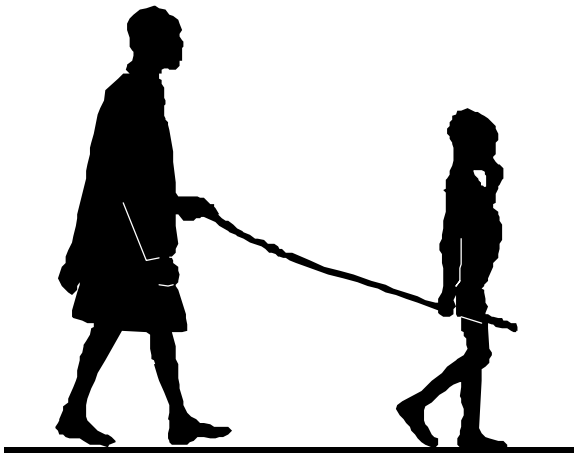

Summary
2002 Program Review for The Carter Center/Lions SightFirst
River Blindness Programs
Cameroon, Ethiopia, Nigeria, OEPA, Sudan, and Uganda
26-28 February, 2003
The Carter Center
Atlanta, GA

THE CARTER CENTER
River Blindness Program

LCIF
LIONS CLUBS INTERNATIONAL FOUNDATION

March 27, 2003

Donors to The Carter Center River Blindness, Lymphatic Filariasis, and Schistosomiasis Programs

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Turner Foundation, Inc.
U.S. Agency for International Development
Bruce Wahle
Thomas and Nell Waltz
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The World Bank

And to many others, our sincere gratitude

Figure A

Onchocerciasis:
Evolution of treatment coverage by country in the Americas 1999-2002

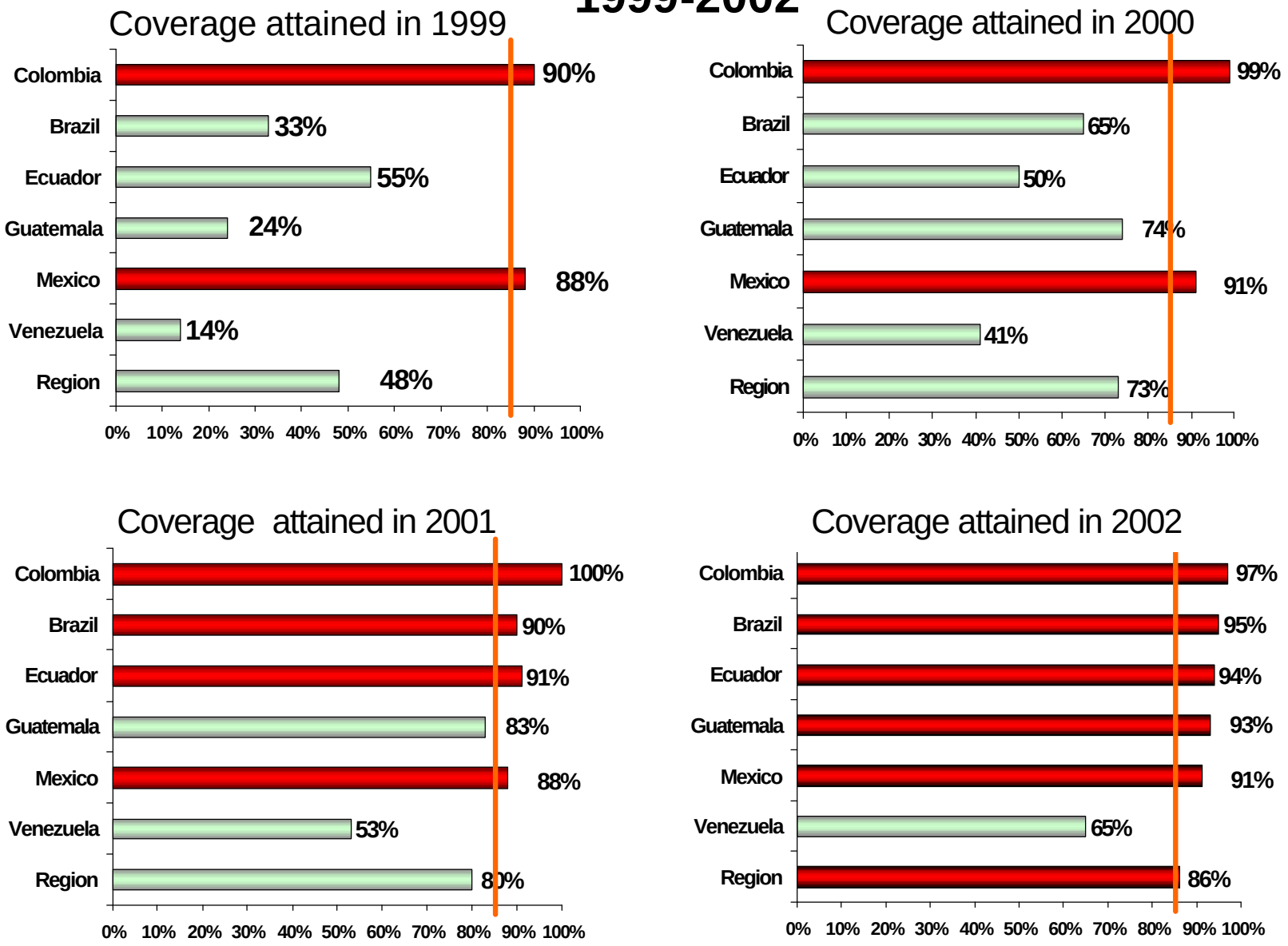


Figure B

Onchocerciasis:

Impact of Mectizan Treatment on Visual Acuity (Counting fingers at three meters): Decreasing prevalence of Poor Vision in 6 Endemic Villages in Imo State, Nigeria after Seven Years of Mass Treatment

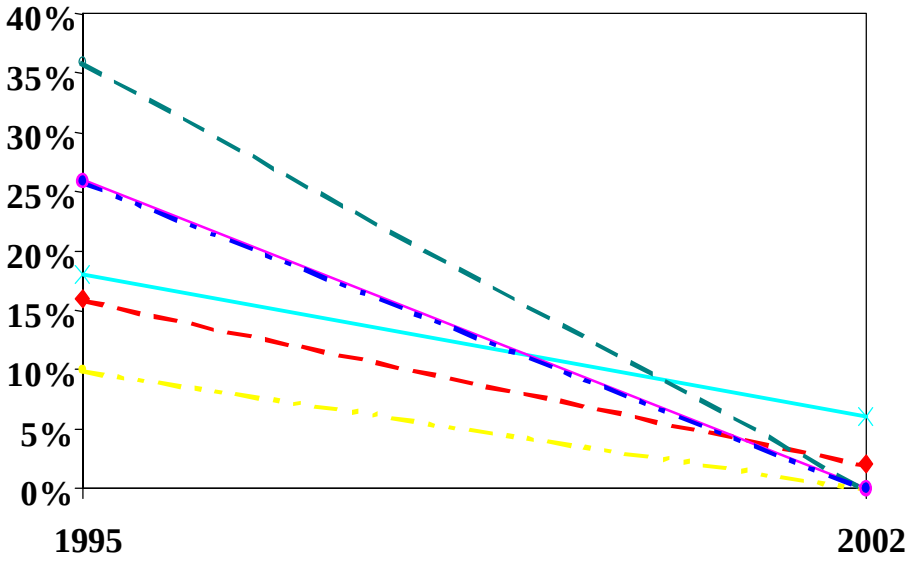
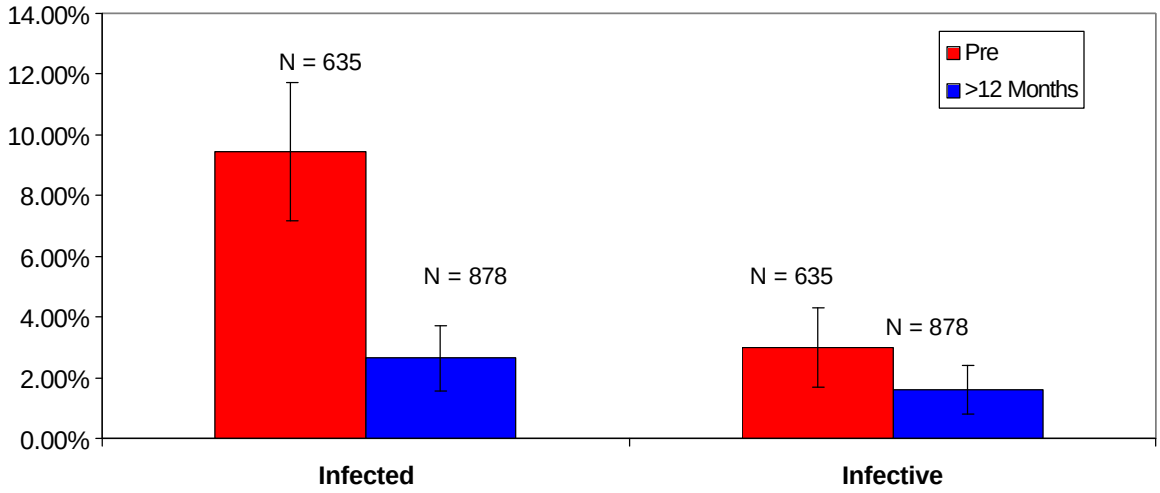


Figure C

Lymphatic Filariasis:

Mosquito infection and infectivity rates* in Plateau and Nasarawa States, Nigeria: Baseline and after at least 12 months of MDA with Ivermectin and Albendazole Treatment (Bars show 95% confidence intervals)



*Based on field dissections of freshly caught *Anopheline* mosquitoes during the period 1998-2002. 'Infection' is any *W. bancrofti* larval stage (but not mf) detected. Infectivity is detection of L3 stages only.

TABLE OF CONTENTS

INTRODUCTION AND OVERVIEW

The Global 2000 River Blindness Program (GRBP) of The Carter Center collaborates with the ministries of health of 11 countries (Map 1), maintains field offices in Guatemala, Cameroon, Nigeria, Sudan, Kenya, Ethiopia, and Uganda, and belongs to international coalitions that include the U.S. Centers for Disease Control and Prevention (CDC), the World Health Organization (WHO), The World Bank, the Inter-American Development Bank (IDB), Merck & Co., Inc., international bilateral donors, and other nongovernmental development organizations (NGDOs). Special GRBP partners include the Lions Clubs International Foundation (LCIF), and the African Program for Onchocerciasis Control (APOC). In October 1999, The Carter Center and Lions Clubs announced the Lions-Carter Center Sight First Initiative to increase our collaboration in the global effort for onchocerciasis control, including the establishment of a new river blindness control program in Ethiopia. See Annex 1 for background information on Carter Center activities.

The GRBP hosted its seventh annual Program Review on February 26-28, 2003, at The Carter Center in Atlanta, Georgia. 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. The main purposes of the review, which was chaired by Dr. Donald Hopkins (Associate Executive Director for Health Programs, The Carter Center), were to assess the status of each program and to determine impediments and problems in program implementation. This year, the African programs also focused on prospects for post-APOC funding and activities. The Nigerian program also reported on the pilot initiative for combining lymphatic filariasis elimination and schistosomiasis control with onchocerciasis control activities in Plateau and Nasarawa States. Key aspects of the discussions are summarized in this report.

Participants (Annex 2) included GRBP country representatives Dr. Albert Eyamba (Cameroon), Mr. Teshome Gebre (Ethiopia), Dr. Moses Katabarwa (Uganda), Dr. Emmanuel Miri (Nigeria), Dr. Mauricio Sauerbrey (Onchocerciasis Elimination Program for the Americas [OEPA]), Mr. Mark Pelletier (Sudan/Khartoum), Ms. Kelly Callahan (Sudan/Nairobi), as well as Prof. Mamoun Homeida, (Chairman, National Onchocerciasis Task Force [NOTF], Sudan), and Global 2000 Atlanta headquarters staff. Special guests included Ms. Rebecca Teel-Daou (LCIF), Dr. Mark Eberhard (Acting Director, Division of Parasitic Diseases [DPD], CDC), Dr. Frank Richards (DPD, CDC) Dr. Steve Blount (Director of Global Health, CDC), Mr. Ross Cox (Deputy Director of Global Health, CDC), Dr. Ed Cupp (Professor of Entomology, Auburn University, Auburn, Alabama), Dr. Tom Unnasch (Professor of Immunology, University of Alabama at Birmingham), Dr. Bjorn Thylefors (Director, Mectizan® Donation Program), Dr. Charles Mackenzie (Professor of Pathology, Michigan State University), and Ms. Catherine Cross (Director, Overseas Programs, SightSavers International), among other observers. See Annex 3 and 4 for a complete contact list and the agenda of this meeting.

Infection with the vector-borne parasite *Onchocerca volvulus* (causing human onchocerciasis) is characterized by chronic skin and eye lesions. The World Health Organization estimates that at least 17.7 million people are infected and 770,000 are blinded or severely visually impaired in the 37 endemic countries. Approximately 123 million people live in endemic areas worldwide and are therefore at risk of infection; over 95% reside in Africa. 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." Periodic mass treatment with Mectizan prevents eye and skin disease caused by *O. volvulus.*

A major focus of GRBP is on routine reporting by assisted programs. The reader is referred to Annex 5 for a discussion of the GRBP reporting process, and for treatment indices used by the program and in this report. Important terms include the number of treatments provided (TX), the Ultimate Treatment Goal (UTG), twice the UTG (UTG[2]), Annual Treatment Objectives (ATO), eligible at-risk population (earp), at-risk villages (arvs), and full coverage (defined as 85% achievement of the UTG, or for OEPA, the UTG[2]).

In 2002, the GRBP assisted in providing a total of 8,964,429 treatments for onchocerciasis (Table 1 and Figure 1). This constituted 90% of the Ultimate Treatment Goal in the assisted areas (Figure 2), and brought the cumulative number of treatments assisted by the Program since its inception in 1996 to 45,390,366. As before, a majority (57%) of treatments were provided in Nigeria (Figure 3). Nearly all treatments (97%) were supported by LCIF (See Figure 4). See Figure 5 for average cost per treatment in Cameroon, Nigeria, Sudan, and Uganda.

In the Americas, the goals are to eliminate clinical manifestations of onchocerciasis by 2007, and to interrupt transmission of the disease altogether. Mass Mectizan treatments are given twice per year. Overall coverage improved from 80% in 2001 to 86% in 2002. For the first time, five of the six countries exceeded the target coverage of 85% or more, and there is increasing evidence that clinical manifestations of the disease are disappearing, and that transmission of the parasite has been or is being interrupted. The Program is actively seeking ways to accelerate impact on transmission.

In Africa, the goal in assisted areas is to help develop sustained programs with coverage rates of 85% or more, in cooperation with the African Program for Onchocerciasis Control (APOC). Each of the country projects improved their coverage rate in 2002 with the largest gains manifest in the youngest program, Ethiopia. Project areas in Nigeria and Uganda have exceeded 95% of their Ultimate Treatment Goals for the past two years, and Sudan continues to increase its coverage despite the ongoing civil war. Nigeria is successfully adapting the infrastructure in two of its states for APOC-assisted health education and annual mass drug treatment against onchocerciasis to also provide similar combined interventions against lymphatic filariasis and schistosomiasis. Most of the additional support for this pioneering work has been provided by GlaxoSmithKline and the Bill & Melinda Gates Foundation, with

some of the praziquantel drug for schistosomiasis donated by Shin Poong, Bayer and Medochemie. Evidence of the impact of combined interventions against these three diseases is beginning to emerge.

Participants at this year's review paid special attention to "post-APOC funding and activities" in Africa, since several GRBP-assisted project areas are in their fifth, and potentially final, year of funding from APOC. Four salient observations emerged from the presentations and discussions on this topic:

- The projects have achieved excellent coverage of eligible populations.
- The lack or paucity of government financial support for the programs is a major obstacle to achieving sustainability.
- The weakness of primary healthcare systems in most assisted areas is such that they are not able to effectively assume responsibility for sustaining program activities, thus constituting another major obstacle to achieving sustainability.
- It was confirmed that support by the Mectizan Donation Program in the form of donated Mectizan "is here forever," i.e., as long as needed.

A special challenge in 2003 is that Ethiopia's UTG has increased substantially from 2002, with the expansion of that program into Bench Maji and North Gondar Zones. As a result, the ATO for all GRBP-assisted areas in 2003 is 12,195,127. The UTG for all GRBP-assisted areas has increased 35%, from 9,913,120 in 2002 to 13,396,540.

In 2003, the GRBP will look harder for evidence of sustainability in certain project areas of Cameroon, Ethiopia, Nigeria, northern Sudan, and Uganda. It is clear, however, that African onchocerciasis programs and their allies will need to continue to seek innovative solutions and advocate strongly for additional sustained support from their own governments, development agencies, and NGDOs. Other potential complementary options include strengthening healthcare systems and infrastructure, and/or showing onchocerciasis to be eradicable in Africa (and thus programs would not have to be sustained indefinitely).

RECOMMENDATIONS 2003 FOR THE CARTER CENTER

The Carter Center, in cooperation with other NGDO partners and individually, should advocate strongly for long-term support of onchocerciasis control activities in Onchocerciasis Control Program (OCP) and APOC-assisted endemic areas after those regional programs have ceased operations. Such advocacy efforts should be directed or raised at meetings of donors, APOC leadership, Joint Action Forum (JAF), CSA, Mectizan Executive Committee (MEC), The World Bank, NGDOs and the respective national governments.

All GRBP-assisted programs in Africa and in the Americas are urged to seize every opportunity to document the impact of current interventions against onchocerciasis (health education and annual or semi-annual mass administration of Mectizan) on transmission of onchocerciasis and on clinical manifestations of the disease. Anecdotes illustrating the popularity or benefits of the Program should be reported to GRBP headquarters.

Map 1

Carter Center-Assisted Onchocerciasis Control Programs

Figure 1

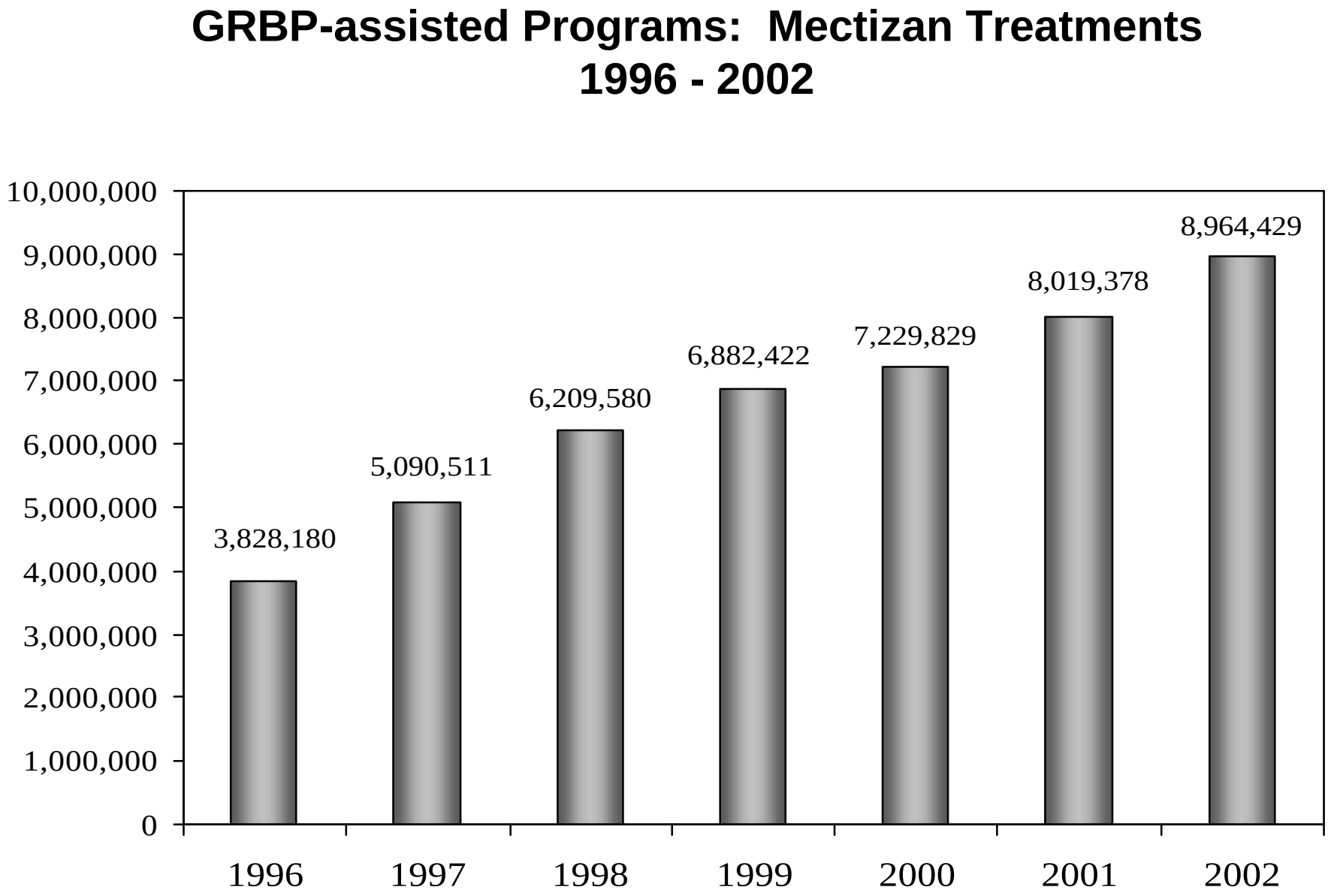

GRBP-assisted Programs: Mectizan Treatments
1996 - 2002
10,000,000
9,000,000
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
3,828,180
5,090,511
6,209,580
6,882,422
7,229,829
8,019,378
8,964,429
1996
1997
1998
1999
2000
2001
2002

Figure 2

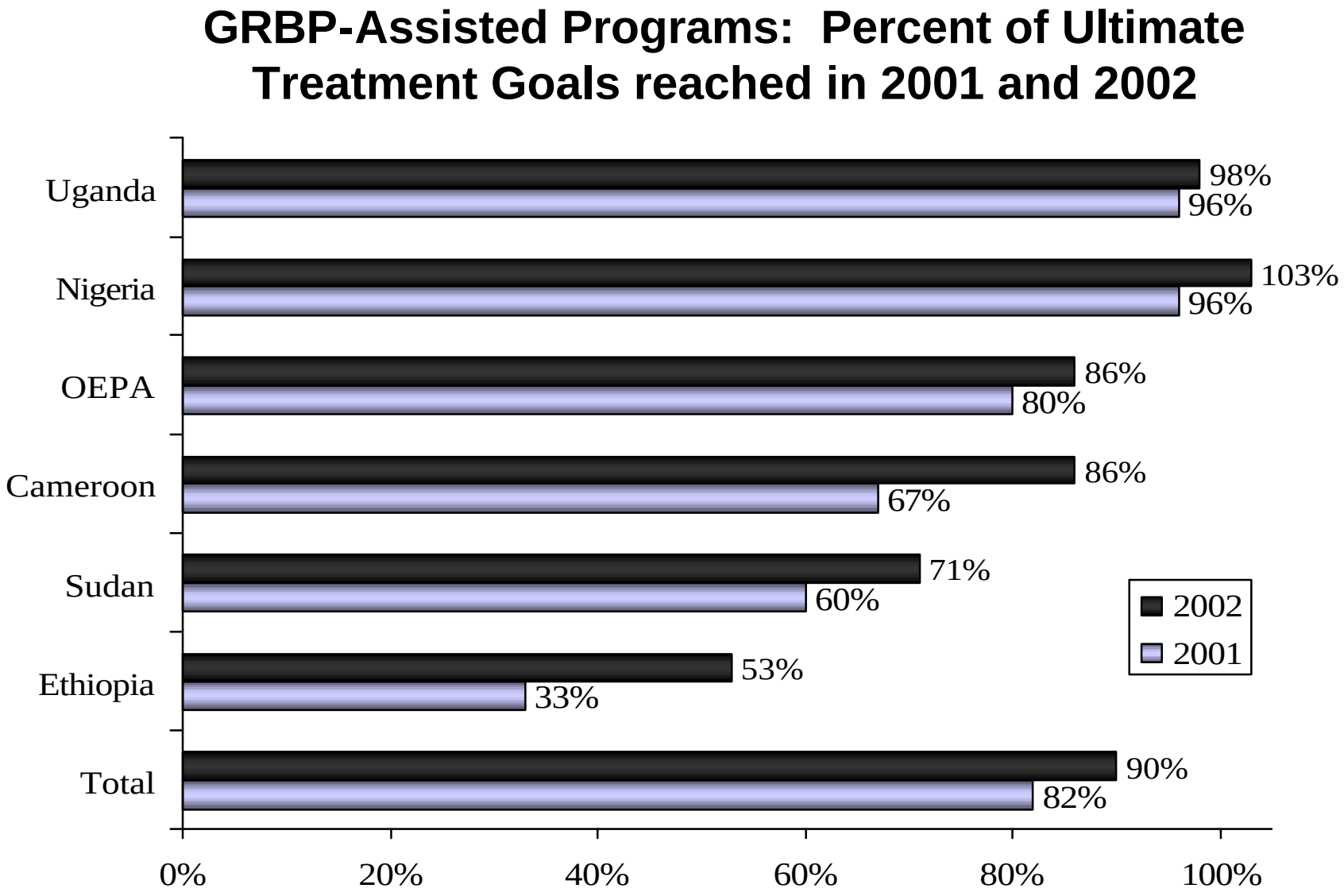

GRBP-Assisted Programs: Percent of Ultimate Treatment Goals reached in 2001 and 2002
Uganda
98%
96%
Nigeria
103%
96%
OEPA
86%
80%
Cameroon
86%
67%
Sudan
71%
60%
Ethiopia
53%
33%
Total
90%
82%
2002
2001
0%
20%
40%
60%
80%
100%

Figure 3

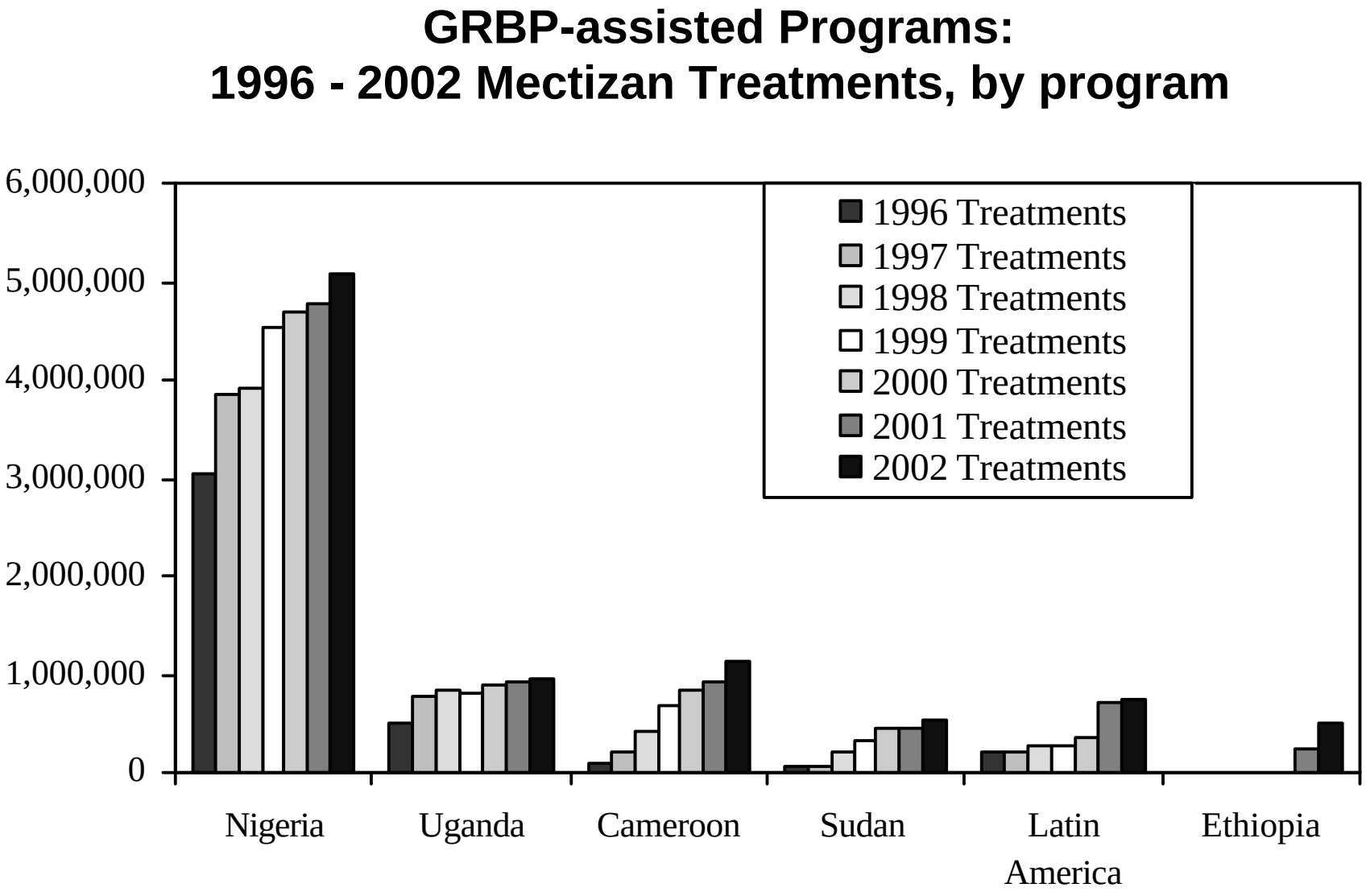

GRBP-assisted Programs:
1996 - 2002 Mectizan Treatments, by program
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
1996 Treatments
1997 Treatments
1998 Treatments
1999 Treatments
2000 Treatments
2001 Treatments
2002 Treatments
Nigeria
Uganda
Cameroon
Sudan
Latin America
Ethiopia

Figure 4

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

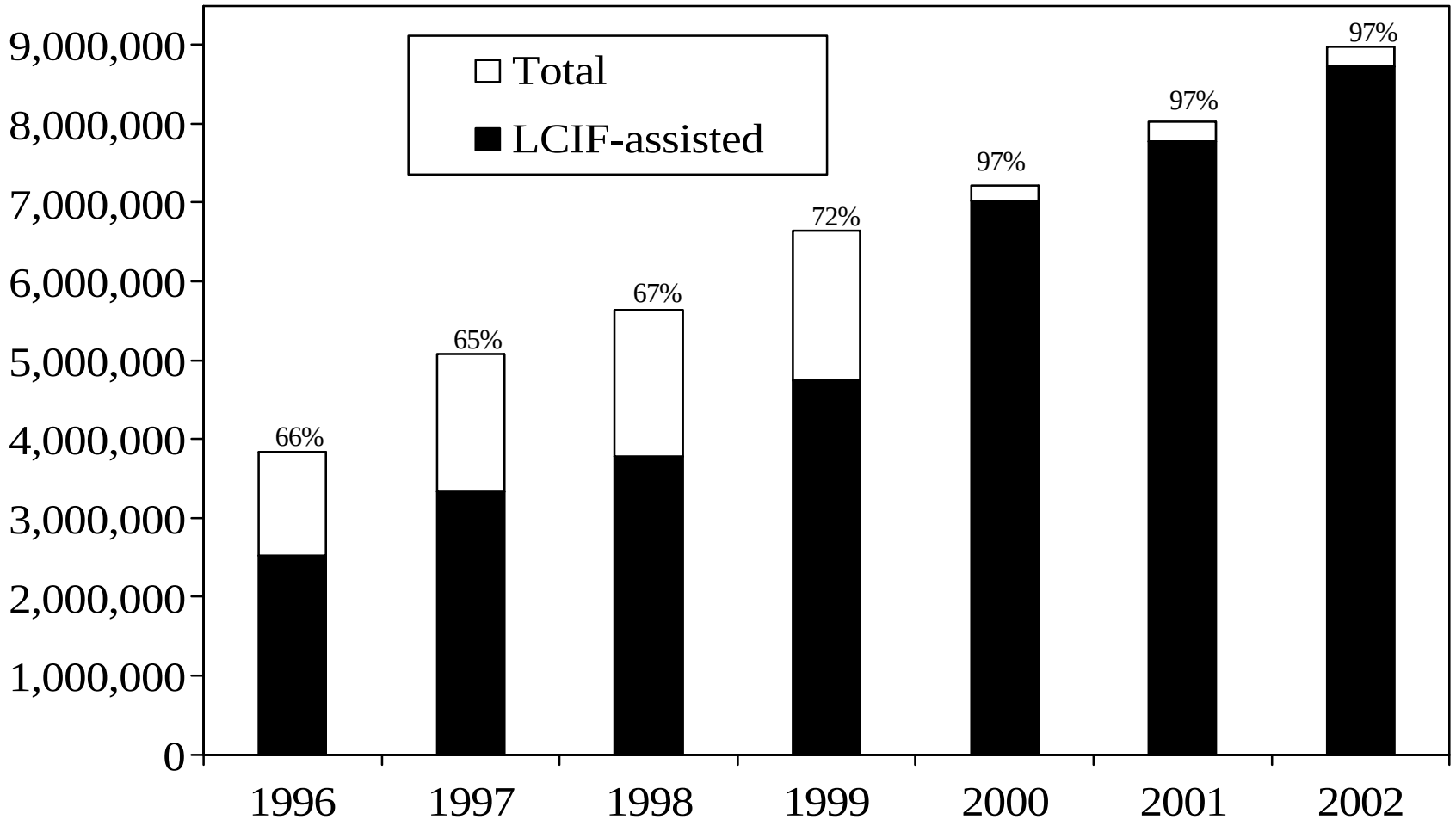


Figure 5

Cost per Treatment in GRBP-assisted African Programs, as reported at the 1998-2002 Program Reviews

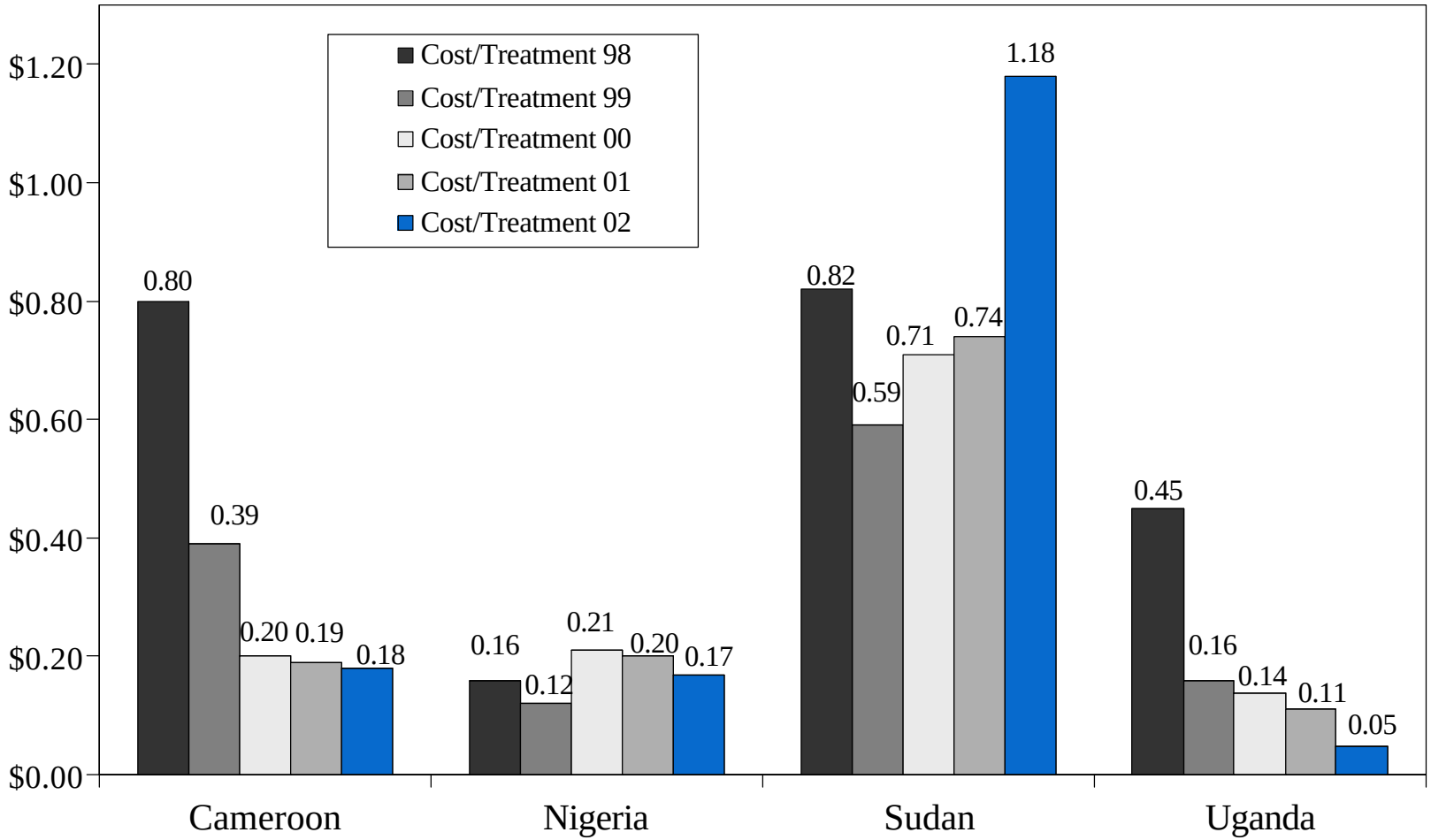


Table 1: Onchoceriasis: 2002 Mectizan treatment figures for Global 2000 River Blindness Program (GRBP)-assisted areas in Nigeria, Cameroon, Uganda, Ethiopia and collaborative programs in Latin America (OEPA) and Sudan

Country/Tx Category		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	% ATO	% ALL GRBP TX
NIGERIA	**UTG=**	**5,000,000**		**ATO(arv)=**	**7,971**											
TX(earp)		86	59,224	151,343	457,660	650,790	1,000,142	753,468	1,009,111	501,458	193,020	265,388	45,748	5,087,438	102%	57%
TX(arv)		0	69	243	638	990	1,996	1,437	1,400	468	351	354	30	7,976	100%	43%
UGANDA	**UTG=**	**974,900**		**ATO(arv)=**	**2,351**											
TX(earp)		0	166,678	176,292	56,406	54,706	45,220	173,144	88,003	42,043	9,136	30,155	109,835	951,618	98%	11%
TX(arv)		0	329	698	561	535	105	634	484	403	307	65	184	2,351	100%	13%
CAMEROON	**ATO(earp)=**	**1,239,592**		**ATO(arv)=**	**2,708**											
TX(earp)		0	0	0	0	0	136,641	398,536	599,535	0	0	0	0	1,134,712	92%	13%
TX(arv)		0	0	0	0	0	430	974	1,522	0	0	0	0	2,926	108%	16%
OEPA**	****UTG(2)=**	**879,774**		**ATO(arv)=**	**1,934**											
TX(earp)		0	0	0	0	0	372,601	0	0	0	0	0	376,581	749,182	85%	8%
TX(arv)		0	0	0	0	0	1,693	0	0	0	0	0	1,653	3,346	88%	18%
ETHIOPIA	**ATO(earp)=**	**548,437**		**ATO(arv)=**	**2,155**											
TX(earp)		0	0	28,136	57,970	121,866	236,676	63,460	4,900	3,069	0	0	0	516,077	94%	6%
TX(arv)		0	0	0	0	0	2,086	0	0	0	0	0	0	2,086	97%	11%
SUDAN	**ATO(earp)=**	**649,949**														
TX(earp)		6,537	4,123	61,385	32,072	46,076	129,288	29,805	14,203	25,294	51,787	32,611	92,221	525,402	81%	6%
TX(arv)																
Totals	**ATO(earp)=**	**9,292,652**		**ATO(arv)=**	**17,119**											
TX(earp)		**4,209**	**287,287**	**387,843**	**618,112**	**956,650**	**1,821,085**	**1,413,902**	**1,753,336**	**579,181**	**294,377**	**387,764**	**624,385**	**8,964,429**	**96%**	**100%**
TX(arv)		**0**	**398**	**941**	**1,199**	**1,525**	**2,531**	**3,045**	**3,406**	**871**	**658**	**419**	**1,867**	**18,685**	**109%**	**100%**
GRBP Cumulative totals=	**45,435,581**															

ATO: Annual Treatment Objective, TX: Number Treated, earp: Eligible At Risk Population, arv: At Risk Villages (mass Mectizan treatment is provided)

UTG: Ultimate Treatment Goal

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

ONCHOCERCIASIS ELIMINATION PROGRAM FOR THE AMERICAS (OEPA)

The Onchocerciasis Elimination Program for the Americas (OEPA) is a regional coalition working to eliminate both morbidity and transmission of onchocerciasis in the Americas through sustained, semi-annual (i.e., every six months) distribution of Mectizan. The OEPA initiative began shortly after passage in 1991 of Resolution XIV of the 35th Pan American Health Organization (PAHO) Assembly, which called for the elimination of onchocerciasis as a public health problem in the Americas by the year 2007. The OEPA coalition includes ministries of health of the six countries (Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela), The Carter Center, PAHO/WHO, the Mectizan Donation Program (MDP) and the U.S. Centers for Disease Control and Prevention (CDC). A Program Coordinating Committee (PCC) provides representation for all of these partners and gives broad directives to the OEPA office, which is based in Guatemala City and staffed through The Carter Center. The Center also coordinates financial assistance to the coalition as part of the Carter Center-Lions SightFirst Initiative.

OEPA has two main goals:

- To prevent new eye disease attributable to onchocerciasis by 2007 through mass treatment of at-risk populations with ivermectin (Mectizan) donated by Merck & Co, Inc.

- To interrupt transmission through high coverage, semiannual mass treatment of at-risk populations with ivermectin. To do so, treatment programs aim to reach at least 85% of persons eligible for treatment who reside in communities known to be endemic for onchocerciasis (Table 2), and sustain treatment coverage for a period of about ten years.

Treatments: Since its inception, treatment coverage has been reported to OEPA as a percentage of the total number of persons estimated to be eligible for treatment: the Ultimate Treatment Goal (UTG). Since 2000, OEPA has used the UTG(2) to monitor the success of programs in providing two treatments per year to all at-risk eligible persons (See Table 3). The UTG(2) is defined as the number of persons in the region who require treatment with Mectizan (the Ultimate Treatment Goal) multiplied by two (since each individual should be treated twice during a calendar year).

During 2002, OEPA provided a total of 749,182 Mectizan treatments, resulting in an overall UTG(2) coverage for the region of 86% (See Table 4 and Figure 6). This was an increase of 6.7% from the number of treatments given in 2001, and for the first time, all of the six endemic countries except Venezuela exceeded the minimal goal of at least 85% coverage. The range of UTG(2) coverage in those five countries was 91% - 97%; in Venezuela it was 65%. (Venezuela's UTG(2) coverage in 2001 was 53%). Treatment coverage in the region has progressed annually.

The treatments provided in 2002 reached 86% of targeted communities in the first round and 87% in the second round (Table 3).

Details of treatments provided by country are as follows:

Brazil provided 12,223 Mectizan treatments against its UTG(2) of 12,840 in the northern states of Roraima and Amazonas. Coverage exceeded 85% of the UTG(2) (95% in the first round; 96% in the second round) for the second straight year, demonstrating again the feasibility of delivering treatment to migratory Yanomami communities in the remote jungle areas. The distribution strategy calls for the use of health care centers, staffed by MOH and NGDO personnel, in 17 accessible "polo" base camps. All 17 polo base camps effected treatments in the first treatment round, and 16 camps effected treatments in the second round (one of these 16 did not reach the 85% coverage).

Colombia has maintained optimal treatment coverage twice yearly in the single known endemic community (Naicioná, in López de Micay municipality, Department of Cauca), despite civil unrest in the area. In 2002, coverage exceeded the 85% UTG(2) goal (2,326) for the fifth straight year: 97% coverage in the first round; 98% in the second round. Impact evaluations conducted in 2001 and analyzed in 2002 reveal dramatic reductions in prevalence of microfilaria by skin biopsy (from 40% in 1996 to 0% in 2001), in microfilaria in the anterior chamber of the eye (from 2.2% in 1996 to 0% in 1998 and 2001), in rate of parasitic infection in vector black flies (from 4.27% in 1996 to 0.21% in 2001), and in rate of infectivity in vector black flies (from 1.07% in 1996 to 0.03% in 2001).

Ecuador achieved the goal of >85% coverage of its UTG(2) (40,242 treatments) for the second straight year in 2002 (93% in the first round and 95% in the second round), after improving its coverage dramatically in 2001. In the first round, 115 of the 119 endemic communities were treated, and 118 communities were treated in the second round. This coverage exceeded the >85% coverage mark.

Guatemala reached the goal of >85% coverage of its UTG(2) (318,606 treatments) for the first time in 2002 (91% in first round; 95% in second round), having narrowly missed that milestone in 2001 [83% of UTG(2)]. In the first round, 497 of 518 endemic communities received treatment, and 493 communities received treatment in the second round. However, most of the "untreated communities" were reported as having been abandoned by the inhabitants due to loss of employment stemming from low coffee pricing.

Mexico achieved >85% coverage of its UTG(2) (317,234 treatments) for the fourth straight year in 2002 (89% in the first round, 92% in the second round). All 670 endemic communities were reached in both rounds.

Venezuela, the last endemic American country to get its program started, increased its coverage to 65% of its UTG(2) (174,942 treatments) in 2002 (70% and 61% in the first

and second rounds, respectively), which was a significant increase over its UTG(2) coverage of 53% in 2001 and 41% in 2000. In the first round 62% of endemic villages were covered, and 56% of villages were covered in the second round. The severe political crisis was a major concern in the country in 2002, and continues to cause concern in 2003.

Impact on transmission of onchocerciasis: In 2002, none of the 29,700 blackflies from the Rio Santiago focus in Ecuador tested positive for prevalence of infection. As illustrated in Map 2, four of the thirteen American foci of onchocerciasis are believed to have no transmission, three foci (Oaxaca, Mexico; Lopez de Micay, Colombia; and Rio Santiago areas of the Esmeraldes focus, Ecuador) are close to ending transmission, and significant endemicity remains in six of the foci. OEPA is beginning to consider potential options for accelerating interruption of transmission (e.g. increased frequency of mass treatment, limited vector control, etc.). CDC plans to test the efficacy of short course antibiotic treatment on the viability of *O. volvulus* adults and microfilaria via impact on *Wolbachia* symbiotic bacteria living in the parasites. Review of OEPA's status by the International Task Force for Disease Eradication in 2001 and at the Conference on Eradicability of Onchocerciasis in 2002 both led to the conclusion that OEPA has demonstrated the feasibility of eradicating onchocerciasis in the Americas ("proof of principle").

IACO 2002: OEPA and the Pan American Health Organization (PAHO) have convened InterAmerican Conferences on Onchocerciasis (IACOs) annually since 1991. The twelfth annual conference (IACO '02) was held in Manaus, Brazil in November 2002. The Conference noted the need to accelerate the process of eradication in the Americas as much as possible, including in Venezuela, and it reaffirmed the need to continue monitoring the status of transmission and delimiting the extent of endemic areas.

RECOMMENDATIONS 2003 for OEPA:

On a case-by-case basis, OEPA should consider the potential for adding other interventions (e.g. increased frequency of mass drug administration (MDA), better timing of MDA, vector control) to existing health education and twice-yearly treatments with Mectizan. Such additions might shorten the time required to interrupt transmission in each of the 9 endemic foci of onchocerciasis in the Americas.

OEPA and The Carter Center should continue to provide all possible assistance to Venezuela in order to help that country's onchocerciasis program to extend its coverage as quickly as possible.

OEPA should continue to develop data management processes so as to be able to evaluate treatment coverage in each endemic community.

OEPA should use SIMONa to model transmission dynamics in other areas besides Ecuador. It is important to determine the importance of low-level infection in vector to transmission and to predict parasite elimination.

OEPA should strongly and quickly support research to evaluate the impact of short course antibiotic therapy targeted at *Wolbachia* symbionts on survival of *O. volvulus* in humans.

The OEPA program is urged to seize every opportunity to document the impact of current interventions against onchocerciasis (health education and semi-annual mass administration of Mectizan) on transmission of onchocerciasis and on clinical manifestations of the disease. Anecdotes illustrating the popularity or benefits of the Program should be reported to GRBP headquarters.

All programs should advocate as strongly as possible for support of national programs by government authorities at all levels.

Determine the importance for treating in hypo-endemic communities.

Map 2

Stratification of onchocerciasis foci in the Americas

MEXICO
1. Oaxaca focus
2. Northern Chiapas focus
3. Southern Chiapas focus

GUATEMALA
4. Huehuetenango focus
5. Solola-Suchitepequez focus
6. Escuintla focus
7. Santa Rosa focus

VENEZUELA
8. North-central focus
9. North-eastern focus
10. Southern focus

BRAZIL
11. Amazonas-Roraima focus

COLOMBIA
12. Lopez de Micay focus

ECUADOR
13. Esmeraldas focus

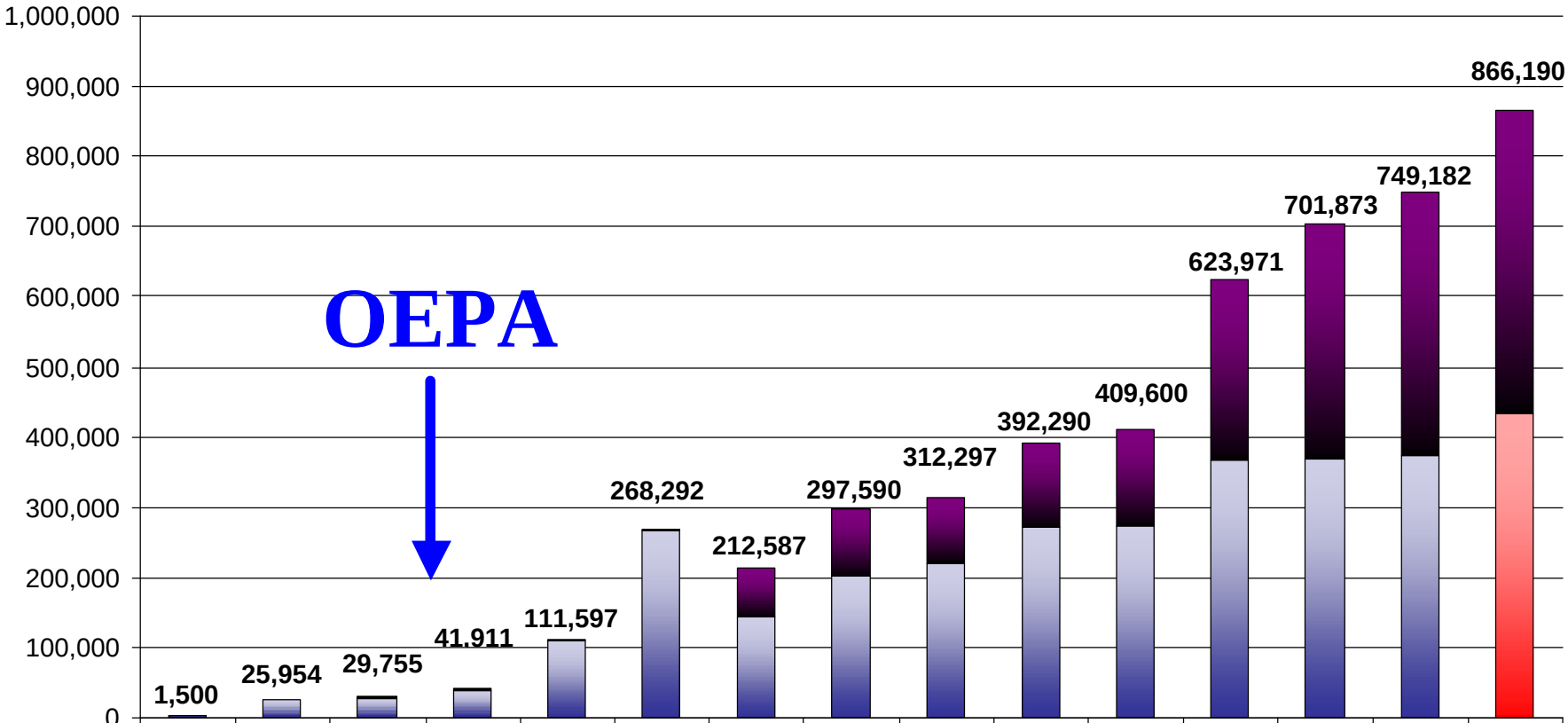
Nonendemic foci (‘suspected’)

Endemic foci where morbidity eliminated and transmission suppressed

Endemic foci where transmission continues

Figure 6

Persons* Treated With Mectizan® in the Americas, 1989-2002, and Ultimate Treatment Goal



	89	90	91	92	93	94	95	96	97	98	99	2000	2001	2002	UTG(2)
2nd. Round	0	0	774	1478	1526	694	69,130	95,417	92395	121872	136944	258,376	332,780	376,581	433,095
1st. Round	1,500	25,954	28,981	40,433	110,071	267,598	143,457	202,173	219,902	270,418	272,656	365,595	369,093	372,601	433,095

*based on first semester treatments

Table 2: OEPA: Endemic communities by level of endemicity, 2002

Country	% of endemicity			Total	% by country
	Hyper (³60)	Meso (>20<60)	Hypo (£20)		
Brazil	5	7	5	17	**1**
Colombia	0	1	0	1	**0**
Ecuador	42	23	54	119	**6**
Guatemala	42	15	461	518	**27**
Mexico	39	220	411	670	**34**
Venezuela	104	216	305	625	**32**
TOTAL	**232**	**482**	**1,236**	**1,950**	**100%**
% of endemicity	**12%**	**25%**	**63%**	**100%**	

Table 3: Treatments in the Americas by country, 2000 - 2002

OEPA 2002

			first round		second round		Total Treatments	
			TX(earp)	(earp)	TX(earp)	(earp)	TX(earp)	(earp)
Countries	**UTG**	**UTG(2)**	**Cum**	**% UTG**	**Cum**	**% UTG**	**Cum**	**% UTG(2)**
Brazil	6,420	12,840	6,073	95%	6,150	96%	12,223	95%
Colombia	1,163	2,326	1,124	97%	1,140	98%	2,264	97%
Ecuador	20,121	40,242	18,655	93%	19,048	95%	37,703	94%
Guatemala	159,303	318,606	145,299	91%	150,640	95%	295,939	93%
Mexico	158,617	317,234	140,529	89%	146,597	92%	287,126	91%
Venezuela	87,471	174,942	60,921	70%	53,006	61%	113,927	65%
Total	**433,095**	**866,190**	**372,601**	**86%**	**376,581**	**87%**	**749,182**	**86%**

OEPA 2001

			first round		second round		Total Treatments	
			TX(earp)	(earp)	TX(earp)	(earp)	TX(earp)	(earp)
Countries	**UTG**	**UTG(2)**	**Cum**	**% UTG**	**Cum**	**% UTG**	**Cum**	**% UTG(2)**
Brazil	6,382	12,764	5,595	88%	5,893	92%	11,488	90%
Colombia	1,101	2,202	1,091	99%	1,101	100%	2,192	100%
Ecuador	19,788	39,576	17,494	88%	18,492	93%	35,986	91%
Guatemala	160,000	320,000	132,526	83%	132,091	83%	264,617	83%
Mexico	168,124	336,248	154,914	92%	142,588	85%	297,502	88%
Venezuela	84,492	168,984	57,473	68%	32,615	39%	90,088	53%
Total	**439,887**	**879,774**	**369,093**	**84%**	**332,780**	**76%**	**701,873**	**80%**

OEPA 2000

OEPA	**ATO(earp)**	**TX(earp) Cum 2000**	**Tx (earp) % ATO**	**ATO(arv)**	**TX(arv) Cum 2000**	**TX (arv) % ATO**	**ATO(hrv)**	**TX(hrv) Cum**	**(hrv) % ATO**
Brazil	6,781	5,103	75%	19	15	79%	5	4	80%
Colombia	1,101	1,070	97%	1	1	100%	0	0	0%
Ecuador	18,629	16,490	89%	119	106	89%	42	42	100%
Guatemala	138,949	127,978	92%	497	501	101%	40	38	95%
Mexico	158,824	157,291	99%	689	689	100%	39	39	100%
Venezuela	86,760	59,687	69%	618	454	73%	79	39	49%
Total	**411,044**	**367,619**	**89%**	**1,943**	**1,766**	**91%**	**205**	**162**	**79%**

Table 4: OEPA: Communities Treated in the First and Second Rounds, 2002

Country	Endemic communities	Communities treated				Communities not treated	%
		>85%	%	<85%	%		
Brazil	17	17	100	0	0	0	0
Colombia	1	1	100	0	0	0	0
Ecuador	119	115	97	4	3	0	0
Guatemala	518	486	94	11	2	21*	4.05
Mexico	670	538	80	132	20	0	0
Venezuela	625	250	40	139	22	236	37.8
Region	1950	1407	72	286	15	257	13

Country	Endemic communities	Communities treated				Communities not treated	%
		>85%	%	<85%	%		
Brazil	17	16	94	1	6	0	0
Colombia	1	1	100			0	0
Ecuador	119	118	99	1	1	0	0
Guatemala	518	473	91	20	4	25*	4.83
Mexico	670	589	88	81	12	0	0
Venezuela	625	229	37	124	20	272	43.5
Region	1950	1426	73	227	12	297	15

*** Communities inhabited**

NIGERIA

Nigeria is probably the most highly endemic country in the world for river blindness, having as much as 40% of the global disease burden. It is estimated that 27 million Nigerians need treatment with Mectizan for onchocerciasis (i.e. the Ultimate Treatment Goal [UTG] is 27 million). The National Onchocerciasis Control Program (NOCP) began in 1989 by treating approximately 49,566 persons with Mectizan, and progressing to provide over 18 million treatments by 2002 (68% of the estimated national UTG).

Background: The Global 2000 River Blindness Program (GRBP) in Nigeria has offices in Jos, Lagos, Owerri, Benin City, and Enugu. The primary activities consist of: 1) direct assistance for treatment activities in nine of the 32 onchocerciasis endemic states in Nigeria (Abia, Anambra, Delta, Ebonyi, Edo, Enugu, Imo, Nasarawa, and Plateau States) (Map 3); 2) helping to implement nationwide onchocerciasis control in partnership with the Nigerian government and the National Onchocerciasis Task Force (NOTF) through a coalition of nongovernmental development organizations (NGDOs) including Christoffel Blindenmission, GRBP, Helen Keller Worldwide, International Eye Foundation, MITOSATH**,** SightSavers, and UNICEF; and 3) working to implement and evaluate the African Program for Onchocerciasis Control (APOC) strategy of Community-Directed Treatment (CDTI) programs. A major GRBP-partner in Nigeria has been the Lions Club International Foundation (LCIF) SightFirst Initiative. The Lions Clubs District 404, with LCIF support, is actively involved in mobilization, health education, and treatment activities.

Treatments: In 2002, the GRBP-assisted areas of Nigeria provided health education and mass Mectizan treatments to 5,087,438 persons in nine states (Table 5). This represented 102% of the UTG for those areas, and a small increase over the 4.8 million treatments with which the GRBP assisted Nigeria in 2001. The mass treatments were conducted in 7,897 hyper- or meso-endemic villages. Persons in hypo-endemic villages of the same states received 558,294 passive treatments with Mectizan during the year. Thus in 2002, the treatments assisted by GRBP represented 27.7% of the 18 million total treatments distributed in Nigeria (Figure 7).

No Serious Adverse Events (SAEs) were reported as a result of Mectizan treatments in Nigeria in 2002. Close monitoring for adverse reactions continues in the southeastern states, because of the presence of *Loa loa* in that part of the country (all of those states are now entering their fifth and sixth years of mass treatment, so the risk of reaction is low). The Program also conducted mass mobilizations (health education) of the populations in all 7,897 at-risk villages targeted during the year.

The Program conducted additional studies of the impact of annual mass Mectizan treatments during 2002. A report from six endemic villages in Abia and Imo States, which received their seventh year of annual mass chemotherapy in 2002, showed that impaired visual acuity (counting fingers at three meters) from onchocerciasis had been reduced by 94% (from 16.5% to 1%) (frontispiece, Figure B). Onchocercal nodule

prevalence had declined by 61%, and related skin rashes were down 88% in the same villages. Other studies in Plateau and Nasarawa States suggest that the rate of onchocerciasis transmission there has been reduced by 75% after ten years of mass treatments with Mectizan. Studies of onchocercal antibodies in young children in Plateau and Nasarawa States in 2001 suggested that mass Mectizan treatments may have interrupted transmission in some, but not all, of the endemic villages that were studied.

Training: The nine states conducted training or retraining for a total of 19,035 health workers involved in Mectizan distribution in 2002. This included 17,035 Community-directed distributors (CDDs) at the village level, 2,651 Local Government Area (LGA) level health staff, and 32 state level health workers. Attrition of CDDs especially remained a serious problem, ranging in 2001 from an average of 6% in the seven southeastern states, to 30% in Plateau and Nasarawa States. Competition with other initiatives, such as polio eradication, that pay stipends to village level health workers, has contributed to CDDs unwillingness to work on onchocerciasis or other programs without comparable compensation.

Mectizan: Nigeria's GRBP received 12,193,924 Mectizan tablets for 2002. It carried forward 64,837 tablets from 2001, and had 12,329 tablets remaining at the end of 2002. The average number of tablets per person treated in the seven southeastern states was 2.91.

Sustainability: Since 2001, all of the onchocerciasis project areas being assisted by GRBP in Nigeria have converted to the community-directed (CDTI) strategy from their previous community-based approach. All the assisted communities are involved in planning and implementing the Program in their respective villages, and governmental primary health care workers supervise all of the CDDs. Enthusiasm for the onchocerciasis program has waned in many villages in the southeastern states, which have been under mass treatment and health education for 6-7 years, as the signs and symptoms of the disease have receded.

Approximately 44% of the 7,023 endemic villages under treatment in the southeastern states supported their CDDs, in amounts averaging the equivalent of US $3.75 each per treatment round in 2002. In Plateau and Nasarawa States, 80% of the 697 endemic communities provided an average of US $3.58 to each CDD in 2002. In the southeastern states, 59% of the 135 LGAs budgeted 3.2 million naira, but released only 2.3 million naira (US $1,744), for an average of per LGA. State level performance in providing financial support was weaker than that of the LGAs and endemic communities: 3 of 7 southeastern states budgeted a total of 2 million naira, but released only 76,200 naira (US $760). At the state level, Plateau and Nasarawa States budgeted nothing and released nothing, but did provide in-kind support by paying staff salaries and providing use of office space and furniture. National support is less than state level support. The Federal Government of Nigeria provided no direct financial support for the Program in any of the nine states in 2002.

A team from APOC conducted a fifth year evaluation of the projects in Plateau and Nasarawa States from 17 February to 2 March 2003. A similar fifth year evaluation is scheduled for the southeastern states in May 2003. The team in Plateau and Nasarawa observed that those programs have achieved high coverage of populations at risk in the target areas, but that there was little or no government support for the programs. They concluded, however, that the two states were making satisfactory progress towards sustainability.

The Lions Clubs in Nigeria have been actively involved in the onchocerciasis program in the southeastern states before APOC funding. In October 2002, a meeting was held in Owerri to strengthen the role of Lions with respect to APOC and ongoing program needs. Several appropriate activities were agreed upon, including advocacy visits to state and LGA officials, monitoring of budget claims and release of funds by government, publicity at local levels, and independent monitoring of community mobilization, health education, and Mectizan distribution.

Lymphatic filariasis/schistosomiasis initiative in Plateau & Nasarawa States: With financial support provided since 1998 from GlaxoSmithKline, the manufacturer of albendazole, GRBP Nigeria has worked with the Federal Ministry of Health of Nigeria and with the state governments of Plateau and Nasarawa States to provide annual combination Mectizan/albendazole mass treatment for lymphatic filariasis (LF) and praziquantel treatment for urinary schistosomiasis (SH) in those two states (Maps 4 and 5). Health education is an integral part of both components of this initiative, which are implemented in conjunction with the established onchocerciasis control activities. In 2001, The Carter Center received funding from the Bill & Melinda Gates Foundation for support of lymphatic filariasis activities. Plateau and Nasarawa States are now "demonstration projects" intended to show "proof of concept" that LF transmission can be interrupted on a large scale in Africa. (See Background in Annex 6.)

Plateau and Nasarawa States were mapped for LF in 2000, and it was determined that mass treatment (and health education) for LF was required in all cities and villages in the 30 LGAs of the two states (estimated population: 4 million). By the end of 2001, nine of the 30 LGAs had been mapped for SH, in tedious village-by-village assessments using urine dipsticks to detect hematuria in samples of 6-14-year-old children. Another four LGAs were mapped in 2002. Results of these assessments are summarized in Maps 4 and 5.

A total of 2,168,355 persons in the two states received health education and mass treatment for LF in 2002, which was 90% of the ATO of 2.4 million treatments (Figure 8 and Table 6). Of those treatments, 888,992 were given in hyper- and meso-endemic onchocerciasis target areas, and the remaining 1,279,363 in LF-only areas (some of which are hypo-endemic for onchocerciasis). 2002 was the first year in which treatments for LF were extended to include the remaining 18 LGAs where Mectizan had not previously been distributed (and which therefore lacked any onchocerciasis infrastructure to build on) because under APOC guidelines their onchocerciasis levels were not high enough to require mass distribution of Mectizan. The ATO for the two

states in 2003 is 3.6 million treatments. No distribution strategy has yet been devised for endemic urban areas.

In 2002, the Program documented evidence that dual Mectizan/albendazole mass treatments are having a significant impact on LF infections in mosquitoes and on mosquito infectivity rates, compared to baseline levels (frontispiece, Figure C). Nineteen sentinel villages also have been designated for special monitoring.

During 2002, the Program distributed over 15,000 health education materials, aired radio messages in Hausa and English, and developed and aired a television documentary as part of its efforts to educate the population about LF. It also mobilized 1,695 endemic villages, and trained 3,013 community-based distributors in the LF-only, non-APOC areas (these activities were implemented in conjunction with the onchocerciasis activities in APOC areas). In the LF-only areas, villagers provided an average of US $6-7 (equivalent) per treatment round in support of their community-based distributors during 2002.

A total of 151,863 persons in the two states received health education and mass praziquantel treatment for SH in 2002 (Figure 9 and Table 6), which was 105% of the ATO of 144,860. The ATO for 2003 is 203,001.

The progress of the highly popular SH component of the integrated program is limited mainly by the slow methods available for assessing SH prevalence, and by the costs of praziquantel tablets. The Program is researching rapid assessment methods, and is already administering praziquantel by height, rather than by weight. The results of research by WHO to confirm the safety of simultaneous administration of the three treatments (Mectizan, albendazole and praziquantel) are eagerly awaited.

During 2002, the Program distributed over 12,000 health education materials, aired radio messages in Hausa and English, and developed and aired a television documentary as part of its efforts to educate the population about SH. It also mobilized 249 endemic villages, and trained 364 community-directed and community-based distributors in endemic villages. Sixty percent (60%) of the 270 communities provided a total of US $1107 (equivalent) to help support their community distributors (average of US $4.1 each).

RECOMMENDATIONS 2003 for GRBP NIGERIA

Onchocerciasis

GRBP Nigeria needs to identify, in collaboration with APOC, the key minimal ingredients and costs required to sustain satisfactory coverage with ivermectin.

GRBP Nigeria should work with other partners in the NGDO Coalition/Nigeria to develop and implement a consensus strategy to address the phasing out of APOC funding to mature project areas.

The Program should phase down GRBP assistance in one or two states after the fifth year of APOC assistance there, in consultation with the NOTF, and subsequently carefully monitor the sustainability of health education and mass drug administration interventions.

GRBP Nigeria should work with the NGDO Coalition/Nigeria and the NOTF to plan a strategy for long-term, sustainable importation, distribution, and reporting of Mectizan.

GRBP Nigeria should continue to study the impact of ivermectin treatments on transmission of onchocerciasis. Some of this work could be linked to the studies of impact on LF transmission.

GRBP Nigeria should track active mass distribution separately from passive treatments.

GRBP Nigeria should continue to help Nigeria extend interventions against SH & LF to other endemic areas in the Southeast of the country.

The Nigerian GRBP-assisted program is urged to seize every opportunity to document the impact of current interventions against onchocerciasis (health education and annual mass administration of Mectizan) on transmission of onchocerciasis and on clinical manifestations of the disease.

Anecdotes illustrating the popularity or benefits of the Program should be reported to GRBP headquarters.

All programs should advocate as strongly as possible for support of national programs by government authorities at all levels.

Lymphatic Filariasis

Continue monitoring the impact of ivermectin and albendazole on LF transmission.

Continue efforts to define a practical strategy for dealing with urban LF in Plateau/Nasarawa States.

Continue efforts to mobilize more support at Federal, State, and Local Government levels.

Seek to document other benefits of mass chemotherapy.

Urinary Schistosomiasis

Develop and pilot test health education and mobilization strategy(ies) by which endemic communities can successfully maintain suppression of schistosomiasis transmission after 2-4 years of mass chemotherapy, without continued mass treatments. An interim strategy could be to treat only every other year.

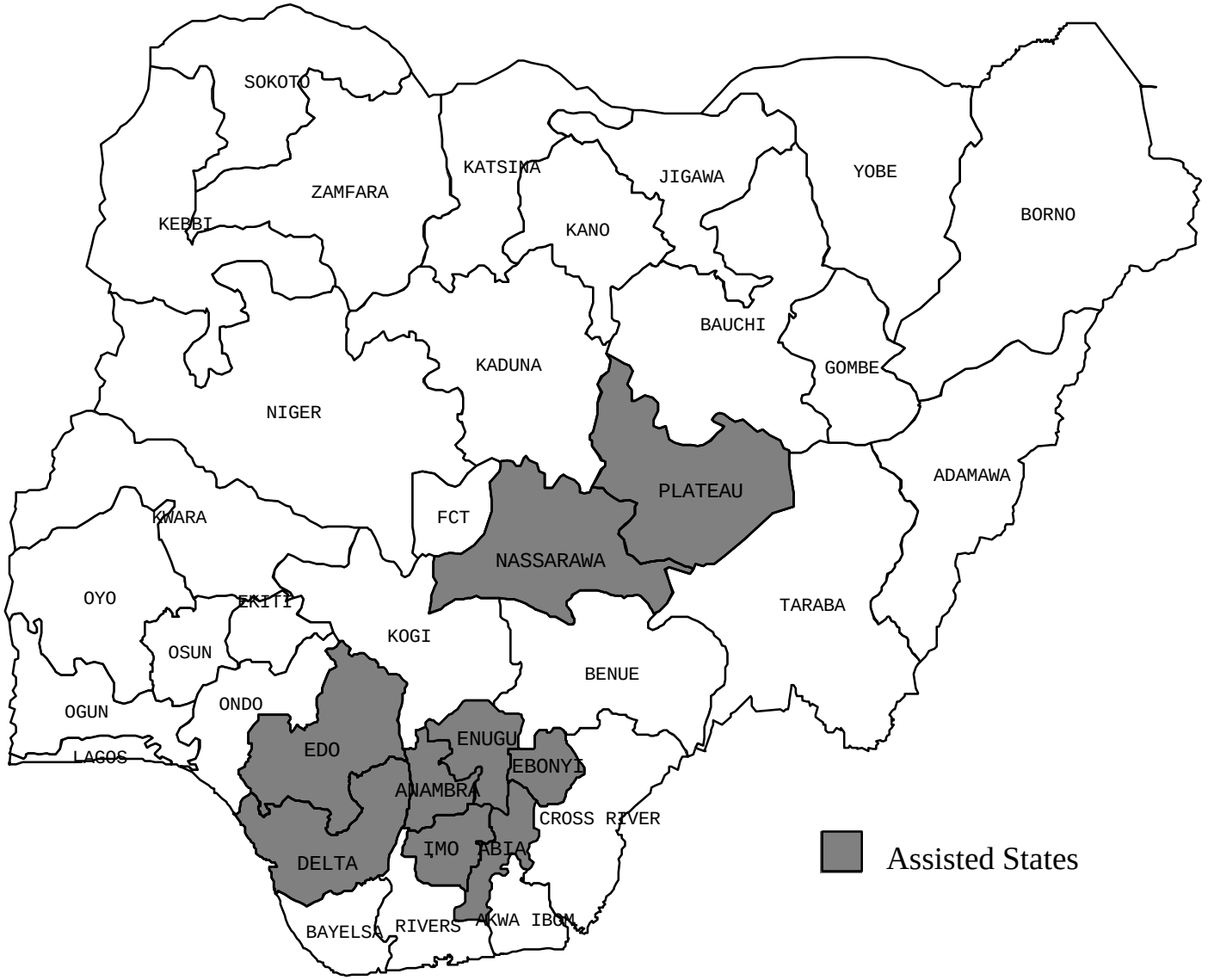
Continue to work with partners to find better methods for rapid assessment of SH that do not require sampling every village.

Seek to document the other benefits of mass chemotherapy, as far as possible.

Continue to seek additional support, including in-kind support of praziquantel, for the Program.

Map 3

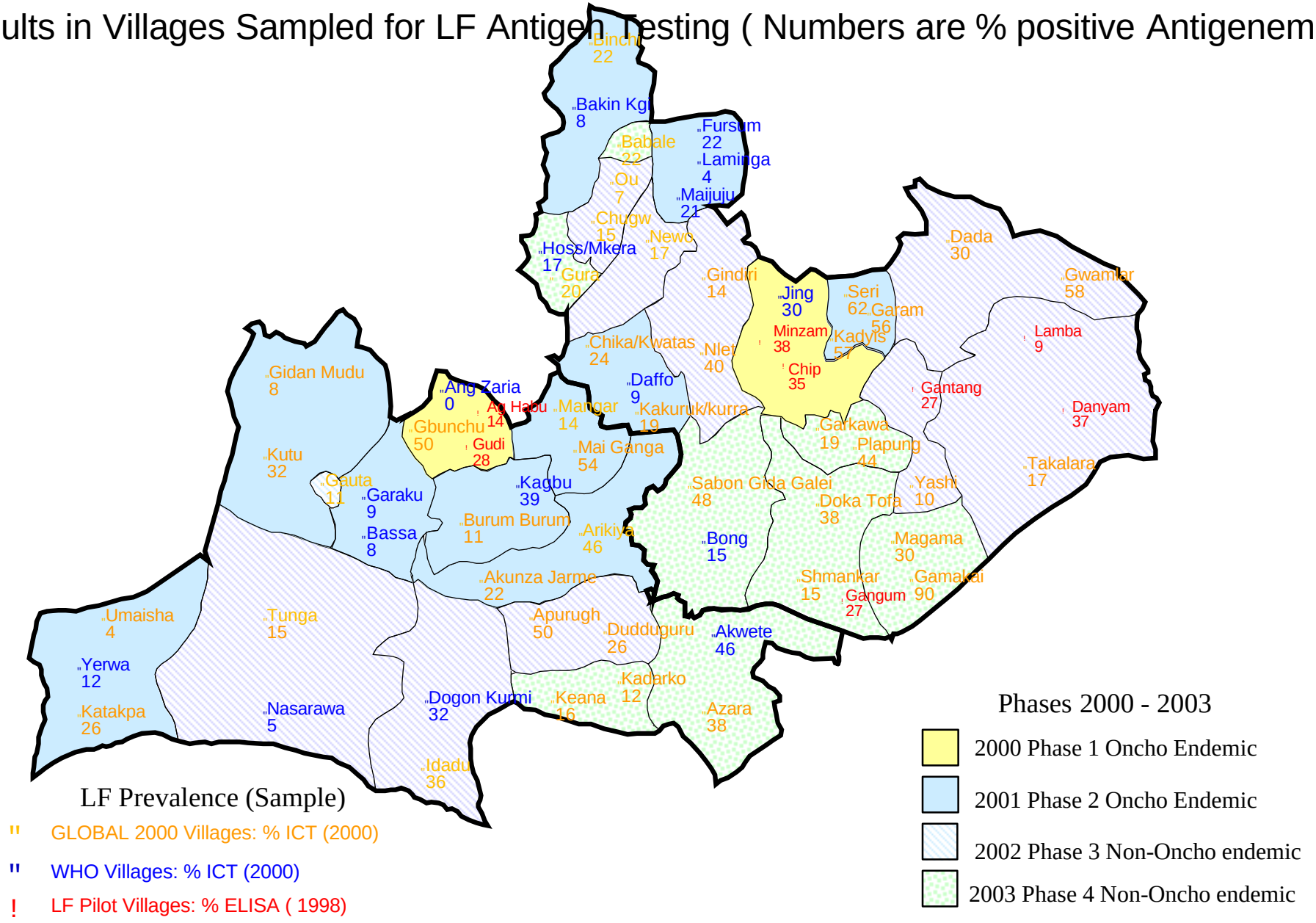
Nigeria
GRBP-assisted States



Map 4

Distribution of Lymphatic Filariasis (LF) in Plateau / Nasarawa States

Results in Villages Sampled for LF Antigen Testing (Numbers are % positive Antigenemia)



Map 5

Rapid Assessment for Schisto in Plateau / Nasarawa States

Average % dipstick positive

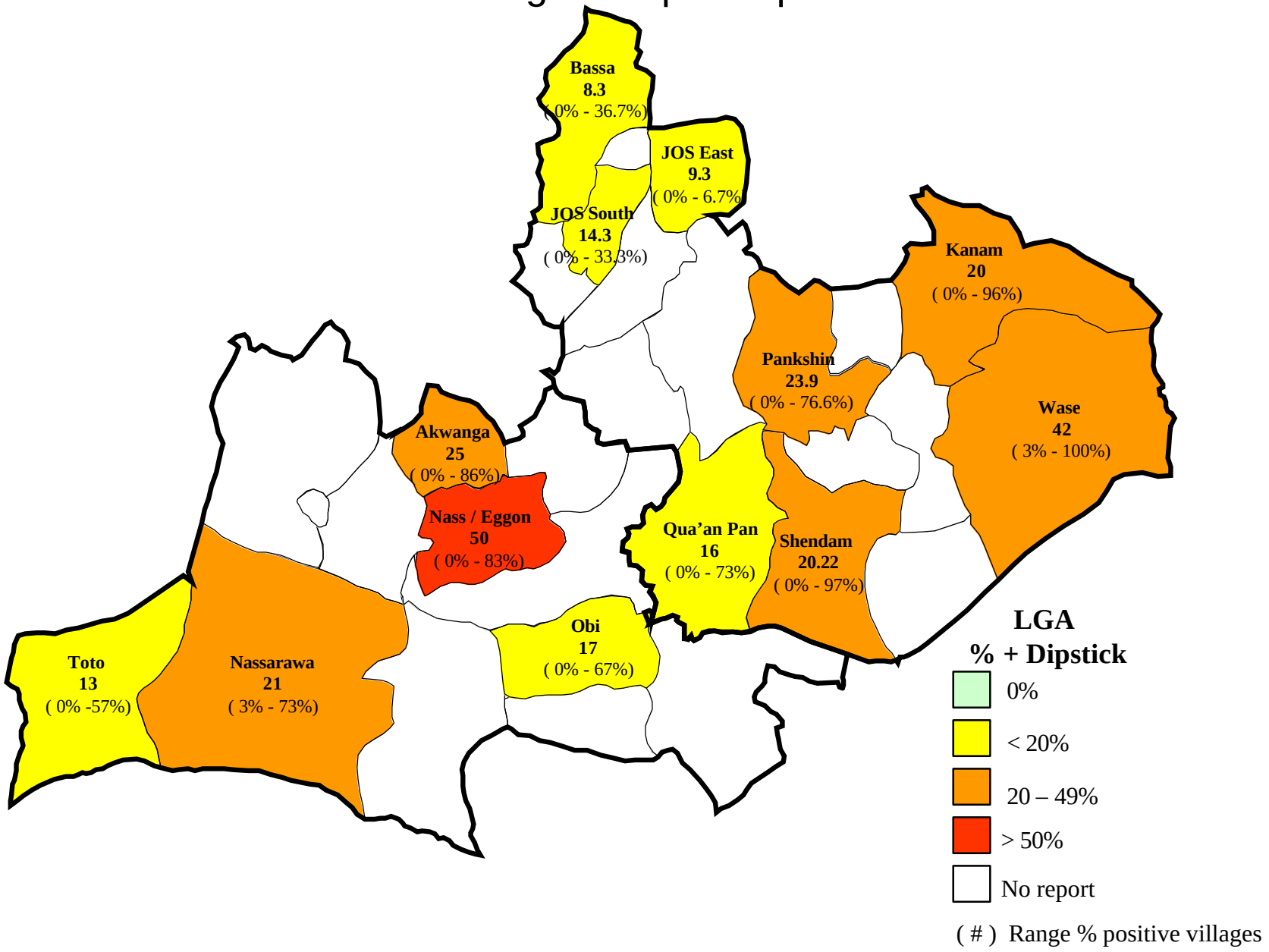
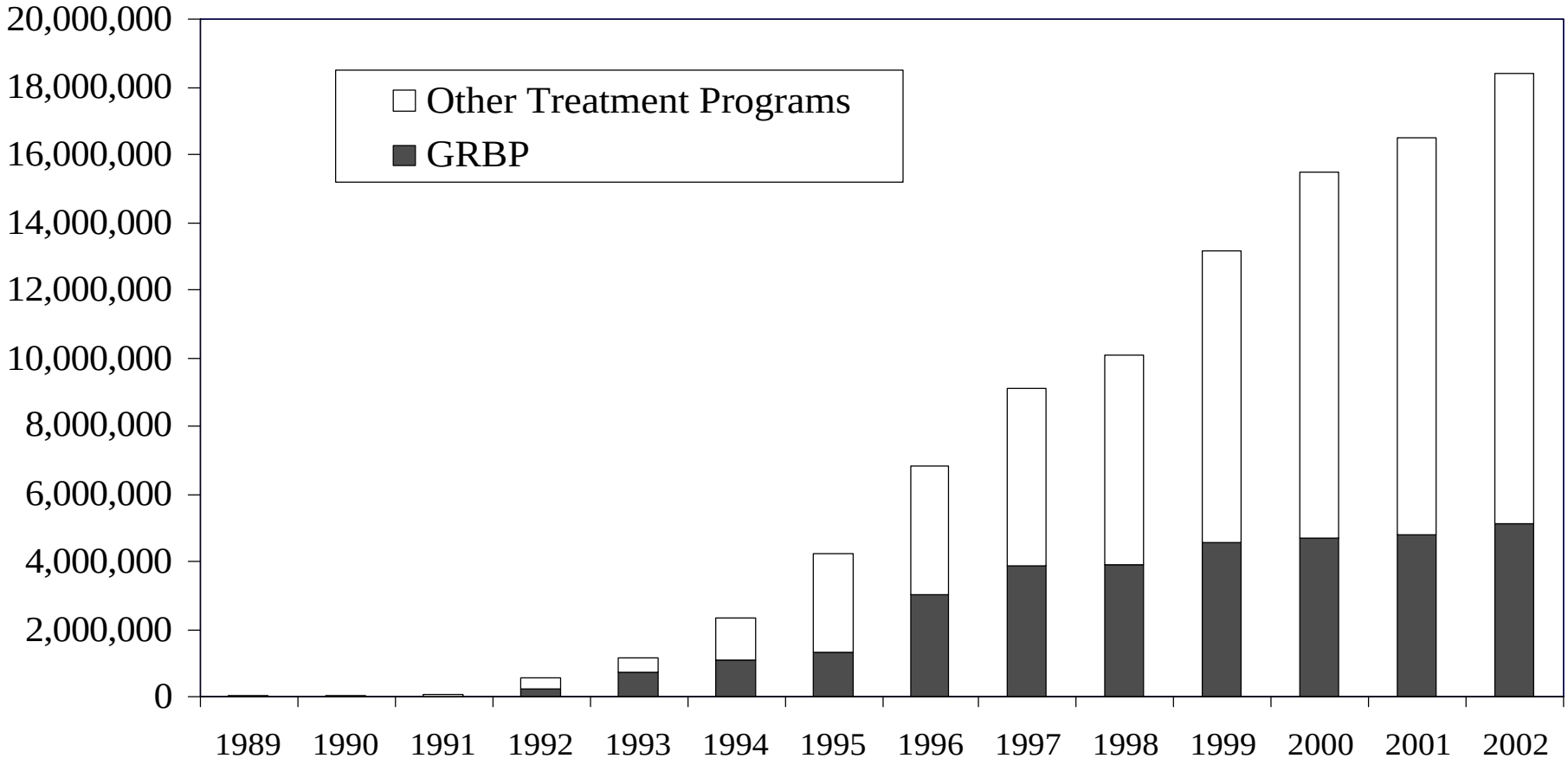


Figure 7

Global 2000 River Blindness Program (GRBP)-assisted treatments and total Mectizan treatments provided in Nigeria, 1989-2002



Treatments from 1992-1995 by RBF
Source of 1998 treatment figures: Nigeria NGDO meeting, April 20, 1999

Figure 8

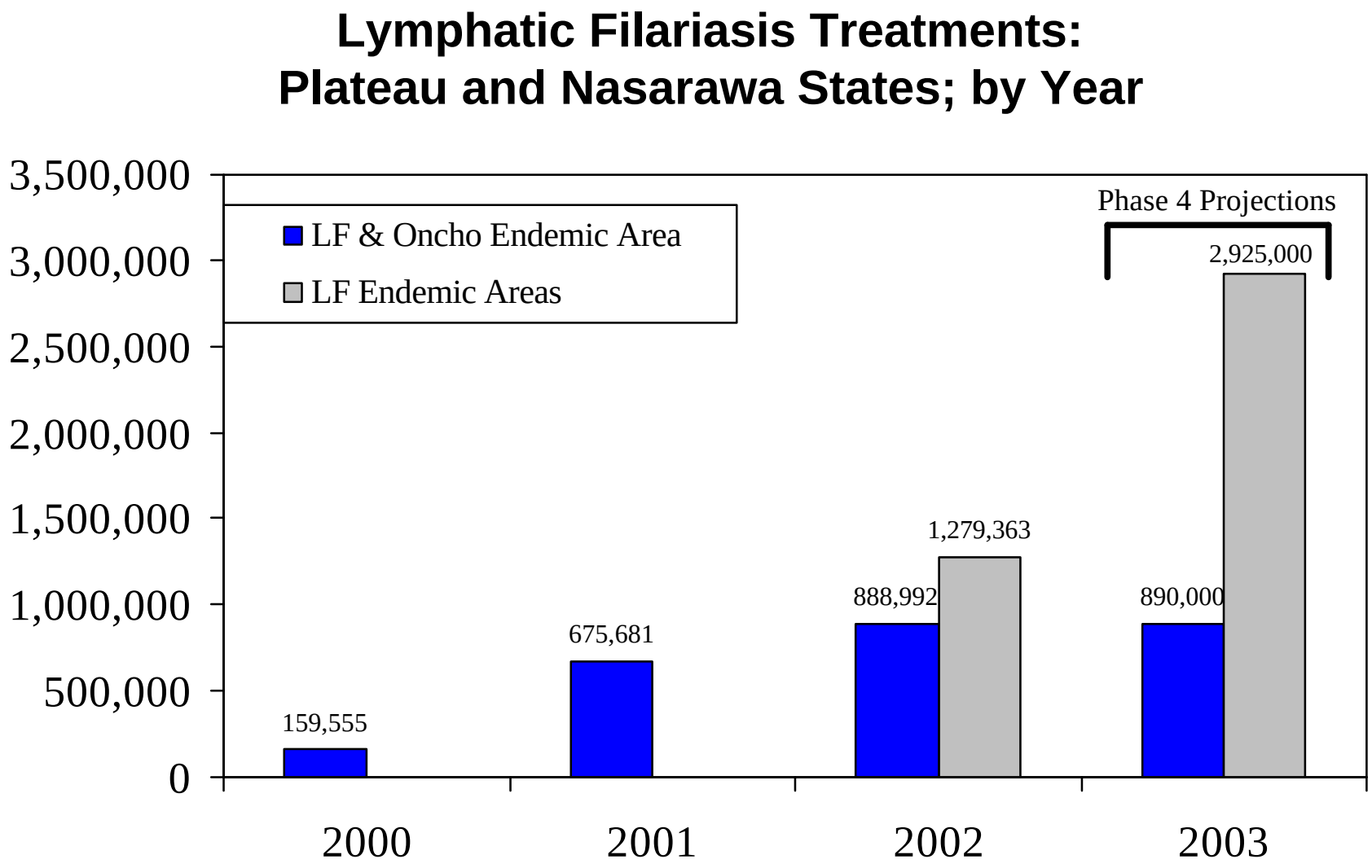

Lymphatic Filariasis Treatments:
Plateau and Nasarawa States; by Year
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
LF & Oncho Endemic Area
LF Endemic Areas
Phase 4 Projections
159,555
675,681
888,992
1,279,363
890,000
2,925,000
2000
2001
2002
2003

Figure 9

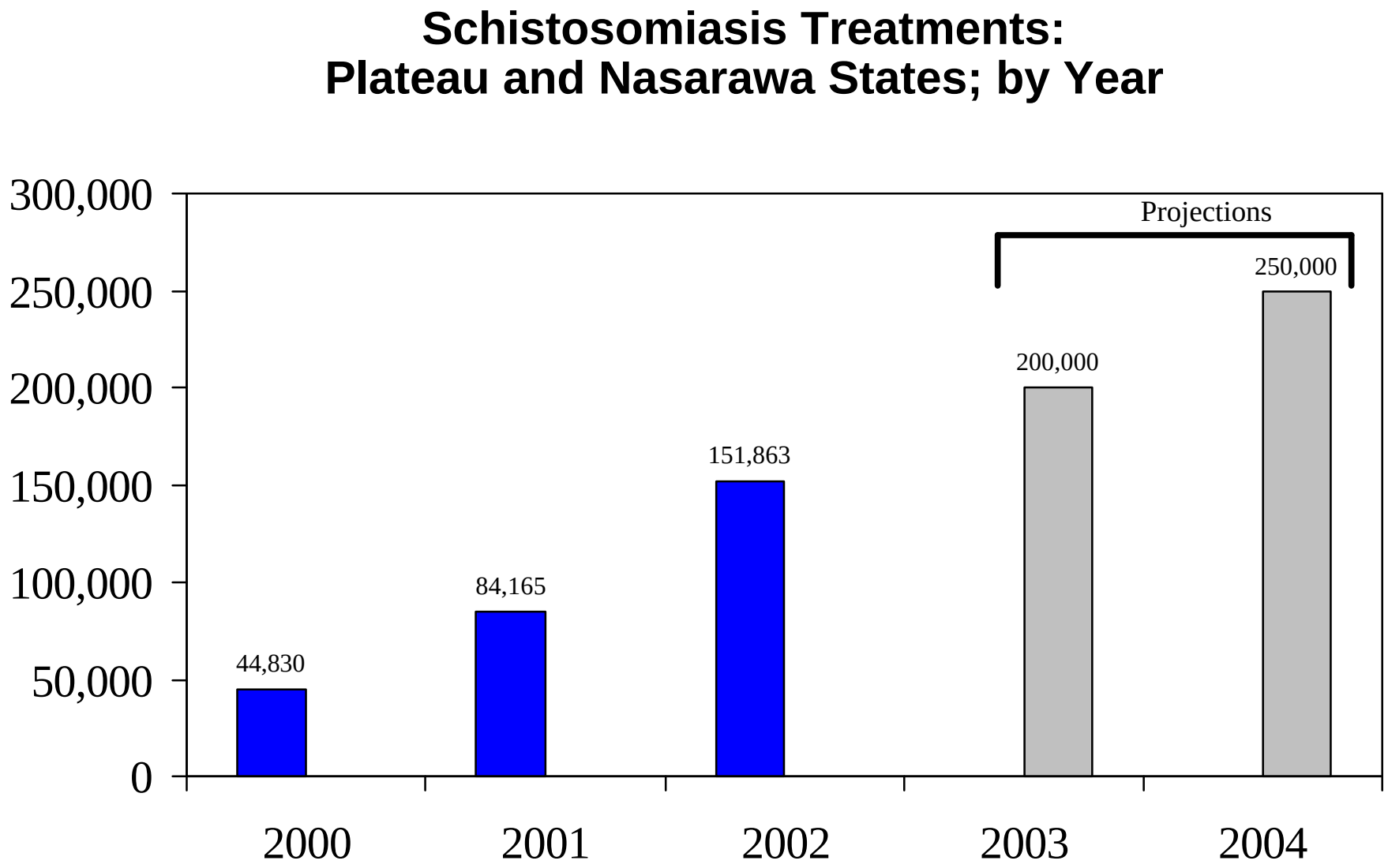

Schistosomiasis Treatments:
Plateau and Nasarawa States; by Year
300,000
250,000
200,000
150,000
100,000
50,000
0
Projections
250,000
200,000
151,863
84,165
44,830
2000
2001
2002
2003
2004

Table 5: Nigeria: GRBP-Assisted Areas: 2002 Mass Treatments for Onchocerciasis

State	# Treatments 2002	UTG 2002	# Villages
Plateau	269,106	286,370	296
Nasarawa	619,886	621,984	589
Imo	736,020	761,313	1,940
Abia	427,164	436,667	684
Edo	634,429	602,691	517
Delta	478,126	539,839	470
Enugu	783,052	767,175	1,377
Anambra	637,579	654,938	1,062
Ebonyi	502,076	495,956	973
Total	**5,087,438**	**5,166,933**	**7,908**

Table 6: 2002 Lymphatic Filariasis, Onchocerciasis and Schistosomiasis treatments: Plateau and Nasarawa States, Nigeria

2002 Tx Category		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	% ATO
Lymph. Filariasis	***ATO(earp)=**	**2,607,854**		**ATO(arv)=**	**3,039**										
TX(earp)	0	306	363	253,675	315,967	570,116	309,430	103,678	178,660	97,461	38,996	192,151	107,552	**2,168,355**	83%
Tx(arv)	0	0	0	359	465	715	301	35	144	196	30	361	116	**2,722**	90%
Onchocerciasis	***ATO(earp)=**	**1,134,021**		**ATO(arv)=**	**935**										
TX(earp)	0	306	363	580	138,131	302,924	198,365	79,829	106,637	27,157	9,725	32,886	30,950	**927,853**	82%
TX(villages)	0	0	0	0	158	299	132	46	69	24	18	66	31	**843**	90%
Schistosomiasis	***ATO(earp)=**	**150,000**		**ATO(>50%)=**	**79**		**ATO (20-49%)=**	**194**							
TX(earp)	0	0	0	0	0	0	0	29,302	45,110	26,636	26,854	15,862	8,099	**151,863**	101%
TX(> 50%)	0	0	0	0	0	0	0	13	17	9	21	4	2	**66**	84%
TX(> 20-49%)	0	0	0	0	0	0	0	34	51	32	24	12	5	**158**	81%

UGANDA

Background: Onchocerciasis affects approximately 1.8 million persons residing in 18 (out of 39) districts in Uganda (Map 6). Currently, GRBP-assisted programs are active in 11 endemic districts: Kisoro, Kabale, Kanungu[1], and Kasese in the Southwest focus bordering the Democratic Republic of Congo (DRC); Nebbi, Moyo and Adjumani in the West Nile focus bordering Sudan and DRC); Gulu and Apac in the Middle North focus; and Mbale (now including Sironko District) in the Mount Elgon focus in the east, bordering Kenya (Map 7, which does not show the new districts of Kanungu and Sironko). GRBP-assisted districts in Uganda operate at full coverage.

Treatments: GRBP/Uganda helped to treat 951,618 persons in 2002, or 97.6% of its Ultimate Treatment Goal (UTG) of 974,900 persons (Figure 10 and Table 7). This was the sixth straight year of more than 85% coverage of the UTG in GRBP-assisted areas, and the fifth successive year of coverage exceeding 90% of the UTG (Figure 11). All eleven districts achieved coverage of >90% of their respective UTG, and all high-risk villages were treated during the year. In 2002, GRBP-assisted areas provided 69.4% of all treatments in Uganda, including 11,859 passive treatments by GRBP-assisted districts, mainly from Nebbi and Kitgum. The UTG for 2003 (GRBP-assisted) is 999,275.

The Program received 2,950,780 Mectizan tablets in 2002 and, at the end of the year, had a balance of 79,704 tablets. An average of 3 Mectizan tablets were used per person treated.

Training/Retraining: Uganda trained 29,961 Community-Directed Health Workers (CDHWs) and 2,432 Community-Directed Health Supervisors (CDHSs) in 2002. 49% of the CDHWs and 37.6% of the CDHSs were female.

Sustainability: The "community-directed intervention approach" has been adopted as national health policy in Uganda. It already has been introduced with measurable positive results for malaria, infant mortality, and other programs. Hence, government support for onchocerciasis activities is strong, including financial support, and the primary healthcare system is viable in many areas. Involvement and active participation of members of the affected communities has increased over the years. Program strategies include the following: 1) training as many inhabitants of endemic villages as possible; 2) encouraging involvement of women and men; 3) grouping health workers and those that they serve in their own kinship clans; and 4) letting community members choose their own health volunteers as well as the location of treatment centers. Some districts, sub-districts, and sub-counties are providing financial support for the Program. The average cost per person treated in 2002 was only US $0.05 per person, of which an estimated 16% was provided by the districts, 55% by APOC, and 29% by GRBP. Overall treatment coverage is very good, and the elements of CDTI are all in place in GRBP-assisted areas. As Kisoro District

[1] Rukunjiri district was divided into two districts: Kanungu and Rukunjiri. All onchocerciasis endemic communities are located in Kanungu.

completes its fifth year of APOC support in 2003, the GRBP/Uganda secretariat is encouraged to monitor that district's ability to manage the Program and maintain good coverage of the population as APOC support is phased out. The role of GRBP in the post-APOC era also must be carefully defined.

RECOMMENDATIONS 2003 for GRBP UGANDA

The Program should phase down GRBP assistance to Kisoro District (a district with particularly strong sustainability indices) after the fifth year of APOC assistance there, and subsequently monitor the implementation of health education and mass drug administration.

The Program is urged to continue to publish periodical accounts of its experiences in establishing sustainable program operations.

The Program should continue to seek opportunities for adding integrated compatible interventions against other diseases in its operations.

The Uganda GRBP-assisted program is urged to seize every opportunity to document the impact of current interventions against onchocerciasis (health education and annual mass administration of Mectizan) on transmission of onchocerciasis and on clinical manifestations of the disease.

Anecdotes illustrating the popularity or benefits of the Program should be reported to GRBP headquarters.

All programs should advocate as strongly as possible for support of national programs by government authorities at all levels.

Map 6

Uganda
REMO Map

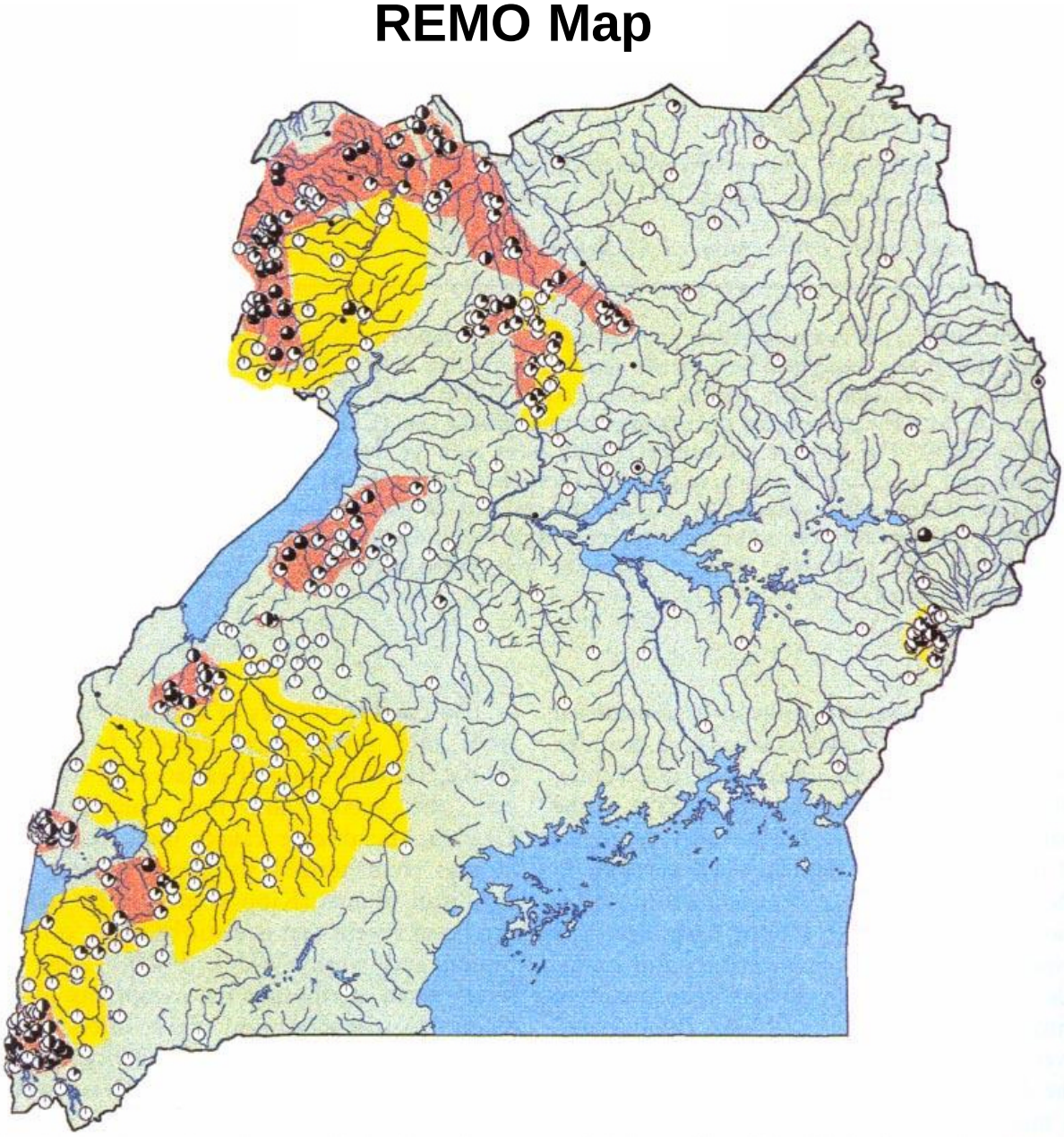


Fig. Endemicity of onchocerciasis in Uganda, as revealed by rapid epidemiological mapping. Nodule prevalences are shown as pie-charts: ○, <1%; ◔, 1%–9%; ◔, 10%–19%; ◑, 20%–39%; and ◕, >40%. Areas clearly requiring treatment (red) and areas requiring further assessment (yellow) are also indicated.

Map 7

Uganda
GRBP - Assisted Districts

(Map does not show districts of Kanungu and Sironko)

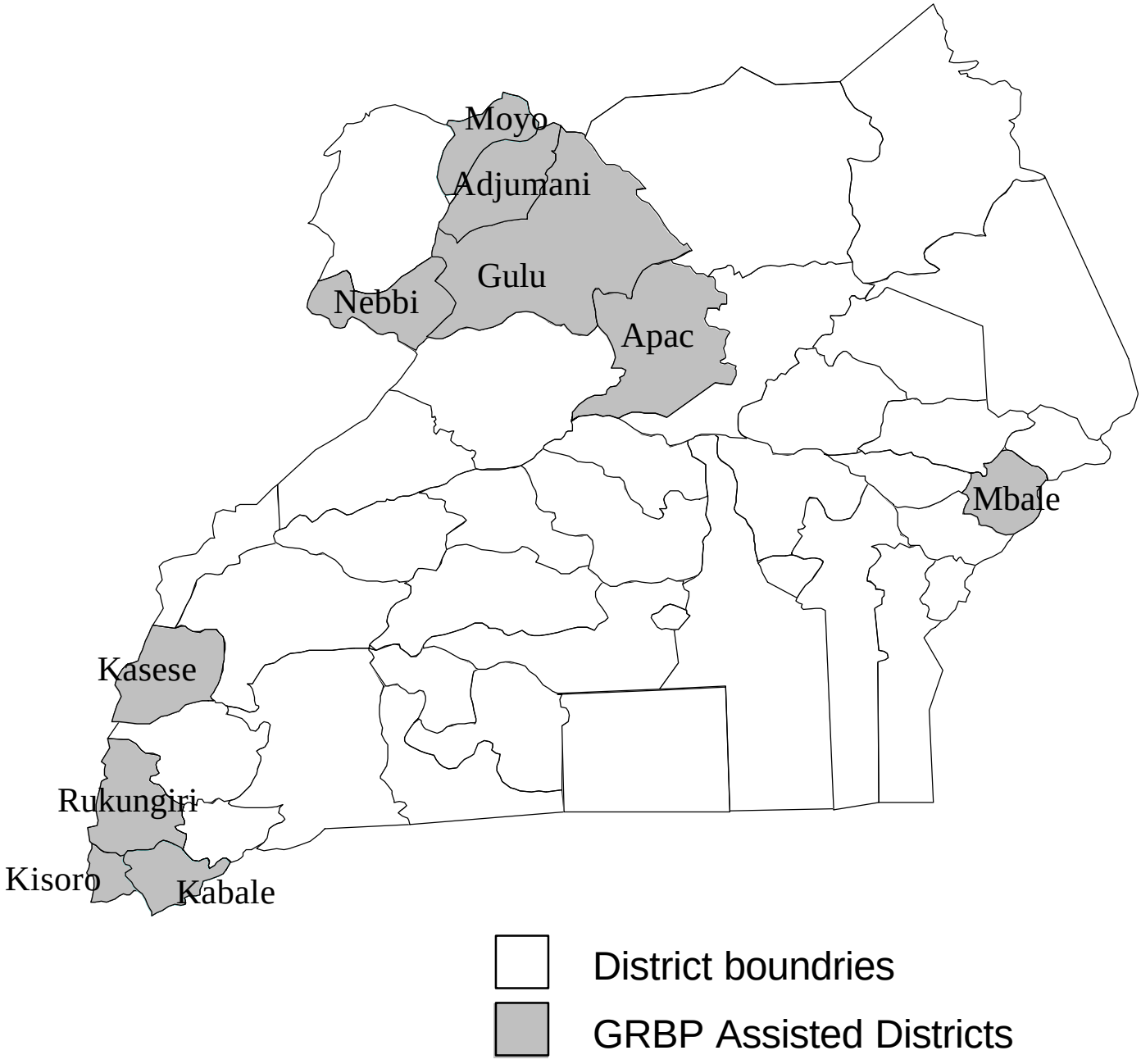
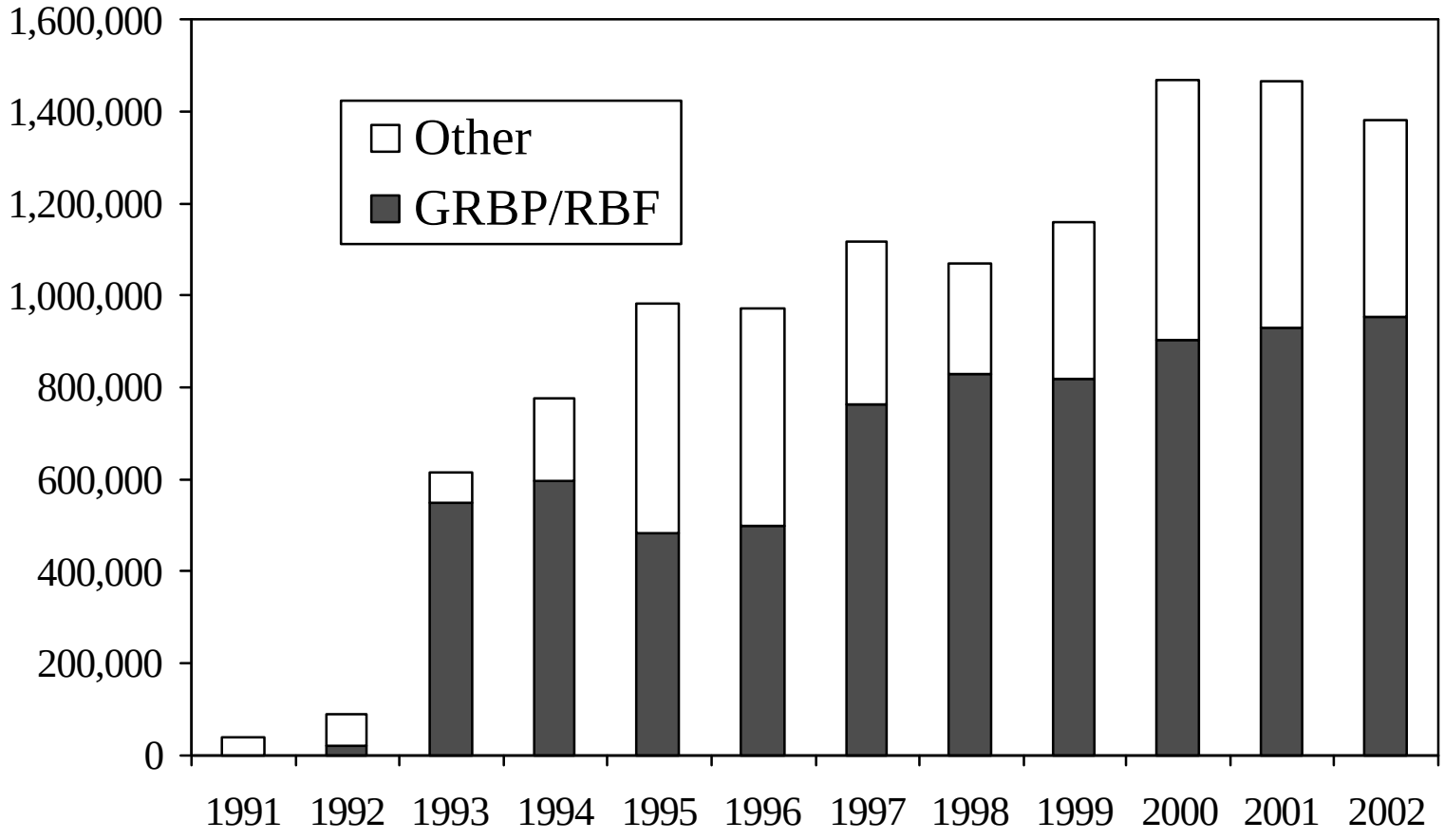


Figure 10

Uganda: GRBP-assisted Mectizan Treatments as Part of the Total Treatments Provided, 1991-2002



Treatments in 1992-1995 by RBF

Figure 11

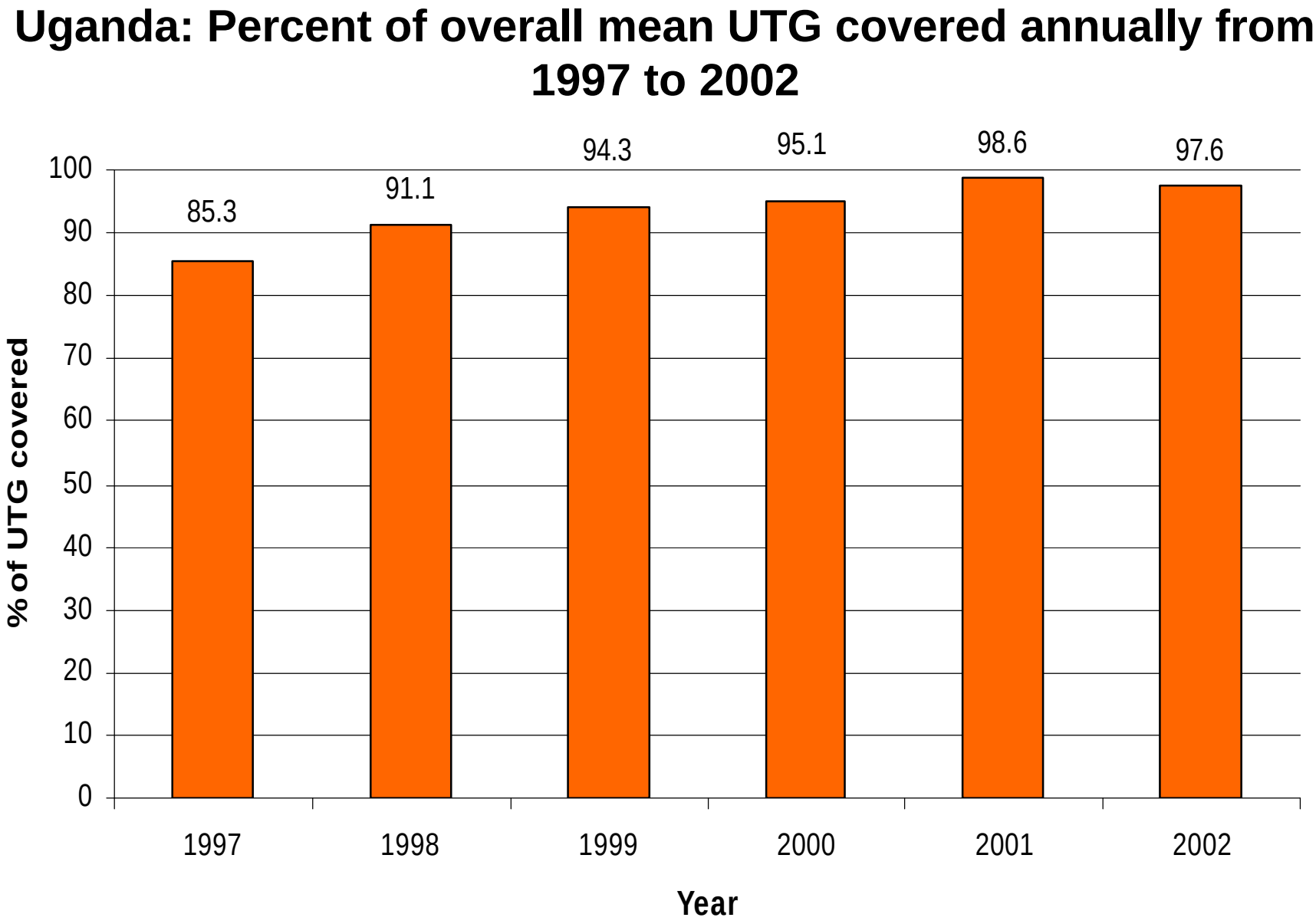

Uganda: Percent of overall mean UTG covered annually from 1997 to 2002
% of UTG covered
100
90
80
70
60
50
40
30
20
10
0
85.3
91.1
94.3
95.1
98.6
97.6
1997
1998
1999
2000
2001
2002
Year

Table 7: GRBP-Assisted Uganda Treatments, 2001 and 2002, By District

2002*

UGANDA	TX (earp)	UTG(earp)	%UTG	TX (arv)	UTG(arv)	% UTG
Adjumani	134,411	139,500	96.4%	218	218	100%
Apac	12,200	12,200	100.0%	9	9	100%
Gulu	137,529	143,400	95.9%	184	184	100%
Kabale	13,542	14,500	93.4%	48	48	100%
Kanungu	36,280	37,000	98.1%	102	102	100%
Kasese	75,800	75,800	100.0%	129	129	100%
Kisoro	15,906	17,000	93.6%	31	31	100%
Mbale	133,340	133,340	100.0%	580	580	100%
Moyo	131,896	133,320	98.9%	189	189	100%
Sironko	42,926	47,500	90.4%	191	191	100%
Nebbi	217,788	221,340	98.4%	670	670	100%
Total	**951,618**	**974,900**	**97.6%**	**2,351**	**2,351**	**100%**

2001*

UGANDA	TX (earp)	UTG(earp)	%UTG	TX (arv)	UTG(arv)	% UTG
Adjumani	132,457	135,407	97.8%	119	119	100%
Apac	11,773	11,773	100.0%	9	9	100%
Gulu	139,108	139,230	99.9%	184	184	100%
Kabale	13,335	13,735	97.1%	27	27	100%
Kanungu	34,926	36,000	97.0%	102	102	100%
Kasese	72,939	73,559	99.2%	125	125	100%
Kisoro	15,423	16,500	93.5%	31	31	100%
Mbale	126,563	129,451	97.8%	417	417	100%
Moyo	129,332	129,436	99.9%	179	179	100%
Sironko	46,103	46,152	99.9%	114	114	100%
Nebbi	210,188	213,920	98.3%	670	670	100%
Total	**932,147**	**945,163**	**98.6%**	**1,977**	**1,977**	**100%**

* The ATO is equal to the UTG.

CAMEROON

Onchocerciasis is widespread in Cameroon, with an estimated 5.1 million people infected, and approximately 62% of its population of 15 million at risk of infection. Some 60,000 people are believed to suffer some degree of visual impairment from onchocerciasis, and perhaps 1 million persons have onchocercal skin disease.

Background: The River Blindness Foundation (RBF) began assisting the MOH in North Province (the most highly endemic area for blinding onchocerciasis in the country) in 1992. North Province, which obtained APOC support in 1999, is the only GRBP project not currently assisted by LCIF. In August 1995, the Lions SightFirst launched a project, supervised by Lions District 403B and in partnership with the MOH and four NGDOs (RBF, Helen Keller Worldwide, International Eye Foundation, and SightSavers International), to distribute Mectizan in 3 other provinces (Centre, Adamaua, and West) over a 5-year period. GRBP became responsible for assisting West Province in 1996 (Map 8). The original SightFirst Cameroon project ended in early 2001, when an extension was granted to supplement new APOC projects in the LCIF-assisted zones, including West Province.

Treatments: The GRBP-assisted areas (Map 8) in Cameroon provided 1,134,712 treatments in 2002 (Table 8), or 85.8% of their combined Ultimate Treatment Goal (1,322,311). This included 900,773 treatments in West Province, and 233,939 treatments in North Province. The overall UTG coverage was similar to that in 2001 (86%). The 2002 treatments assisted by GRBP were about 60% of all treatments in Cameroon (Figure 12). The ATO for 2003 is to provide 1,265,391 treatments.

Mectizan: The GRBP/Cameroon received 3,148,500 Mectizan tablets in 2002, and had 725,746 left over from 2001. 370,352 tablets expired during the year and were removed from inventory. No Severe Adverse Events (SAEs) were reported in 2002 (Figure 13). The average number of tablets per treatment was two.

Training: In 2002, the Program trained 3,661 Community-directed distributors (CDDs) in West Province, and 1,137 CDDs in North Province, for a total of 4,798 CDDs trained.

Sustainability: Mectizan treatment and health education using CDTI has been accepted as the principal strategy for control of onchocerciasis since 1999. Prior to 2002, however, the Cameroonian Ministry of Health used a “cost recovery” system, under which 100 Central African Francs (CFAs) (US $0.20) was charged for each Mectizan treatment to cover distribution costs. It had long been postulated that the cost recovery system was contributing to low rates of treatment coverage in Cameroon. Preliminary studies conducted by GRBP after the MOH stopped requiring cost recovery in the onchocerciasis program in 2002 suggest that treatment compliance improved after cost recovery ended. The transitions to CDTI strategy in the two provinces were about two-thirds completed in 2002 and are expected to be completed in 2003.

Costs-per-treatment were estimated at US $0.18 in West Province, and US $0.24 in North Province. The Government of Cameroon provides significant funding (>US$ 150,000 in 2002) for the Program. Since North Province is in its fifth year of APOC funding, the Program will soon have an opportunity to test the sustainability of operations there.

Loa loa: Loiasis is endemic in the forested areas of west central Africa, including Cameroon. Compared to the filarial parasites that cause onchocerciasis and lymphatic filariasis, *Loa loa* causes no serious disease, although the occasional subconjunctival migration of a worm across the eye can be disconcerting to the infected person. Unlike onchocerciasis, where the microfilaria (mf) are found in the skin and eyes, those of *L. loa* are found in the blood, and can occur in spectacular concentrations. The effectiveness of Mectizan against *L. loa* remains a subject of research. At doses used for onchocerciasis (150-200 ug/kg), Mectizan reduces *L. loa* microfilaremia to about 14% of its pretreatment level for up to one year after treatment. It is unlikely that Mectizan kills adult *L. loa* parasites in humans. The concern with *Loa loa* is the occurrence of a rare central nervous system (CNS) reaction (resulting in a stupor or coma) that is related to the rapid killing of *Loa loa* microfilaria in the blood. Persons with 'heavy infections,' (e.g., numbers of *L. loa* mf $\geq$30,000 mf per milliliter of blood) are at greatest risk of a CNS event. The risk of CNS reaction in these individuals is almost always on their first exposure to Mectizan. The Mectizan Donation Program (MDP) requests that programs distributing ivermectin for onchocerciasis control programs follow recommendations where *L. loa* is known to be endemic to allow for rapid identification of coma events and appropriate management of patients in referral peripheral health care settings. Peripheral care settings are preferred since it is there where their families can remain close by to provide nutrition and nursing care. GRBP assisted programs adhere closely to the recommendations of the MDP.

To date, there have been 63 patients meeting the case definition of Loa CNS reactions post ivermectin treatment reported to MDP (Dr. Nana Twum-Danso, MDP, personal communication). Fifty-seven of these cases (90%) have occurred in Cameroon, and most of these (82%) in Center Province. The GRBP-assisted program in Cameroon has had a total of seven CNS cases potentially related to *Loa loa* since 1996, all of which have occurred in West Province. Of these seven patients only two were native to West Province, and both of these were from Malantouen Health District, in the northeastern part of the province. The other five persons with CNS events post Mectizan treatment originated from provinces other than West (four were from Northwest Province and one from Adamaoua). There have been two deaths (one each in 1998 and 1999).

No cases of adverse reactions potentially related to *Loa loa* were reported in Cameroon in 2002. In 2001, there were five cases of probable *Loa* CNS reactions post Mectizan treatment, all of whom were successfully managed with peripherally based nursing care. All patients recovered without long-term sequellae. Overall, CNS reactions in West Province are extremely rare, occurring at the rate of less than 3 cases per 1 million treatments. The rate of CNS cases in 2001 more than doubled

compared to previous years, to 7 cases per million treatments (Figure 13). The reason for this increase is not clear.

Surveillance structures for monitoring adverse reactions in all GRBP-assisted areas were maintained and strengthened in 2002. The provincial health delegates and the provincial chiefs of community health have been informed about *Loa loa*-related reactions, and the risks associated with treatment. The referral and treatment program for patients with such reactions is integrated into the primary health care system. Patients are managed in district hospitals, so that their families remain near to help with their nursing care.

RECOMMENDATIONS 2003 for GRBP CAMEROON

The Program should continue to monitor the impact of the government's halting of its cost recovery policy on mass treatment coverage.

The Program should phase down GRBP assistance to North Province after the fifth year of APOC assistance there, and subsequently carefully monitor the sustainability of health education and mass drug administration interventions.

The Program should clarify, and continue to monitor, support provided by the Government to the onchocerciasis program.

The Cameroon GRBP-assisted program is urged to seize every opportunity to document the impact of current interventions against onchocerciasis (health education and annual mass administration of Mectizan) on transmission of onchocerciasis and on clinical manifestations of the disease.

Anecdotes illustrating the popularity or benefits of the Program should be reported to GRBP headquarters.

All programs should advocate as strongly as possible for support of national programs by government authorities at all levels.

Map 8

Cameroon
GRBP - Assisted Provinces

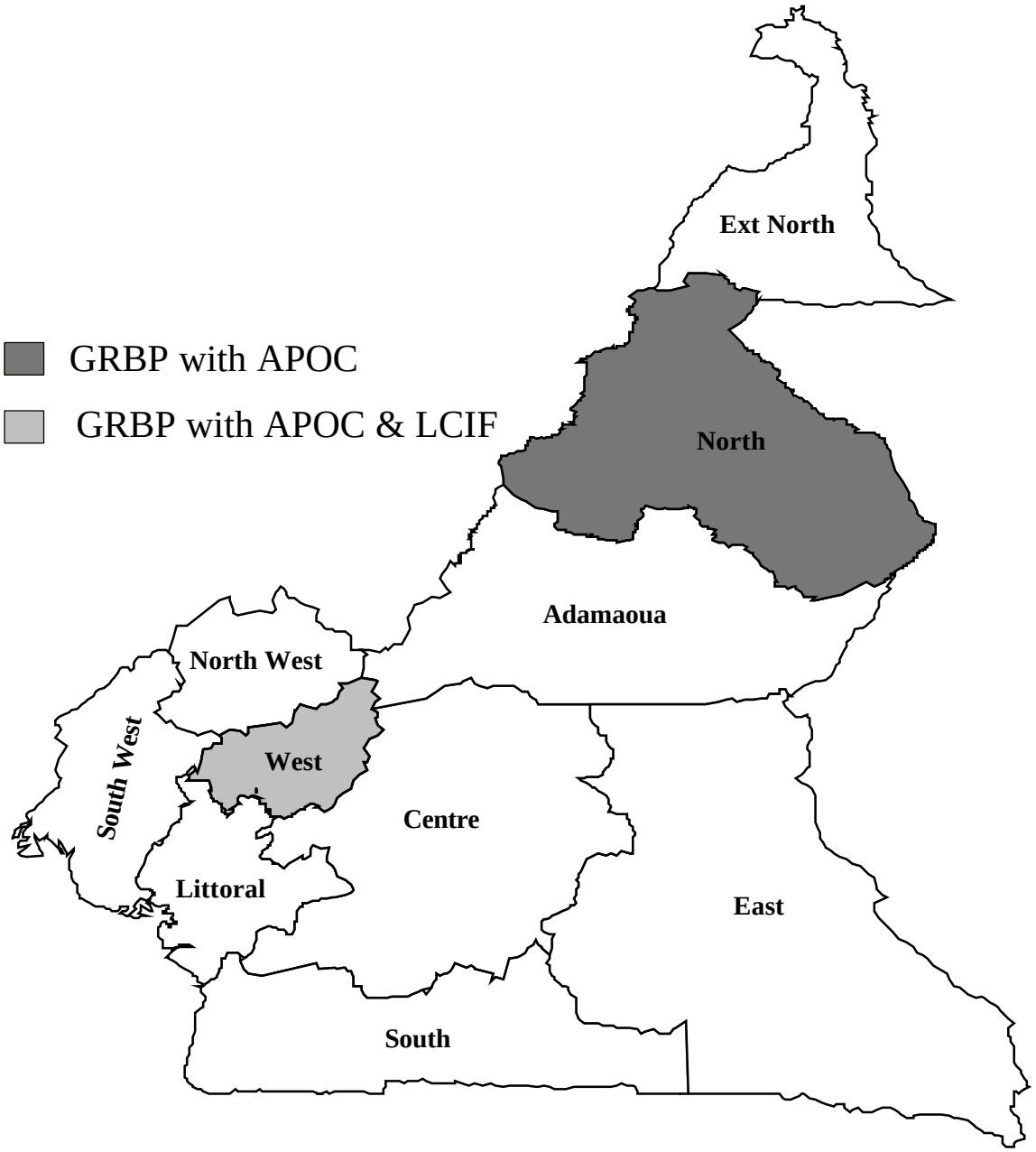
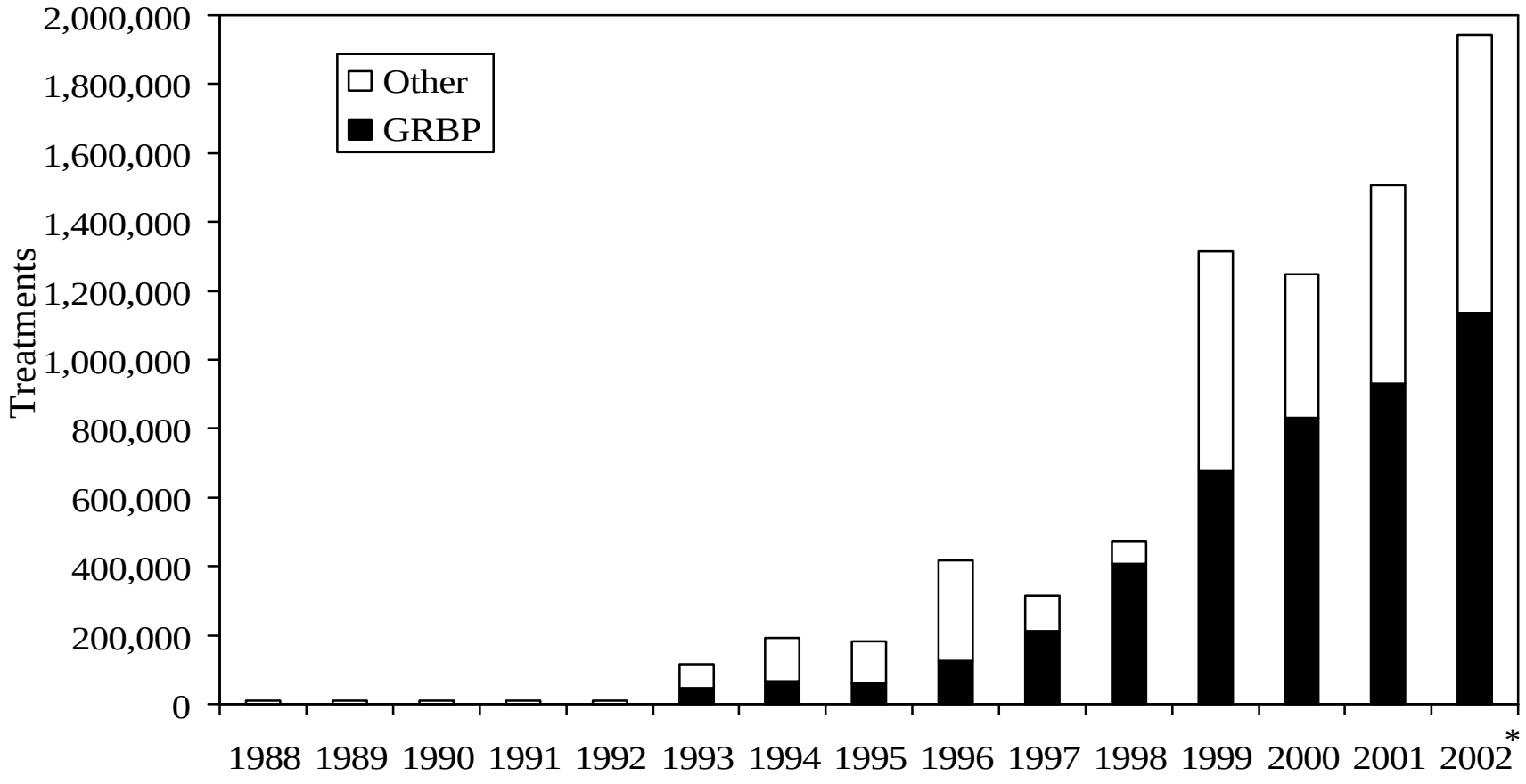


Figure 12

Cameroon: GRBP-assisted Mectizan Treatments as Part of Total Treatments Provided, 1988-2002



Treatments in 1993-1995 by RBF

* Source of non-GRBP figure: MDP

Figure 13

Adverse Reaction Rate Potentially Related to *Loa loa*, Per Million Treatments in West Province 1996-2002

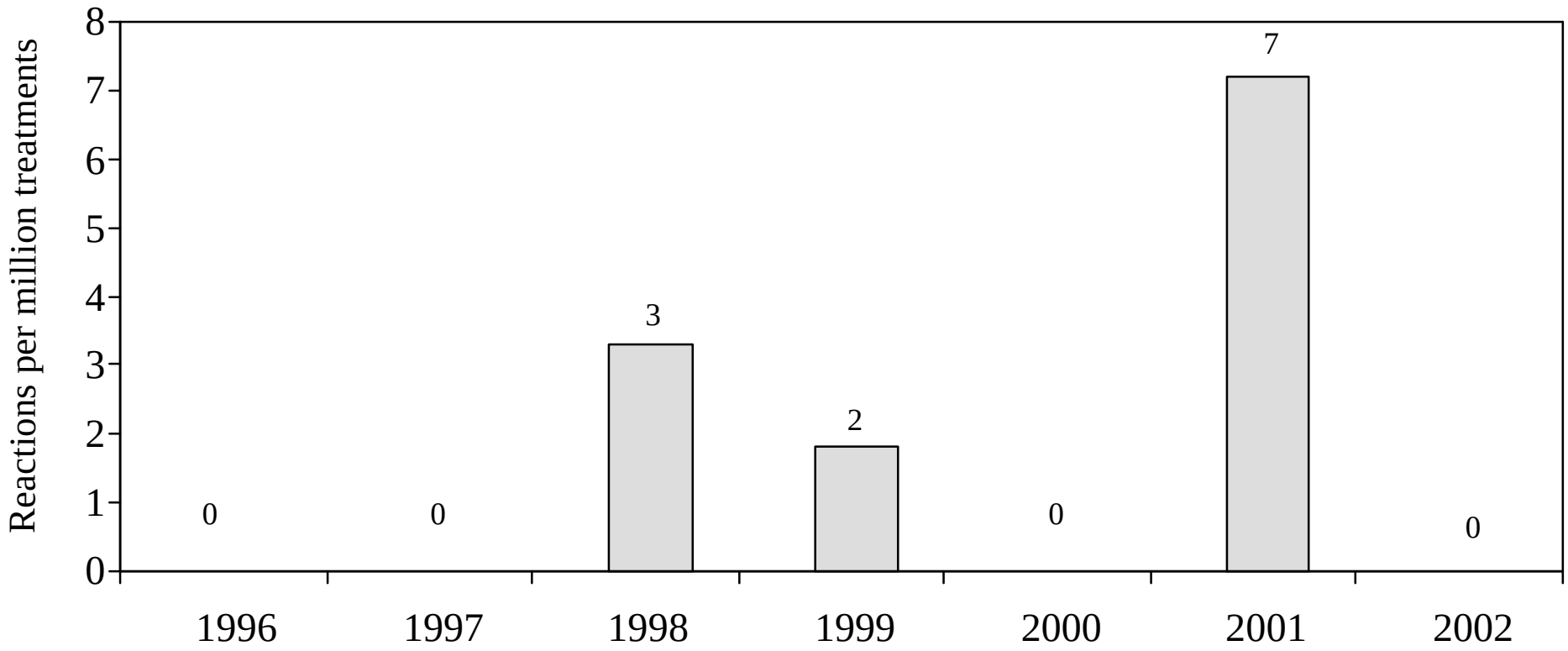


Table 8: Summary of Treatment Activities 2002: Cameroon

Province	Total population	ATO (earp)	Tx 2002	% ATO	UTG	%UTG
North	308,353	239,550	233,939	98%	246,682	95%
West	1,296,006	1,000,042	900,773	90%	1,075,629	84%
Total	1,604,359	1,239,592	1,134,712	92%	1,322,311	86%

SUDAN

There are an estimated two million persons at risk of onchocerciasis in Sudan, and 10,000 cases of onchocerciasis-related blindness. Of the several endemic areas (Map 9) in the country, the southern (principally southwestern) focus is the most significant and is characterized by high prevalence of blinding onchocerciasis (Map 10). Some of the highest rates of blindness due to onchocerciasis in the world occur in southwest Sudan.

The decades-old civil war in Sudan continues (although there is hope for a peaceful settlement in the near future), and as a result, channels of communication between the Government of Sudan (GOS) and the non-government held areas in the south remain key to coordinating and accelerating progress in the onchocerciasis control program (Map 11). Operation Lifeline Sudan/South (OLS/S) is a consortium of non-governmental development organizations (NGDOs) working in the contested southern part of the country, led by the United Nations Children's Emergency Fund (UNICEF). Within the structure of the OLS, Health Net International (HNI) is the NGDO that coordinates the distribution of Mectizan in OLS areas in a program known as the South Sudan Onchocerciasis Control Program (SSOCP). HNI orders and stores Mectizan for NGDOs with onchocerciasis control activities in areas served by OLS. HNI works to standardize training and reporting formats for the NGDOs engaged in treatment activities. Since 1996, 35 NGDOs have participated in onchocerciasis activities in southern Sudan. However, insecurity and funding issues have made continuous long-term assistance difficult. Currently, 26 NGDOs are actively involved. All parties work closely with the Sudan Relief and Rehabilitation Association (SRRA), which is the humanitarian arm of the resistance group, the Sudan People's Liberation Movement (SPLM).

In 1996, Sudan established a National Onchocerciasis Task Force (NOTF) that includes both the Government of Sudan (GOS) and the SSOCP. The NOTF receives support for Sudan's campaign against onchocerciasis from the Lions Clubs International Foundation (LCIF) (through The Carter Center) and the African Program for Onchocerciasis Control (APOC). In 2001, the Southern Sector Onchocerciasis Task Force (SSOTF) was established by the SRRA to respond to the technical and management issues that arise within the treatment areas under opposition control. The Carter Center has a seat on both the NOTF and the SSOTF. In October 2002 the NOTF and SSOTF met and worked jointly on a definition of gray (unknown/unserved) areas, standardization of treatment cards and logo, definition of a community, and plans for biannual meetings.

Treatments: Treatments in Sudan have been steadily increasing, despite the war, since former US President Jimmy Carter negotiated a four month long "Guinea worm cease fire" in 1995, that also helped to launch Mectizan treatments in conflict areas. In 2002, LCIF funds, provided through The Carter Center, helped support the GOS and three NGDOs active in the SSOCP: Zud Ost Asia (ZOA), International Medical Corps (IMC), and Aktion Afrike Hilfe/County Health Department.

Approximately 80% of the population affected by onchocerciasis in Sudan is in the south, of which the GOS and Sudan People's Liberation Army (SPLA) each have access to about 40%. The other 20% is inaccessible to either side.

The GRBP-assisted health education and treatments for onchocerciasis in 2002 totaled 525,339. Of these, 357,329 were delivered by the GOS, and 168,010 were delivered by three NGDOs in southern Sudan (Table 9). Another 215,746 treatments were delivered by other NGOs working under the SSOCP, totaling an unprecedented 741,085 onchocerciasis treatments throughout Sudan in 2002 (Figure 14). The GRBP-assisted treatments in GOS and OLS/S areas represented 62.7% of the estimated UTG for those areas in 2002.

On the GOS side, "Oncho Days" of intensive health education and advocacy were held around Khartoum, in camps for Internally Displaced Persons and in Juba and Wau. Two cities, Raja and Torit, changed hands twice in 2002, from GOS to SPLA to GOS, which resulted in difficulties in maintaining accurate records. An estimated 25,000 people moved from Raja to Tambura, on the SPLA side, and were treated there (not officially counted by IMC in treatment figures for Global 2000, yet officially counted by HNI) with Mectizan.

Training: As indicated in Table 10, the programs trained or re-trained a total of 126 supervisory health workers and 1,135 Community-Directed Distributors in 2002.

Mectizan: In 2002, 1,340,000 Mectizan tablets were received. Of these, 1,071,987 were used and 268,013 were left over. The average number of tablets per person treated was two.

Four incidents that may be attributable to Severe Adverse Events (SAEs) were reported. Specific information is not yet available.

Sustainability: Sustaining the gains achieved by mass treatments with Mectizan since 1995 is a particularly difficult challenge in Sudan, because of the now twenty-year old civil war. The country's poor infrastructure and vast terrain are additional challenges. Mectizan treatments are very popular at the community level, however, and health workers on both sides have sought to actively encourage community participation in the distribution process, in keeping with the CDTI strategy. The onchocerciasis program also has been used as an entry point for several other interventions, including distribution of vitamin A and of iodized salt, trachoma control, and polio eradication. The social impact of the Program has been documented in a few instances, including resumption of menses in at least 50 women on the GOS side after treatment with Mectizan. *Two boys born after long periods of infertility were named Mectizan!*

Government financing for the Program has been minimal. In 2002, the GOS provided about 10.5% (US $33,500) of "in kind" costs for that program (APOC: 69%, SightFirst/Carter Center 20.5%). Even in the northern areas of the country, the primary

healthcare system is generally not yet functioning well enough to sustain this program. At present, 26 NGOs are providing crucial support for efforts in southern Sudan in OLS/S areas, although Sudanese nationals have been increasingly involved, as a part of deliberate strategy by the SSRA, OLS/S, and the NGOs in the past two years.

Because of the war, average costs per treatment are exceptionally high: about US $0.74 in GOS areas, and US $1.64 in all OLS/S areas in 2002. The overall cost per treatment in Sudan is $1.18.

APOC conducted a fifth year evaluation in GOS areas in January 2003 and conducted Rapid Epidemiological Assessment (REA) in OLS/S areas in March 2003. Results are not yet available.

RECOMMENDATIONS 2003 for GRBP SUDAN

The Carter Center/GRBP are encouraged to refine the levels of onchocerciasis endemicity, population at risk, and UTG in accessible affected areas.

The Carter Center/GRBP should help facilitate joint meetings between representatives of the NOTF and the SSOTF, as well as the realization of joint NOTF/SSOTF recommendations, in order to enhance cooperation between the two programs.

The Carter Center/GRBP should encourage the NOTF and SSOTF to begin planning for expansion of onchocerciasis control activities in post-war Sudan. This also might include considerations of add-on interventions such as for schistosomiasis, lymphatic filariasis, and trachoma, for example.

The Carter Center/GRBP should monitor for any serious side effects from Mectizan and also for *Loa loa*-related complications, especially in populations being treated for the first time.

The Carter Center/GRBP should clearly define geographical coverage as the entire known population in the target area, not as the accessible population only.

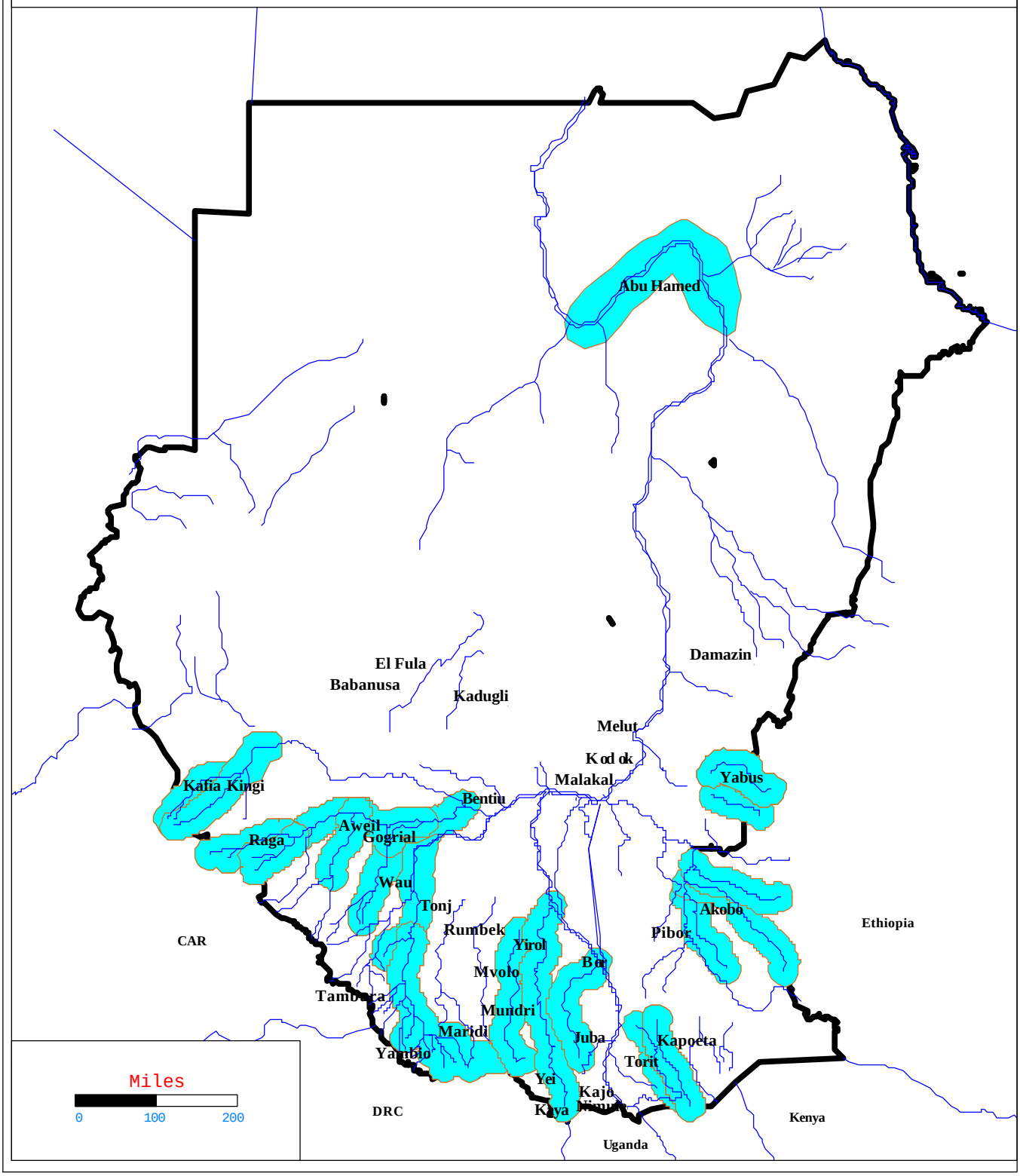
Sudan GRBP-assisted programs are urged to seize every opportunity to document the impact of current interventions against onchocerciasis (health education and annual mass administration of Mectizan) on transmission of onchocerciasis and on clinical manifestations of the disease.

Anecdotes illustrating the popularity or benefits of the Program should be reported to GRBP headquarters.

All programs should advocate as strongly as possible for support of national programs by government authorities at all levels.

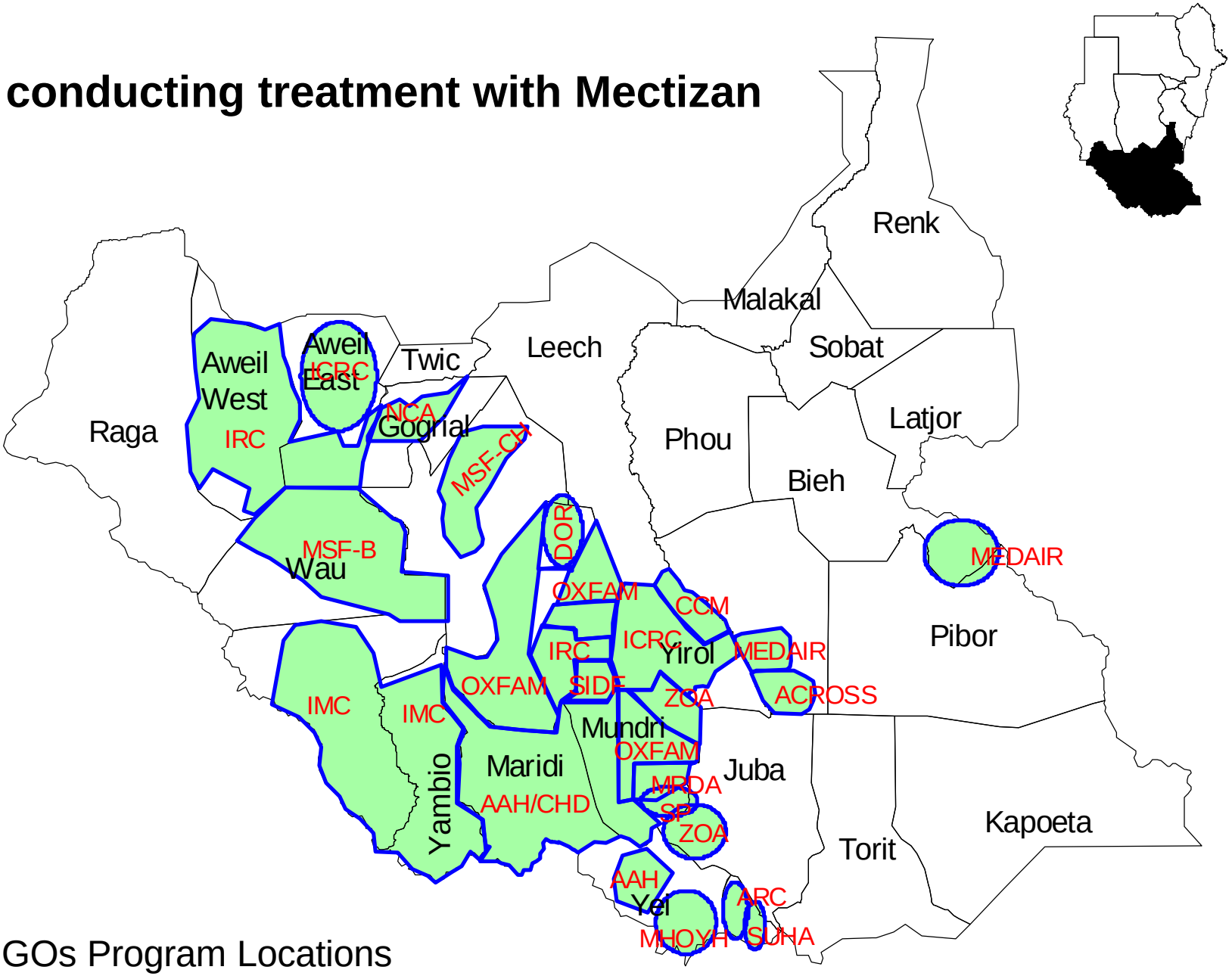
Map 9

Onchocerciasis in Sudan



Map 10

OLS/S
NGOs conducting treatment with Mectizan



Map 11

Sudan Onchocerciasis Control Program

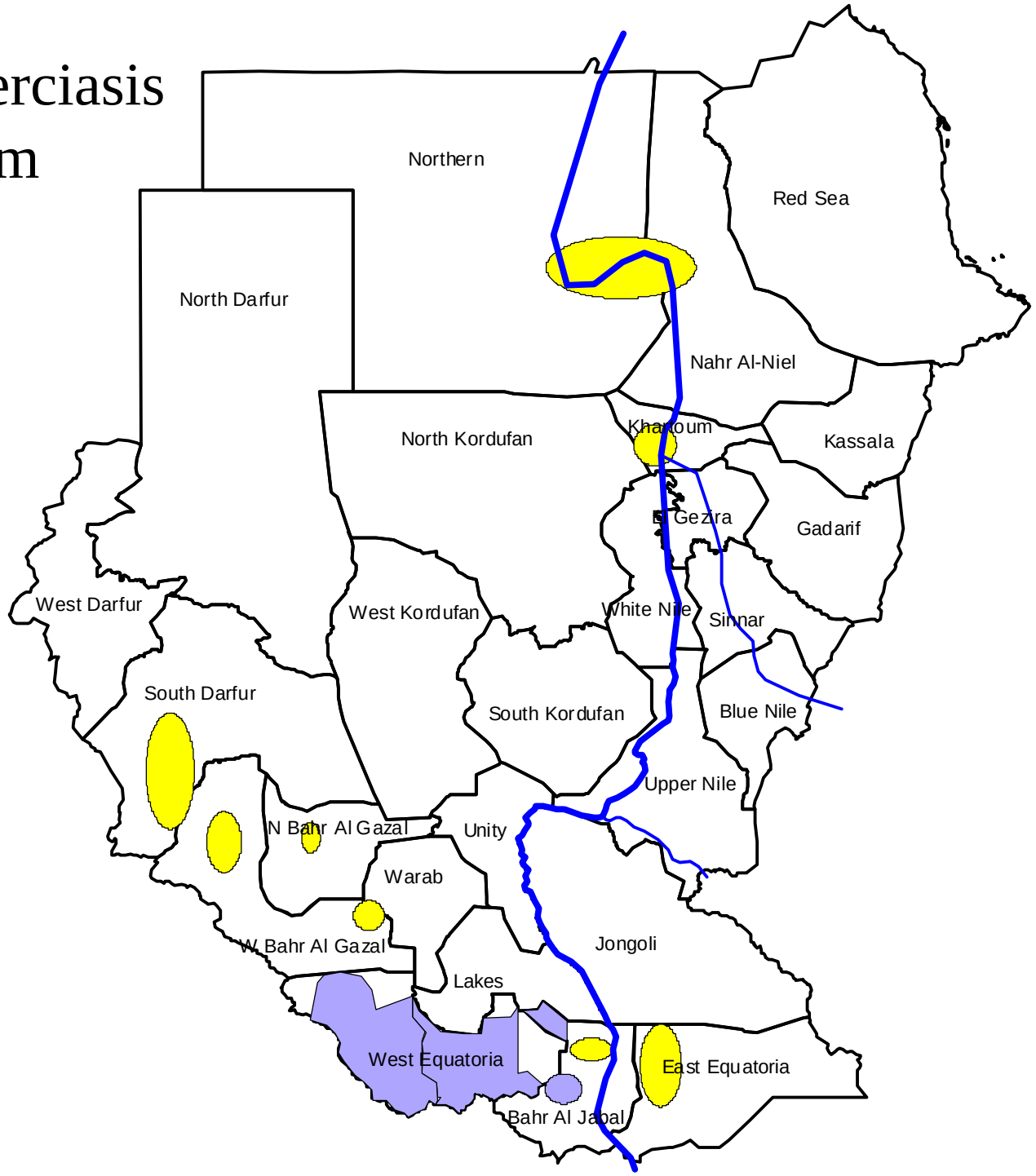
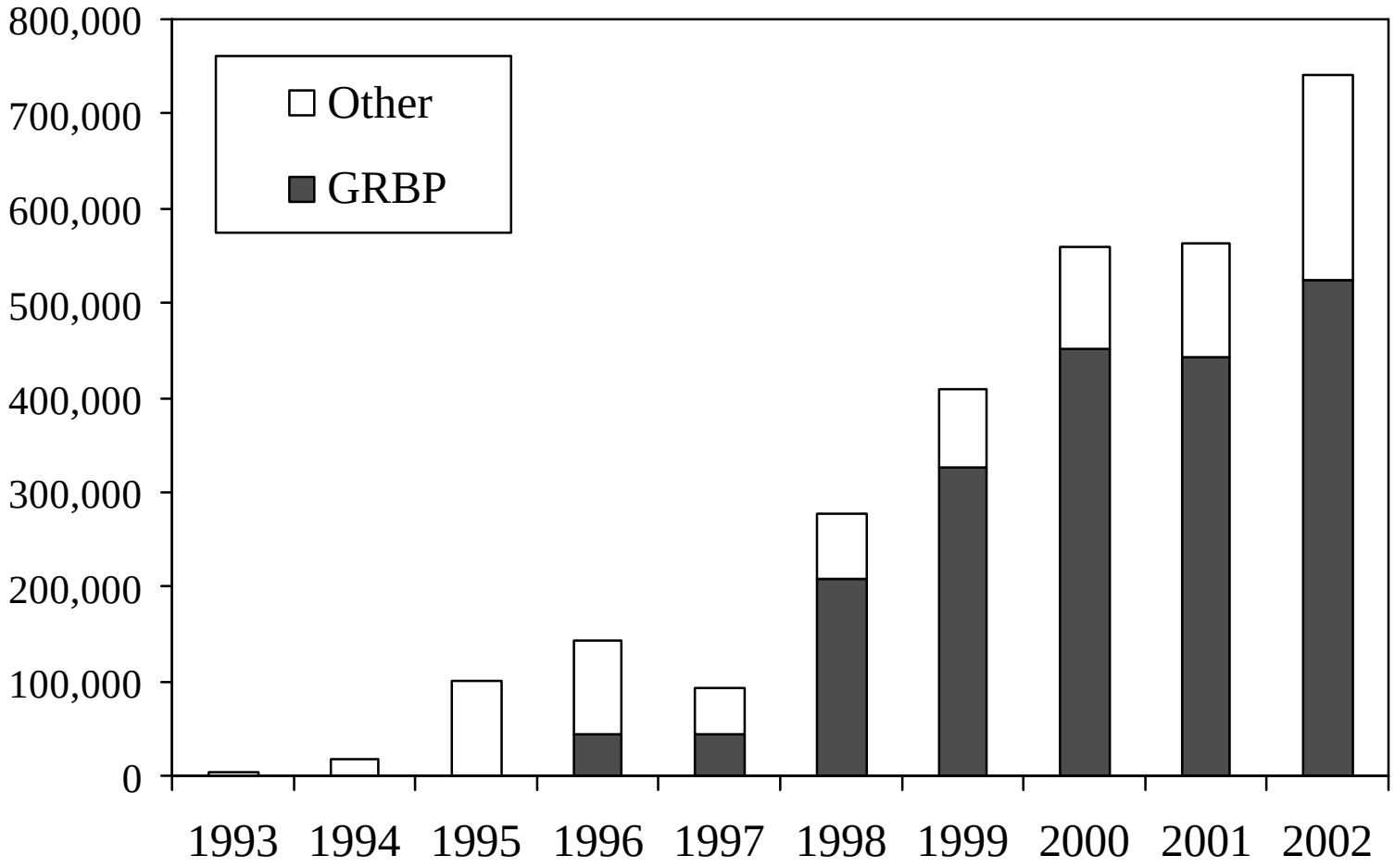


Figure 14

Sudan: GRBP-Assisted Mectizan Treatments as Part of the Total Treatments Provided, 1993-2002



Since 1997, GRBP activities in Sudan have been supported by Lions Clubs International Foundation

Table 9: OLS/S - GRBP Assisted
Mectizan treatments 2002: Sudan

	Mectizan Treatments													% of ATO	ATO	UTG
	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL			
SOUTH SUDAN																
State: Western Equatoria																
AAH/CHD Maridi	1,370	1,434	784	254	0	866	5,030	0	165	3,570	4,044	847	**18,364**	**87%**	**21,000**	**26,250**
AAH/CHD Mundri	994	60	52	0	0	1,470	3,154	0	1,738	368	709	8,417	**16,962**	**61%**	**28,000**	**35,000**
IMC Yambio	1,852	0	0	7,060	5,846	3,751	1,429	3,293	3,834	9,198	10,713	9,427	**56,403**	**71%**	**80,000**	**100,000**
IMC Tambura	0	1,414	5,669	2,857	10,054	7,062	1,310	1,584	4,810	8,153	4,266	11,046	**58,225**	**74%**	**78,400**	**98,000**
State: Bhar Al Jabal																
ZOA Katigiri	1,386	697	1,257	1,532	1,584	1,436	1,227	0	0	0	0	nr	**9,119**	**38%**	**24,000**	**30,000**
ZOA Tali	935	518	1,190	943	1,022	1,544	1,657	0	0	0	0	1,128	**8,937**	**25%**	**35,720**	**44,650**
GRBP Assisted	**6,537**	**4,123**	**8,952**	**12,646**	**18,506**	**16,129**	**13,807**	**4,877**	**10,547**	**21,289**	**19,732**	**30,865**	**168,010**	**63%**	**267,120**	**333,900**
HNI (Other NGOs)	**47,570**	**15,964**	**6,648**	**17,751**	**48,686**	**30,481**	**10,968**	**6,048**	**14,219**	**9,907**	**4,352**	**3,152**	**215,746**	**92%**	**235,680**	**266,100**
All OLS/S	**54,107**	**20,087**	**15,600**	**30,397**	**67,192**	**46,610**	**24,775**	**10,925**	**24,766**	**31,196**	**24,084**	**34,017**	**383,756**	**76%**	**502,800**	**600,000**
OLS/S GRBP % of Total Treatments	**12%**	**21%**	**57%**	**42%**	**28%**	**35%**	**56%**	**45%**	**43%**	**68%**	**82%**	**91%**	**44%**			

Table 10: Sudan Onchocerciasis Control Program (GRBP-Assisted Areas)

	# Persons Treated 2002	ATO 2002	UTG 2002	Trained	
				Supervisors	CDDs
GOS	357,329		503,439	60	1,012
OLS/S	168,010	267,120	333,900	66	123
Total	525,339		837,339	126	1,135

ETHIOPIA

Background: Ethiopia is the largest, most populous country in the Horn of Africa, with over 60 million people and an area of 435,000 square miles. Onchocerciasis was first reported in southwestern Ethiopia in 1939 by Italian investigators. The northwestern part of the country was reported to be endemic in studies conducted in the 1970s. Onchocerciasis endemicity was evaluated further in Rapid Epidemiological Mapping of Onchocerciasis (REMO) exercises conducted in 1997, 1998, and 2000. REMO was completed in 2001, and the results indicated that out of 6 regions surveyed, all regions were endemic for onchocerciasis and 4 out of the 5 had areas that were meso- or hyper-endemic (Map 12). Currently, it is estimated that 7.3 million persons are at risk of onchocerciasis, and 1.4 million are infected.

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). Mr. Teshome Gebre, Global 2000 country representative, is secretary of the NOTF. A National Plan of Action for onchocerciasis control activities in Ethiopia was drafted at a workshop in Nazareth on September 14, 1999, with the assistance of many partners, including The Carter Center. The plan proposed phasing the delivery of Mectizan tablets and health education into onchocerciasis endemic areas identified in the 1997 REMO exercise. Table 11 shows the ATOs for 2002 and 2003. In December 1999, the MOH invited The Carter Center to be its partner in an application to the African Program for Onchocerciasis Control (APOC) for support of treatment activities in Kaffa/Sheka zones of the SNNPR (Map 13). The proposal, which was approved in 2000, targeted 25% of the eligible at-risk population in the zone (209,512) for 2001, with expansion to the UTG (773,604) by year 2003. Mobilization and training of distributors to carry out treatment activities using the CDTI strategy began in 2000, and treatment was initiated in 2001. Currently, there are no other mass treatment onchocerciasis activities in Ethiopia.

A strong relationship with the local Lions Club contributes greatly to this effort. The Lions have played an active role in attending and sponsoring meetings, including the official launching of onchocerciasis control activities on December 5, 2000, in Addis Ababa. High-level attendance at that launching included Dr. Lamisso Hayesso (Vice Minister of Health), Dr. Ebrahim Samba (Regional WHO Director), Dr. Tebebe Y/Berhan (Vice Governor, Lions Clubs District 411), and Dr. Mitchel Jancloes (WHO Representative for Ethiopia), among others.

Treatments: CDTI implementation in Ethiopia first began in the GRBP-assisted Kaffa-Sheka zone of the Southern Nations Nationalities and Peoples Region (SNNPR) in 2001. The Program provided health education and Mectizan to 233,309 persons, which represented 111% of its ATO for 2001. Kaffa-Sheka zone was later divided into two separate zones, Kaffa and Sheka, which contained two and three woredas (districts) under treatment, respectively.

During 2002, activities in Kaffa zone expanded to include four additional woredas, for a total of six, while Sheka zone conducted CDTI activities in the same three woredas for a second time. Kaffa zone treated 358,996 persons (95% of its ATO), and Sheka zone treated 157,081 (92% of its ATO) in 2002. Thus, the GRBP-assisted areas treated a total of 516,077 persons in 2002, or 94% of the ATO, 67% of the UTG for Kaffa Sheka, for the year (Figure 15 and Table 14). The treatment activities took place from March through July 2002. GRBP activities will expand in 2003 to Bench Maji zone (adjoining Kaffa and Sheka zones) in the SNNPR, and to North Gondar zone in the Amhara Region (Map 13). Proposals have been submitted to APOC which, if approved, would allow GRBP to begin assisting CDTI activities in Illubabor and Jimma zones, which also adjoin Kaffa and Sheka zones, but are administratively part of Oromiya Region (Map 13). GRBP/The Carter Center is still the only NGDO assisting onchocerciasis control efforts in Ethiopia, however Africare plans to begin assisting projects in Gambella Region.

Training: A total of 469 trainers (351 in Kaffa; 118 in Sheka) and 2,424 Community-Directed Drug Distributors, or CDDs (1,870 in Kaffa; 554 in Sheka), were trained in 2002.

Assessments: Assessments of *Loa loa* prevalence were conducted in suspected woredas. There was no indication of that disease in the surveyed areas. A paper is being prepared for publication.

Mectizan: A total of 1,645,500 Mectizan tablets (3,291 bottles) were received from the MDP for treatments in Kaffa and Sheka zones in 2002. The Program had a balance of 328,045 tablets at the end of the year. 2,708, or 0.2%, of the Mectizan tablets were wasted. The average number of tablets per treatment was 2.5.

Three deaths occurred following Mectizan treatments in Kaffa Zone: a 28-year-old woman known to have a chronic gastrointestinal (GI) problem died 15 hours after taking Mectizan; a 40-year-old man known to have a GI problem died 20 hours after taking Mectizan; and an 80-year-old man, who had a recurrent foot infection from a gunshot wound, died 10 days after taking Mectizan. In addition, a 48-year-old man from Sheka zone suffered loss of vision 11 days after treatment, but recovered fully in approximately two months. No other Severe Adverse Events (SAEs) were recorded.

Sustainability: One of the last endemic countries to begin onchocerciasis control activities under APOC, Ethiopia is making rapid progress in extending health education and mass treatment with Mectizan to endemic areas. A second NGDO (Africare) is poised to begin assisting implementation in 2003. However, no NGDO partner has come forth to assist the government in three endemic regions (Metekel, East Wellega, and West Wellega). The government may implement activities in the regions with APOC support but without an NGDO partner.

Mectizan procurement and delivery are well integrated into the country's existing system for those functions, and are thus "sustainable." But the Program is currently

completely dependent on external support as there is no line item for CDTI in the government's budget. There are only part-time coordinators for onchocerciasis activities at all levels, including the national level, and the available transport, finances, and personnel are all used for numerous other health activities besides onchocerciasis control. The current decentralization process in the MOH and the newly introduced MOH strategy, "health extension package," may facilitate implementation of CDTI in the long run. Add-on interventions that are being explored, such as for LF, also may foster sustainability.

RECOMMENDATIONS 2003 for GRBP ETHIOPIA

The Ethiopian GRBP is scheduled to expand its ATO almost three-fold in 2003 compared to 2002. The Program should monitor for Severe Adverse Events as carefully as possible in populations being treated for the first time.

Expansion of treatment for onchocerciasis should take priority over add-on interventions in GRBP-assisted areas for the time being.

The Ethiopian GRBP should encourage Ethiopian health authorities to implement control measures against onchocerciasis under APOC auspices without an NGDO partner in at least one project area in order to test the sustainability of such an approach.

The Ethiopian GRBP should seek to involve coffee plantation companies in Keffa and Sheka Zones in helping to support onchocerciasis control activities.

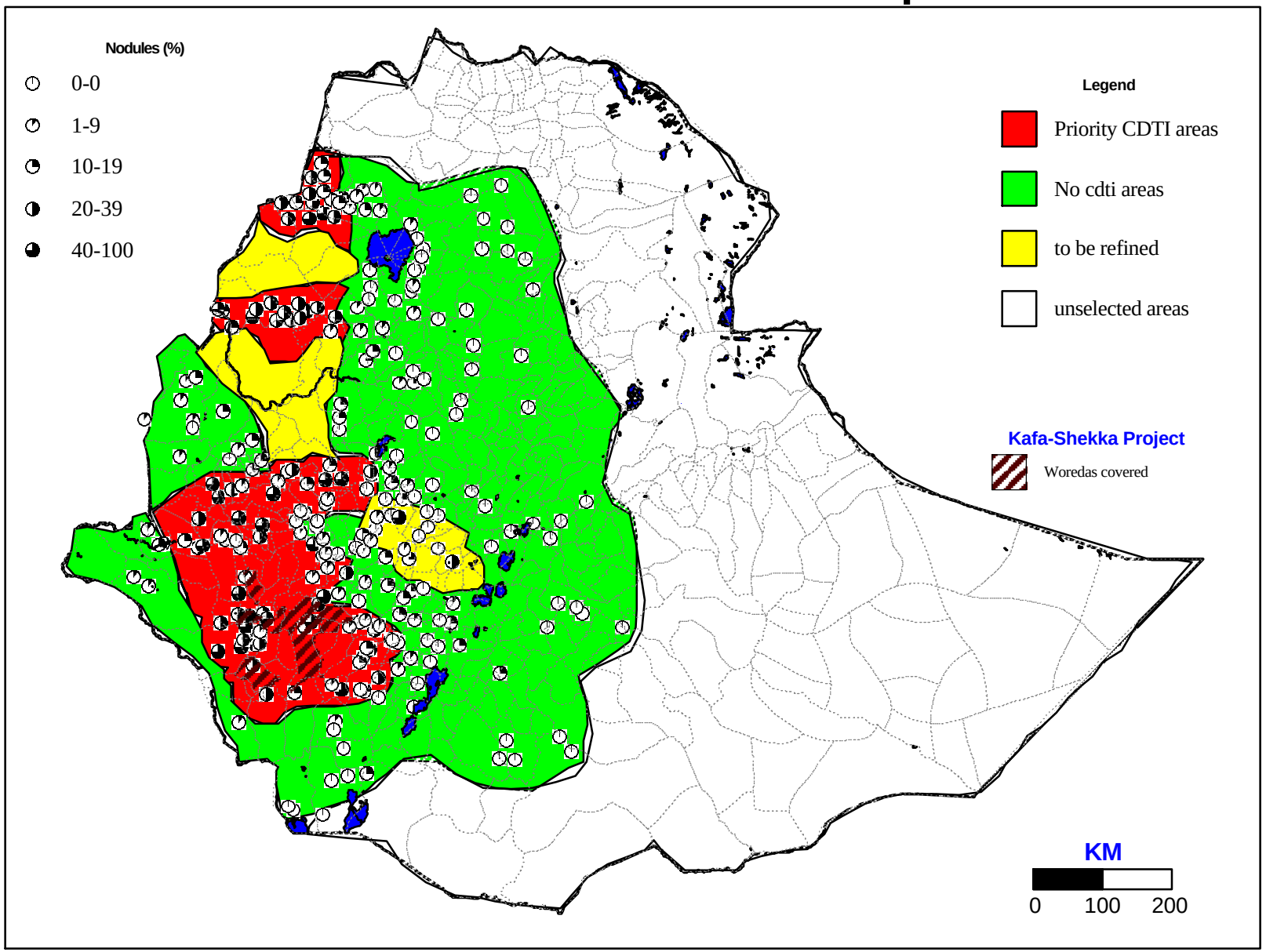
The Ethiopian GRBP-assisted program is urged to seize every opportunity to document the impact of current interventions against onchocerciasis (health education and annual mass administration of Mectizan) on transmission of onchocerciasis and on clinical manifestations of the disease.

Anecdotes illustrating the popularity or benefits of the Program should be reported to GRBP headquarters.

All programs should advocate as strongly as possible for support of national programs by government authorities at all levels.

Map 12

Current CDTI Areas in Ethiopia



Map 13

GRBP-Assisted CDTI Projects in Ethiopia

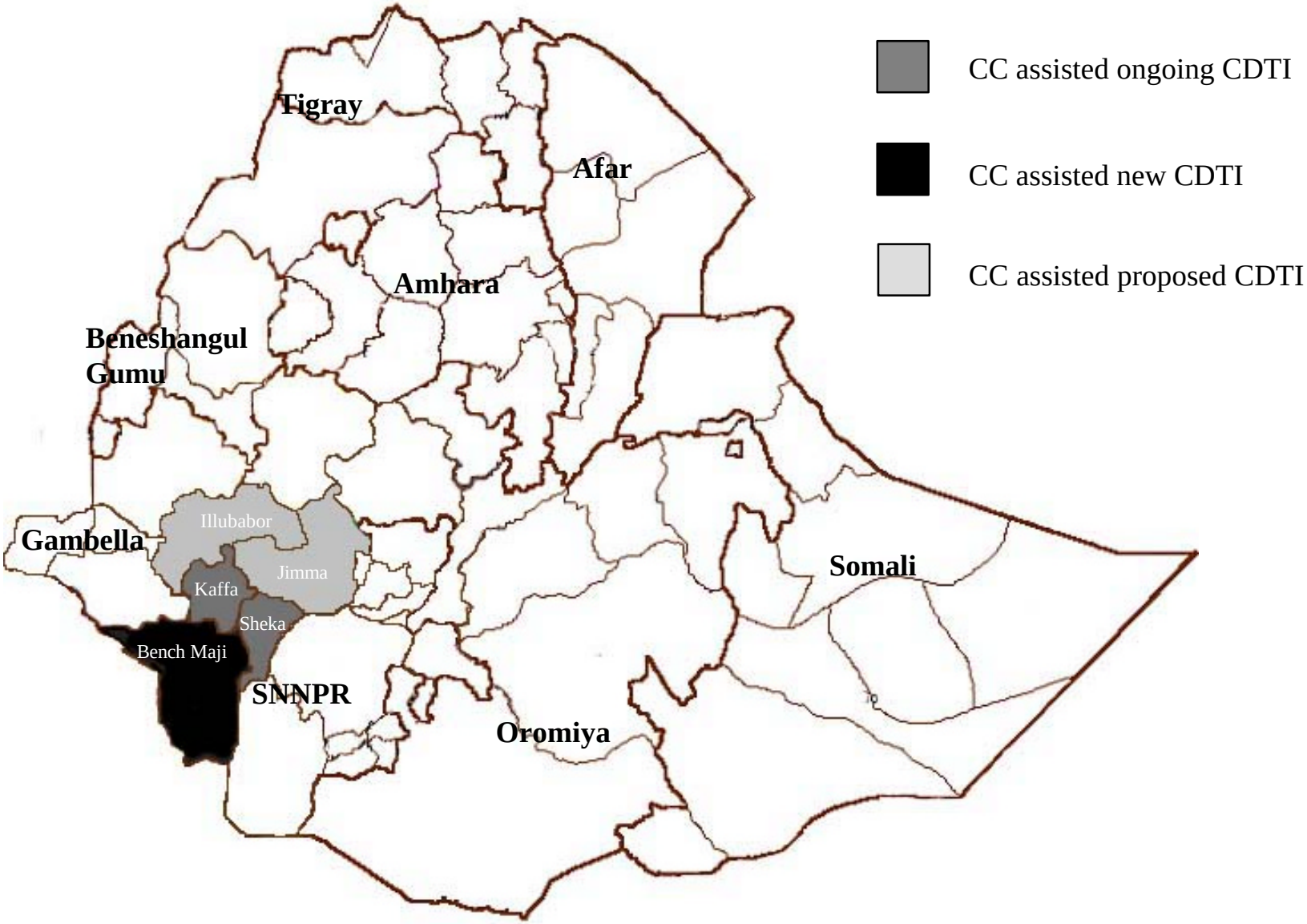


Figure 15

Ethiopia: 2001, 2002 Mectizan Treatments and ATO for 2003

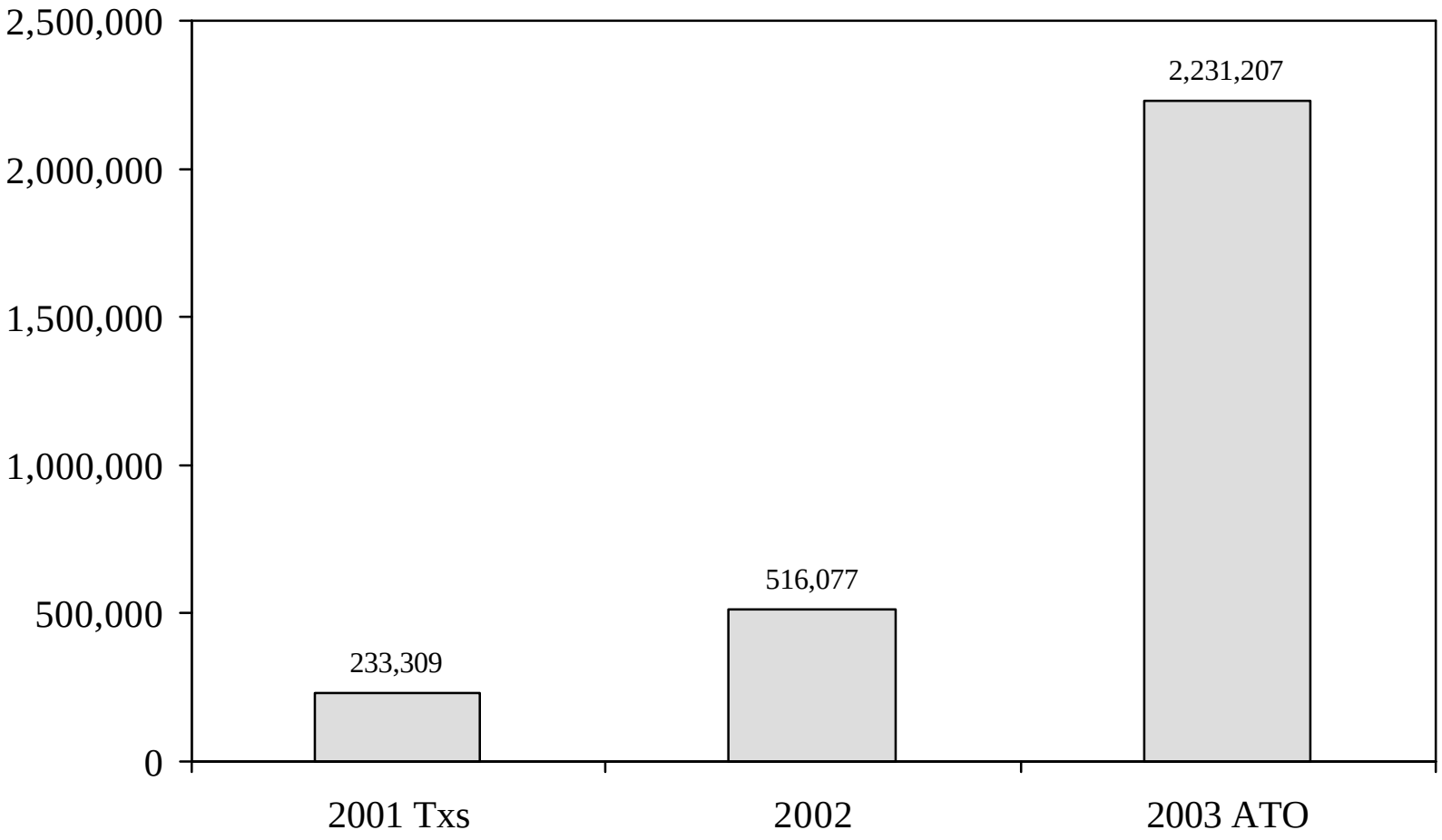


Table 11: GRBP-Assisted Areas in Ethiopia, 2002

Zone	UTG (est.)	ATO 2002	Population Treated 2002	ATO 2003
Kaffa	762,523	378,617	358,996	610,018
Sheka	204,483	169,820	157,081	163,586
Subtotal	**967,006**	**548,437**	**516,077**	**773,604**
North Gondar	113,461	--	--	93,401
Bench Maji	315,073	--	--	252,058
Ilubabor*	866,954	--	--	626,690
Jimma*	606,816	--	--	485,454
TOTAL	**2,869,310**	**548,437**	**516,077**	**2,231,207**

*** Proposed**

Acronyms

APOC ..... African Program for Onchocerciasis Control
arvs ..... at-risk villages (villages requiring community-wide active mass therapy)
ATO .....Annual Treatment Objective
CBD ..... Community-Based Distributors (pre-APOC strategy)
CDC.....Centers for Disease Control and Prevention
CDD.....Community-Directed Distributors (APOC strategy)
CDHS .....Community-Directed Health Supervisors
CDHW .....Community-Directed Health Workers
CDTI .....Community-Directed Treatment with Ivermectin
CFAs ..... Central African Francs
CNS.....Central Nervous System
CSA .....Committee of Sponsoring Agencies
earp .....eligible at-risk population
DEC.....diethylcarbamazine
DPD..... Division of Parasitic Diseases
FMOH..... Federal Ministry of Health of Nigeria
GOS.....Government of Sudan
GRBP ..... Global 2000 River Blindness Program of The Carter Center
GSK..... GlaxoSmithKline
HE ..... Health Education
HNI ..... HealthNet International
HQ ..... Headquarters
hrv.....(OEPA term) highest risk villages for morbidity, prevalence of microfilaria in skin greater than 59%
IACO..... InterAmerican Conference on Onchocerciasis
ICT.....immunochromatographic card test
IDB..... Inter-American Development Bank
IDP.....Ivermectin Distribution Program
IEC..... Information, Education, and Communication
IMC..... International Medical Corps
JAF.....Joint Action Forum
LCIF..... Lions Clubs International Foundation
LF .....Lymphatic Filariasis
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
NGDO..... Nongovernmental Development Organization
NOCP ..... National Onchocerciasis Control Program
NOTF..... National Onchocerciasis Task Force
OCP.....Onchocerciasis Control Program
OEPA ..... Onchocerciasis Elimination Program for the Americas

OLS/S ..... Operation Lifeline Sudan/S
OV ..... *Onchocerca volvulus*
PAHO ..... Pan American Health Organization
PCC ..... Program Coordination Committee of OEPA
PCR ..... Polymerase Chain Reaction
PHC ..... Primary Health Care
RBF ..... River Blindness Foundation
REA ..... Rapid Epidemiological Assessment
REMO ..... Rapid Epidemiological Mapping of Onchocerciasis
SAE ..... Severe Adverse Event
SH ..... *Schistosomiasis haematobium* (urinary schistosomiasis)
SMTC ..... Sustainable Management Training Center, Jos, Nigeria
SNNPR ..... Southern Nations Nationalities and Peoples Region
SPLM/A ..... Sudan People's Liberation Movement/Army
SRRA ..... Sudan Relief and Rehabilitation Association
SSOCP ..... South Sudan Onchocerciasis Control Program
SSOTF ..... South Sudan Onchocerciasis Task Force
TCC ..... Technical Consultative Committee of APOC
TX ..... treatments
UNICEF ..... United Nations Children's Fund
UTG ..... Ultimate Treatment Goal
WHO ..... World Health Organization
WVI ..... World Vision International
ZOA ..... Zud Ost Asia

ANNEXES

ANNEX 1

The Carter Center and River Blindness: In 1987, Merck approached then executive director of The Carter Center, Dr. William Foege, for assistance in organizing the global distribution of Mectizan®. The Mectizan Executive Committee (MEC)/Mectizan Donation Program (MDP) was created in 1988 and housed at the Atlanta-based Task Force for Child Survival and Development, an independent partner of The Carter Center. The global initiative has grown to one that has enabled approximately 30 million treatments per year since 1996 and over 250 million treatments since the MDP began. Indeed, the donation has stimulated what is widely considered a model of how industry, international organizations, donors, national Ministries of Health and affected communities can successfully work together toward a common goal.

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 nongovernmental development organization (NGDO) founded by John and Rebecca Moores in 1990. The Global 2000 River Blindness Program (GRBP) was established at The Carter Center to assume the field activities of the RBF. GRBP's primary aim 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 monitor that process. The Carter Center also serves the Onchocerciasis Elimination Program for the Americas (OEPA), which coordinates activities to completely eliminate the infection in all six onchocerciasis-endemic countries in the Americas (Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela). In 1997, GRBP expanded to a collaborative program in Sudan (with support of Lions Clubs SightFirst Initiative) as part of the Carter Center's peace initiative and Guinea worm disease eradication efforts there. In 1999, with expanded support from Lions Clubs International Foundation (LCIF) (under a new Lions-Carter Center Sight First Initiative), The Carter Center accepted an invitation to assist in onchocerciasis control activities in Ethiopia, and treatments and HE began there in 2001.

Partnerships: The GRBP of The Carter Center works through partnerships at all levels. The primary partners are the Ministries of Health (MOHs) and their national onchocerciasis control programs executed within and through the indigenous primary health care system. GRBP and MOH staff work in the field with the rural communities using information, education, and communication techniques (IEC) to improve understanding and empowerment of people to be full partners in the program and the drug delivery process. As mentioned above, GRBP has a long and evolving partnership with Lions Clubs and the Lions' SightFirst Initiative. Another key partner is the Division of Parasitic Diseases (DPD) at the U. S. Centers for Disease Control & Prevention (CDC), where GRBP technical staff members are housed. GRBP works closely with the MDP at the Task Force for Child Survival and Development.

Partners in the African Programs: In Africa, GRBP partners include the MOHs in host countries (Cameroon, Ethiopia, Nigeria, Sudan, and Uganda), United Nations organizations (WHO, UNICEF, and The World Bank), and other NGDOs. GRBP is a

member of the NGDO Coalition for Mectizan Distribution that includes, among others, Christoffel Blindenmission, Helen Keller Worldwide, Interchurch Medical Assistance, HealthNet International, Lions Clubs International Foundation, l'Organisation pour la Prevention de la Cecite, SightSavers International, and the U.S. Committee for UNICEF. Another important partner is the African Program for Onchocerciasis Control (APOC), which is executed by WHO and funded through a trust fund housed at The World Bank. APOC was launched in 1995, and aims to establish, by 2010, "community-directed" river blindness treatment programs in an estimated 19 African countries. The APOC provides funds and technical/managerial support to six-year Mectizan distribution projects carried out by Ministry of Health/NGDO partnerships. The Carter Center currently has 13 projects assisted by APOC in five African countries.

Partners in the American Programs: GRBP/The Carter Center provides the administrative framework for OEPA. Headquartered in Guatemala, OEPA is the technical and coordinating body of a multinational, multiagency coalition working for the elimination of all onchocerciasis morbidity and transmission from the Americas by the year 2007. Through OEPA, GRBP 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) with representation from key members of the initiative (and on which The Carter Center holds two institutional seats). GRBP works with the Pan American Health Organization (PAHO), the CDC, and several US and Latin American universities. In 2000, the Carter Center's partnership with Lions Clubs expanded to include OEPA, and LCIF now holds an institutional seat on the PCC.

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ANNEX 4: AGENDA

AGENDA
Seventh Annual Program Review Meeting
Global 2000 River Blindness Program
The Carter Center, Cecil B. Day Chapel
February 26-28, 2003

Wednesday, February 26

8:30 - 9:00	Continental Breakfast	
9:00 - 9:10	Welcome, introductions and remarks	Dr. Donald Hopkins (Chair)
9:10 - 9:30	APOC external reviews and the Post- APOC era	Dr. Moses Katabarwa

Nigeria

9:30 - 10:30	Nigeria (oncho) Presentation	Dr. Emmanuel Miri/ Dr. Abel Eigege
10:30 - 11:00	Coffee Break	
11:00 - 12:00	Nigeria (oncho) Presentation	Dr. Miri/Dr. Eigege
12:00 -1:00	Oncho: Discussion/Recommendations	Dr. Hopkins
1:00 - 2:00	Lunch in Allen Foyer	
2:00 – 2:15	Overview of the Gates LF Grant	Dr. Frank Richards
2:15 – 3:00	Nigeria LF Presentation	Dr. Eigege
3:00 - 3:30	LF Discussion/Recommendations	Dr. Hopkins
3:30 - 4:00	Coffee Break (GROUP PHOTO)	
4:00 - 5:00	Nigeria Schisto Presentation	Dr. Eigege
5:00 - 5:30	Schisto Discussion/Recommendations	Dr. Hopkins
5:30 – 5:50	Lions Presentation	Ms. Rebecca Teel Daou

Thursday, February 27

8:30 - 9:00	Continental Breakfast	

Uganda

9:00 - 10:30	Uganda	Dr. Katabarwa
10:30 - 10:45	Coffee Break	
10:45 - 11:45	Uganda: Discussions/Recommendations	Dr. Hopkins

OEPA

11:45 – 12:45	Onchocerciasis Elimination Program for the Americas (OEPA) (Part 1)	Dr. Mauricio Sauerbrey
12:45 - 1:45	Lunch in Allen Foyer	
1:45 - 2:15	OEPA (Part 2)	Dr. Sauerbrey
2:15 - 2:45	MERTU/CDC Activities	Dr. Richards
2:45 - 3:45	OEPA: Discussion/Recommendations	

3:45 - 4:00	Coffee Break	

Cameroon

4:00 - 5:30	Cameroon Presentation	Dr. Albert Eyamba
5:30 - 6:30	Cameroon: Discussion/Recommendations	Dr. Hopkins

Friday, February 28

8:30 - 9:00	Continental Breakfast	

Sudan

9:00 - 10:00	Sudan Presentation (Part 1, GOS)	Dr. Mamoun Homeida
10:00 - 10:15	Khartoum Office Post-APOC Issues	Mr. Mark Pelletier
10:15 - 10:30	Coffee Break	
10:30 - 11:30	Sudan Presentation (Part 2, SSOCP)	Ms. Kelly Callahan
11:30 - 11:45	Nairobi Office Post-APOC Issues	Ms. Callahan
11:45- 12:45	Sudan: Discussion/Recommendations	Dr. Hopkins
12:45 - 2:15	Lunch in Allen Foyer (OPTIONAL MUSEUM TOUR)	

Ethiopia

2:15- 3:15	Ethiopia Presentation	Mr. Teshome Gebre
3:15 - 4:15	Ethiopia: Discussion/Recommendations	Dr. Hopkins
4:15 – 4:45	Coffee Break	

Other items

4:45-5:15	Mectizan® Issues	MDP/Global 2000 staff
5:15-5:45	Reporting Prize	Ms. Lindsay Rakers
5:45-6:15	General Conclusions/Reflections	Dr. Hopkins
6:15	Closure of the Seventh Annual River Blindness Program Review	Dr. Hopkins

ANNEX 5: GRBP 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 varies from those used in the Americas. Although detailed discussion of the mapping processes is beyond the scope of this document, a summary of the two approaches follows.

In much of Africa, a staged village sampling scheme called Rapid Epidemiological Mapping of Onchocerciasis (REMO) is recommended by WHO to define endemic "zones" that should capture most or all villages having onchocercal nodule rates $\geq$ 20% for mass treatment. The mapping strategy is based on studies that illustrate that the morbidity from onchocerciasis occurs primarily in villages with nodule prevalences of > 20%. In the first stage of REMO, survey villages are selected from areas, which are environmentally likely to support black fly breeding and therefore transmission of *O. volvulus*. In the second stage, the survey villages are visited and a convenience sample of 30-50 adults are examined (by palpation) for onchocercal nodules. The mean nodule prevalence for each village sample, along with the latitude and longitude coordinates for that village, are entered into a geographic information system that then is used to define endemic zones (surrounding the sample villages having nodule prevalences of $\geq$ 20%). All villages falling within the treatment "zone" are considered "at-risk" and offered mass Mectizan treatment annually. 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 offered mass Mectizan treatment activities every six months. It is recommended that every village in known or suspected endemic areas have a rapid epidemiological assessment of 50 adults, who would have both nodule examinations and superficial skin biopsies to identify *O. volvulus* microfilariae in skin. Villages in which one or more persons are positive (sample prevalence >3.3%) are considered 'at risk,' and recommended for the mass treatment campaign. Thus, the cutoff prevalence for treatment also varies between Africa and the Americas.

Data Reporting: GRBP program offices are asked to submit reports monthly to 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. The treatment data that are reported originate from records prepared during mass treatment activities carried out by village distributors and/or national Ministry of Health personnel. The accuracy of these reports is routinely confirmed with random spot checks performed primarily by Ministry of Health personnel, supplemented by site visits by GRBP/OEPA staff, and Lions Clubs members. Summary reports of numbers of villages and persons treated are compiled at the district level and forwarded (whenever possible through Ministry of Health surveillance and reporting channels) to both headquarters of the national onchocerciasis programs and the national GRBP offices in Jos (Nigeria), Kampala

(Uganda), Yaounde (Cameroon), Khartoum (Sudan), and Nairobi (for rebel-held areas of south Sudan). In the Americas, the ministries of health in the six countries report treatments quarterly to the OEPA office in Guatemala City, which then provides a combined regional report to PAHO and GRBP.

The data from monthly reports are supplemented with additional information, at annual GRBP Program Reviews held the first quarter of each year. At these Reviews, all GRBP 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 operating in other parts of the countries GRBP assists, when available, are also discussed.

GRBP Treatment Indices: Treatments are reported as the numbers of persons or villages (communities) treated (TX) by state or province for the month. Cumulative treatment figures are compared to Annual Treatment Objectives (ATOs). GRBP uses two ATOs, both of which are established based on projections of program capacity. Communities targeted for active mass distribution (arvs) are to receive community wide Mectizan treatment for all eligible to take the medicine. The ATO for mass drug administration in arvs [ATO(arvs)], is the total number of at-risk villages in which a program projects it will provide mass treatment during the year. The ATO for eligible at-risk population [ATO(earp)] is the number of persons who can receive Mectizan who are known or thought to be living in arvs. The eligible at-risk population (earp) are all persons living in arvs who can receive Mectizan (e.g., who are over five years of age and in good health, excluding pregnant women). In practice, the ATO is established in projections based on age-eligible estimates, and its accuracy is expected to improve with time. The ATO(earp) is expected to be the same figure used in the annual request for tablets submitted to the Mectizan Donation Program. Program directors are urged to define their ATOs using the latest epidemiological mapping information and village census data from the most recent treatment rounds. Given the complex emergency in Sudan (characterized by war, famine, and displacement), only a rough estimate of the ATO(earp) can be made, and reporting of an ATO(arv) has not yet been established.

Full Geographic Coverage and the Ultimate Treatment Goal: Full geographic coverage is reached when the program is able to extend mass treatment services to all arvs in the assisted area. The Ultimate Treatment Goal (UTG) is defined as the sum of the eligible populations living in all arvs in the assisted area. That is, the UTG is that number of persons estimated to ultimately require Mectizan treatment once a program has the capacity to provide full geographic coverage. At the point when the program can demonstrate that it has treated the UTG, it is said to have reached full coverage; in other words full coverage is defined by the point TX(earp)=ATO(earp)=UTG. GRBP program progress is judged by the ability to meet ATO objectives and to increase those objectives over a reasonable time period to reach full geographic coverage and the Ultimate Treatment Goal.

INDICES OF SUSTAINABILITY

GRBP programs are asked to report annually on three sets of indices for sustainability, including: community involvement, national and local government involvement, and costs (expressed as cost per treatment). The guidelines for the reporting follow.

Community Involvement: Is the community involved in the design and implementation of the treatment program and in the selection of their community-based distributor (CBD)? If data are available on monetary or in-kind community support for CBDs, formation of village health committees, and community support for CBDs to collect Mectizan from a central point, these also should be reported.

Government Involvement: Is the program supervised by the primary health care system? Does the local and central government have a line item for onchocerciasis control in its budget? If so, how much of this budget has been released to the program?

Cost: This calculation includes all costs, including: a) country GRBP HQ costs, overhead, and salaries; b) delivery of Mectizan from the port of entry to community, including collecting the drug from a central point by the CBD; c) training; d) MOH/PHC supervision and monitoring of the program; and e) remuneration/incentives paid to CBDs by the community, which could include cost recovery mechanisms.

ANNEX 6: THE GRBP NIGERIA LYMPHATIC FILARIASIS (LF) ELIMINATION AND URINARY SCHISTOSOMIASIS CONTROL PROGRAM

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. Microfilaria, which circulate nocturnally in blood, can be almost completely suppressed by annual single-dose combination therapy, with either Mectizan (also donated by Merck & Co., Inc. for LF in Africa) and albendazole (donated by GlaxoSmithKline), or diethylcarbanazine (DEC) and albendazole. Annual mass treatment with the combination of Mectizan and albendazole prevents mosquitoes from being infected and, when given for 4-6 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 to hatch in fresh water and infect snails, continuing the lifecycle. The presence and passage of these eggs in tissues leads to inflammation and organ damage. School-aged children (5-14 years old) are the most heavily infected and also tend to be the main disseminators of this infection through their urination and defecation in or near fresh water. Mass drug distribution of praziquantel (40 mg/kg) every 1-3 years can significantly reduce schistosomiasis morbidity. Praziquantel (which is not being donated by pharmaceutical companies to control programs in large amounts, as are Mectizan and albendazole) costs about US $0.08 per 600 mg tablet.

Nigerians suffer a disproportionate share of the disease burden from these two parasitic diseases. The country is thought to have the greatest numbers of persons at risk for LF in Africa, and globally is ranked third behind India and Indonesia in human suffering from this parasite. One recent review estimated that 22% of Nigerians (over 25 million) are infected with LF, although mass drug administration for LF in Nigeria will need to reach many times this number. The geographic distribution of the disease appears to show a gradient increasing from north to south in the country, coincident with increasing tropical climate. For schistosomiasis, an estimated 20 million Nigerians (the greatest of any country in the world) need to be treated every 1-3 years with praziquantel. The distribution of urinary schistosomiasis (schistosomiasis hematobium-SH) in Nigeria was explored in a Federal MOH survey, conducted in 1990-91, which showed that infection was most prevalent in the north-central and southeast areas of the country. The main goal of the 1997-2001 Nigeria National Plan of Action on Schistosomiasis Control is to reduce the prevalence of the disease by 50% within 5 years, but few treatments had been given because of the expense of praziquantel.

The Carter Center is working with the Ministry of Health in Nigeria to establish LF elimination and SH control programs in Plateau and Nasarawa States (Maps 3 and 4). For LF, the effort is based on a strategy of health education (HE) and annual drug combination therapy with albendazole and Mectizan. The manufacturers of these drugs have global donation programs for LF: GlaxoSmithKline donates albendazole, and Merck & Co., Inc. donates Mectizan. For SH, the strategy is similar: HE and mass annual treatments with the oral drug praziquantel. Praziquantel however is not being routinely donated to the program, although in past years The Carter Center has received limited gifts of praziquantel from pharmaceutical companies including Bayer AG, Medochemie, and Shin Poong Pharmaceutical Company, Ltd. The Carter Center has purchased the remainder through funds raised from other donors.

Working with federal, state, and local ministries of health, the GRBP LF effort assists in: 1) ascertaining the distribution of LF and SH in Plateau and Nasarawa States; 2) implementing HE and mass treatment where appropriate; and 3) documenting the impact of these interventions. The states' GRBP-assisted onchocerciasis control programs (which are partially funded by APOC) have been the launching point for the LF and SH programs. Dr. Abel Eigege directs the GRBP assistance activities. Dr. M.Y. Jinadu, the national program coordinator for the LF and SH Programs in Nigeria, is actively involved in the GRBP-assisted program.

ANNEX 7: PUBLICATIONS BY OR ASSISTED BY GRBP STAFF IN 2002-3

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Dadzie Y, Neira M and Hopkins DR. 2003. Final Report on the Conference on the Eradicability of Onchocerciasis. *Filaria Journal* 2: 2.

ANNEX 8: ACKNOWLEDGEMENTS

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We would like to thank GSK for the following:

"Dear Dr Hopkins, Dr Richards, Dr Miri and all Carter Center & Global 2000 Colleagues,
Minne Iwamoto and I greatly regret that neither of us can be present today during your Nigeria LF Program Review. We want you to know that we at GSK are committed partners with you and follow your work with special interest. We wish you all the best for a successful and productive meeting." Brian Bagnall at GSK, Philadelphia

In addition, we would like to honor the following persons, of our field staff, who passed away in 2002:

Kenya
Francis Ombija Olwago, Driver

Sudan
Ms. Eliza Amay, Title
Mr. Anthony Agostino, Title

Cameroon
Mr. Kanko, Provincial Onchocerciasis Coordinator

Nigeria
Sunday Akawu, Driver

"Fighting blinding diseases has profound significance, not for me as an interested observer, but for the child who will never go blind and for his parents and grandparents, who will have hope that things can improve in their lives, which quite often is the only time they've ever seen this proven."

Former U.S. President Jimmy Carter, 9/5/2000