

THE CARTER CENTER'S ASSISTANCE TO RIVER BLINDNESS CONTROL PROGRAMS: ESTABLISHING TREATMENT OBJECTIVES AND GOALS FOR MONITORING IVERMECTIN DELIVERY SYSTEMS ON TWO CONTINENTS

FRANK O. RICHARDS, JR., EMMANUEL S. MIRI, MOSES KATABARWA, ALBERT EYAMBA, MAURICIO SAUERBREY, GUILLERMO ZEA-FLORES, KENNETH KORVE, WANJIRA MATHAI, MAMOUN A. HOMEIDA, IRENE MUELLER, ELVIN HILYER, AND DONALD R. HOPKINS

Global 2000 River Blindness Program/The Carter Center, Atlanta Georgia; The Nigeria Global 2000 River Blindness Program, The Carter Center, Jos, Nigeria; The Uganda Global 2000 River Blindness Program, The Carter Center, Kampala, Uganda; The Cameroon Global 2000 River Blindness Program, The Carter Center, Yaounde, Cameroon;

The Onchocerciasis Elimination Program for the Americas, Guatemala City, Guatemala; The Sudan Onchocerciasis Control Program, Khartoum, Sudan; The Southern Sudan Onchocerciasis Control Program, HealthNet International, Nairobi, Kenya; The Sudan Global 2000 Program, The Carter Center, Khartoum, Sudan

Abstract. Periodic mass treatment with ivermectin in endemic communities prevents eye and dermal disease due to onchocerciasis. As part of an international global partnership to control onchocerciasis, The Carter Center's Global 2000 River Blindness Program (GRBP) assists the ministries of health in ten countries to distribute ivermectin (Mectizan, donated by Merck & Co.). The GRBP priorities are to maximize ivermectin treatment coverage and related health education and training efforts, and to monitor progress through regular reporting of ivermectin treatments measured against annual treatment objectives and ultimate treatment goals (e.g., full coverage, which is defined as reaching all persons residing in at risk villages who are eligible for treatment). Since the GRBP began in 1996, more than 21.2 million ivermectin treatment encounters have been reported by assisted programs. In 1999, more than 6.6 million eligible persons at risk for onchocerciasis received treatment, which represented 96% of the 1999 annual treatment objective of 6.9 million, and 78% of the ultimate treatment goal in assisted areas.

INTRODUCTION

Infection with the vector-borne parasite *Onchocerca volvulus* (human onchocerciasis) is characterized by skin and eye lesions.¹ The infection is transmitted in rural areas by *Simulium* species black flies that breed in rapidly flowing

Carter Center-Assisted Onchocerciasis Control Programs

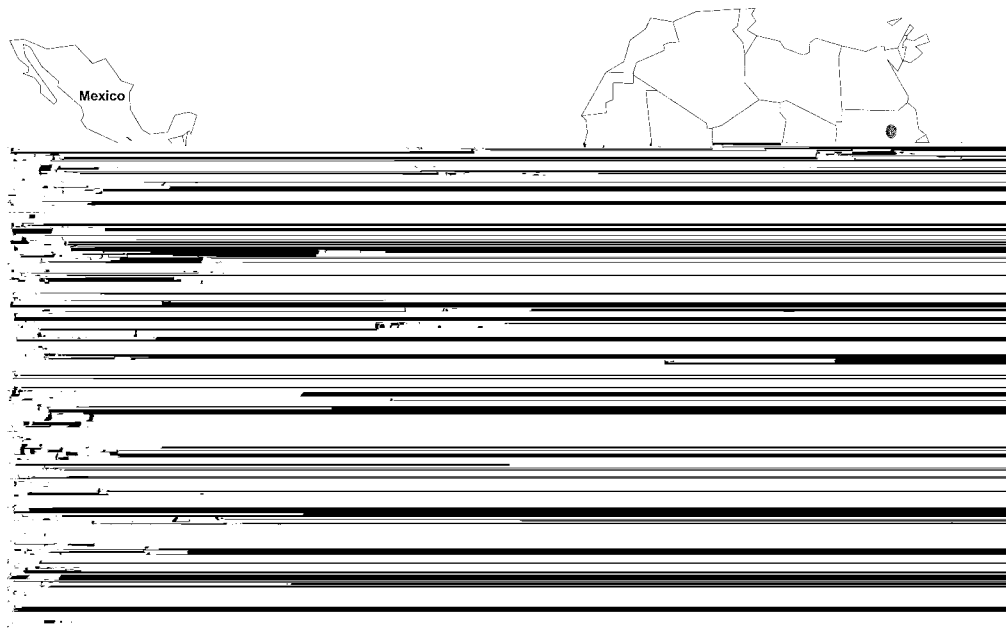


FIGURE 1. Areas in 10 countries assisted by the Global 2000 River Blindness Program of The Carter Center.

monitoring of treatments. This paper will present a compilation of the 1996–1999 treatment data reported by GRBP-assisted programs and discuss how treatment objectives and goals are established to assess how GRBP assisted areas are progressing toward reaching full treatment coverage.

METHODS

GRBP-assisted areas. During the period 1996–1999, the GRBP assisted ministries of health in ivermectin delivery activities in 10 countries in Africa and the Americas (Figure 1). The GRBP assisted in nine of 32 onchocerciasis endemic states in Nigeria (Abia, Anambra, Delta, Ebonyi, Edo, Enugu, Imo, Nasarawa, and Plateau States),^{9,10} in 10 of the 18 endemic districts in Uganda (Adjumani, Apac, Gulu, Kabale, Kasese, Kisoro, Mbale, Moyo, Nebbi, and Rukungiri Districts),^{11,12} and in two of 10 endemic provinces in Cameroon (North and West Provinces).¹³ In Sudan, where the program must contend with a civil war that has waged for more than 15 years, the GRBP assisted the ministry of health (in Khartoum) to provide treatments in areas controlled by the Government of Sudan, as well as three NGOs based in Nairobi (Aktion Afrika Hilfe, International Medical Corps, and World Vision International) to distribute ivermectin in parts of areas controlled by opposition forces in the south.^{14–16} Through the Onchocerciasis Elimination Program for the Americas (OEPA), the GRBP assisted in all endemic areas of all six endemic countries in the Americas (Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela).¹⁶ 13

who can receive ivermectin in accordance with the Mectizan Donation Program guidelines. Persons who should *not* receive treatment (ineligibles) were young children (less than five years of age, body weight less than 15 kg, or height less than 90 cm), anyone in poor health, pregnant women, or women nursing newborn infants less than one week of age. Annual orders for ivermectin tablets were calculated based on known or estimated (calculated to be 85% of the total population) eligible population figures.

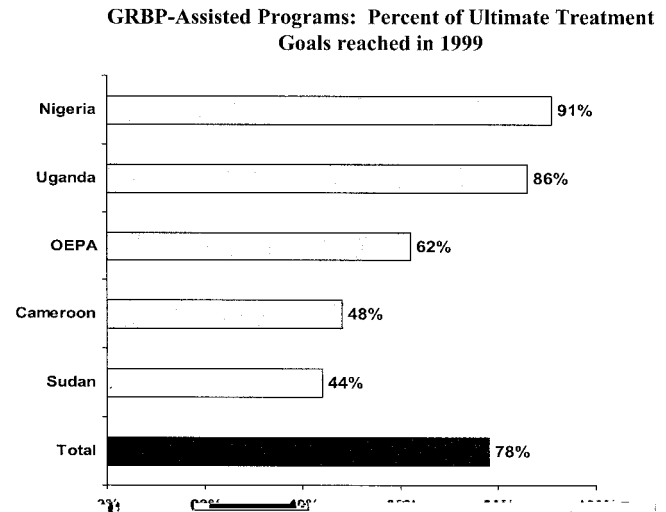
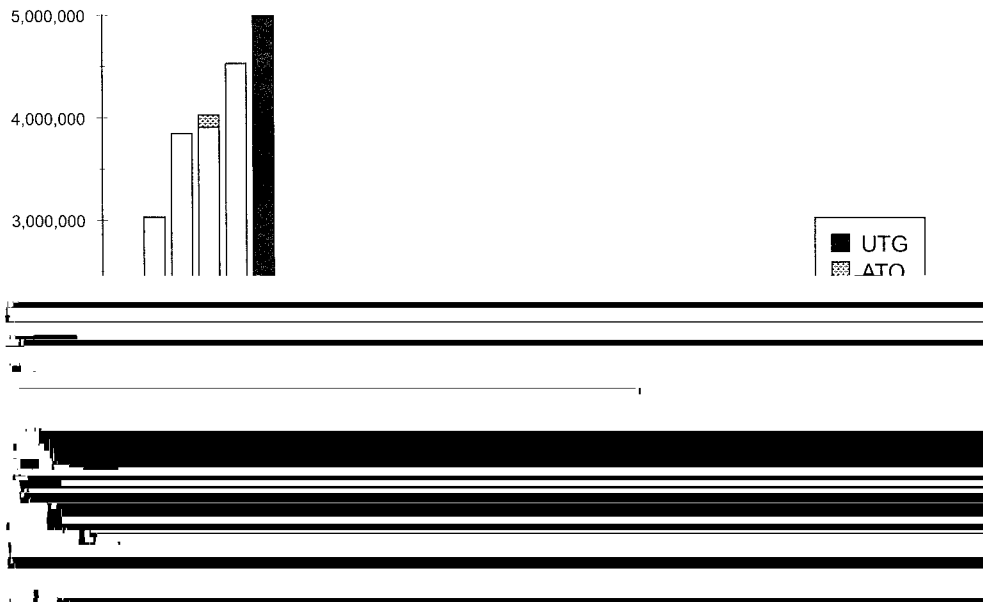


FIGURE 2. The Carter Center's Global 2000 River Blindness Program (GRBP) program progress is shown toward reaching the ultimate treatment goal of 8,554,746 persons (defined as the sum of the known or estimated eligible populations living in all at risk villages in the assisted area). Overall success in 1999 averaged 78%, led by the Nigerian (91%) and Ugandan (86%) programs.

**Carter Center-assisted Programs:
1996 - 1999 Ivermectin Treatments and Annual Treatment Objectives (ATOs),
with Ultimate Treatment Goals (UTG), by Program**



FIGURE

TABLE 1

Onchocerciasis: 1999 ivermectin treatment figures for The Carter Center's Global 2000 River Blindness (GRBP)-assisted areas in Nigeria, Cameroon, Uganda, and collaborative programs in Latin America and Sudan

Country/Tx Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% ATO	% All GRBP TX
Nigeria	ATO(earp) = 4,475,000		ATO(arv) = 7,859												
TX(earp)	694	58,917	725,212	286,772	435,729	1,046,684	376,844	522,614	445,982	138,233	366,456	128,540	4,532,677	101%	69%
TX(arv)	2	164	1,385	498	845	1,664	704	828	806	115	800	113	7,924	101%	59%
Uganda	ATO(earp) = 868,466		ATO(arv) = 1,730												
TX(earp)		13,966	173	16,230	145,995	135,944	68,869	34,477	99,827	164,298	139,440	248	819,467	94%	12%
TX(arv)			31	166	166	255	344	50	171	299	248		1,730	100%	13%
Cameroon	ATO(earp) = 817,134		ATO(arv) = 2,476												
TX(earp)	72,902	28,849	20,325	20,015	56,551	32,367	65,069	85,704	104,671	116,336	38,729	36,926	678,444	83%	10%
TX(arv)	210	155	85	109	134	77	150	501	298	134	49	265	2,167	88%	16%
OEPA	ATO(earp) = 345,512		ATO(arv) = 1,798												
TX(earp)			126,987			1,479				139,727		5,682	273,875	79%	4%
TX(arv)			986							499		69	1,554	86%	12%
Sudan	ATO(earp) = 376,310		ATO(arv) = Unknown												
TX(earp)	6,689	8,556	23,045	32,108	44,261	28,017		1,072	7,379			175,652	326,779	87%	5%
TX(arv)															
Total	ATO(earp) = 6,882,422		ATO(arv) = 13,863												
TX(earp)	80,285	110,288	895,742	355,125	682,536	1,382,739	510,782	643,867	657,859	558,594	544,625	347,048	6,631,242	96%	100%
TX(arv)	212	319	2,487	773	1,145	1,996	1,198	1,379	1,275	1,047	1,097	447	13,375	96%	100%

ATO = annual treatment objectives; earp = eligible at-risk population; arv = at-risk villages; TX = mass treatment; OEPA = Onchocerciasis Elimination Program for the Americas.

erage, which occurs when the treatment services have expanded to all at risk villages defined through rapid assessment exercises. The second element is full population coverage, which occurs when ivermectin tablets reach all eligible persons known or estimated to live in those at risk villages. Combined, these two elements define a numerical

13. Ngoumou P, Owona-Essomba R, Godin C, 1996. Ivermectin-based onchocerciasis control in Cameroon. *World Health Forum* 17: 25–28.
14. Baraka OZ, Khier MM, Ahmed KM, Ali MM, el Mardi AE, Mahmoud BM, Ali MH, Homeida MM, Williams JF, 1995. Community based distribution of ivermectin in eastern Sudan: acceptability and early post-treatment reactions. *Trans R Soc Trop Med Hyg* 89: 316–318.
15. Calcoen D, Mabor M, 1997. Onchocerciasis monitoring and mass treatment with ivermectin under unstable war conditions in south-western Sudan. *Bull Trop Med Int Health* 5: 1–4.
16. Homeida MA, Goepf I, Magdi A, Hilyer E, MacKenzie CD, 1999. Medical achievements under civil war conditions. *Lancet* 354: 601.
17. Blanks J, Richards F, Beltran F, Collins R, Alvarez E, Zea Flores G, Bauler B, Cedillos R, Heisler M, Brandling-Bennett D, Baldwin W, Bayona M, Klein R, Jacox M, 1998. The Onchocerciasis Elimination Program of the Americas: a history of partnership. *Pan Am J Public Health* 3: 367–374.
18. Ngoumou P, Walsh JF, Mace JM, 1994. A rapid mapping technique for the prevalence and distribution of onchocerciasis. *Ann Trop Med Parasitol* 88: 463–474.
19. WHO, 1999. *Community Directed Treatment with Ivermectin; Report of a Multi-Country Study*. Geneva: World Health Organization. Tropical Disease Research (TDR)/AFR/RP/96.1).
20. Remme JHF, 1995. The African Programme for Onchocerciasis Control: preparing to launch. *Parasitol Today* 11: 403–406.
21. Etya'ale DE, 1998. Mectizan as a stimulus for development of novel partnerships: the international organization's perspective. *Ann Trop Med Parasitol* 92 (suppl): S73–S77.
22. Nyiama T, 1998. Community perspective on Mectizan's role as a catalyst for the formation of novel partnerships. *Ann Trop Med Parasitol* 92 (suppl): S169–S170.