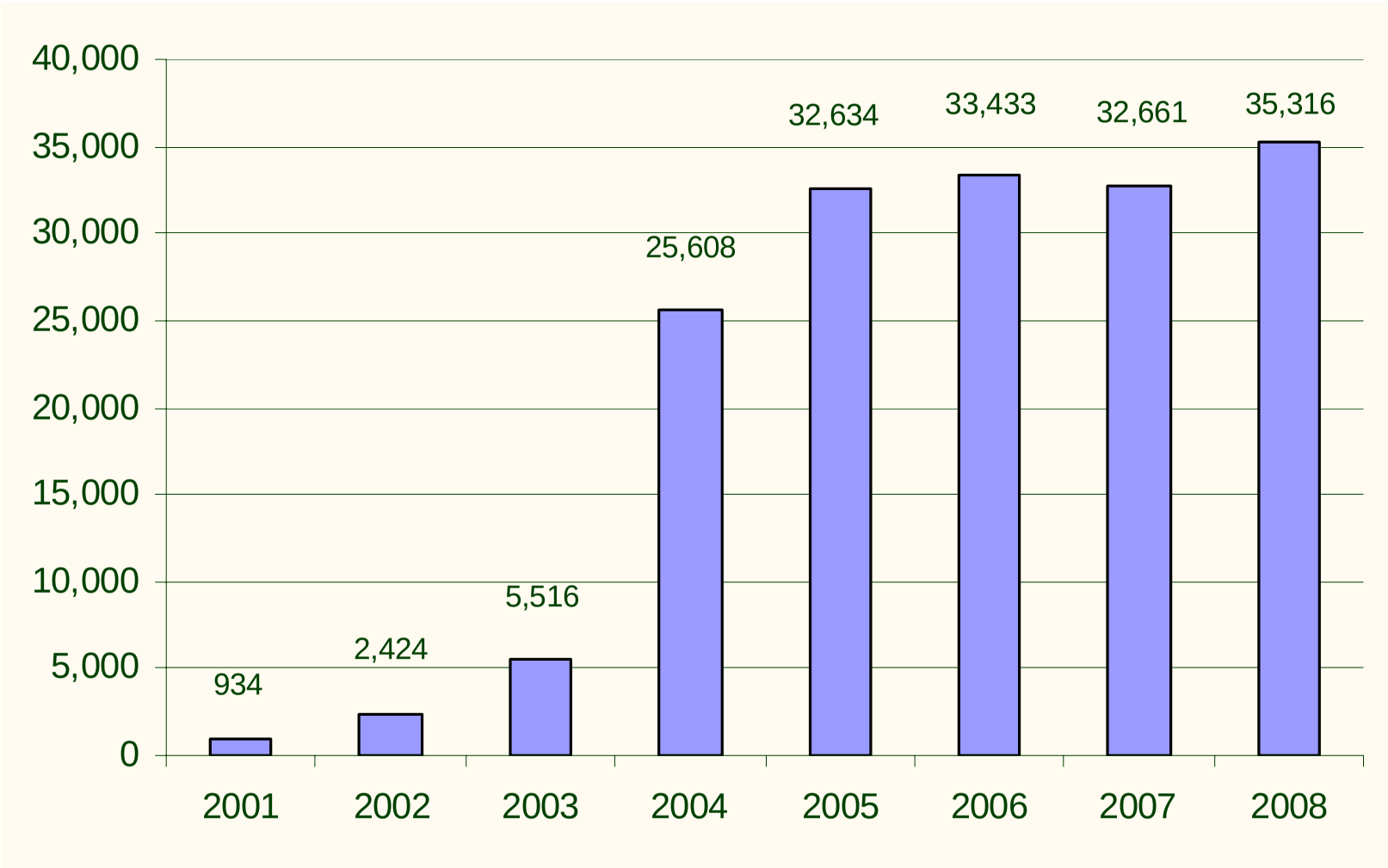


Figure 44

Ethiopia: Progress on Community Ownership, 2005 - 2008

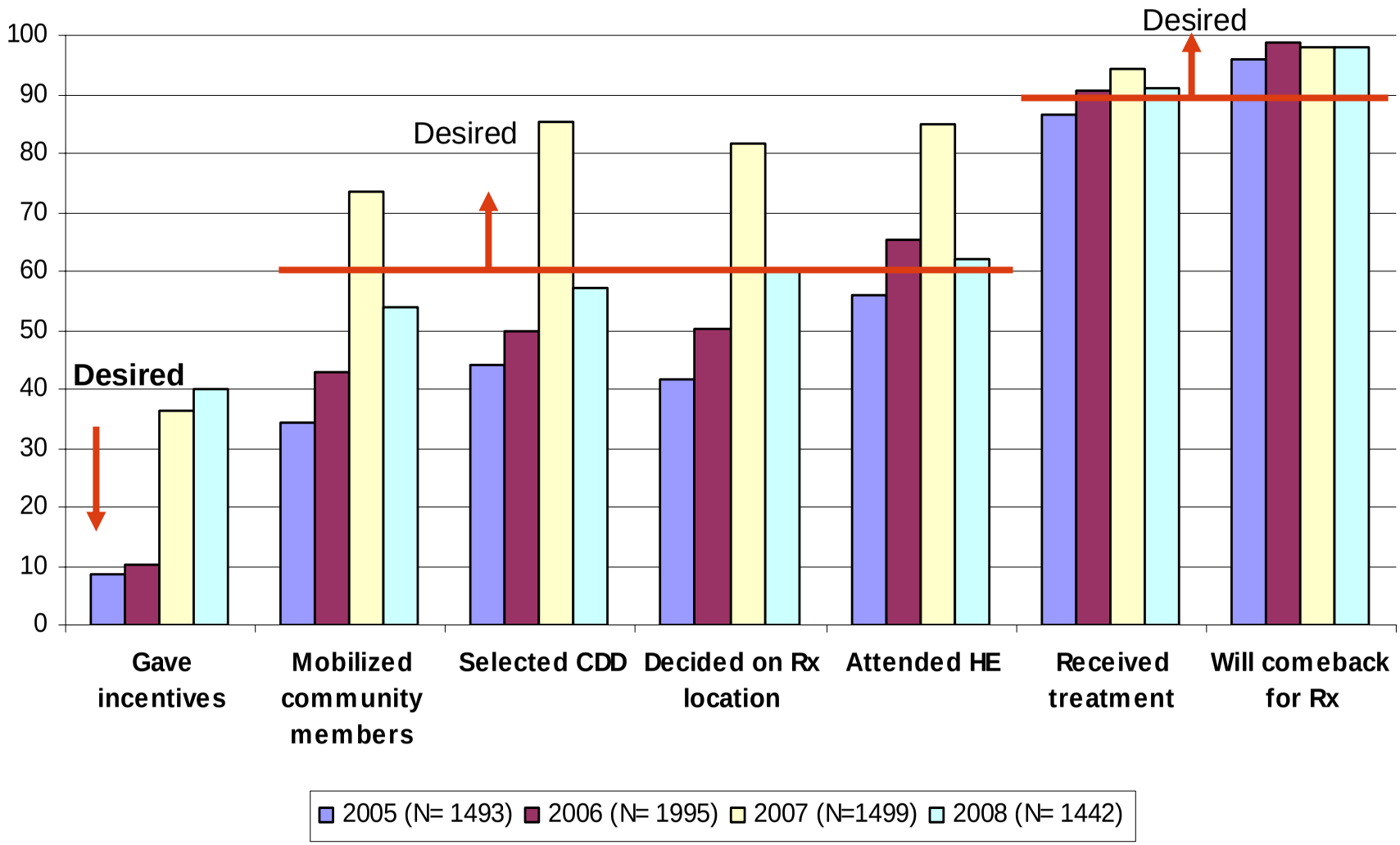


Figure 45

Ethiopia: Ratio of CDDs and Community Health Supervisors to Population and Community, 2008

Name of Zone	Total population for 2008	No of Villages/ Communities	Number of CDDs	Number of Community Supervisors	Ratio of CDDs to Community	Ratio of CDDs to Population	Ratio of Community Supervisors to community
Kaffa	930,584	2,984	6,024	373	2:1	1:154	1:8
Sheka	213,164	618	1,257	72	2:1	1:170	1:9
B. Maji	632,035	1,236	3,135	257	2.5:1	1:202	1:5
N. Gondar	282,046	904	4,220	819	4.7:1	1:67	1:1
Illubabor	692,309	3,794	9,202	368	2.4:1	1:75	1:10
Jimma	884,169	4,123	9,492	339	2.3:1	1:93	1:12
Metekel	142,056	289	1,046	159	3.6:1	1:136	1:2
Gambella	92,786	320	940	78	2.9:1	1:99	1:4
TOTAL	3,869,149	14,268	35,316	2,465	2:1	1:113	1:6

Figure 46

Ethiopia: Training Plan 2009

	CDDs			Community Supervisors			Health Workers		
	New	Refresher	Total	New	Refresher	Total	New	Refresher	Total
Kaffa	3282	6,024	9,306	229	373	602	22	174	196
Sheka	875	1,257	2,132	62	72	134	10	79	89
B. Maji	3185	3,135	11,509	179	257	436	20	160	180
N. Gondar	153	4,220	4,054	0	819	819	8	216	224
Illubabor	169	9,202	9,227	180	368	548	24	342	366
Jimma	460	9,492	13,713	0	339	339	8	259	267
Metekel	357	1,046	964	3	159	162	8	76	84
Gambella	331	940	1690	86	78	164	10	61	71
TOTAL	8,830	35,316	41,220	739	2,465	3,204	110	1,367	1,477

Figure 47

Ethiopia: Government Financial Contribution at Zonal Level

Zone	No. of persons treated	Total amount released from Government (USD)*	District Level	
			No of woredas	% released to the woredas
Kaffa	691,439	20,965	11	N.A.
Sheka	161,892	8,985	5	N.A.
Bench Maji	460,334	6,855	10	N.A.
North Gondar	210,604	5,325	4	N.A.
Illubabor	556,106	22,850	12	N.A.
Jimma	735,879	26,885	4	N.A.
Metekel	100,149	19,710	4	N.A.
Gambella	66,652	20,850	5	N.A.
TOTAL	**2,983,055**	**132,425**	**55**	N.A.

* Best estimate made in consultation with project staff

ACRONYMS

APOC ..... African Program for Onchocerciasis Control
arvs ..... at-risk villages (villages requiring community-wide active mass therapy)
ATO ..... Annual Treatment Objective
ATP ..... Annual Transmission Potential
BMGF ..... Bill & Melinda Gates Foundation
CBM…….. ……Christoffel Blindenmission
CDC ..... Centers for Disease Control and Prevention
CDD .....Community-Directed Distributors
CDHS .....Community-Directed Health Supervisors
CDHW ..... Community-Directed Health Workers
CDTI .....Community-Directed Treatment with Ivermectin
CHS.....Community Health Supervisor
CPA.....Comprehensive Peace Agreement
CSA..... Committee of Sponsoring Agencies
earp ..... eligible at-risk population
DEC..... diethylcarbamazine
DPD.....Division of Parasitic Diseases, CDC
DPDA ..... Drug Procurement and Delivery Agency
DRC .....Democratic Republic of the Congo
EPI ..... Expanded Program for Immunization
FGOS ..... Federal Government of Sudan
FLHF .....Front Line Healthcare Facility
FMOH..... Federal Ministry of Health
GOS ..... Government of Sudan
GOSS..... Government of South Sudan
GSK.....GlaxoSmithKline
HE .....Health Education
HQ.....Headquarters
HW ..... Health Worker
IACO ..... InterAmerican Conference on Onchocerciasis
ICT ..... Immunochromatographic Card Test (for Lymphatic Filariasis diagnosis)
IEC .....Information, Education, and Communication
IRB .....Institutional Review Board
ITN ..... Insecticide-Treated (bed) Net
JAF..... Joint Action Forum
LCIF ..... Lions Clubs International Foundation
LCCSFI .....Lions-Carter Center SightFirst Initiative
LF.....Lymphatic Filariasis
LLIN..... Long Lasting Insecticidal (bed) Net
LGA.....Local Government Area (Nigeria)
MDA ..... Mass Drug Administration
MDP ..... Mectizan® Donation Program
MEC .....Mectizan® Expert Committee
Mectizan® ..... Ivermectin (Merck & Co., Inc., product name)

MOH.....Ministry of Health
NID.....National Immunization Day
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
OV.....*Onchocerca volvulus*
PAHO ..... Pan American Health Organization
PAPN .....Post-APOC, Post-NGDO
PCC.....Program Coordination Committee of OEPA
PCR .....Polymerase Chain Reaction (test for DNA)
PHC.....Primary Health Care
PNC.....Provincial Nutrition Coordinator
PZQ..... Praziquantel
RBF .....River Blindness Foundation
RBP..... River Blindness Program of The Carter Center
REA..... Rapid Epidemiological Assessment
REMO ..... Rapid Epidemiological Mapping of Onchocerciasis
RTA.....Resident Technical Advisor
SAE.....Severe Adverse Event
SH .....*Schistosomiasis haematobium* (urinary schistosomiasis)
SSI ..... Sight Savers International
TCC..... Technical Consultative Committee of APOC
TCC..... The Carter Center
TDA.....Triple Drug Administration
TDR..... Special Programme for Research and Training in Tropical Diseases
TOT.....Trainer of Trainees
TX.....Treatments
UOEC.....Ugandan Onchocerciasis Elimination Committee
UNICEF.....United Nations Children's Emergency Fund
UTG..... Ultimate Treatment Goal
VAS..... Vitamin A Supplementation
VCD.....Vector Control Division
WHO ..... World Health Organization

ANNEX 1: SUMMARIES OF SPECIAL PRESENTATIONS AT PROGRAM REVIEW

SPEAKER SUMMARIES

(*Our gratitude to the individual speakers for providing these*)

SPEAKER SUMMARIES

1. LF Survey on Halting Treatment in Central Nigeria	Mr. Jonathan King
2. Risk of Vitamin A Adverse Reactions	Mr. Darin Evans
3. Soil Transmitted Helminthes in Southeast Nigeria	Dr. Julie Gutman
4. CDD Reports on Bed Nets in Ethiopia	Mr. Aryc Mosher
5. Laboratory Needs/Issues in the Programs	Ms. Nancy Cruz-Ortiz
6. Uganda: Progress of Onchocerciasis Elimination	Mr. Thomas Lakwo
7. The Maramagambo-Kalinzu onchocerciasis focus in western Uganda. Actual status.	Prof. Rolf Garms
8. Uganda: Imaramagambo Focus Issues: Re-emergence of Onchocerciasis?	Prof. Rolf Garms
9. Ethiopia: The New LF program in Gambella and National Mapping Update	Dr. Patricia Graves

LF Elimination in Plateau and Nasarawa States Nigeria: Preliminary results of population-based prevalence surveys and spot checks after six years of mass drug administration

Jonathan King

In partnership with the Ministry of Health, The Carter Center is supporting the elimination of lymphatic filariasis in Plateau and Nasarawa States, Nigeria. Mass drug administration (MDA) with ivermectin and albendazole for the elimination of LF was initiated in 2000 after baseline mapping demonstrated the infection was endemic in all districts. By 2002 all 30 Local Government Areas (LGAs) in the two states were receiving MDA.

To determine the impact of MDA on the prevalence of LF we conducted population-based surveys to obtain a district level estimate of LF antigenemia. We assessed the presence of circulating filarial antigen using the Binax Now Filariasis Immunochromatographic Card Test (ICT). As part of an ongoing effort to integrate neglected tropical disease elimination or control programs, surveys in 14 LGAs were integrated with trachoma mapping assessments using the recommended trachoma random cluster survey design. We kept this methodology for LF-only surveys in the remaining 16 LGAs. In each LGA, we took a systematic sample of 20 census enumeration areas or EAs from the entire list of EAs to serve as our clusters. We used maps of the EAs to divide the area into segments of equal numbers of households. All households in one randomly selected segment were surveyed. All persons over two years of age were eligible for ICT.

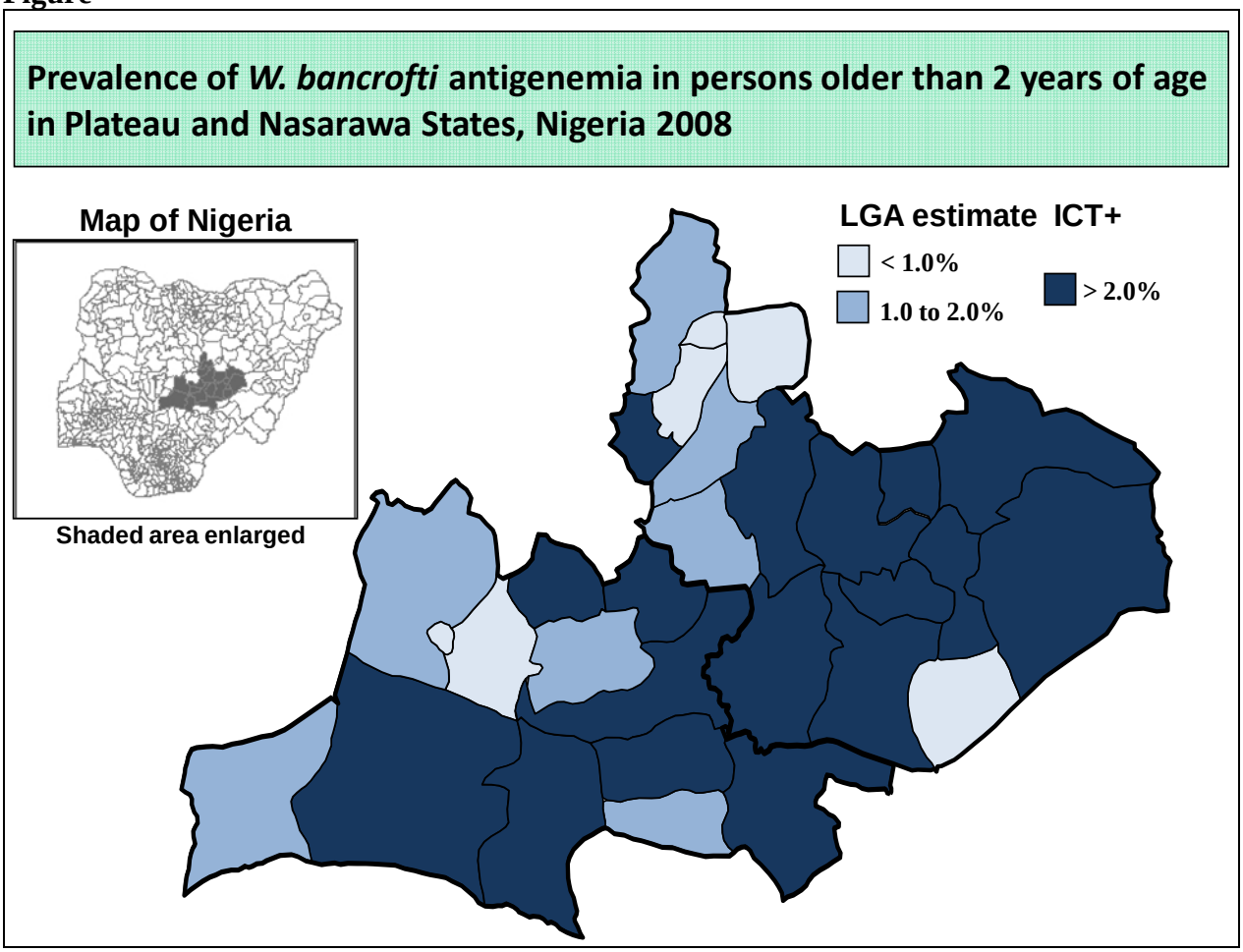
In addition, we re-assessed non-sentinel villages surveyed at baseline in LGAs where district level estimates from the integrated surveys suggested very low LF antigen infection levels. In each village, we took a random, systematic sample of approximately 34 households from a list of total households in the village. All persons over two years of age in each selected household were eligible for ICT. All persons with a positive ICT were followed-up for blood smear for mf screening.

In the cluster surveys, we examined a total of 36,139 persons with the ICT of whom 54.1 percent (19,550) were women and 16 percent (5,788) were children aged three to six years. The response rate varied between 70-75 percent of the eligible population registered. Of the registered population, 20-28 percent was not at home at the time of the visit.

Total examined per LGA ranged from 517 persons in Wase where some local conflict prevented teams from assessing all clusters, to 1,784 persons. Population-based antigen prevalence by LGA ranged from 0.2 to 16.1 percent. Overall antigen prevalence estimates were less than two percent in 13 LGAs. The number of children aged three to six years examined per LGA ranged from 49 in Wase to 307. Antigen prevalence among this age group ranged from 0-5.61 percent by LGA. There were no young children found positive in six LGAs.

The Figure below shows the prevalence of *Wuchereria bancrofti* antigenemia for all ages in the 30 LGAs in Plateau and Nasarawa States. The LGAs are shaded according to the point estimate for LGA-level antigen prevalence.

Figure



In the fifteen non-sentinel villages that were surveyed at the start of the program, LF antigen prevalence in 2000 ranged from four to 32 percent in these sites. In 2008, antigen prevalence ranged from zero to nine percent. There is a clear appearance of reduction in antigen levels over the past eight years. Currently teams are screening for microfilaria in all persons identified as antigen positive by ICT.

Findings from these surveys are consistent with sentinel site data, and demonstrate that MDA has been successful in reducing antigen prevalence, but we may not have achieved elimination in all areas. The Ministries of Health in Plateau and Nasarawa states should be commended on their efforts to implement and sustain MDA in all LGAs. With the results, we can say that at least 19 LGAs should continue MDA. Antigenemia estimates in 11 LGAs are very low and based on antigen estimates alone, six LGAs have met thresholds established by other regional LF elimination programs suggesting the potential to stop MDA. Further data collection and review of existing data is needed in five additional LGAs before considering a stop in MDA, specifically in LGAs where onchocerciasis is co-endemic.

Risks of Vitamin A Adverse Reactions

Darin Evans

After TCC Nigeria began distributing vitamin A supplementation (VAS) in Plateau and Nasarawa states in 2006 associated with our mass drug administration program with ivermectin and albendazole, the Federal Ministry of Health and UNICEF began an immunization program which also included VAS. The UNICEF campaign was only able to reach between 65 and 75 percent of the target population, leaving roughly 300,000 eligible children untreated. This number was used to justify continued efforts by TCC Nigeria to reach the remaining at risk population via a 'mop-up' VAS strategy during the MDA. Operationally, this was challenging. In addition, it also has raised concerns over the safety of VAS and the risks of treating children more frequently than the WHO-recommended six-monthly treatment, because of poorly coordinated campaigns that include VAS, or other VAS avenues (especially fixed clinics). In other countries where we assist, for example, VAS may be provided through National Immunization Days (NIDs) for children between 12-59 months and through the Expanded Program on Immunization (EPI) for children between six to 12 months. The purpose of this presentation was to clarify what these risks associated with vitamin A toxicity are and whether they warrant cessation to the TCC VAS program associated with our larger MDA programs.

Vitamin A toxicity is defined by three types of exposure: **chronic**, which is the effect of long term exposure (weeks to years) to high vitamin A intake, **teratogenic**, which is the effect of high vitamin A intake on a fetus, and **acute**, which is the effect of extremely high doses in a very short time (hours to days) and which is the concern in Nigeria.

It must be stated that little is published about vitamin A toxicity in general and acute vitamin A toxicity in particular. With the exception of a few isolated cases, what knowledge we have of acute toxicity comes largely from anecdotal case studies of chronic illness and through animal studies. The topic becomes even more complicated in areas that are vitamin A deficient, as the mechanisms of vitamin A absorption are not fully understood. WHO recommended doses in deficient areas range from four to 20 times more than the defined toxic levels (infants aged nine to 11 months 100,000 IU, children aged 12 months and older 200,000 IU).

To answer the question of whether the risks of acute vitamin A toxicity are great enough to discontinue the program, one must weigh the benefits of supplementation against the associated adverse outcomes of acute toxicity. The benefits of vitamin A supplementation are great and well documented but are beyond the scope of this short presentation. We therefore focus on adverse reactions of acute toxicity:

Acute toxicity is defined in three stages: in the early stage, symptoms are usually transient and disappear within a few days. These include nausea, vomiting, headache, vertigo, blurred vision, muscular in-coordination, and, in infants, a bulging fontanel. The second stage of toxicity is associated with extremely high doses and occurs during the following week. Symptoms include drowsiness, malaise, loss of appetite, physical inactivity, itching, skin exfoliation, and recurrent vomiting. As with the early stage, these symptoms disappear within a week or two of discontinuation. The final stage is the lethal dose and is defined, in animals, as the dose needed to kill 50 percent of the recipients. In monkeys, this is 560,000 IU per kg of weight or roughly 2.55 million IU for a 10 pound monkey. A single case of a human receiving a lethal dose has

been reported in the literature where a neonate received close to a total dose of one million IU over a period of 11 days – this was approximately 450,000 IU per kg.[3]

While the lethal dose is a worst case scenario, it is a rare enough occurrence not to raise much concern. Likewise, the effects of acute toxicity are usually transient and easily managed with proper care. According to UNICEF, a megadose of VAS is safe to give after 30 days of a previous dose (http://www.who.int/vaccines/en/vitamina.shtml#strategies). Thus, if one were to space the distribution campaign accordingly, there would be no risk of providing the supplement within the 30 days. In practice, however, this means avoiding the periods 30 days before and 30 days after another supplemental dose.

Given the overwhelming benefits of VAS (called a "miracle" drug by some) it would seem careless not to provide it given the opportunity. Carter Center assisted programs that are using VAS should take the proper precautions in planning their distribution.

Editor's Note: A recommendation made as a result of this presentation was as follows:

All Carter Center-assisted programs active in Vitamin A supplementation (VAS) have been challenged by the need to deliver VAS every six months, VAS supply chains, and other NGOs or agencies delivering Vitamin A. Above all, we seek safety, by providing WHO recommended spacing of VAS of at least thirty days when other mechanisms for VAS are active in the same areas. The Carter Center will help to 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 hold up Mectizan® distribution if VAS supplies are not readily available. We will seek to publish our experience with VAS activities.

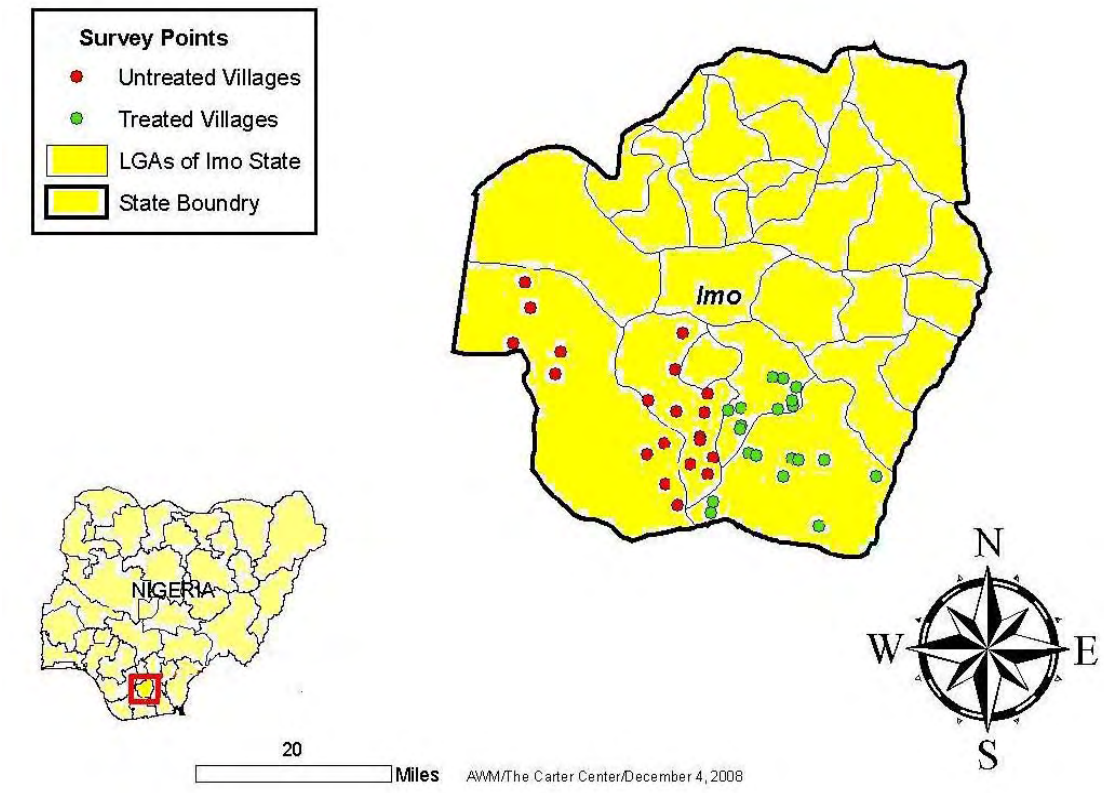
[3] In 2001, 14 children died in India after receiving VAS from a UNICEF supported program. Details are limited but health workers who had formerly used a 2ml spoon were instead given a 5ml cup which could have provided up to 230,000 IU per kg in a low birth weight baby. This case is still in proceedings. (See: Ganapat, Mudur. "Deaths trigger fresh controversy over vitamin A programme in India." *BMJ*; 323: 1206. 24 Nov 2001.)

Beneficial Effects of Annual Mass Treatment with IV for Onchocerciasis on the Prevalence of Intestinal Helminths and the Health of Children

Julie Gutman

Ivermectin (IVM) is the drug of choice for onchocerciasis. Annual IV mass drug administration (MDA) for onchocerciasis has been ongoing in Imo state, Nigeria, in 18 of 27 Local Government Areas (LGA) since 1995. Soil transmitted helminths (STH) (*Ascaris lumbricoides*, Hookworm, and *Trichuris trichiura*) also occur in this state and are likely responsible for significant morbidity among those children living in this resource poor setting. IVM has good efficacy against *Ascaris* but is less effective for treatment of *Trichuris* and Hookworm. We conducted a study of the effect of annual IVM MDA for onchocerciasis to determine the degree to which that program has added benefits against STH. The important programmatic question to be answered is whether a benzimidazole needs to be added to the onchocerciasis IVM MDA program in order to make it most effective against STH.

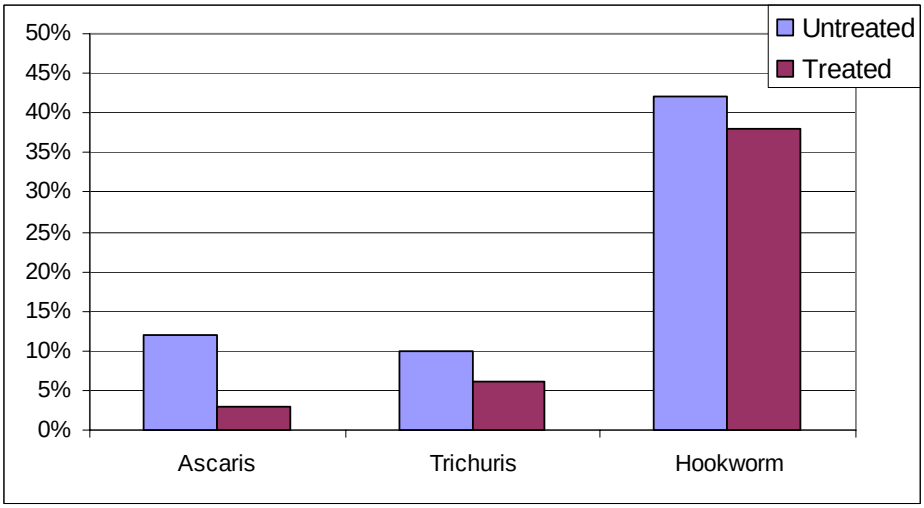
We selected 20 villages in both MDA treated and untreated LGAs, matching villages on factors likely to affect STH prevalence. At least 25 children age 10-15 were randomly selected in each of the 40 villages. A fecal specimen was collected and processed by Kato-Katz method. The numbers of *Ascaris, Hookworm,* and *Trichuris* eggs per slide were recorded. Albendazole was offered to all infected children.



1,031 children were examined; 537 from untreated and 494 from treated LGAs. There was a significant difference in the prevalence of infection with Ascaris and Trichuris in the treated vs. untreated areas; three percent vs. 12 percent ($p<0.0001$) and six percent vs. 10 percent ($p=0.012$) respectively. There was no difference in the prevalence of Hookworm infection (38 percent vs 42 percent, $p=0.20$). The geometric mean egg count per gram stool among STH positive children was also significantly higher in untreated versus treated samples for Ascaris and Trichuris, but not for Hookworm (Ascaris: 1,187 vs. 188, $p<0.0001$; Trichuris: 92 vs. 64, $p=0.01$; Hookworm: 175 vs. 169, $p=0.18$). From a community perspective, nearly all the villages required at least school based therapy for Hookworm, with six of the untreated and four of the treated villages qualifying for MDA for the entire community, based on current WHO recommendations. None of the treated villages, however, qualified for MDA for either Ascaris or Trichuris; while five and four of the untreated villages qualified for MDA for Ascaris and Trichuris, respectively. Of these, one village qualified for community wide MDA for a prevalence of Ascaris >50 percent.

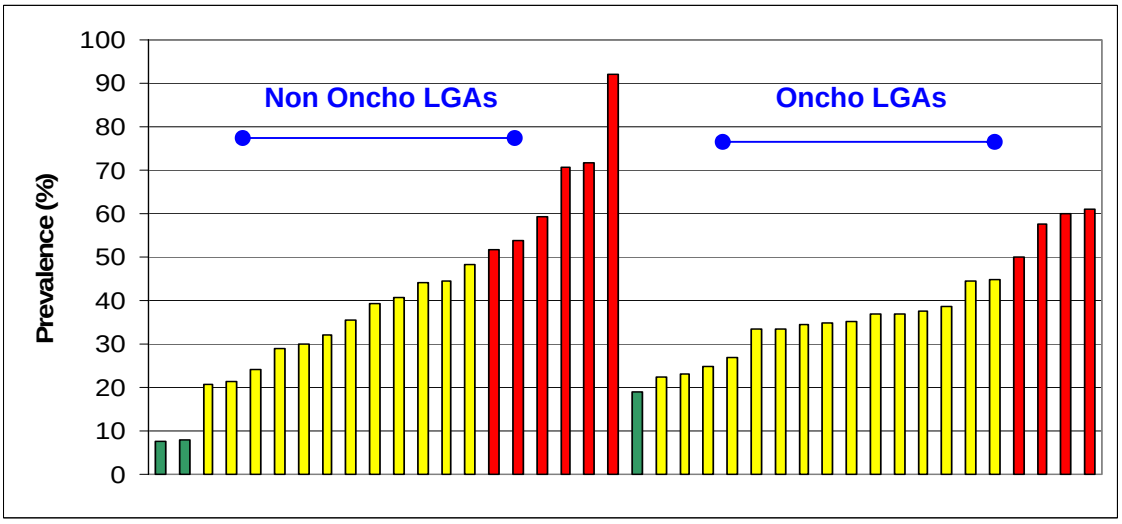
We conclude that IVM MDA for onchocerciasis reduces Ascaris and Trichuris prevalence but not that of hookworm. Benzimidazoles should be added to IVM MDA to have the greatest impact against STH.

Prevalence of STH infection among school aged children



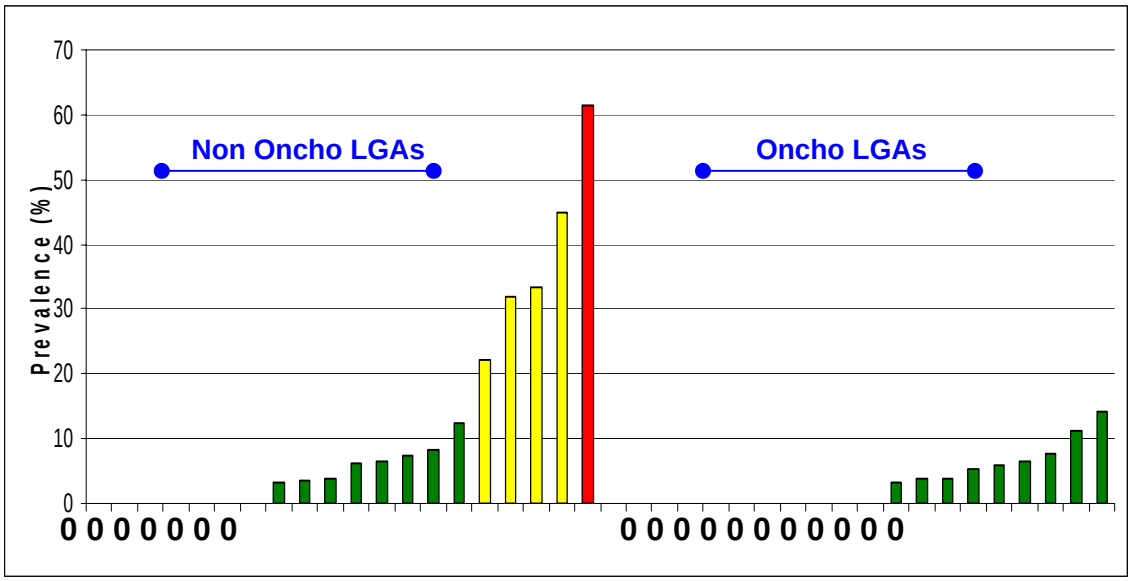
This graph above shows the prevalence of each of the soil transmitted helminth infections among school age children in treated compared to untreated villages. There was no difference among the treated and untreated groups in the prevalence of hookworm infection; however, there was a significant drop in the prevalence of infection with both ascaris and trichuris among children from treated areas. The findings were similar among the preschool aged group.

Prevalence of Hookworm infection among school aged children by village



This graph above shows the prevalence of hookworm infection by village. Per WHO recommendations, villages with prevalence ≥50 percent require twice annual mass drug administration; 20-49 percent require annual administration; and <20 percent do not require mass drug administration. There was not a statistically significant difference in the number of villages requiring Mass Drug Administration for Hookworm between treated and untreated areas.

Prevalence of Ascaris infection among school aged children by village



This graph above shows the prevalence of ascaris infection by village. The zeros represent villages with no infections. None of the villages in the treated area required MDA per WHO recommendations (treatment is required when the prevalence of infection equals or exceeds 20 percent), while five villages in the untreated areas do. This difference was statistically significant. The results for Trichuris were similar to Ascaris.

The Role of Community Directed Distributors in MALONCHO Project Areas

Aryc W. Mosher

The Carter Center initiated its Malaria Control Program following an invitation in 2006 from the Ethiopia Federal Minister of Health to join his country in addressing the need for twenty million long-lasting insecticidal nets. The Carter Center reorganized its contribution efforts in the control of trachoma and in onchocerciasis in Ethiopia so that they could be integrated with malaria control. The new organized programs are called MALTRA (malaria and trachoma) and MALONCHO (malaria and onchocerciasis). Both programs rely upon the well placed and highly organized systems to distributed drugs and health education. In the MALONCHO program, Community Directed Distributors (CDDs) are the cornerstone of this successful campaign. The efforts of CDDs can be enhanced further to increase programmatic impact.

Currently, while CDDs are registering households and determining eligibility for the distribution of Ivermectin, they are also asking households how many LLINs they have. This information is then recorded on the household registration logs. Additionally, CDDs have been trained to provide behavior change communication regarding the need for and proper use of LLIN particularly when they indentify households with LLINs which are not being used.

At the close of the 2008 program year, 93.8 percent of the villages in our program areas had household registration logs available for review. These registration logs completed by the CDDs recorded nearly 470,322 LLINs available across 11,962 villages.

2008-Ethiopia: Zonal and Regional Summaries of LLIN Ownership within CDTI areas of Oromia and SNNPR Regions (As reported on CDD Household Registration Logs)

Region	REPORTED NUMBERS FROM CDD REGISTRATION LOG BOOKS					CENSUS RESULT		CALCULATED ESTIMATES			
	Number of Zones	Number of Woredas	Number of Kebeles	Number of Villages	No. LLINs	Revised Total From CDD Registration Logs*	Pop. In Community receiving LLINs	Estimated Num HH (4.2 persons per HH)	Num. LLINs per HH	Estimates Remaining LLIN Need (Gap) **	% Pop in Malarious Areas***
Oromia	Illubabor	12	275	3,505	85,334	685,876	315,648	75,154	1.14	64,975	46.0%
Oromia	Jimma	4	125	3,734	96,627	803,583	344,624	82,053	1.18	67,480	42.9%
SNNPR	Bench Maji	10	208	1,207	143,564	627,184	467,010	111,193	1.29	78,822	74.5%
SNNPR	Kaffa	11	291	2,904	79,207	896,551	231,584	55,139	1.44	31,071	25.8%
SNNPR	Sheka	5	62	612	65,590	213,164	146,072	34,779	1.89	3,968	68.5%
Totals		**42**	**961**	**11,962**	**470,322**	**3,226,358**	**1,504,938**	**358,319**	**1.31**	**246,315**	**46.6%**

*Totals for Population, as indicated on the summary reporting forms did not equal the actual totals of Males and Females population from the reporting forms. A Revised Total was created that is the actual sum of Males and Females from the forms.

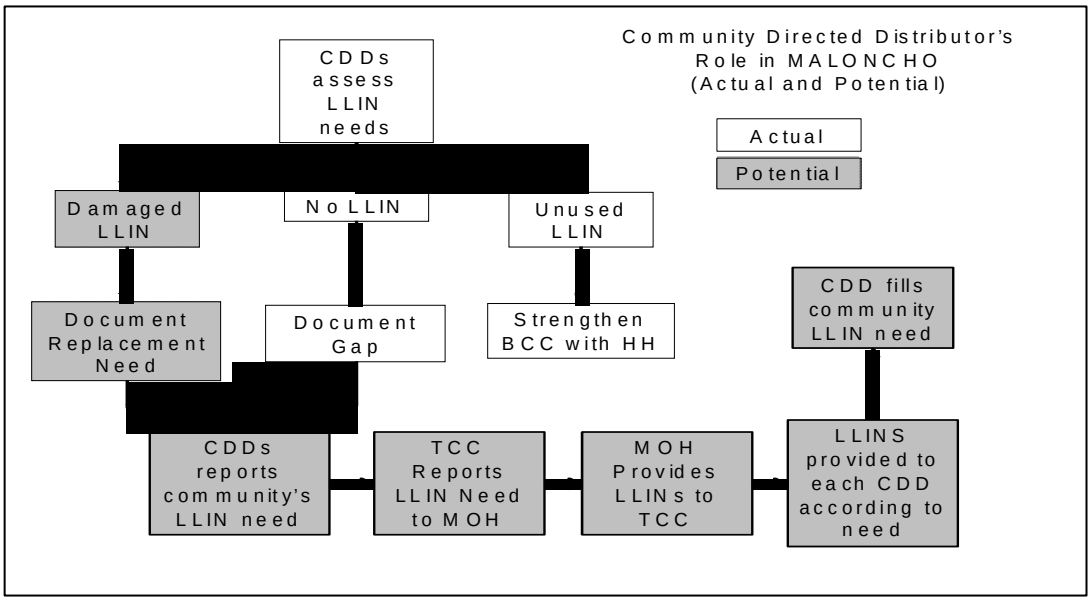
**Based National Goal of Achieveing a mean of 2 LLIN/household. These estimates are an overestimate.

***Program indicated that LLINs were only distributed to "malarious" communities.

Through additional calculations, we used the information from the registration logs to make additional estimates reflected in the table above. First, we estimated LLIN coverage per household (HH), as these data were not extracted from the CDD household registration forms. By estimating the number of persons per household as 4.2, we assumed there were 358,318 households in the 11,962 villages. Therefore 470,322 LLINs/358,318 HHs = estimated mean of 1.31 LLINs/HHs. We then estimated number of LLINs needed to fill gaps by subtracting the calculated LLIN per HH mean (1.31) from the current national LLIN target goal (a mean of two LLIN/HH) and multiplying it by the estimated number of households (358,319). In this case, our maximal number of LLINs needed to fill the "gap" would be approximately 246,000 LLINs. (This estimate would be recognized as a maximum since we used a goal of two LLIN per household rather than the official goal of a mean of

two LLIN/HH). Lastly, we estimated the percentage of population within the project area that lives in "malarious areas." As LLINs were delivered only to malarious villages, we can estimate the percentage of persons living in malarious areas at the kebele, zone or regional levels by taking the total population of communities that received LLINs at that level and dividing it by the total population of communities living at that level (communities that did and did not receive LLINs at that level). A rough estimate of the malarious population within these five zones would be calculated as: 1,504,938/3,226,358= 46.6 percent. One might use this estimate to assist with resource allocations and/or to compare it with national/local developed estimates.

While the above is useful (and increasingly so as confidence in the reported data and compliance with reporting increases), the role of the CDD can be further expanded to increase their integrative efforts in malaria and onchocerciasis control. In the chart below, the white boxes show how CDDs are currently involved with the malaria component of MALONCHO. The grey boxes are the potential areas for expansion of activities. If the household registration logs could be expanded to collect information about *damaged* LLINs along with households with *no* LLINs, the ability of CDDs to report true community LLIN need would be strengthened. Additionally, if TCC and the MOH were able to collaborate on a mechanism whereby TCC could place orders for LLINs with the MOH to fill from its national stock, TCC would then provide the distribution mechanisms to give these nets to the CDDs for pinpoint targeted household delivery. The need for both gaps and replacement net filling could be accomplished through the CDDs within CDTI areas.



In order to maximize the role of CDDs, we need to: 1) conduct a thorough review of the household registration logs, the timing and manner in which CDDs register households, assess household LLIN need, and provide behavior change messages; 2) review the upward reporting and summary of the data collected from the CDD registration logs so that information can be extracted by household, so that exact data rather than estimates of household ownership can be directly obtained (in addition to household coverage, which we are unable to calculate based on upward reporting problems); and 3) begin exploring how we can best use the collected information to assist the MOH to respond by filling identified gaps and replacement needs.

Laboratory Needs/Issues

Nancy Cruz-Ortiz

Diagnostic tools used for the elimination of onchocerciasis are:

1) Serological: detection of the antibody IgG4 to recombinant antigen OV16; this is only and exposure assay – it does not show infection to onchocerciasis.
2) Polymerase chain reaction: detection of infectious stages L3 larvae of *Onchocerca volvulus* in Simulium.

There is a need to implement these diagnostic tools in Africa. In order to do so, we have to overcome several challenges to establishing and maintaining operational diagnostic laboratories.

- Designing and Maintaining Facilities
    - Equipment should be as uniform as possible to assure the quality and consistency of the results.
    - Laboratory space should be designed for efficient work flow and to accommodate the assay. This is important to avoid contamination of the samples.
    - Power should be stable. In order to assure quality of the reagent, samples and results, the cold chain must be maintained all the time.
    - Equipment should receive the basic maintenance.

- Reagent Provision
    - The cost of shipping and buying reagents for these laboratories is high.
    - Reagents brands should always be the same to assure consistency of the results. If we change brands, assays should be re-standardized and this consumes a lot of time.
    - Each country should look into import/export regulations to find a way to buy their own reagents, so that they do not have to rely on Dr. Thomas Unnasch.

- Qualified Personnel - The laboratory should have this structure:
    - Manager of the laboratory
        - Degree in biochemistry, microbiology or related areas
        - Fully experienced in good laboratory practices (GLP)
        - Assuring quality control and correct interpretation of data
        - 100 percent dedicated
    - Technical staff
        - Basic knowledge of laboratory work
        - GLP
        - Running samples
        - Supervised by the manager of the lab

- Quality Control
    - To ensuring consistency of the results: Laboratory personnel should adhere to the protocol, use common reagents and internal standard and controls.

- To ensure that results are accurate, an independent auditor should examine the raw data, parallel analysis of matched samples, certification by analysis of blinded samples and/or retrospective analysis of archived samples.
- It is important the results are being reviewed by qualified personnel, to ensure their quality.

Progress in Vector Elimination/Control Activities in Uganda

Thomas Lakwo

Background: Uganda launched an onchocerciasis elimination campaign in 2007. This involved strategies of twice yearly treatment in selected foci supplemented with vector elimination/control using temophos (ABATE®). Five foci identified for vector elimination/control were Elgon, Kashoya-Kitomi, Wambabya-Rwamarongo, Budongo and Bwindi. Activities are ongoing in three of the foci (Elgon, Kashoya-Kitomi, Wambabya-Rwamarongo). These foci are found in what is known as the yellow zone of the Ugandan 'Oncho Flag.' We report results from two of these foci (Elgon and Kashoya-Kitomi), as well as results from Wadalai, a focus in the yellow zone where no vector activities are ongoing.

Procedures of implementation:

River prospection, crab catches and examinations, adult fly catches (expressed as flies captured per man hour—FMH) at established sites, river dosing, monitoring and supervision and epidemiological surveys in foci with no or limited data. The Carter Center is thanked for having procured 200 liters of ABATE® for the ministry of health for its vector elimination/control activities.

Results:

Kashoya-Kitomi focus: There has been tremendous reduction in crab infestation and adult flies in the established monitoring sites. In Buhindagi river system, there was reduction in crab infestation from 4.7 percent in January 2007 to 0.04 percent in December 2008. Fly density reduced from 14 FMH in 2007 to 0.27 FMH by end of 2008, and infection rate from 5.5 percent to 0 percent in 2008. In River Kitomi system, river treatment was suspended due to the vector free status that has been observed for over six months. However, focal larviciding will still be necessary in Buhindagi river system to completely eliminate the vector.

Elgon focus: This is the only focus in eastern Uganda, and is found close to the border with Kenya. There are three river systems (Namatala, Namufumbulo, Tsutsu) that used to breed *S. naevei s.s* vector. River dosing that started in January 2008 had drastic impact in vector populations by the end of the period under review. In view of this, river dosing was suspended in December 2008. Post-insecticide surveillance has been put in place.

Wadelai focus: The vector is believed to have been *S. damnosum* that seems to have disappeared due to unknown reasons. Annual ivermectin treatment started in 1993 and twice yearly treatment introduced in 2006. Impact assessment data indicate that the disease is virtually no more in the focus. This prompted the Ugandan Onchocerciasis Elimination Committee (UOEC) to move this focus from the yellow to the green zone of the elimination flag, an indication that transmission has been interrupted.

Challenges in vector elimination/control

- The tough terrain in some of the focus
- Low population of fresh water crabs
- Lack of updated identification key for the emerging new species *of Simulium*

- Damming, diversions and dumping in rivers and others associated with prospection of gold

Proposed plan for 2009

- Obtain entomological and epidemiological data for the four foci in the green zone, especially Itwara and Mpamba-Nkusi.
- Continue monitoring in Kashoya-Kitomi and Elgon foci where river dosing was suspended.
- Conduct insecticide trials in Wambabya-Rwamarongo focus.
- Collect blood spots for OV16 antibody testing from Kashoya-Kitomi, Bwindi, Imaramagambo and Itwara foci. Analyze OV16 blood spots already obtained from Elgon and Wambabya-Rwamarongo foci.
- Start prospection activities in Budongo focus in June 2009.

The Maramagambo-Kalinzu onchocerciasis focus in western Uganda. Actual status.

Rolf Garms

The Maramagambo-Kalinzu onchocerciasis focus East of Lake Edward in Bushenyi district in south-western Uganda (Fig. 1; 2) is one in a chain of about ten onchocerciasis foci along the western boundaries of Uganda with the vector *Simulium neavei* s.s. It is neighboring the Kasyoha-Kitomi focus (Fig. 1; 3), from which it is separated by a narrow mountain ridge. The focus is associated with two large forest reserves, the Maramagambo and the Kalinzu, with a total size of 580 km^2. The forests are transected by several river systems which pass through the Queen Elizabeth National Park and drain into Lake Edward. The human population lives east and south of the forests. Surveys carried out in the early 1990's by the Christoffel-Blindenmission (CBM) in 20 communities revealed nodule prevalences from 17 to 58 percent (data of the Ministry of Health), suggesting meso- to hyperendemic situations. Mass-treatments using ivermectin were already begun in 1992/1993. At present 207 villages in the district are under annual community directed treatment with ivermectin (CDTI).

The vector which has to be expected in the focus is *S. neavei*, whose larvae develop in an obligate phoretic association on freshwater crabs and hence depend on crabs, in western Uganda on the species *Potamonautes aloysiisabaudiae*. Unfortunately, the dynamics of the transmission, the distribution of the vector and its associated freshwater crabs were never assessed. It was therefore an unexpected finding that neither flies nor crabs could be collected, when Katamanywa et al. (unpublished report 2007) made a first visit to the focus in November 2007 and checked 15 sites.

Fig. 1. Onchocerciasis foci in Uganda with the vector *Simulium neavei*.

1, Bwindi; 2, Maramagambo-Kalinzu; 3, Kasyoha-Kitomi; 4, Rutete (extinct without vector control); 5, Itwara (eliminated by vector control); 6, Mpamba-Nkusi (eliminated); 7, Bugoma; 8, Wambaya; 9, Budongo; 10, West Nile I; 11, West Nile II; 12, Maracha-Terego; 13, Imatong; 14, Mount Elgon.

Our follow-up study in July 2008 (16.-31.VII.) did not confirm the complete absence of crabs. Very few crabs were caught in six out of the 45 sites which were visited within and outside the forests at altitudes from 1,000 to 1,500 m. Only six crabs (5 males, one female) from four of the sites resembled *P. aloysiisabaudiae*. The four positive sites were spread over a large area from the north to the south of the study area, which suggested that the crabs were widely distributed, but at extremely low population densities, which certainly cannot support *S. neavei* populations capable to transmit *Onchocerca volvulus*. As had to be expected, no adult *S. neavei* were seen during the study. This was in clear contrast to the situation in other foci as e.g. the Kasyoha-Kitomi (Fig. 1; 3), the Itwara (Fig. 1; 5) or the Mpamba-Nkusi (Fig. 1; 6), where large numbers of crabs can be collected at any time throughout the year.

Parallel to the entomological studies, a short parasitological survey was carried out in four villages (Kibungo, Nwenkurijo, Sherere, and Swazi). In one of them (Swazi), CBM in 1992/93 had determined a nodule prevalence of 38 percent. Skin-snips (two each) were taken from altogether 295 persons. All skin snips were microscopically negative, and there were no clinical signs of onchocerciasis.

The absence of vector flies, the virtual absence of freshwater crabs, and the apparent absence of the parasite *Onchocerca volvulus* from the human population provide evidence that there is no autochthonous transmission of onchocerciasis in the Maramagambo-Kalinzu focus.

Reasons for the (almost) disappearance of crabs, which must have been there, and consequently the absence of *S. neavei* are not clear. None of the possible reasons (ecological changes due to global warming or deforestation, pollution by chemicals used in tea plantations or epizootics caused by fungal, bacterial or viral infections destroying the crab populations) seem to be the cause. The forests look still intact, the physical and chemical characteristics as water temperatures, pH and electrical conductivities were similar to those determined in other foci. Pollution by human activities cannot be excluded but would not explain the absence of crabs from such a large area. It did not occur in other foci, which are also surrounded by tea plantations. Mass mortalities of crab and other crustacean populations due to infections have been described, e.g. from Europe (crayfish plague) and China (tremor disease of the Chinese mitten crab), but have not been reported from Africa.

According to our findings and the results of the parasitological assessments, criteria justifying a CDTI are no longer met and mass treatments may no longer be necessary. However, to be on the safe side, it is recommended that some more parasitological surveys should be carried out in further communities, preferably in those villages which were surveyed by CBM in 1992/1993. It is also proposed that some more entomological studies should be conducted at sites deeper in the forests, if possible near their western edges, where the rivers enter the Queen Elizabeth National Park. Since our standard trapping technique, the use of meat baited funnel-shape traps, mainly collects the larger and older crabs, different techniques, such as dredging, could be tried to find out whether young crabs are around, which eventually could build up a new population.

Replacement of *Simulium neavei* by *S. damnosum* s.l. Risk of a re-emergence of onchocerciasis?

Rolf Garms

Simulium neavei depends on forest or a dense vegetational cover over its breeding sites and tends to disappear after deforestation. Selective bush clearing was even successfully employed to eradicate *S. neavei* from one of the former onchocerciasis foci in Kenya. A decline or even disappearance of *S. neavei* due to deforestation has been noted along some river systems in western Uganda.

The clearest example is the former Rutete onchocerciasis focus (Fig. 1; B) where, in 1971, onchocerciasis was highly endemic with microfilaria prevalences of 55 percent and 71 percent among the villagers of Miranga and Mirongo. At that time the vector, which was *S. neavei*, had its breeding sites in the Mahoma and Nsonge rivers (J. Yocha, 1972, unpublished reports). When the focus was re-visited in 1990, *S. neavei* had disappeared and also the phoretic host of its larvae, the freshwater crab *Potamonautes aloysiisabaudiae*, had become rare. The Miranga forest on the upper Mahoma had disappeared and gallery forests along the Nsonge were largely destroyed. Already in 1992 onchocerciasis in the area had declined to 14 percent (P. Fischer et al. 1997, East Afr Med J 74, 321-5).

While *S. neavei* depends on a forested environment, some species of the *S. damnosum* complex find their preferred breeding sites in open sunlit rivers. These species can spread after deforestation, colonize former breeding sites of *S. neavei* and potentially replace it as the vector. Four species/forms of the *S. damnosum* complex are known to occur in the Ruwenzori area of western Uganda. Two of them, *S. damnosum* form "Sebwe" and *S. pandanophilum*, are merely zoophilic. While "Sebwe" has a wide distribution in rivers draining from the Ruwenzori mountains, *S. pandanophilum* is a forest species which often occurs together with *S. neavei*. Also, the form "Nkusi" is regarded as mainly zoophilic, feeding on cattle, but occasionally it also feeds on man. In contrast, *S. kilibanum* (= *S. damnosum* form "Nyamagasani") is highly anthropophilic. Formerly, this species was widely distributed along the Ruwenzori mountains in rivers Lubilia/Tako, Nyamagasani, Sebwe, Mubuko and Ruimi and a vector of onchocerciasis. First attempts by using the larvicide DDT to alleviate the intolerable biting nuisance caused by *S. kilibanum* at the Ruimi river prison farm were begun in 1963. Later, from 1969 to 1977, measures were extended to the whole Ruwenzori focus and became a highly successful vector control project. Biting densities could be reduced from 100 to 200 flies per man/hour to practically zero (reviewed by A. Krueger et al. 1999, Trop Med In .Health, 4, 819-826).

When, after 1990, the vector situation in the focus was reassessed, *S. kilibanum* had disappeared from most river systems but remained a vector of onchocerciasis and a biting nuisance on the Lubilia-Tako river system along the Uganda-Congo border, now the Kasese focus (Fig. 1, A). It was alarming that parts of the Mahoma and Nsonge rivers in the Rutete onchocerciasis focus (Fig. 1, B), which was not part of the Ruwenzori vector control project, had now been colonized by a genetical form of *S. kilibanum*, which became a serious biting nuisance. It had to be clarified whether *S. kilibanum* eventually had replaced *S. neavei* as a vector of onchocerciasis. Large numbers of flies were caught and dissected from 1991 to 1995 and again 10 years later from 2003 to 2005 (Table 1). In the early 1990's, low infection rates were still observed with just

one infective larva in the head of 1,000 parous flies, which was in agreement with the low infection rate in the human population. Ten years later, no infective flies were seen anymore. Hence, there was no evidence that *S. kilibanum* became a vector in the Mahoma and Nsonge area, since it was first found there in 1990. In contrast; in the Kasese onchocerciasis focus, where the transmission was studied from 1991 to 1996, more than 14 percent of the parous females harboured developing larvae of *O. volvulus* and 34 infective larvae were estimated for 1,000 parous flies (Table 1).

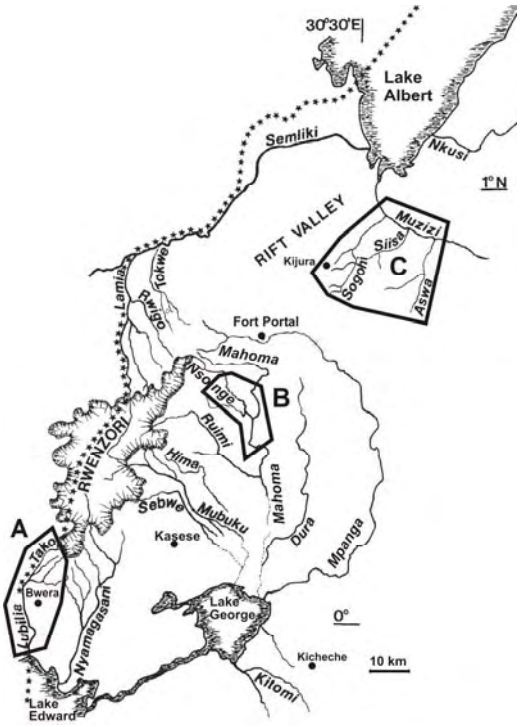


Fig. 1 Distribution of man-biting species of the *Simulium damnosum* complex in western Uganda.
A. *Simulium kilibanum* man-biting and vector of onchocerciasis on Lubilia and Tako rivers in Kasese focus.
B. *Simulium kilibanum*. A biting nuisance on the Mahoma and Nsonge rivers in the former Rutete focus, where *S. neavei* disappeared due to deforestation.
C. *Simulium damnosum* form "Nkusi". Zoophilic, occasionally man-biting on the Sogohi, Siisa and Aswa rivers in the Itwara focus, where *Simulium neavei* was eliminated by vector control.

In order to alleviate the biting nuisance experimental treatments using the larvicide temephos (ABATE®) were conducted in 1992. Results were promising. Later, in 2004, a plan was developed to control *S. kilibanum* in the whole focus. Since this form has a limited distribution the effect of control measures could be long-lasting. Elimination should to be possible.

Table 1. Infection and infectivity rates of *Simulium kilibanum*, numbers L3 in heads (L3 H) of 1,000 parous flies in former Rutete onchocerciasis focus (1991-1995, 2003-2005), and in Kasese focus 1991-1996.

Period	No. caught	No. parous	% parous	No. parous dissected	% parous with L1/L2	% parous with L3 H	No. L3 H in 1,000 parous
Former Rutete focus							
1991-1995	16,078	5,436	37	4,791	2.32	0.04	1
2003-2005	3,391	1,412	42	1,412	0.21	0.00	0
Kasese focus							
1991-1996	5,298	1,714	34	1,706	14.6	0.80	34

The “Nkusi” form of *S. damnosum* is zoophilic but occasionally also feeds on man, in particular when cattle are around, as first noted in 1991 on the lower Sogohi river in the Itwara focus (Fig.

1; C). After *S. neavei* had been eliminated from the focus in 2003 and due to increasing human activities, gallery forests were destroyed. Higher numbers of Nkusi were also caught near the Siisa and Aswa rivers. So far, none of the few infections detected in “Nkusi” could be identified as *O. volvulus*. They probably were not of human origin.

It can be concluded that species of the *S. damnosum* complex did not become vectors in foci where *S. neavei* disappeared due to deforestation (Rutete) or had been eliminated by vector control (Itwara).

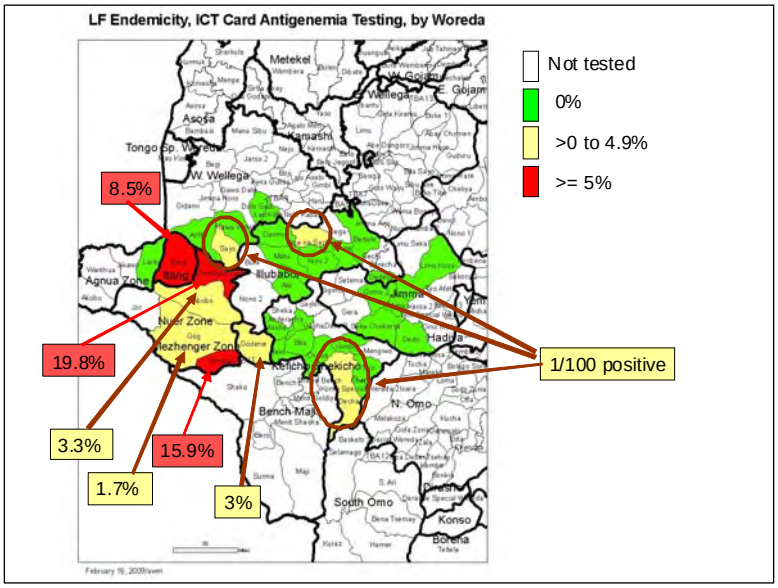
Ethiopia: the new LF program in Gambella and national mapping update.

Patricia M Graves

Lymphatic filariasis (LF) caused by *Wuchereria bancrofti* and transmitted by *Anopheles* mosquitoes has long been known to exist in Ethiopia, especially in the western lowlands. However the exact distribution and prevalence is unknown. If LF is present in CDTI areas, it would be relatively straightforward to add albendazole mass drug administration to the current ivermectin distribution, in order to eliminate LF (with support from GSK). The large numbers of long lasting insecticidal nets distributed in Ethiopia during the last three years may also help the LF elimination effort.

During 2008, The Carter Center supported LF mapping in Ethiopia under subcontract to investigators at Addis Ababa University led by Dr. Asrat. A total of 126 woredas (districts) in Gambela, Oromia, SNNPR, Benishangul Gumuz and Amhara region thought to be at risk of LF were targeted for mapping, of which 52 are in CDTI areas covered by The Carter Center.

Figure X: Results of mapping in 2008



Mapping was done using a rapid antigen detection (ICT) test on fingerprick blood taken during the daytime. In each district, at least one site was randomly or purposely selected with a goal of sampling 100 persons per site.

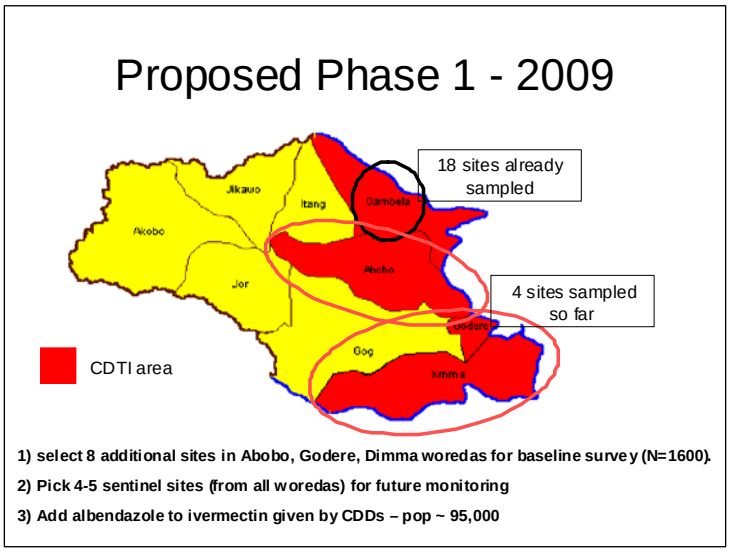
To date, 46 woredas have been sampled (N=5,256 persons tested), of which 32 are in TCC CDTI areas (61.5 percent completion of CDTI woredas). Figure X shows the percentage positive in each woreda tested to date. The percent of persons positive by ICT for LF antigen was 3.3 percent (4.3 percent in CDTI areas). The great majority of positives were found in Gambela region: 16.1 percent of persons were positive out of 1037 tested. Six out of the seven woredas tested in Gambela (including all four of the current CDTI woredas) showed greater than one percent prevalence and are therefore eligible for LF mass drug administration. Outside Gambela region, three woredas (two in Oromia region in Illubabor and West Wellega zones; one in SNNPR in Kaffa zone) had one positive out of 100 persons tested.

In seven sites in Gambela town woreda, both ICT and night blood tests for microscopic detection of microfilariae (Mf) in blood were done. The overall results showed 30.8 percent prevalence by ICT (N=370) and 23.5 percent prevalence by Mf (N=268), although there was large variation by woreda and the results are still being analyzed.

The mapping in the remaining 20 CDTI woredas and the remaining other woredas is in progress. In addition, checking of additional sites in the three woredas showing 1/100 positive is recommended to confirm that they are endemic.

Based on these results and the fact that mapping of Ethiopia as a country if far from being fully completed, a phased approach to introduction of a national elimination effort based on mass distribution of ivermectin and albendazole has been undertaken, starting with Gambella.

Figure Y: Introduction of albendazole MDA in CDTI areas of Gambella Region



Phase 1 would be the four current CDTI woredas in Gambela region, shown in Figure Y. (Note that Godere woreda has recently split into two).

Before MDA commences, it is recommended that an additional eight sites in Abobo, Godere and Dimma woredas be sampled in 2009 to provide a representative baseline prevalence. Sentinel sites (4-5) should then be selected for monitoring.

Ideally, albendazole will be introduced in these four woredas in 2009 in conjunction with ivermectin. Approval and supply of the drug is being requested. The population to be covered is about 95,000.

The selection of additional woredas for Phase 2 starting in 2010 will depend on the following:

1) Completion of mapping of remaining woredas
2) Checking additional sites in three woredas in Oromia and SNNPR
3) If no more CDTI woredas are found to have LF, consideration of adding LF positive, non-CDTI woredas in Gambela (Gog and Itang) if security permits
4) Liaison with other organizations planning LF MDA in Ethiopia
5) Obtain additional funding for the Ethiopian program

Acknowledgements:
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Dr. Tebebe for storage of ICT tests
GSK for support and future albendazole

ANNEX 2: 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 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, 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 are long-lived (between five and 15 years). Female worms release embryonic stage offspring called microfilariae that emerge from the nodules. The microfilariae swarm under the skin and can enter the eyes, where they cause inflammation and ocular damage. The transmission cycle is carried on as these microfilariae are picked up, metamorphasize 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. When transmission falls below a critical threshold, worm populations cannot be sustained.

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, 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 620 million treatments valued at more than three quarters of a billion U.S. dollars during the 20 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.

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 RBP was

established at The Carter Center to assume the field activities of the RBF. The primary aim of the RBP is to help residents of affected communities and local health workers establish and/or sustain optimal Mectizan® distribution and related health education (HE) activities and to monitor that process. Currently, we assist parts of five countries in Africa: Cameroon, Ethiopia, Nigeria, Sudan and Uganda. The Carter Center RBP also includes 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).

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.

In 2006, projects in Sudan (Khartoum office) and Uganda launched elimination strategies. In Sudan, the strategy targets Abu Hamad focus in River Nile state only. 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 2008 marked the fifth year in which the program helped to treat more than 10 million people.

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. These additional interventions include albendazole distribution for intestinal helminths and lymphatic filariasis, Vitamin A distribution and the battle against malaria. Please see each country's section for individual reports.

Partnerships: The Carter Center works through partnerships, with our primary partners being the Ministries of Health (MOHs) and their national onchocerciasis control programs. The Carter Center assists programs that are executed within and through the

indigenous primary health care system. The Carter Center and MOH staff work closely with most workers and the afflicted rural communities, and the Center provides technical assistance and assists in information, education, and communication (IEC). A 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), where Carter Center technical staff members of the RBP are housed. The Carter Center also works closely with the MDP at the Task Force for Global Health, and is represented on the MEC.

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 Worldwide, 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 aims to establish by the year 2015, "community-directed" river blindness treatment programs throughout highly endemic onchocerciasis areas in Africa. Carter Center disease control experts Dr. Donald Hopkins, Dr. Frank Richards, and Dr. Moses Katabarwa all have served on the Technical Consultative Committee of APOC.

Partners in the Americas Programs: The Carter Center provides the administrative framework for the Onchocerciasis Elimination Program for the Americas (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 the Lions Clubs International Foundation (LCIF), Pan American Health Organization (PAHO), CDC, and several U.S. and Latin American universities. Since 2003, the Bill & Melinda Gates Foundation has been an important partner in the regional initiative to the national programs. Merck & Co., Inc., provides Mectizan® and financial support to OEPA.

ANNEX 3: MONITORING SUSTAINABILITY AND COSTS AFTER WITHDRAWAL OF CORE FUNDING BY THE AFRICAN PROGRAM FOR ONCHOCERCIASIS CONTROL (APOC)

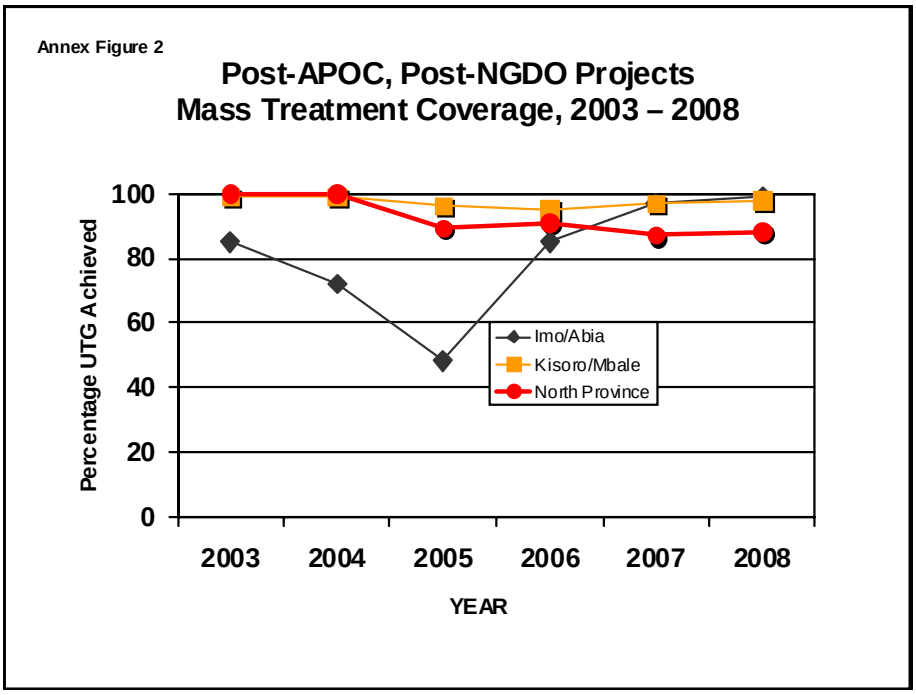
The African Program for Onchocerciasis Control (APOC), which administers a large World Bank trust fund for onchocerciasis, has markedly reduced World Bank support to Carter Center-assisted African onchocerciasis projects. The Carter Center RBP and its national partners enjoyed APOC support for 18 Carter Center-assisted river blindness projects in Africa, all of which have completed their five year cycle of APOC core support and are no longer receiving APOC Trust Fund support for delivery of Mectizan®. Four Ethiopian RBP projects wrapped up their last year of APOC core support in late 2008. Several RBP projects continue to receive support for special initiatives, but no longer depend upon support from APOC for implementation (field) activities such as community mobilization, health education, supervision, monitoring, data collection and reporting. Although this should be the responsibility of government, a common theme in our experience has been insufficient national funding of APOC projects.

Annex Figure 1: 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
* First year with APOC was 2004, but Carter Center became NGDO partner in 2005			

As a result of the APOC pull-out, a 'post-APOC funding gap' was established, with added funding demands being placed on The Carter Center RBP and government. The RBP continues to monitor the situation carefully, collecting and refining government and Carter Center funding figures, including any additional funds provided through APOC; monitor trends for increased funding, especially as related to how The Carter Center might be asked to fill the 'post-APOC funding gap.' The RBP is monitoring UTG coverage in years post-APOC as well (Table). The ultimate goal is to see Mectizan® delivery handed over to the full fiscal responsibility of the national, state, and local governments.

Annex Figure 2



ANNEX 4: THE CARTER CENTER RBP REPORTING PROCESSES

At-risk Villages (arvs): An epidemiological mapping exercise is a prerequisite to identifying at-risk villages (arvs) for mass Mectizan® treatment programs. The assessment techniques used in the mapping exercise in Africa vary from those used in the Americas. An overview of the two approaches follows.

In much of Africa, a staged village sampling scheme called Rapid Epidemiological Mapping of Onchocerciasis (REMO) is recommended by the WHO to define endemic "zones" that should capture most or all villages having onchocercal nodule rates $\geq$ 20 percent (and microfilariae in skin prevalence $\geq$ 40 percent) for mass treatment. The mapping strategy is based on studies that have shown that most morbidity from onchocerciasis occurs in villages where the nodule prevalence exceeds 20 percent. In the first stage of REMO, survey villages are selected from areas that are 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 '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.

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. 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.

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 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 PCC in its regular meetings. Ministries of Health report their results annually to WHO and (in Africa) to 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.

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 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.

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 over 90 cm. in height and in good health). Although RBP mass treatment activities exclude pregnant women, these women may 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.

ANNEX 5: THE NIGERIA LYMPHATIC FILARIASIS (LF) ELIMINATION AND URINARY SCHISTOSOMIASIS CONTROL INITIATIVES

Lymphatic filariasis (LF) in Africa is caused by *Wuchereria bancrofti*, a filarial worm that is transmitted in rural and urban areas by *Anopheline* and *Culex sp*. mosquitoes, respectively. The adult worms live in the lymphatic vessels, and cause 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. 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 (eMerck), 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 main goal of the 1997-2001 Nigeria National Plan of Action on Schistosomiasis Control was to reduce the prevalence of the disease by 50 percent within five years using praziquantel, but few treatments were given because of the expense of the medicine.

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 and schistosomiasis control programs in Plateau, Nasarawa and Delta states (See maps in Nigeria section). The national programs are actively involved in The Carter Center-assisted program. For LF, 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®.

For schistosomiasis, the strategy is similar: HE and mass annual treatments with the oral drug 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),[123] 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 PZQ (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, PZQ was purchased through a generous grant from the Izumi Foundation and support from individual donors. The schistosomiasis program in the southeast continues to receive funding for PZQ and program support in Delta State from the Izumi Foundation, while exploring program expansion to other Carter Center–assisted states in the southeast.

This 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 a recent Carter Center-supported study which 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-aged children 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 (See Gutman et. al. in Appendix 6).

ANNEX 6: PUBLICATIONS AUTHORED OR COAUTHORED BY RBP PERSONNEL

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Dr. Zerihun Tadesse – Ethiopia
Mr. Abate Tilahun Habtemariam – Ethiopia
Dr. Mauricio Sauerbrey – Guatemala (OEPA)
Dr. Abel Eigege – Nigeria
Dr. Emmanuel Emukah – Nigeria
Dr. Emmanuel Miri – Nigeria
Dr. Nabil Aziz Mikhail Awad Alla - Sudan
Ms. Peace Habomugisha – Uganda

Country Representatives

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Dr. Tong Chor Malek Deran – Sudan
Dr. Thomas Lakwo – Uganda

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Ms. Nancy Cruz-Ortiz – Centro de Estudios en Salud, Guatemala
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Dr. Adrian Hopkins – Mectizan® Donation Program
Mr. Kisito Ogoussan – Mectizan® Donation Program
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ANNEX 9: AGENDA

Day 1: Monday February 16, 2009

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: 2008 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 – 12:30 12:30 – 12:45	LF Survey on halting treatment in central Nigeria *Discussion*	Mr. Jonathan King
12:45 – 1:45	***Lunch***	
1:45 – 2:00 2:00 – 2:15	Mectizan® Issues *Discussion*	Dr. Adrian Hopkins
2:15 – 2:45 2:45 – 3:00	Uganda presentation *Discussion (Comments by Dr. Thomas Lakwo)*	Ms. Peace Habomugisha
3:00 – 3:30 3:30 – 3:45	Ethiopia presentation *Discussion*	Mr. Teshome Gebre
3:45 – 4:00	***Coffee Break***	
4:00 – 4:30 4:30 – 4:45	Sudan presentation *Discussion*	Dr. Tong Chor Malek
4:45 – 5:15 5:15 – 5:30	Cameroon presentation *Discussion*	Dr. Albert Eyamba
5:30	***Session Adjourned*** ***Shuttle departs for hotel***	

Day 2: Tuesday February 17, 2009

8:00	***Shuttle pickup at hotel***	
8:30 – 9:00	***Continental breakfast***	
Part 2: Sustainability through Integration and Kinship Systems in Africa, Monitoring of the 13 foci 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 – 10:30 10:30 – 10:45	Nigeria presentation (Plateau and Nasarawa Gates integration activities) Risk of Vitamin A adverse reactions *Discussion*	Dr. Abel Eigege Mr. Darin Evans
10:45 – 11:00	***Coffee Break***	
11:00 – 11:30 11:30 – 11:45	Nigeria presentation (Southeast Gates integration activities) *Discussion*	Dr. Emmanuel Emukah
11:45 – 11:55 11:55 – 12:00	Soil transmitted helminthes in southeast Nigeria *Discussion*	Dr. Julie Gutman
12:00 – 12:30 12:30 – 12:45	OEPA presentation *Discussion*	Dr. Mauricio Sauerbrey
12:45 – 1:45	***Lunch***	
1:45 – 2:15 2:15 – 2:30	Ethiopia presentation *Discussion*	Mr. Teshome Gebre
2:30 – 2:40 2:40 – 2:45	CDD Reports on Bed nets in Ethiopia *Discussion*	Mr. Aryc Mosher
2:45 – 3:15	***Coffee Break and Group Photo***	
3:15 – 3:45 3:45 – 4:00	Uganda presentation (with laboratory issues) *Discussion*	Ms. Peace Habomugisha
4:00 – 4:10 4:10 – 4:15	Laboratory issues in Sudan *Discussion*	Dr. Tong Chor Malek
4:15 – 4:45 4:45 – 5:00	Laboratory needs/issues in the programs *Discussion*	Ms. Nancy Cruz-Ortiz Dr. Tom Unnash
5:00 – 5:15 5:15 – 5:30	Nigeria: TDA and Trachoma plans for 2009 *Discussion (Comments by Dr. Richards)*	Dr. Abel Eigege
5:30	***Session Adjourned*** ***Shuttle departs for hotel***	

Day 3: Wednesday February 18, 2009

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	Advancing elimination in OEPA: Doxycycline, 4x/year treatment in Mexico *Discussion (Comments by Dr. Richards)*	Dr. Mauricio Sauerbrey
9:50 – 10:20 10:20 – 10:35	Uganda: Progress of onchocerciaisis elimination *Discussion (Comments by Dr. Katabarwa)*	Mr. Thomas Lakwo
10:35 – 10:50	***Coffee Break***	
10:50 – 11:20 11:20 – 11:35	Uganda: Imaramagambo focus issues, and Replacement of *S. neavei* by *S. damnosum:* re-emergence of onchocerciasis? *Discussion*	Prof. Rolf Garms
11:35 – 11:50 11:50 – 12:05 12:05 – 12:20	Ethiopia: the new LF program in Gambella, and national mapping update Proposed hypoendemic onchocerciasis study *Discussion (Comments by Mr. Gebre)*	Dr. Patricia Graves Dr. Moses Katabarwa
12:20 – 1:15	***Lunch***	
1:15 – 1:45 1:45 – 2:00	Cameroon: Does transmission take place in hypoendemic areas for oncho? A study in North Province *Discussion (Comments by Dr. Katabarwa)*	Dr. Albert Eyamba
2:00 – 2:15 2:15 – 2:30	Oncho modeling with STELLA *Discussion*	Dr. Bob Unnasch
2:30 – 2:45	***Coffee Break***	
2:45 – 3:15 3:15 – 3:30	Nigeria: SE bednet coverage survey, schisto rotation scheme *Discussion (Comments by Dr. Richards)*	Dr. Emmanuel Emukah
3:30 – 4:30	Summary and Closure of Thirteenth Session	Dr. Don Hopkins Dr. Frank Richards
4:30	***2008 Carter Center River Blindness Program Review Adjourned*** ***Shuttle departs for hotel***	

ANNEX 10: ACKNOWLEDGEMENTS

The River Blindness Program in Atlanta would like to sincerely thank the following individuals for their help in planning the Program Review and the preparation of these Proceedings:

All special presenters who prepared a summary of their talks for the annex section of this document: Ms. Nancy Cruz-Ortiz, Mr. Darin Evans, Mr. Jonathan King, Prof. Rolf Garms, Dr. Patricia Graves, Dr. Julie Gutman, Mr. Thomas Lakwo and Mr. Aryc Mosher

Ms. Rebecca Brookshire, Ms. Kelly Callahan, Ms. Elizabeth Cromwell, Ms. Michele Cullom, Ms. Maureen Goodman, Ms. Deborah Hakes, Ms. Madelle Hatch, Ms. Lauri Hudson-Davis, Ms. Molly Howard, Ms. Patsy Irvin, Ms. Martha Lucas, Ms. Faith Randolph, Ms. Lindsay Rakers, and Mr. Randy Slaven. We would also like to send a special thanks to all the presenters, and to Ms. Jackie Culliton and the many Carter Center volunteers.

"More precious than a diamond."

Former U.S. President Jimmy Carter, speaking about Mectizan® tablets that prevent river blindness (Annual Report, 2001-2002).