



Eye of the Eagle



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Then and Now, Center's Programs Tackle Neglected Tropical Diseases

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In this special issue to mark the 10th year of the *Eye of the Eagle* newsletter, we commemorate several notable achievements not just of the past decade, but from when The Carter Center began fighting disease and building hope at the grass roots in collaboration with our partners at the Centers for Disease Control and

Prevention (CDC) and in several developing countries almost a quarter of a century ago. The articles in this issue summarize our work on many fronts, categorized as eradication, integration, and innovation.

Eradication

For the past 24 years, The Carter Center has led the global program to eradicate dracunculiasis (Guinea worm disease) in close collaboration with CDC, the World Health Organization (WHO), and UNICEF. This was our first target among neglected tropical diseases, and since 1986 we have seen

the number of endemic countries reduced from 20 to four and the number of cases reduced from an estimated 3.5 million to about 3,200 cases in 2009. Today, we are on the verge of eradicating this ancient disease, although southern Sudan remains our biggest challenge.

In 1996, The Carter Center assumed the work of the River Blindness Foundation, and since then, the Center has led the Onchocerciasis Elimination Program for the Americas (OEPA) with the governments of the six affected countries. Further, we are assisting a nationwide onchocerciasis elimination effort by Uganda and a focal elimination effort in northern Sudan. Both countries are included

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THE CARTER CENTER



Waging Peace. Fighting Disease. Building Hope.



Peter DiCampo

A child swallows a dose of Mectizan in Guatemala, where the Center has worked to fight onchocerciasis since 1996. The Center has targeted the control or elimination of neglected tropical diseases for 24 years.

10th Anniversary

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in the African Program for Onchocerciasis Control (APOC). Carter Center co-founders Jimmy and Rosalynn Carter and the River Blindness Foundation played key roles in the creation of APOC, including advocacy, fundraising, and initiation of onchocerciasis control measures in Ethiopia and Sudan.

We were also major partners with the government of Ghana and the International Trachoma Initiative as Ghana became the first sub-Saharan African country to eliminate blinding trachoma.

With Carter Center assistance, two Nigerian states, Plateau and Nasarawa, have recently interrupted the transmission of lymphatic filariasis in several previously endemic local government areas through mass drug administration of Mectizan[®] and albendazole.

The International Task Force for Disease Eradication, which was first convened at The Carter Center in 1989–1992 and revived in 2001, has identified seven diseases as potential targets for eradication and, in the process, triggered the global effort to eliminate lymphatic filariasis. In follow-up to other task force recommendations, in 2002 The Carter Center co-sponsored with WHO a major

conference to assess the eradicability of onchocerciasis, and in 2008 catalyzed a binational effort to eliminate malaria and lymphatic filariasis from the island of Hispaniola (Dominican Republic and Haiti) by 2020. The Center also co-sponsored with WHO the first-ever program review for Buruli ulcer in five African countries.

Integration

Carter Center–assisted programs in Plateau and Nasarawa states of Nigeria pioneered the integration of mass drug

administration and health education to combat onchocerciasis, lymphatic filariasis, and urinary schistosomiasis simultaneously beginning in 1999, adding trachoma and vitamin A supplementation later. The programs subsequently conducted the first combined surveys for urinary schistosomiasis and trachoma and demonstrated with CDC the dramatic ability of village-based volunteers in the onchocerciasis program to distribute bed nets for preventing malaria and lymphatic filariasis while simultaneously distributing



Louise Gubb

A water vendor in Ghana checks his filter before placing it atop his water drum. Filtering helps prevent Guinea worm disease, the eradication of which is a global effort led by The Carter Center.

Timeline of Carter Center Health Programs, 1982 to Present

In honor of the 10th anniversary of *Eye of the Eagle*, here is a look back at some of the key moments in the history of the Carter Center's health programs.

1982

The Carter Center is established by former U.S. President Jimmy Carter and his wife, Rosalynn, in partnership with Emory University.



Groundbreaking of The Carter Presidential Center.

1985

First Rosalynn Carter Symposium on Mental Health Policy is held.



Mrs. Carter addresses attendees at her mental health symposium.

10th Anniversary

Mectizan for onchocerciasis. We have shown that simultaneous triple-drug administration of Mectizan, albendazole, and praziquantel in Nigeria is safe, simplifying and reducing costs of treatment for multiple parasites.

Assistance to Ethiopia broke new ground with the first combined village-based operations against malaria and trachoma (known as Maltra) and against malaria and onchocerciasis (Maloncho). Elsewhere, village volunteers originally recruited and trained to report cases, distribute cloth filters, and conduct health education in national Guinea worm eradication programs have assumed various combinations of other public health duties.

Innovation

Our assistance to national Guinea worm eradication programs resulted in the first major innovation, which was to demonstrate successful use of African village volunteers as the basis for village-based surveillance systems to provide reliable monthly reporting of cases, including extending primary health care outreach (for dracunculiasis) for the first time to many villages, later demonstrating the value of the case containment strategy to accelerate interruption of transmission of dracunculiasis.

The River Blindness Foundation and Carter Center–assisted activities in Uganda pioneered the use of traditional kinship structures to greatly enhance control efforts against onchocerciasis. In the Amhara region of Ethiopia, the trachoma control program engendered an explosion of grassroots latrine building by fostering involvement of women. Assistance to the ministries of health and education under the Ethiopia Public Health Training Initiative during the past 10 years has helped Ethiopia improve and expand training of health workers, and discussions are underway to consider adapting a similar approach in other countries.

In the Imo and Abia states of Nigeria, there was a documented failure to maintain good treatment coverage in community-directed treatment programs for onchocerciasis when external financial assistance from both APOC and The Carter Center was suspended, highlighting important sustainability issues that need to be addressed. All of the programs we have assisted and are assisting have monitored the impact of their interventions assiduously.

Finally, one of the most important legacies of the global Guinea worm eradication effort will be the powerful examples of advocacy on behalf of a public health program by three

remarkable former heads of state: Gen. (now President) Amadou Toumani Touré of Mali, Gen. (Dr.) Yakubu Gowon of Nigeria, and Jimmy Carter of the United States.

Of the interventions we have assisted to date, we can count:

- 125 million treatments for onchocerciasis
- 31 million treatments for trachoma
- 26 million treatments for lymphatic filariasis
- 4 million bed nets distributed
- 3 million treatments for schistosomiasis
- 1 million household latrines constructed

As a result of these and other efforts, we estimate that the Carter Center's work has prevented more than 50 million cases of dracunculiasis. Our work has averted about 1 million cases of poor vision and the blindness of 50,000–70,000 people from onchocerciasis, while preventing low vision or blindness from trachoma in about 600,000 people.

I am pleased also to inform our readers that the *Eye of the Eagle* henceforth will expand its reporting beyond onchocerciasis and trachoma to reflect all the Carter Center's work against tropical diseases.

1986

The Guinea Worm Eradication Program is launched as the Center's first health program.



Guinea worm eradication in Ghana.

1991

Mental Health Program begins.

1992

The International Committee of Women Leaders for Mental Health is created; former First Lady Rosalynn Carter chairs the group.

The International Task Force for Disease Eradication, meeting at The Carter Center, declares that lymphatic filariasis is eradicable.

continues

10th Anniversary

Donors and Partners Have Made the Carter Center's Work Possible

The success of the Carter Center's health programs is due largely to the partnerships with governments, corporations, foundations, and individuals, stemming from a shared commitment to the control and elimination of several neglected tropical diseases. These collaborations have grown stronger over the years and make it possible to prevent the suffering of millions of people around the world from diseases often ignored by others.

“We have the ability to combat these ancient scourges,” said President Carter. “With the support of our partners, The Carter Center can continue to [help] improve the lives of our neighbors in Africa and Latin America, giving them hope that their societies will no longer be burdened by these preventable diseases.”

The Carter Center's River Blindness and Trachoma Control programs, which have reached more than 125 million people in Africa and the Americas, were established more than 10 years ago by strong donor support from the River Blindness Foundation, the Conrad N. Hilton Foundation, the Kingdom of Saudi Arabia, USAID, and the Netherlands. Initial support was complemented by generous donations from pharmaceutical companies, foundations, and individuals.

Through sustained and growing support from Merck & Co., Inc; Pfizer Inc; GlaxoSmithKline; and Merck KGaA (E. Merck) in conjunction with the World Health Organization (WHO), The Carter Center has assisted in more than 180 million treatments of needed medications in 14 countries in Africa and the Americas over the past decade. Mectizan[®], donated by Merck & Co., Inc., and albendazole, donated by GlaxoSmithKline, treat river blindness and lymphatic filariasis. Zithromax[®], donated by Pfizer Inc, controls trachoma. Since 2008, Merck KGaA (E. Merck) and WHO have

donated unprecedented levels of praziquantel, allowing the Center to effectively quintuple the number of children treated for schistosomiasis in Plateau and Nasarawa states in Nigeria.

Critical program support for the Center's River Blindness and Trachoma Control programs also has come from many committed foundations. The Lions Clubs International Foundation's passion to end preventable blindness has led them to provide major support over the past decade for the Carter Center-assisted onchocerciasis programs in Nigeria, Cameroon, Uganda, Ethiopia, Sudan, and the Americas, and to trachoma programs in Ethiopia and Sudan.

Support from the Conrad N. Hilton Foundation in 1999 helped establish Carter Center-assisted trachoma programs in Ghana, Mali, Niger, and Nigeria. The 10-year grant allowed the Center to take a global leadership role in trachoma control by focusing on the “F” (facial cleanliness) and “E” (environmental improvement) components of the SAFE strategy. The Hilton Foundation's partnership now has been strengthened with a subsequent five-year challenge grant in 2008, supporting nationwide trachoma programs in Mali and Niger and a

1993

The Onchocerciasis Elimination Program for the Americas (OEPA) is established with funding from the River Blindness Foundation to eliminate ocular disease from onchocerciasis in the six endemic

countries in the Western Hemisphere.



OEPA health worker providing education.

Pakistan Guinea Worm Eradication Program reports its last case.

1994

The Guinea Worm Eradication Program in Kenya reports its last indigenous case.

Guinea worm extraction.



10th Anniversary

robust trachoma program in southern Sudan.

The Center's partnership with the Bill & Melinda Gates Foundation, which began with support for the International Task Force for Disease Eradication and the Guinea Worm Eradication Program, has expanded to include support for controlling and eliminating other diseases. A challenge grant to The Carter Center from the Gates Foundation in 2004 provided the necessary support for the Onchocerciasis Elimination Program for the Americas to achieve impressive milestones toward elimination of the disease in the region. A subsequent partnership with the Gates Foundation in 2006 is allowing the Center to demonstrate effective integration of interventions for several neglected tropical diseases in Nigeria.

Strategic support also has been provided by other foundation donors over the past decade, including the Izumi Foundation, which gave the Center its first foundation grant for the Schistosomiasis Control Program in 2007.

Hundreds of individuals have joined the government, corporate, and foundation donors to enable the work of the Carter Center's health programs. Many



Vanessa Vick

A girl in the Amhara region of Ethiopia uses the handwashing station outside her family's latrine. Both the latrine and the handwashing are keys to preventing trachoma and other diseases. Donor support has helped The Carter Center establish programs that prevent blinding diseases like trachoma in Africa and the Americas.

made generous financial contributions that were matched through Gates and Hilton challenge grants. Others have provided direct support to specific programs, many of them spanning multiple years. The Center is grateful for the generous and thoughtful support that has allowed the programs to expand their reach over the past 10 years.

"We have the ability to combat these ancient scourges," said President Carter. "With the support of our partners, The Carter Center can continue to [help] improve the lives of our neighbors in Africa and Latin America, giving them hope that their societies will no longer be burdened by these preventable diseases."

1995

President Carter and the River Blindness Foundation play key roles in raising funds for the new African Program for Onchocerciasis Control (APOC). President Carter attends the launch of APOC at the World Bank.

President Carter negotiates a "Guinea worm cease-fire" between the warring parties in civil war-stricken Sudan. During the historic cease-fire, the first Mectizan® treatments (donated by Merck & Co., Inc.) for onchocerciasis are given for the first time in southern Sudan.



Sudanese community.

Attendees at a Rosalynn Carter Georgia Mental Health Forum.



First Rosalynn Carter Georgia Mental Health Forum is held.

continues

10th Anniversary

Gen. Dr. Yakubu Gowon Stands as Hero in Guinea Worm Eradication

The last case of Guinea worm disease in Nigeria was suffered by Grace Otubu, 58, of Ezza Nkwubor village in Enugu state, whose worm emerged in November 2008. Twelve months later, Nigeria triumphed over the ancient, crippling affliction, also known as dracunculiasis, that had affected hundreds of thousands of Nigerians at its peak. The success of Africa's most populous nation against this debilitating waterborne parasite would not have been possible

without the hard work of the endemic communities, the relentless vigilance of the national program, and the dedication of Gen. Dr. Yakubu Gowon, Nigeria's former head of state.

"General Gowon's contribution to Nigeria's success is invaluable. It is my sincere hope that more African leaders will follow his example," said President Carter. "He has been a passionate voice for Guinea worm elimination among his fellow Nigerians and other African nations. He is a good friend not only to me, but also to the people of Nigeria suffering from neglected diseases."

When The Carter Center began spearheading the Guinea worm eradication campaign in 1986, an estimated 3.5 million cases were found in 20 countries in Africa and Asia. Two years later, Nigeria was deemed the world's most Guinea worm-endemic country when the Nigerian Ministry of Health and The Carter Center began elimination efforts and conducted the first nationwide case search, resulting in 653,492 reported cases.

Gen. Gowon traveled exhaustively through some of the most isolated and

forgotten regions of Nigeria—making 82 visits to 135 endemic communities since 1999—to mobilize communities to adopt Guinea worm prevention methods such as filtering their drinking water and using the safe larvicide ABATE® (donated by BASF Corporation) to treat contaminated, stagnant water sources.

In recognition of Gen. Gowon's outstanding efforts, President and Mrs. Carter presented him with the Jimmy and Rosalynn Carter Award for Guinea Worm Eradication in 2006. It was the first time the award had been presented to a former head of state.

"Guinea worm elimination in Nigeria is very good news," Gen. Gowon said. "We are improving the economic well-being of the Nigerian people. Young ones will be well enough to attend school without having to suffer pains of the Guinea worm. Really, it's increasing productivity in the community, the nation."

Today, the challenge to wipe "the fiery serpent" off the face of the earth intensifies as the final fraction of one percent of cases (approximately 3,200 as of December 2009) is targeted in pockets of four remaining endemic countries—Sudan, Ghana, Mali, and Ethiopia.



Deborah Hakles

President Carter congratulates Nigeria former Head of State Gen. Dr. Yakubu Gowon for his tireless efforts to rid the country of Guinea worm disease during a ceremony in 2006.

1996

The Carter Center absorbs the field operations of the River Blindness Foundation in Nigeria, Cameroon, Uganda, and six countries in the Americas; launches onchocerciasis control program.



A Ugandan victim of onchocerciasis.

India Guinea Worm Eradication Program reports its last case.

1997

Carter Center-assisted treatments for onchocerciasis in Sudan are supported by Lions Clubs International Foundation and the African Program for Onchocerciasis Control.



A Sudanese family.

River Blindness

Center-Assisted Programs Aim to Eliminate Onchocerciasis from Americas, Select African Foci

In January 2002, 64 experts in several disciplines at a conference deliberated the following question: Is onchocerciasis (river blindness) eradicable with current knowledge and tools? Attendees at the Conference on the Eradicability of Onchocerciasis concluded that the disease was not able to be eradicated yet due to major barriers in Africa (Dadzie Y, Neira M and Hopkins D. *Filarial Journal* 2003;2:103–5). However, the experts at the conference, which was organized by The Carter Center and the World Health Organization with funding from the Bill & Melinda Gates Foundation, concluded that in the Americas and possibly in Yemen and some sites in Africa, transmission could be stopped using current tools. It was recommended that where elimination was feasible, transmission should be interrupted as soon as possible. Additional conference recommendations called for better diagnostic tests and development of a drug capable of killing adult *Onchocerca*

volvulus parasites (macrofilaricide).

For the past 10 years, the Carter Center's activities for fighting onchocerciasis have advanced the conference's recommendations. The Center has worked to eliminate onchocerciasis throughout the Americas and in select foci in Africa (see Figure 1) and assisted programs to use better and more sensitive diagnostic tests.

Elimination in the Americas

When The Carter Center assumed responsibility for managing the Onchocerciasis Elimination Program for the Americas (OEPA) in 1996, Mectizan® was being distributed in only three of the six endemic countries in the region—Ecuador, Guatemala, and Mexico. The Center helped to expand the program and switch to a strategy of twice-per-year Mectizan treatment, intensifying the pressure on the parasite. By 2000, treatment programs had been launched in the other three countries—Brazil, Colombia,

and Venezuela—and had reached all 13 endemic foci; overall regional coverage exceeded 85 percent of the eligible population in both rounds of the twice-yearly treatment strategy. In 2003, Mexico initiated quarterly distribution of Mectizan in 50 communities of South Chiapas focus in an effort to hasten elimination. By 2006, the most logistically difficult focus to reach—the South focus in Venezuela—at last reached the 85 percent coverage goal.

In 2007, the Santa Rosa focus in Guatemala was the first to stop Mectizan treatments and enter into post-treatment surveillance after apparently interrupting transmission of onchocerciasis (Lindblade et al., *American Journal of Tropical Medicine and Hygiene* 2007; 77:334–341). By the end of 2009, six of the 13 foci in the Americas had stopped treatment, including the only focus in Colombia. In March 2010, Ecuador became the second country and seventh focus to stop treatment.

Elimination in Africa

The Carter Center has aimed for onchocerciasis control (as opposed to elimination) in areas it assists in Africa using the strategy currently

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The Carter Center launches the Ethiopia Public Health Training Initiative, helping the ministries of health and education to improve rural access to health care for 75 million Ethiopians.



Ethiopian public health worker.

The Rosalynn Carter Fellowships for Mental Health Journalism begin with the inaugural class of journalists.



Mental health fellow Gail Fisher, a photojournalist.

The national Guinea worm eradication programs in Senegal, Yemen, and Cameroon report their last indigenous cases.

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River Blindness

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Figure 1 Areas Where The Carter Center Is Assisting in Elimination of Onchocerciasis



embraced by the African Program for Onchocerciasis Control (APOC) of annual treatment with Mectizan in areas where onchocerciasis prevalence appears to exceed 40 percent (microfilaria in skin). A study in the areas the Center assists in Cameroon and Uganda has shown that after 13 years of annual treatment with good coverage, onchocerciasis control has been achieved, but a small percentage of children remain infected, suggesting

low levels of ongoing transmission of the parasite (Katarbarwa et al., *Journal of Tropical Medicine and International Health* 2008; 13:1–8).

In 2006, the Sudanese government launched an onchocerciasis elimination campaign in the isolated Abu Hamad focus of Nile state with assistance from the Lions Clubs International Foundation and The Carter Center. The strategy for elimination was to increase treatments from annually to

every six months, broadening treatment to also include endemic communities where prevalence was lower than 40 percent, and expanding laboratory support to use new and more sensitive diagnostic techniques such as OV16 recombinant antigen serological testing and polymerase chain reaction testing of black flies for *O. volvulus* DNA. Since 2007, Abu Hamad has had six rounds of treatments occurring every six months, with all rounds but one achieving 85 percent coverage. (The second round of 2007 achieved 30 percent coverage.)

In 2007, the Ugandan government launched a campaign aiming to eliminate onchocerciasis nationwide, employing a strategy of twice-per-year treatment and vector elimination and control through the spraying of larvicide. The government received Carter Center financial and technical support in this effort as well as support from SightSavers International and the international Non-Governmental Development Organization Coordination Group. The Carter Center is assisting in seven Uganda foci for the elimination effort: Mbampankusi, Wadalai, Budongo, Wambabya-Rwamarongo, Bwindi, Kashoya-Kitomi, and Mt. Elgon. Assessment of impact is

1998

The Carter Center assists Nigeria in establishing and integrating lymphatic filariasis and schistosomiasis programs in Plateau and Nasarawa states with the existing onchocerciasis program.

With support from the Conrad N. Hilton Foundation, The Carter Center launches the Trachoma Control Program to assist Ghana, Mali, Niger, and Nigeria. The Center brings expertise and new attention to the "F" and "E" aspects of the SAFE strategy.

Chad Guinea Worm Eradication Program reports its last indigenous case.

1999

First praziquantel treatments are purchased and given by the Carter Center-assisted Schistosomiasis Control Program in Nigeria.



A Nigerian girl prepares to take praziquantel.

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River Blindness

ongoing. As a result of more intensive distribution of Mectizan, treatments have expanded dramatically in Carter Center–assisted areas (see Figure 2).

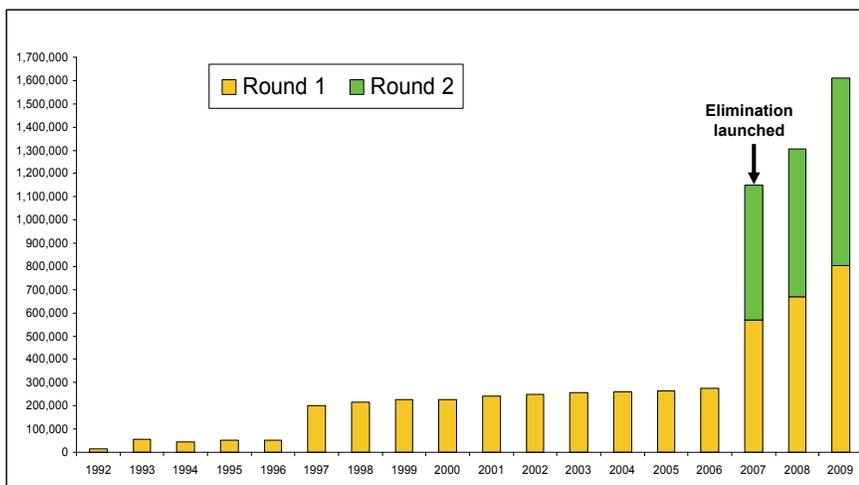
New Diagnostic Techniques

The Carter Center staff and consultants at various academic and research institutions (University of South Florida, Universidad del Valle de Guatemala, U.S. Centers for Disease Control and Prevention, Centrol de Biotecnologia in Mexico, U.S. National Institutes of Health, Scripps

Research Institute, and others) support laboratory capacity and assay development in the onchocerciasis elimination efforts. Elimination programs use the resulting science-driven information to help guide implementation of field activities and determine when treatment activities should be halted. The Carter Center has supported laboratories in Guatemala, Mexico, Ecuador, Sudan, and Uganda; in 2010 the Center will help establish a laboratory in Nigeria with financial support from

the Bill & Melinda Gates Foundation. Dr. Tom Unnasch at the University of South Florida has helped establish the laboratories, train and mentor Ministry of Health laboratory personnel, supply regularly needed reagents, and ensure quality control, especially related to polymerase chain reaction testing in black flies and skin snips. Nancy Cruz-Ortiz from the Guatemala laboratory has provided support to the OEPA program for OV16 serology work and has traveled to Uganda to assist in establishing that laboratory to support the elimination program there.

Figure 2 Carter Center–Assisted Onchocerciasis Treatments in Uganda (1999–2009)*



* Treatments in 1992–1995 were supported by the River Blindness Foundation. Number of treatments in 2009 is provisional.

In Memoriam

Wazarwahi Lazarus

We join the national River Blindness Program of Uganda in mourning the loss of Wazarwahi Lazarus, vector control officer in the Bushenyi district. Lazarus was killed in an accident while leaving the field on Nov. 23, 2009, after supervising ivermectin treatments administered in Bunyaruguru Health Subdistrict. The Carter Center sends its sincere condolences to his family.

The Carter Center and Lions Clubs International Foundation launch a major partnership, the Lions–Carter Center SightFirst Initiative, to fight trachoma and onchocerciasis.



President Carter, then–Lions Clubs International Foundation President Jim Ervin, and Mali President Amadou Toumani Touré mark the official launch of the SightFirst Initiative in Mali.

2000

First combination treatments (Mectizan and albendazole) for both lymphatic filariasis and onchocerciasis are administered in the Carter Center–assisted integrated program in Nigeria.

First treatments of Zithromax® (donated by Pfizer Inc) begin in Carter Center–assisted areas of Ethiopia and Sudan, under the Lions–Carter Center SightFirst Initiative.



A child takes Zithromax in Sudan.

Inaugural biennial world conference on the Promotion of Mental Health and Prevention of Mental and Behavioral Disorders is held at The Carter Center.

continues

River Blindness

Ugandan Man Helps Rid His Community of Onchocerciasis

In the early 1990s, fear dominated the community of Jawe parish, found in Mbale district, Uganda. The Jawe clan's neighboring parishes, Buryango and Bulweta, were being plagued by an unknown ailment that attacked a person's skin and eyes. The disease left its victims unable to care for themselves or their families.

At a community meeting in 1993, parish member Edirisa Wangwenyi told the attendees about the disease that was attacking their neighbors. He said the disease plagued sufferers with skin like that of a lizard—very hard, dry, and peeling off like a snake's skin. Its victims scratch themselves nonstop every day and tear apart their bodies with stones and broken pieces of pots. He described the sufferers as a cursed race and warned all not to associate with them to avoid getting their sickness. The community members heeded Wangwenyi's instructions, although many themselves had unknowingly already been infected by the disease—onchocerciasis.

Five years later, the Jawe subcounty chief received a box containing

ivermectin tablets and was told that they combated onchocerciasis. The parish chief selected Wangwenyi to distribute the medicine. Wangwenyi soon learned that he and many others in his parish also had the dreaded disease. The instructions he received were clear: Begin treatment with yourself.

Wangwenyi walked house to house



Frank O. Richards Jr.

Edirisa Wangwenyi, one of the first village volunteers who distributed ivermectin to fight onchocerciasis in Uganda, stands in his home, which is filled with health education materials and inspirational posters.

to distribute the ivermectin, taking several months for distribution. Many people refused to take it, and some experienced side effects. Wangwenyi had to assure the people that the side effects would pass, and that he too was taking the ivermectin. Treatment coverage in the community was low for some years, in part because of resistance to taking the drug.

In the second year of distribution, two people per parish were chosen to assist Wangwenyi, and communities were empowered to make decisions on how to run the program. The Carter Center came to assist the Uganda Ministry of Health in the program and worked to strengthen community structures through a kinship system. The use of kinship structures increased distribution and community acceptance, and over the years the terrible manifestations of onchocerciasis disappeared as treatment coverage improved.

Recently, Wangwenyi expressed his gratitude to The Carter Center and other donors for their unending support. "The prisoners of onchocerciasis have been set free," he said.

Note: Special thanks goes to Peace Habomugisha, country representative for The Carter Center in Uganda, for interviewing Wangwenyi and providing the content for this article.

2001

The International Task Force for Disease Eradication is reestablished at The Carter Center with a grant from the Bill & Melinda Gates Foundation. Among its first conclusions is that elimination of onchocerciasis transmission in the

Americas is possible using available tools.



Health worker in Guatemala examines girl for signs of onchocerciasis.

The Carter Center-assisted Onchocerciasis Program is launched in Ethiopia under the Lions-Carter Center SightFirst Initiative, incorporating nearly all areas requiring mass treatment.

For the first time, international journalists—from New Zealand—join the Rosalynn Carter Fellowships for Mental Health Journalism.

The World Health Organization declares end of Guinea worm disease in Central African Republic.

River Blindness

Integrated Interventions in Nigeria Save Time, Money

Long on the frontlines in the fight against neglected tropical diseases, The Carter Center continuously looks for ways to make a greater impact through more efficient use of resources. In Nigeria, the Center has pioneered integrated interventions against onchocerciasis (river blindness), lymphatic filariasis, urinary schistosomiasis, malaria, and trachoma.

In 1999, the Nigeria Ministry of Health, assisted by The Carter Center, launched a pilot initiative—the first of its kind—to piggyback lymphatic filariasis elimination and schistosomiasis control onto its existing onchocerciasis control program in Plateau and Nasarawa states. The effort built on the community-directed treatment with Mectizan® that had been established in collaboration with the African Program for Onchocerciasis Control.

The results of the pilot study, published in 2002 (Hopkins, et al. *Am J Trop Med Hyg* 67; 266–272), showed that all three diseases could be managed effectively through the same distribution, education, and mobilization strategy. However, schistosomiasis

treatment could not share the same distribution schedule because there were no studies at the time to show the safety of simultaneous co-administration of praziquantel (for schistosomiasis) together with Mectizan and albendazole (for onchocerciasis and lymphatic filariasis). As a result, treatment of schistosomiasis had to be given in a separate round at least one week before or after the onchocerciasis/lymphatic filariasis intervention. The necessity of a separate treatment round increased the costs and resources needed. Added to this was the challenge of obtaining an adequate supply of praziquantel, which was not donated to the Center. Resources were not sufficient to purchase enough praziquantel to scale up the schistosomiasis program together with onchocerciasis and lymphatic filariasis programs, diseases for which the treatment drugs were donated to the Center. The latter challenge was partially addressed by another innovation: rotating communities off of mass drug administration with praziquantel after 3–4 annual rounds of treatment (“praziquantel holidays”), so that more



Frank O. Richards Jr.

A Nigerian girl receives medicine to treat three diseases simultaneously — river blindness, lymphatic filariasis, and schistosomiasis.

untreated communities can benefit.

Subsequently, a study in Thailand, funded by the World Health Organization (WHO), found no clinically relevant pharmacokinetic interactions or adverse events when Mectizan, albendazole, and praziquantel were given concurrently, compared to when these drugs were given individually (Na-Bangchang et al., *Trans Royal Soc Trop Med and Hyg* 2006; 100: 335–345).

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2002

The Carter Center and the World Health Organization co-sponsor Conference on the Eradicability of Onchocerciasis at The Carter Center.



2002 onchocerciasis conference attendees.

2003

The Center begins assisting integrated control of onchocerciasis and schistosomiasis in Delta state, Nigeria.



Vehicles cross a large stream via ferry en route to Schistosomiasis Program launch in Delta state.

The Uganda Guinea Worm Eradication Program reports its last indigenous case.

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River Blindness

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Based on these results, the Nigerian Ministry of Health and Carter Center staff began co-administering the drugs, known as triple-drug administration, which eliminated the need for multiple treatment rounds in each village (Eigege et al., *Ann Trop Med Parasitol* 2008; 102:177–9). Triple-drug administration was launched in 2007 with a monitored rollout in Plateau state. With more than 5,000 people treated, village distributors showed only very rare dosing errors (0.06 percent of doses), and only 56 people (1.1 percent) complained of mild adverse events after treatment, none of which interfered with their daily activities.

In a further positive development, Merck KGaA (E. Merck) donated praziquantel (through WHO) to Plateau and Nasarawa states beginning in 2008, allowing triple-drug administration to be expanded to all local government areas in the two states that had received at least one round of stand-alone treatment for schistosomiasis. As of December 2009, more than 813,000 people have been safely treated with triple-drug administration. It has effectively eliminated the need for redundant vertical programming, resulting in an estimated cost savings of

approximately 40 percent compared to stand-alone distributions.

Bolstered by the success of the integrated approach to mass drug administration, The Carter Center sought to expand the use of the integrated community-directed model even further by incorporating training and distribution for insecticide-treated bed nets into the onchocerciasis and lymphatic filariasis programs. In 2004, another study (in cooperation with the Centers for Disease Control and Prevention) was conducted in Plateau and Nasarawa states to assess co-delivery of Mectizan, albendazole, and bed nets to people vulnerable to malaria (pregnant women and children under age 5 years). Community distributors delivered 38,600 bed nets to households while simultaneously treating 150,800 people for lymphatic filariasis and onchocerciasis. Treatment coverage was not affected—in fact there was an 11 percent increase over the previous year—and bed net ownership among the households with vulnerable people surveyed jumped from 10 percent to 80 percent after a single distribution (Blackburn, et al. *Am J Trop Med Hyg* 2006, 75(4): 650–655). Since 2004, The Carter Center has assisted in the distribution of more

than 260,000 insecticide-treated bed nets through the integrated community-directed approach in Plateau and Nasarawa, although the program has been constrained by lack of nets.

The Carter Center continues to seek new opportunities to broaden the scope and effectiveness of the programs it assists through integration. With support of the Bill & Melinda Gates Foundation, a major effort to examine costs and management of integration is currently underway in Nigeria where interventions for six priority health conditions (lymphatic filariasis, onchocerciasis, schistosomiasis, trachoma, malaria, and vitamin A deficiency) have been integrated at various levels. Integrated activities such as disease mapping, management, and interventions have been shown to be both effective and cost-efficient.

For example, a 2009 study (King, et al. *Am J Trop Med Hyg* 81(5): 793–8) on integrated mapping in Nigeria for trachoma and schistosomiasis showed that integrating district-based trachoma surveys into school-based schistosomiasis surveys was more useful in identifying individual communities where interventions were warranted than the recommended district-based approach alone.

Continued from previous page

2004

Through the mobilization of women, more than 89,000 latrines are built to help prevent trachoma in Ethiopia—one of the most endemic countries in the world; approximately 2,150 had been built the year before.

The Carter Center-assisted Nigeria Lymphatic Filariasis Program launches integrated control of malaria and lymphatic filariasis through distribution of insecticide-treated bed nets.

The national Guinea worm eradication programs in Mauritania and Benin report their last indigenous cases.



A child in Benin who will never face Guinea worm disease.

2005

The Carter Center agrees to assist Sudan in its effort to eliminate onchocerciasis from the Abu Hamad focus.

2006

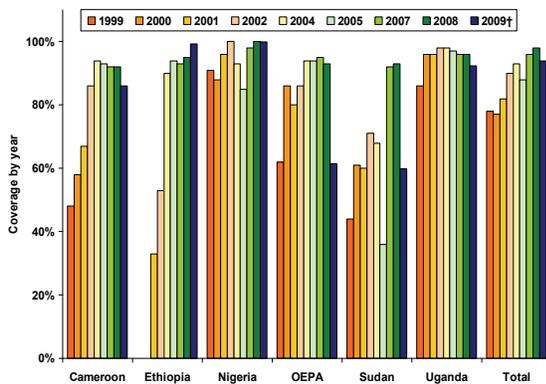
The Carter Center-assisted Cameroon Onchocerciasis Program begins integrating distribution of vitamin A capsules to children in conjunction with Mectizan treatments, at the request of the government.

River Blindness

Impact of Mass Drug Administration Evident in Africa, Americas

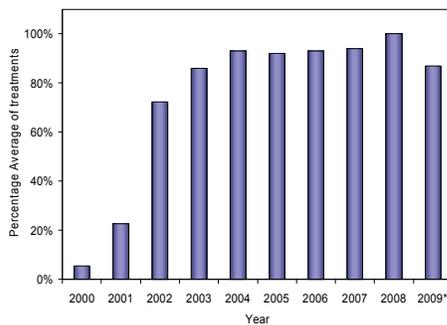
Figure 3 Carter Center–Assisted River Blindness, Lymphatic Filariasis, and Schistosomiasis Mass Drug Administration

River Blindness Program Treatment Coverage of Eligible Population by Country (1999–2009)†



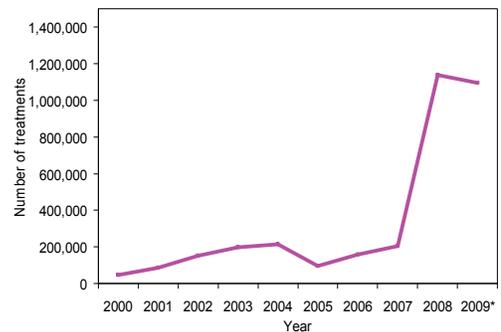
* Program in Ethiopia began treatment in 2001
† 2009 figure is provisional

Lymphatic Filariasis Program Treatment Coverage of Eligible Population by Year in Nigeria (2000–2009)*



* 2009 figure is provisional

Schistosomiasis Program, Number of Treatments by Year in Nigeria (2000–2009)*



continues on page 14

The Carter Center agrees to assist Uganda in its effort to eliminate onchocerciasis nationwide.

The Carter Center receives the Bill & Melinda Gates Foundation Award for Global Health for its pioneering work to fight five neglected diseases: dracunculiasis, onchocerciasis, schistosomiasis, lymphatic filariasis, and trachoma.

The Ethiopian government invites The Carter Center to assist its malaria control program. In six months, the Center purchases and distributes 3 million of the 20 million long-lasting insecticidal bed nets needed by the program.



Bed net distribution in Ethiopia.

The national Guinea worm eradication programs in Cote d'Ivoire, Burkina Faso, and Togo report their last indigenous cases.

continues

River Blindness

Continued from page 13

treatments (with praziquantel donated and obtained from Merck KGaA (E. Merck)/World Health Organization, Shin Poong Pharmaceutical, Medochemie LTF, and Bayer AG).

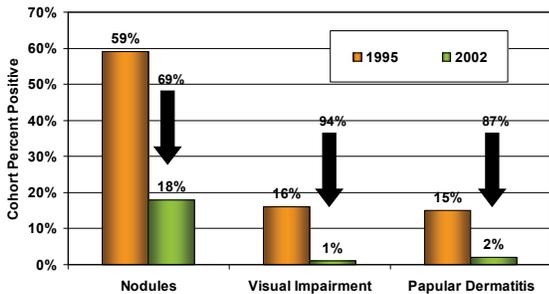
Treatment coverage (see Figure 3) based on the eligible population residing in the targeted river blindness and lymphatic filariasis program areas has exceeded the 85 percent coverage goal for years. While coverage is more difficult to calculate for the Schistosomiasis Control Program because

eligible populations vary according to disease prevalence, the dramatic increases in praziquantel being distributed following the Merck KGaA (E. Merck) donation through the World Health Organization are highly gratifying.

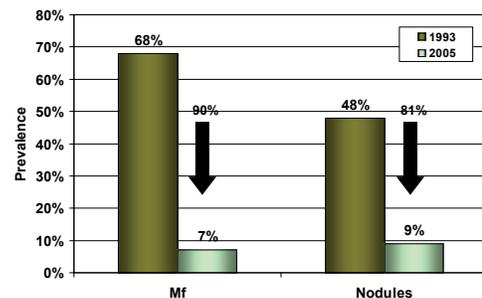
In this commemorative issue of the newsletter, we reflect visually on the striking impact well-executed mass drug administration programs have had on the prevalence of river blindness, lymphatic filariasis, and schistosomiasis in the areas where The Carter Center works (see Figures 4–6).

Figure 4 Impact of Carter Center–Assisted Onchocerciasis (River Blindness) Program

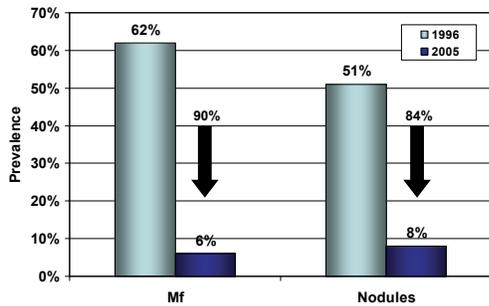
Reduction in River Blindness Morbidity in a Cohort Followed from 1995 to 2002, Nigeria



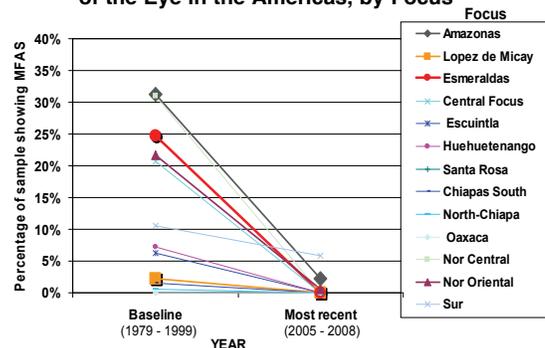
Reduction of Cross-sectional Microfilaria (mf) and Nodule Prevalence in Uganda (1993 compared to 2005)



Reduction of Cross-sectional Microfilaria (mf) and Nodule Prevalence in Cameroon (1996 compared to 2005)



Reduction of Microfilaria in the Anterior Segment of the Eye in the Americas, by Focus



2007

Continued from previous page

President and Mrs. Carter and the chairman of the Carter Center Board of Trustees, John Moores, lead a team of Center staff in a visit to health programs in Ghana, Sudan, Ethiopia, and Nigeria.



President and Mrs. Carter with Guinea worm victim in Ghana.

Colombia becomes the first nation in the Americas to interrupt transmission of onchocerciasis.

In Ethiopia, the Carter Center's assistance focuses on integration of malaria with trachoma control in Amhara region and integration of malaria with onchocerciasis control in parts of four other regions. Integration of Guinea worm eradication and trachoma control

activities begins in southern Sudan.



Health education on malaria in Ethiopia.

River Blindness

Figure 5

Impact of Carter Center–Assisted Lymphatic Filariasis (LF) Program in Sentinel Villages of Plateau and Nasarawa States, Nigeria

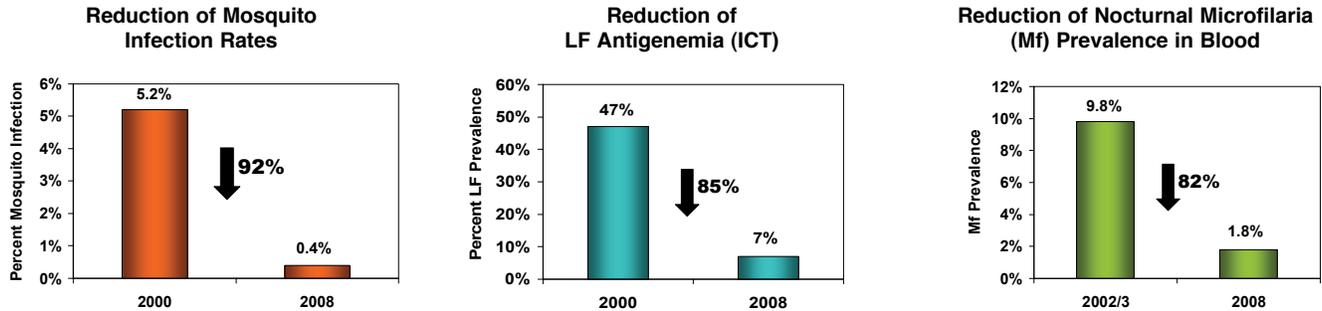
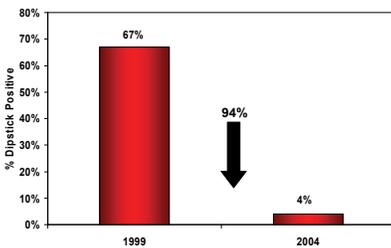


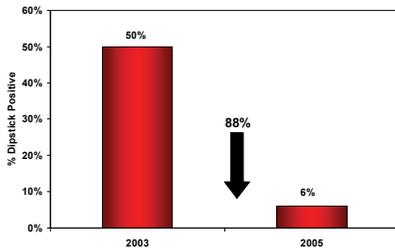
Figure 6

Impact of Carter Center–Assisted Schistosomiasis Program in Nigeria

Blood in Urine* in Schoolchildren in Plateau and Nasarawa States



Blood in Urine* in Schoolchildren in Delta State



* As determined by urine reagent dipsticks

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Blackburn BG, Eigege A, Gotau H, Gerlong G, Miri E, Hawley WA, Mathieu E, Richards FO Jr, 2006. Successful integration of insecticide-treated bed net distribution with mass drug administration in Central Nigeria. *Am J Trop Med Hyg* 75(4):650–655.

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ES, Eigege A, Emukah EC, Nwobi BC, Jiya JY, 2009. Nigeria's war on terror: Fighting dracunculiasis, onchocerciasis, lymphatic filariasis, and schistosomiasis at the grassroots. *Am J Trop Med Hyg* 80(5):691–698.

O'Loughlin R, Fentie G, Flannery B, Emerson PM, 2006. Follow-up of a low-cost latrine promotion programme in one district of Amhara, Ethiopia: Characteristics of early adopters and non-adopters. *Trop Med Int Health* 11(9):1406–1415.

Porco TC, Gebre T, Ayele B, House J, Keenan J, Zhou Z, Hong KC, Stoller N, Ray KJ, Emerson PM, Gaynor BD, Lietman TM, 2009. Effect of mass distribution of azithromycin for trachoma control on overall mortality in Ethiopian children: A randomized trial. *JAMA* 302(9):962–968.

Rotondo LA, Ngondi J, Rodgers AF, King JD, Kamissoko Y, Rodgers AF, King JD, Kamissoko Y, Amadou A, Jip N, Cromwell EA, Emerson PM, 2009. Evaluation of community intervention with pit latrines for trachoma control in Ghana, Mali, Niger and Nigeria. *Int Health* 1(2):154–162.

Sauerbrey M, 2008. The Onchocerciasis Elimination Program for the Americas (OEPA). *Ann Trop Med Parasitol* 102(Suppl. 1): S25–S29.

The 100 millionth dose of Mectizan administered in Carter Center–assisted onchocerciasis programs.

The Carter Center launches two research projects in Nigeria to investigate integrated efforts against neglected tropical diseases, with the support of the Bill & Melinda Gates Foundation.



Two studies examine neglected tropical diseases in Nigeria.

Dr. Donald Hopkins, Carter Center vice president for health programs, receives the Merck Mectizan Award for onchocerciasis work and the Fries Prize for Improving Health for the battle against Guinea worm disease.



Dr. Donald Hopkins shares a moment with a Nigerian boy.

continues

Trachoma

Trachoma Control: Progress Made in Ghana, Ethiopia, Mali, Niger

Over the last 10 years, remarkable strides have been made in the control and elimination of blinding trachoma. The Carter Center has made notable contributions through its collaboration with national trachoma control programs, advocacy among partners and donors,

original operational research, and innovative integration strategies. The programs in Ghana, Mali, Niger, and Ethiopia in particular have significant progress to report.

Ghana

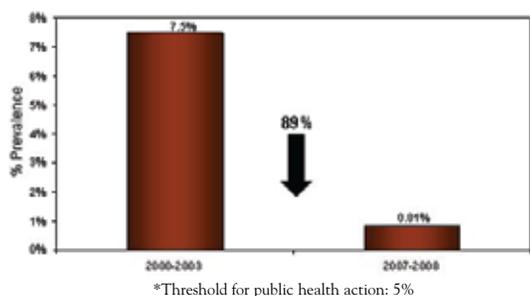
In 2009, the Ghana Health Service announced that it had entered the final stages of eliminating blinding trachoma as a public health problem, citing results from Carter Center-supported prevalence surveys conducted in all formerly trachoma-endemic districts (see Figure 7), in which 74,225 people from 12,679 households in 410 communities were examined for clinical signs of trachoma. According to current World Health Organization (WHO) guidelines, if the prevalence of trachoma (clinical grade: trachoma inflammation follicular [TF]) is less than 5 percent among children ages 1–9 years, active trachoma is considered no longer a public health problem.

In the surveys, the overall prevalence of clinical signs of TF among children ages 1–9 years was 0.84 percent (95 percent confidence interval 0.63–1.05 percent), and district-level TF prevalence ranged from 0.14–2.9 percent, indicating that these districts no longer warrant mass intervention. Communities still require surveillance, however, so that any remaining pockets of active trachoma can be identified and responded to.

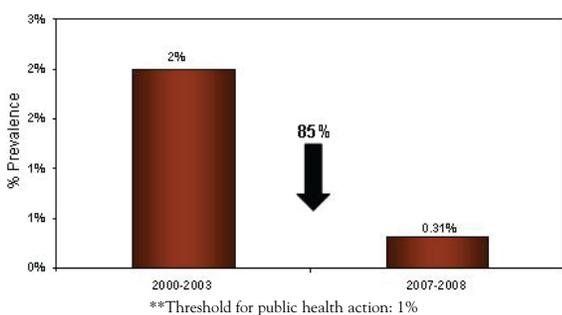
The estimated surgical backlog of trichiasis (TT) cases in the two formerly endemic regions of Ghana is between 1,000 and 9,000 people, with the majority being women age 60 years and older. The Ghana Health Service is perform-

Figure 7 Impact of Carter Center–Assisted Trachoma Program in Ghana

Average Prevalence of Trachoma Inflammation Follicular (TF) for Children Ages 1-9 Years in Northern and Upper West Regions*



Average Prevalence of Trichiasis (TT) for Adults >14 Years of Age in Northern and Upper West Regions**



2008

Triple-drug administration (praziquantel, Mectizan, albendazole) is shown to be safe and feasible for simultaneous treatment of schistosomiasis, onchocerciasis, and lymphatic filariasis in Carter Center-assisted

integrated project in Nigeria's Plateau and Nasarawa states.



Nigerian man suffering from lymphatic filariasis.

The 20 millionth dose of combined Mectizan and albendazole (donated by GlaxoSmithKline) is administered in Nigeria's Carter Center-assisted lymphatic filariasis program.

Pan American Health Organization adopts a resolution calling for elimination of onchocerciasis transmission in the Americas by 2012.

Trachoma is no longer considered a public health problem in Ghana.

Ghana becomes the first country in sub-Saharan Africa to eliminate blinding trachoma as a public health problem through use of the SAFE strategy.



Trachoma

ing active TT case searches throughout the two regions, and Ghana will soon submit an application to WHO for certification of elimination. Carter Center assistance to Ghana's Trachoma Control Program was funded by the Conrad N. Hilton Foundation. Zithromax® was donated by Pfizer Inc, and assistance by the International Trachoma Initiative also supported Ghana in this achievement.

Ethiopia

In Ethiopia, the Amhara region is home to one of the world's most severe burdens of trachoma. The Carter Center assists the Amhara Regional Health Bureau to deliver the full SAFE strategy (see Figure 8 for data and an explanation of SAFE). With support from the Lions Clubs International Foundation and the Ethiopian Lions, the Center has worked with the Amhara Regional Health Bureau to facilitate trichiasis surgical outreach, mass distribution of antibiotics, health education in communities and schools, and household latrine construction since 2001. In 2007, the Center and the

Amhara Regional Health Bureau integrated the existing trachoma control program with malaria control interventions, creating the innovative Maltra (malaria-trachoma) project to cover the region's entire population, estimated at 17.3 million people.

To streamline the mass distribution of antibiotics, the Amhara Regional Health Bureau began organizing semi-annual Maltra weeks in late 2008, with support of The Carter Center and local Lions Clubs. During Maltra week, distribution of antibiotics and malaria control interventions occur simultaneously, enhancing coverage and uptake among communities. Health extension workers and community volunteers provide millions of trachoma treatments during Maltra week, conduct testing and provide treatment for suspected malaria cases, and present health education.

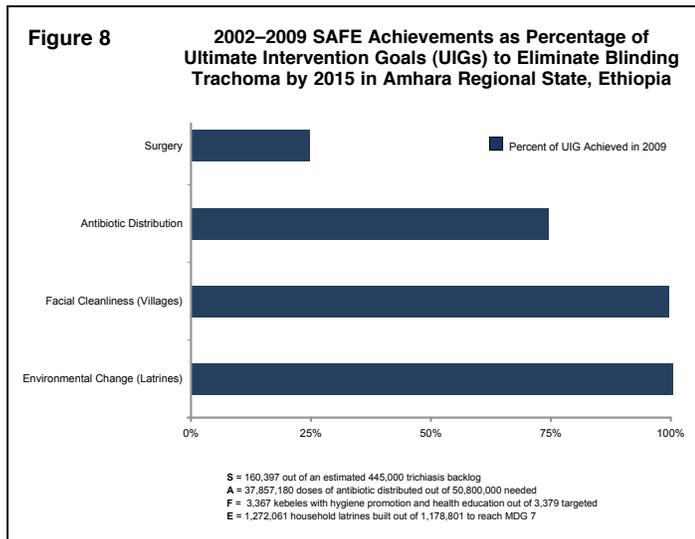
During the first Maltra week, in November 2008, anti-

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Aryc Moshier

A boy receives a dose of azithromycin during a Maltra week campaign in Mehel Mba woreda, Ethiopia, in May 2009.



The 10 millionth dose of Zithromax is administered in Amhara, Ethiopia. Maltra weeks are launched in Amhara to intensify trachoma and malaria interventions—5 million doses of Zithromax are distributed during the first Maltra week.

The Carter Center–assisted schistosomiasis control program in Nigeria receives a 10-year donation of praziquantel tablets from the World Health Organization and Merck KGaA (E. Merck). Treatments expand by almost five-fold.

In follow-up to recommendations of the International Task Force for Disease Eradication, The Carter Center begins an 18-month initiative to stimulate elimination of malaria and lymphatic filariasis in Haiti and the Dominican Republic and co-sponsors with

the World Health Organization the first program review for Buruli ulcer programs in Benin, Cote d'Ivoire, Ghana, Nigeria, and Togo.



Fighting malaria in Dominican Republic.

continues

Trachoma

Continued from page 17

biotics were distributed in 46 districts to approximately 4.8 million people. Two more weeks were organized in 2009, reaching more than 14 million people. This new approach to antibiotic delivery has been a resounding success by dramatically increasing the reach and uptake of distribution. The Carter Center continues to support surgery, health education, and latrine construction year-round in the Amhara region, where the goal is to eliminate blinding trachoma by 2015.

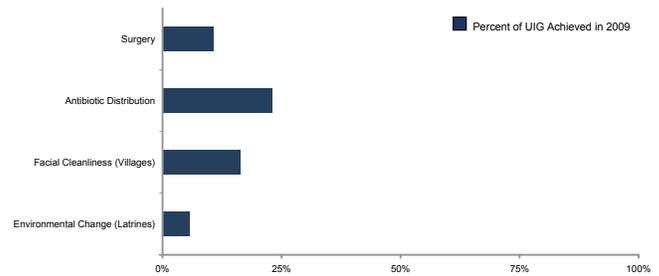
Mali

Mali aims to eliminate blinding trachoma as a public health problem (according to WHO guidelines) by 2015. The Malian national prevention of blindness program has conducted trichiasis outreach services for more than a decade. With support from the Conrad N. Hilton Foundation, The Carter Center began assisting trachoma control in Mali in 1999 and started facilitating surgery in 2008. Since then, more than 5,000 people have received surgery with Carter Center support (see Figure 9). In addition, more than 1,700 villages benefit from ongoing health education, and more than 60,000 latrines have been constructed with support from The Carter Center.

Niger

Like Mali, Niger's national prevention of blindness program also aims to eliminate blinding trachoma as a public health problem (according to WHO guidelines) by 2015. Since the inception of the national program in 1999, with Carter Center assistance (funded by the Conrad N. Hilton Foundation), more than 600 villages have benefited from ongoing health education, and more than 43,000 latrines have been constructed (see Figure 10). In 2008, The Carter Center expanded its support to include the provision

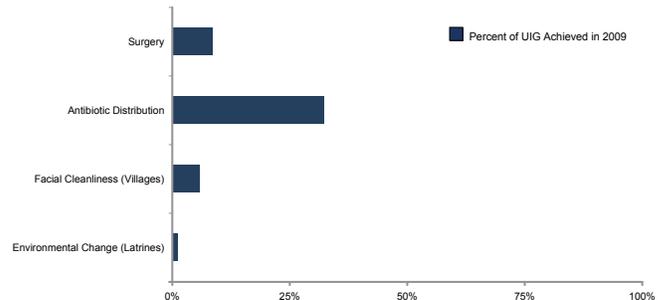
Figure 9 2009 National SAFE Achievements as Percentage of Ultimate Intervention Goals (UIGs) to Eliminate Blinding Trachoma by 2015 in Mali*



S = 5,171 out of an estimated 48,367 trichiasis backlog
 A = 164,000 doses of tetracycline provided to the national program
 F = 1,722 villages with hygiene promotion and health education
 E = 12,828 household latrines built

*Data includes activities supported by other partners, including Helen Keller International, the International Trachoma Initiative and Sight Savers International.

Figure 10 2009 National SAFE Achievements as Percentage of Ultimate Intervention Goals (UIGs) to Eliminate Blinding Trachoma by 2015 in Niger*



Provisional 2009 Data: SAFE Activities supported by The Carter Center only
 S = 3,180 out of estimated 36,782 trichiasis backlog
 A = 612,965 doses of antibiotic distributed
 F = 571 villages with hygiene promotion and health education
 E = 12,099 household latrines built

*Data are provisional and include activities supported by other partners, including Helen Keller International and the International Trachoma Initiative.

of surgery and mass antibiotic administration. Nearly 3,200 people have already received surgery to correct trichiasis, and 613,000 people have received antibiotics with support from The Carter Center in 2009.

Continued from previous page

The U.S. Congress passes the Paul Wellstone and Pete Domenici Mental Health Parity and Addiction Equity Act of 2008, the culmination of years of advocacy by Mrs. Carter, the Carter Center's Mental Health Program, and others.



Mrs. Carter testifies in front of a Congressional committee.

Carter Center assistance to trachoma programs in Mali and Niger expands to include Zithromax distribution and trichiasis surgeries with additional support from the Conrad N. Hilton Foundation.

2009

Nigeria, once the most endemic country for Guinea worm disease in the world with more than 653,000 cases reported in 1988, reports zero cases for an entire year for the first time, as does Niger. Only four of 20 formerly endemic countries continue to fight the disease.



Woman with last indigenous case of Guinea worm disease in Nigeria.

Trachoma

Medical Student Travels Far to Perform Trichiasis Surgery

Mekuria Amare, a health officer in the North Gondar Zone of Ethiopia, is currently completing his clinical training at Gondar University to become a medical doctor. Mekuria initially received training as a health officer, providing him the opportunity to provide general health care to a rural population. In 2007, he was trained by The Carter Center to provide trichiasis surgery at his health post in the remote district of Telemt.

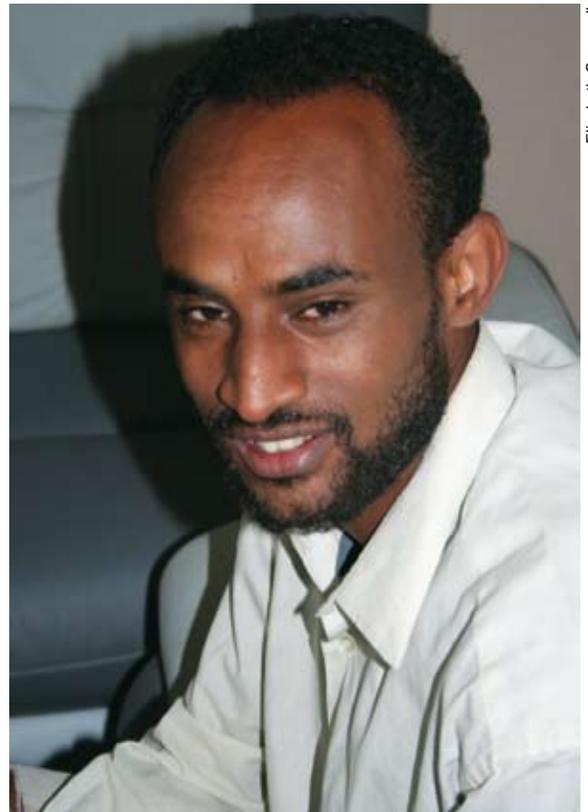
Before returning to medical school in 2008, he had performed 260 surgeries at his health post, serving his community and surrounding villages. “The infrastructure in Telemt is amazingly difficult,” he reported. “There are no roads, no services. It’s very difficult for the population to seek medical care and even less likely for outreach services to find them.”

Despite the difficult environment, Mekuria continues to conduct trichiasis surgeries, even though he is no longer stationed in the district. During his school vacations, he travels to Adi

Arkey, the nearest city. From there, he walks two days to reach Telemt. In January 2009, he conducted a 15-day campaign with a fellow student, together operating on more than 500 people. “There were a lot of cases,” Mekuria said. “We were the first to offer them surgery.” Because the area is so remote, he worked with local health extension workers to ensure patients in the community were informed in advance. “The health extension workers were my right hand,” he explained. “They were very effective at educating the community.”

Mekuria plans to conduct future campaigns in the Debark district of North Gondar Zone. Even though he does not work there routinely, he has made arrangements with the district health authorities. He also has encouraged his

friends to train as TT surgeons. When asked why he continues to participate in the trachoma control program as a medical student, he replied: “We have a talent to give this surgery, and we have to help by any means. It is our mission.”



Elizabeth Cromwell

Although now a medical student, Mekuria Amare continues to provide trichiasis surgery to patients in isolated communities in Ethiopia.

In Nigeria, 10 of 30 endemic local government areas in Plateau and Nasarawa states interrupt transmission of lymphatic filariasis.

The 100,000th trichiasis surgery is performed, 1 millionth household latrine is built, and 30 millionth dose of Zithromax is administered as the Lions-Carter Center-assisted trachoma program reaches full scale in Ethiopia.

The University of California at San Francisco and the Ethiopia Ministry of Health, in partnership with The Carter Center, publish groundbreaking research that distribution of Zithromax for trachoma control may reduce child mortality by 50 percent in Amhara, Ethiopia.

Health officials from 11 African countries recognize President Carter and The Carter Center with a leadership award for their “pioneering contributions to eradicating neglected tropical diseases in Africa.”



2009 leadership award.

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Global Health News

Dr. Miri Honored for Service to Humanity in Nigeria

Dr. Emmanuel Miri, Carter Center representative in Nigeria, was honored by the North Central Students Forum during a short ceremony at the Carter Center office in Jos on April 9, 2009, for his “hard work and dedication to the service of humanity.” Several executive members of the group, including its president and secretary-general, were present. Dr. Miri dedicated the award to the health volunteers in the thousands of Nigerian villages to which The Carter Center provides assistance.

Members of the North Central Students Forum present Dr. Emmanuel Miri (left) with a plaque.

