Eye of the Eagle

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IACO 2010

Population at Risk of River Blindness in the Americas Declines

The number of people at risk for onchocerciasis (river blindness) in the Americas has declined for the first time since The Carter Center began its campaign to eliminate the disease in the Western Hemisphere, according to data presented at the 20th annual Inter-American Conference on Onchocerciasis (IACO) in Antigua, Guatemala, Nov. 10–12, 2010. In 1993, the estimated at-risk population was 4 million. It is now fewer than 500,000.

Most recently, the at-risk population has declined by nearly 82,000, thanks to three areas (known as foci) passing the three-year benchmark of no new transmission of the disease. Thus, the people in these areas—Santa Rosa and Escuintla in Guatemala and North Chiapas in Mexico (see Figure 1)—are no longer at risk of the disease.

The current at-risk population includes only those living in the remaining 10 foci where the disease is either actively transmitted or where transmission has

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Caja Lúdica

Local children from an endemic area use creative ways to remind community members of the importance of taking Mectizan.

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Ethiopian Maltra Week Brings Treatment, Testing to 9.2 Million

A weeklong campaign focused on trachoma and malaria reached more than 9 million Ethiopians in 76 districts of western Amhara region. Launched on Oct. 31, 2010, this was the fifth and largest Maltra (malaria-trachoma) week; more than 4,000 four-person teams of health workers and volunteers traveled on foot to provide mass treatment for trachoma, case detection and treatment for malaria, and health education and awareness for both diseases.

By the end of the week, each team provided more than 2,000 treatments. More than 9.2 million people were treated with Pfizer-donated Zithromax® for trachoma (see Figure 4), and 120,000 people were tested for malaria. Of those tested for malaria, 70,000 required and received treatment. Health workers noted that now that the Ethiopians are experienced and comfortable with the campaign, they are demanding service from the field teams, and supervision is coming as much from the program recipients as from the implementers.

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River Blindness

IACO 2010

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been stopped for fewer than three years.

The World Health Organization guidelines for certification of onchocerciasis elimination recommend that foci removed from mass drug administration (because it is suspected that disease transmission has been stopped) should conduct surveillance for a minimum of three years. If no recrudescence of infection is detected during this time, then onchocerciasis would be declared eliminated from that focus.

The Carter Center's Onchocerciasis Elimination Program for the Americas (OEPA), the six affected countries, and their partners are working to end transmission of the disease in the hemisphere by 2012, in accordance with a 2008 resolution by the Pan American Health Organization, through sustained, mass drug administration of Mectizan® (donated by Merck) every six months in endemic areas.

In the region, there are 13 foci within the six endemic countries where mass drug administration has occurred (see Figure 1). As the program succeeds over time, fewer people in the Americas each year need to receive Mectizan. Compared to 2009, the number of people to be treated in the region in 2010 decreased by almost 10,000 to 326,253. Of the 13 foci, mass drug administration has been stopped in seven: Escuintla, Huehuetenango, and Santa Rosa (Guatemala); Northern Chiapas and Oaxaca (Mexico); López de Micay (Colombia); and Esmeraldas (Ecuador).

A theme of IACO 2010 was "Intensifying Remaining Treatment," and representatives of Mexico, Venezuela, and Brazil discussed their challenges in increasing treatment frequency from two to four times per year in traditionally hyperendemic areas, meaning those where baseline onchocerciasis prevalence is greater than 60 percent. This intensive treat-

Figure 1 **Geographic Distribution and Transmission Status of the 13 Foci of the Americas in 2010**

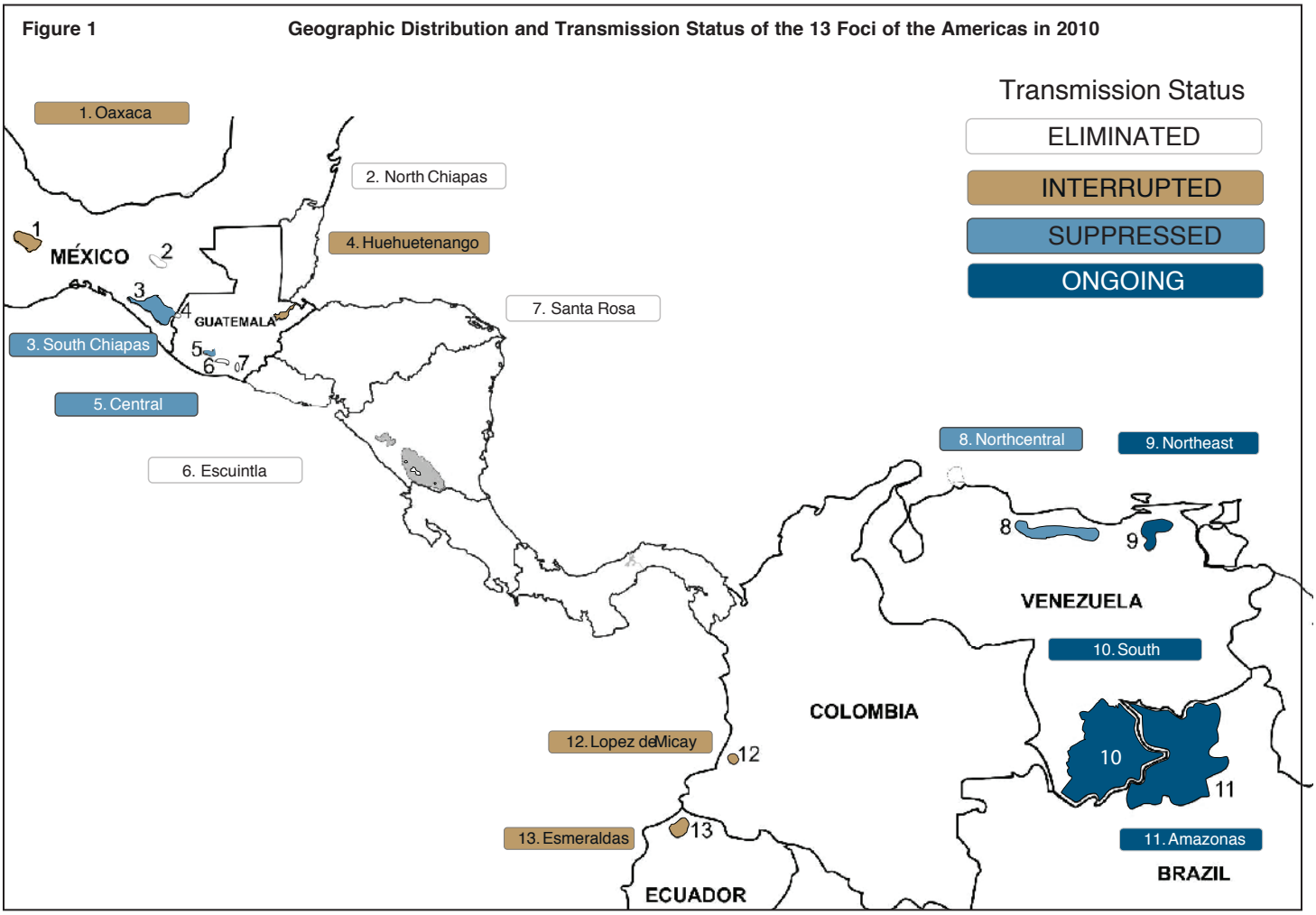


Figure 2 Four-Times-per-Year Treatment with Ivermectin in the Americas Region, Projected for 2011

Focus	No. of Communities	Cumulative No. of Treatment Rounds Exceeding 85% Coverage (2010)	Communities to Receive 4x/Year Treatments in 2011 (%)	No. of Hyperendemic Communities to Receive 4x/Year Treatments in 2011 (%)	2010 Transmission Status
Santa Rosa, GU	37	14	N/A	N/A	Eliminated
Lopez de Micay, CO	1	20	N/A	N/A	Interrupted in 2007
Escuintla, GU	117	13	N/A	N/A	Eliminated
North Chiapas, MX	13	12	N/A	N/A	Eliminated
Huehuetenango, GU	43	17	N/A	N/A	Interrupted in 2008
Oaxaca, MX	98	19	N/A	N/A	Interrupted in 2008
Esmeraldas, EC	119	23	N/A	N/A	Interrupted in 2009
South Chiapas, MX	559	19	163 (29%)	39 (100%)	Suppressed
Central, GU	321	18	N/A	N/A	Suppressed
Northcentral, VZ	45	16	N/A	N/A	Suppressed
Northeast, VZ	465	15	40 (9%)	35 (100%)	Ongoing
Amazonas, BR*	22	19	7 (32%)	7 (100%)	Ongoing
South, VZ *	10	9	5 (50%)	5 (100%)	Ongoing
TOTAL	**1850**		**215 (12%)**	**86 (100%)**	

N/A-Not Applicable
*South focus and Brazil refer to geographic areas, not communities.

The 2010 IACO meeting was convened by the Ministry of Health of Guatemala, the Carter Center's Onchocerciasis Elimination Program for the Americas (OEPA), and the Pan American Health Organization, with support from the Bill & Melinda Gates Foundation, the Lions Clubs International Foundation, and Merck. It was attended by 75 people, including 25 representatives of the Guatemala Ministry of Public Health and Social Assistance, from national, departmental, and municipal levels. Dr. Salomón López, director of the Department of Health Regulation, Surveillance, and Control, represented the minister of health of Guatemala during the opening ceremony. Also in attendance were the directors of the six national onchocerciasis elimination programs in Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela; representatives of the local Lions Clubs from five of the six countries (Alfonso Barahona, Margarita Peña Constante, Ramiro Peña Constante, Dr. Libardo Bastidas Passos, Dr. Ricardo Araujo Gurgel, Vania Araujo Gurgel, and Dr. Florencio Cabrera Coello); Kristen Eckert (Lions Clubs International Foundation); Dr. Steven Ault (PAHO); Dr. Adrian Hopkins (Mectizan Donation Program); Ken Gustavsen (Merck); Dr. Ed Cupp (chair of OEPA's Program Coordinating Committee); and Dr. Mark Eberhard (U.S. Centers for Disease Control and Prevention). Attending for The Carter Center were Dr. Mauricio Sauerbrey (director of OEPA), Dr. Donald Hopkins (vice president for health programs), Dr. Frank Richards, Craig Withers, Lindsay Rakers, and Nicole Kruse.

ment approach is being used to hasten disease elimination in four foci: South Chiapas (Mexico), Northeast and South (Venezuela), and Amazonas (Brazil) (see Figure 2). Four-times-per-year treatment occurred in 2010 in all hyperendemic areas of South Chiapas and the Venezuelan Northeast and in 40 percent of Venezuelan South. In 2011, this treatment intensification will expand to 100 percent of hyperendemic areas in Brazil and the South focus of Venezuela. Several countries are also considering using prolonged (5–6 week) courses of doxycycline treatment for onchocerciasis as well.

The progress of the OEPA initiative was palpable at this meeting and is possible only due to the persistence, expertise, and creativity of the partners. One memorable presentation was given by an acting troupe that has provided "art as a bridge to health" services for health education through onchocerciasis fairs held in endemic communities. Troupe members provided lively and unforgettable performances of their unique methods of encouraging people to keep taking their Mectizan until onchocerciasis has been eliminated.

Caja Lúdica

A Guatemalan acting troupe demonstrates health education through song.

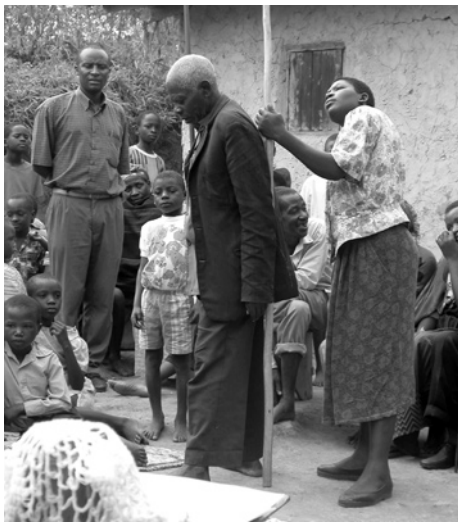
Uganda Committee Recommends Criteria for Onchocerciasis Elimination

The Wadelai focus in Uganda became the first area in the country where a committee has recommended that mass drug administration with Mectizan® be halted, which means that experts suspect that transmission of river blindness has been interrupted there.

At its third session, Aug. 10–12 in Kampala, the Uganda Onchocerciasis Expert Elimination Advisory Committee (UOEEAC) met to recommend national criteria for onchocerciasis elimination and apply those criteria to foci in the country where transmission appears to have been stopped. The UOEEAC advises the Uganda Ministry of Health.

The agreed-upon criteria were based on several key documents, including the World Health Organization 2001 guidelines for onchocerciasis elimination, the report of the practical application of these guidelines in the Americas (Lindblade 2007), the report of onchocerciasis transmission interruption in Uganda's Itwara focus (Garms 2009), and a report of onchocerciasis transmission interruption in foci in Mali and Senegal (Dawari 2009).

These criteria were applied to seven foci (see Figure 3) where data suggest transmission of onchocerciasis might be interrupted. Each focus was reviewed based on current entomological, parasitological, and OV16 antibody serological studies in children, as well as the history of vector elimination and control and mass treatment with ivermectin. The UOEEAC concluded that the Wadelai focus in Nebbi district met all the criteria and recommended the halting of treatment. The group also recommended a three-year period of post-treatment surveillance for recrudescence before characterizing onchocerciasis in that focus as having been eliminated. The Imaramagambo and Itwara foci were closest to joining Wadelai, depending on whether additional data could be collected promptly.

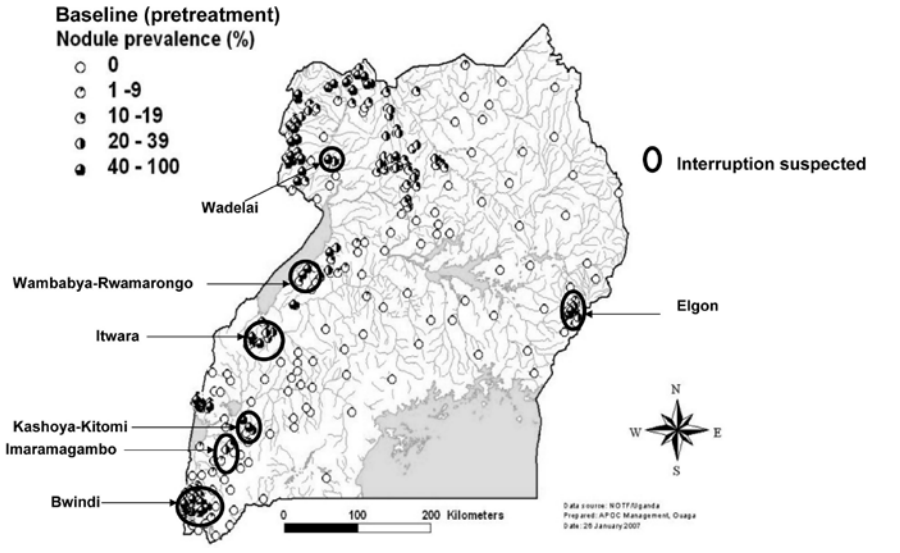


Moses Katabarwa

In a village in Uganda, a community health worker measures a man to determine his dosage of Mectizan to prevent river blindness. A Uganda committee advised that one area of Uganda, the Wadelai focus, stop Mectizan treatments, meaning disease transmission is suspected to have been halted there.

The meeting was opened by Dr. Kenya-Mugisha, director general of health services, who thanked The Carter Center for its assistance in eliminating Guinea worm disease from Uganda and stressed the importance of focusing on diseases such as onchocerciasis that have been earmarked by the Ministry of Health for elimination. He thanked all partners—The Carter Center, Sightsavers International, and

Figure 3 **Seven Foci in Uganda Where Transmission of River Blindness Is Suspected to Have Been Interrupted**



the African Program for Onchocerciasis Control—assisting Uganda's onchocerciasis elimination program and especially highlighted the financial and technical support The Carter Center is providing to the UOEEAC. He requested that the UOEEAC provide the ministry with national criteria on which the success of the elimination program could be assessed.

Members of the third UOEEAC included independent experts professor F. Walsh (chairman), professor R. Garms, and professor T. Unnasch; Dr. A. Noma (African Program for Onchocerciasis Control); Dr. M. Katabarwa (The Carter Center); B. Male (Sightsavers International); and national experts Dr. A. Onapa, E. Tukesiga, and J. Katamanywa. T. Lakwo, acting national coordinator for onchocerciasis, and P. Habomugisha, Carter Center Uganda, served as co-secretaries to UOEEAC. Among the many observers were Dr. M. Nanyunja (World Health Organization Uganda) and Dr. T. Ukety (World Health Organization Geneva).

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Survey Shows Heightened Interventions Needed in Northern Cameroon for Elimination

A new Carter Center–assisted study has found evidence of ongoing transmission of onchocerciasis in northern Cameroon, despite 12 or more years of Mectizan® distribution, suggesting that treatment must be intensified to reach elimination.

The finding of onchocerciasis infections in young children born after the treatments were instituted was considered evidence that transmission had not been completely eliminated.

The study of three health districts in the North region (Touboro, Tchollire, Rey-Bouba) found no infections in children in two of the districts Tchollire and Rey-Bouba), although incident ocular disease attributable to onchocerciasis was still found. However, in Touboro health district, where the baseline prevalence of infection was greatest and where annual treatments had been provided for the longest (17 years), there was evidence of ongoing transmission. Onchocercal infection was found in 20 of 107 children under 10 years of age, and in dissection of over 12,000 vector black flies, 1.4 percent were found to harbor infectious (L3 stage) larvae. The results are currently being prepared for publication.

A 2008 study conducted after 11 years of ivermectin distribution in the West region (Katabarwa et al., *Journal of Tropical Medicine and International Health* 2008; 13:1–8) found onchocerciasis prevalence had been reduced to very low levels. However, the finding of onchocerciasis infections in young children born after the ivermectin treatments were instituted was considered key evidence that transmission of the parasite *Onchocerca volvulus* had not been completely interrupted by the program.

Many African governments are anxious to move from a target of control of onchocerciasis disease to a new target of elimination, including the government of Cameroon. Similar to the efforts being undertaken in Uganda, if elimination of onchocerciasis becomes the goal for Cameroon, the new study from the North region supports a policy that offers the flexibility to add interventions—such as multiple treatment rounds per year or vector control—where needed.

The Carter Center has assisted the Ministry of Health to control river blindness in Cameroon for more than 15 years, having assumed responsibilities for assisting programs launched in the early 1990s in North and West regions with assistance from the River Blindness Foundation.

Maltra Week

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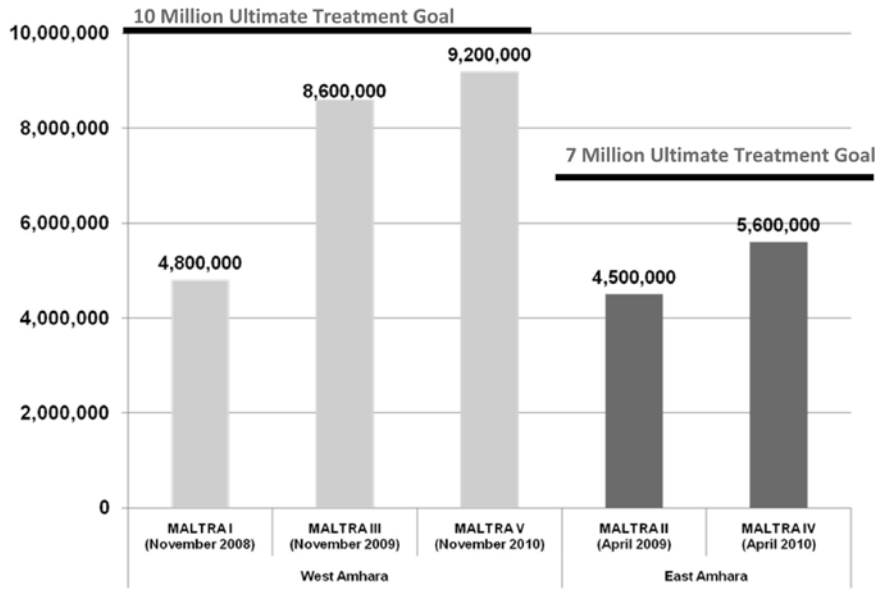
Traveling light, teams were equipped with logbooks and pens, Zithromax tablets and suspension, measuring poles, rapid diagnostic test kits for malaria, malaria treatments, and celebratory caps and t-shirts.

The ceremonial launch of this Maltra campaign took place in the historic town of Zegie on the shores of the inland source of the Blue Nile, Lake Tana. The first dose of Zithromax was administered by Dr. Freda Lewis-Hall, chief medical officer of Pfizer Inc, and Lion Dr. Tebebe Y. Berhan and observed by the vice president of Amhara and senior representatives from Pfizer, Lions Clubs International Foundation, International Trachoma Initiative, Task Force for Global Health, and The Carter Center.

The Amhara program is the largest consumer of Pfizer's Zithromax donation, and the rollout of the campaign provided a firsthand opportunity for Pfizer's senior staff to see how their product is used in the field, talk to people affected by trachoma, and hear personal testimony about how the program has affected individual lives.

Figure 4 **Persons Treated for Trachoma (Azithromycin and Tetracycline Eye Ointment) During Maltra Weeks**



Over the years, the Lions Clubs International Foundation has provided financial support exceeding $6 million to the trachoma program in Amhara, and Sid Scruggs, the current president, led the Lions delegation in witnessing the full-scale activities of a program that started with Lions support in just a few villages in 1999 but now serves the entire regional state. The goal of eliminating trachoma as a source of blindness in Amhara by 2015 remains viable and achievable if pressure on this disease can be maintained.

The sixth and seventh Maltra campaigns are planned for 2011 in April and November, respectively. Meanwhile, The Carter Center will continue working all year with its partners in the Amhara Regional Health Bureau and federal Ministry of Health to free Ethiopians from malaria and trachoma.

Paul Emerson

Health education, such as this demonstration of face washing, is a part of all Maltra weeks in Ethiopia.

Five Years Later, Ethiopian Girl Still Benefiting from Trachoma Program

Five years ago in Ethiopia, 3-year-old girl Haymanot Shibabow charmed former U.S. President Jimmy Carter and former First Lady Rosalynn Carter with her willingness to demonstrate her training latrine. The Carters were visiting the girl's village, Mosebo, to help launch the expansion of trachoma control programming to the whole of Amhara region in September 2005.

Haymanot and her family were early adopters of improved sanitation practices in the region, and five years later they are still following good domestic hygiene. While her father has rebuilt the household latrine twice, young Haymanot still prefers to have her own, covered now with an old plastic basin.

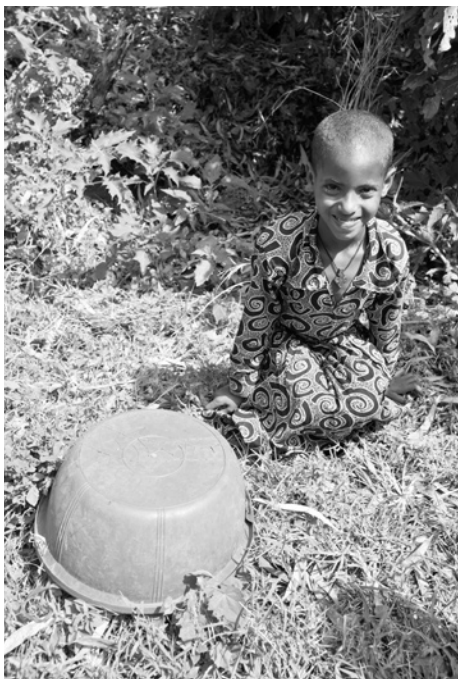
The SAFE strategy (surgery, antibiotics, facial cleanliness, environmental improvement) has successfully been expanded to 150 districts in Amhara since 2005, and Mosebo has not been overlooked. Neighbors have received free lid surgery at the local health center, Haymanot's family and friends have received three annual doses of Zithromax,® there is an active health extension worker and a trachoma education program in the village school, and more than half of the households now have their own latrines. With continued hard work, blindness from trachoma may be a distant memory by the time Haymanot reaches adulthood.

Louise Gubb

Haymanot sits under a bed net in her family's home in Mosebo village.

Vanessa Vick

Haymanot Shibabow,3, shows her training latrine, September 2005.



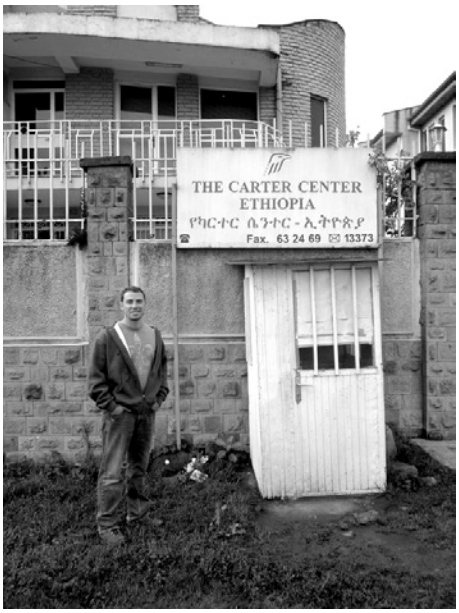
Louise Gubb

Haymanot Shibabow, now age 8, still uses her own latrine, November 2010.

Pfizer Fellow Employs Technology Skills to Assist Trachoma Control

By Stephen Jordan

When I learned that I had been selected to be one of 19 Pfizer global health fellows for 2010, I was exceedingly honored. Not only would I be joining a group of Pfizer employees who dedicate three to six months to help build capacity within various nongovernmental organizations (NGOs) around the world, but I learned that the NGO I would be assisting was The Carter Center, an organization I have long admired. I was chosen to collaborate with The Carter Center in Ethiopia in its efforts to assist the Ethiopia Ministry of Health and local Lions Clubs in trachoma control.



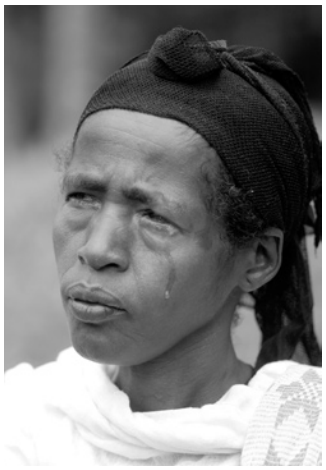
The Carter Center

Outside the Carter Center office in Addis Ababa, Stephen Jordan, a 2010 Pfizer global health fellow, is using his technology skills to support the trachoma control program for several months in 2010 and 2011.

The Pfizer Global Health Fellows program began in 2003 to increase Pfizer's contribution to global efforts in fighting HIV/AIDS, tuberculosis, malaria, trachoma, and other public health threats in developing countries. Working with its partners, Pfizer invests the full range of its resources—people, skills, expertise, and funding—to improve global health, with fellows using their skills and expertise to build the capacity of local partner organizations to expand services. I was chosen for my background in collaboration technology through which I have created and managed systems supporting over 100,000 Pfizer employees worldwide.

The majority of my time in Ethiopia has been working with the Carter Center staff in reviewing and identifying challenges within its information technology management systems. While the proposals for solutions are still being developed and reviewed, I have had the opportunity to witness the program's preparations for one of the more innovative programs in public health history—Maltra week.

On Oct. 31, 2010, the massive campaign kicked off in Bahir Dar, Ethiopia, by the shores of Lake Tana. There, representatives from The Carter Center, the Lions Clubs, the Ministry of Health, the International Trachoma Initiative, Pfizer Inc, and 15,000 Ethiopian health extension workers and volunteers came together to launch the fifth Maltra campaign with the goal of serving over 10 million citizens of western Amhara to eliminate blinding trachoma and control malaria. Before heading to the Amhara region, I observed the massive effort of loading a convoy of 23 trucks with Zithromax®, tetracycline eye ointment, and other materials over the course of three days. It was an amazing sight.



Louise Gubb

Stephen Jordan's work in the Carter Center's Ethiopia office will benefit trachoma victims around the country, such as this woman, Asnaku Shigute, who has had repeated trachoma infections since she was a child.

> **I have witnessed the wealth of ingenuity and personal fortitude that is bringing great change.**

Prior to arriving in the city of Addis Ababa, I had very little personal knowledge of Ethiopia except what one hears through the media about famine, disease, and poverty. Although my personal experience has allowed me to witness that Ethiopia is struggling with these issues, I have witnessed the wealth of ingenuity and personal fortitude that is bringing great change in the access to necessary preventative disease strategies. I feel so very privileged to have even a small role in this massive effort.

Health Workers Give Donated Zithromax, a First for Nigeria

With a quick swallow of banana-flavored medicine, David Nuhu, a 4-year-old boy from Aloshi village in central Nigeria, became the first recipient of Pfizer-donated Zithromax® for trachoma in the country.

Elizabeth Cromwell

With assistance from community drug distributor Zinariya Samson, 4-year-old David Nuhu, from Aloshi village in Nasarawa state, takes the first dose of donated Zithromax in Nigeria to treat trachoma.

Community drug distributors Zinariya Samson and Daniel Adeka treated Nuhu's entire household during training exercises, providing not only antibiotics for trachoma control but also health education to help prevent future trachoma infections.

"I want my community to be healthy," Samson said, adding that her sister previously had distributed medication in her community.

The new program was officially launched in a ceremony in Abuja on Oct. 14, 2010, and included representatives of the federal Ministry of Health, Pfizer Inc, and The Carter Center. The ceremony coincided with World Sight Day to raise awareness of preventable blindness in Nigeria. In addition to being Africa's most populous country, Nigeria is thought to account for a large share of the worldwide burden of trachoma. Nine northern states are endemic for the disease.

In 2010, Nigeria began implementing mass drug administration for trachoma control with Zithromax and tetracycline eye ointment in seven local government areas in Plateau and Nasarawa states. At the end of 2010, Sightsavers International also supported mass drug administration for trachoma in several areas in Zamfara, Sokoto, and Kebbi states.

In Plateau and Nasarawa, the Nigeria Ministry of Health and The Carter Center implement integrated drug administration for schistosomiasis, lymphatic filariasis, and river blindness control. Community drug distributors—like the two who treated David Nuhu's family—play a crucial role in the success of the program. Their participation maximizes the program's

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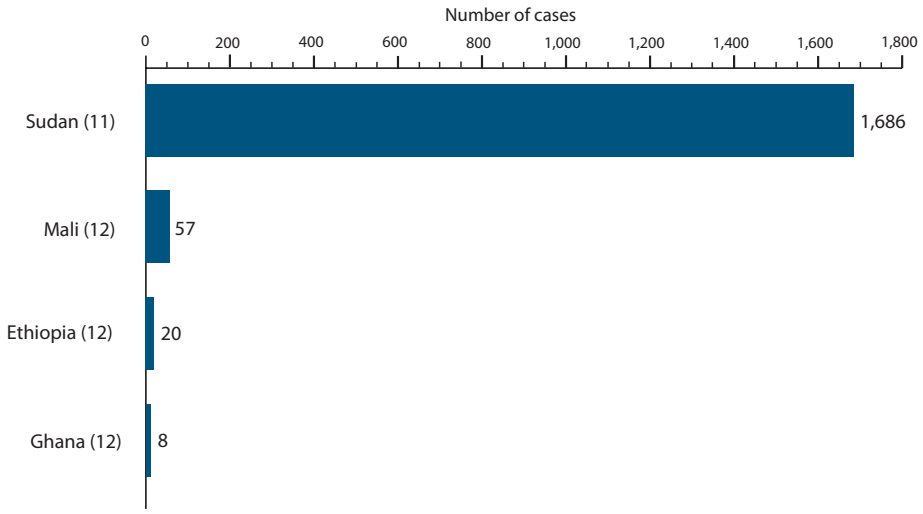
Cases of Guinea Worm Disease Continue to Fall, According to Data Through November 2010

During the first 11 months of 2010, Sudan reported 1,686 (95 percent) of 1,785 cases of Guinea worm disease reported in the world, while the other three endemic countries (Ethiopia, Ghana, and Mali) combined reported only 85 cases of the disease (see Figure 5).

However, 10 additional cases of Guinea worm disease were reported from an outbreak in Chad during this same period. Four additional cases were exported from one country to another: Sudan exported one case to Ethiopia, and Mali exported three cases to Niger during the reporting period.

The 1,785 cases reported so far represent a 44 percent decrease from the 3,171 cases reported during the same period in 2009; 1,348 (75 percent) of the cases were contained, prevented from transmitting the infections to others. All reported data are provisional.

Figure 5 **Distribution by Country of 1,781 Indigenous Cases of Dracunculiasis: 2010***



*Provisional. Numbers in parentheses denote number of months for which reports have been received, e.g., (11) = January — November 2010.

Includes an outbreak of 10 cases reported in Chad of unknown origin.

Excludes one case imported into Ethiopia from Southern Sudan in June 2010, three cases imported into Niger from Mali.

Nigeria

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coverage and reduces the cost of treatment. Communities are responsible for providing an incentive to their community drug distributors.

Zinariya Samson will try to juggle her daily household chores with her duties as a community drug distributor during this treatment round. "Nothing good is easy," she said.

In September, representatives from the Plateau and Nasarawa state ministries of health were trained in trachoma treatment protocol, reporting, supervision, and stock management at the Carter Center office in Jos. The state ministry representatives then helped train integrated health teams from the seven local government areas where mass drug administration for trachoma is warranted. Participants included a representative from the Blindness Prevention Program in the federal Ministry of Health; representatives from Zamfara, Sokoto, and Kebbi states; staff from Sightsavers International Nigeria; and Christoffel-Blindenmission.

These representatives then returned home to lead training of community drug distributors in their local areas. From late September through October, 1,710 distributors were trained in Plateau and Nasarawa states; they will target some 780,000 people in the two states for treatment with antibiotics.

Community drug distributor Jacob Igbeadio, who has been doing the work for four years, said, "I feel an obligation to serve my village. Whenever I am distributing, they joke and call me 'doctor.' I like that."

Survey Reveals High Burden of Malaria in Plateau, Nigeria

Nigeria is highly endemic for malaria, with as much as 90 percent of the population at risk for contracting the disease, most of which is due to *Plasmodium falciparum*, the most dangerous form of malaria. As part of nationwide efforts to scale up malaria control, a massive long-lasting insecticidal net distribution campaign is currently underway throughout Nigeria with a goal of covering all households with an average of two nets. The Carter Center, which has been assisting the Nigeria Ministry of Health with net distribution for simultaneous malaria control and lymphatic filariasis elimination in four states (Plateau, Nasarawa, Imo, and Ebonyi), is currently assisting in the scale-up of mass net distribution efforts, as resources allow.

To evaluate the impact of these massive net distribution campaigns, The Carter Center has assisted the ministries of health in two states (Plateau in North Central region and Abia in South East region) to conduct malaria surveys, which are providing detailed baseline information about the prevalence of malaria and anemia.

During August and September 2010, prior to the net scale-up, more than 60 individuals in eight teams were trained to visit representative household clusters to view and assess the presence of mosquito nets and ask questions about household characteristics, net usage, malaria knowledge and attitudes, and exposure to malaria-related health education messages. The teams also took blood samples, performed rapid diagnostic testing for malaria and anemia, and then provided appropriate treatment. The rapid diagnostic tests enabled immediate treatment, while blood slides were used for later confirmation of malaria. The surveys were completed in November 2010.

Preliminary results available from the Plateau state survey showed that 43 percent of almost 7,000 individuals tested in 1,379 households were found to be positive for malaria by rapid diagnostic test. However, there was huge variation between villages and households in the proportion of people who were positive, with the percentage positive varying by household cluster from 0 percent to 82.5 percent. The variation is likely to depend, at least partially, on factors such as the households' use of nets, access to malaria treatment, and house construction (i.e., ease of mosquito access). These and other factors will be explored in the final survey analysis.

The complexity of the malaria situation is exemplified by one rural compound on the outskirts of Fobur village near Jos East local government area in Plateau state, where three brothers reside with their families. The compound of three households has several nets, but these are not enough to serve all family members. The children share the bed nets. In one bed, three children share a net that is too small to be tucked in properly under the mattress at night, which means they are not maximally protected against mosquitoes. Most of the children in the compound have had fever off and on since the end of the rainy season in

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Patricia Graves

A survey team member draws blood from a child in Jos East local government area in Plateau state, August 2010.

The Carter Center
One Copenhill
453 Freedom Parkway
Atlanta, GA 30307

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CARTER CENTER

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Nigeria

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June, and the results of rapid diagnostic testing for malaria showed more than half had malaria at the time of the survey. There is a health center in the village where the children could receive treatment for malaria, but when asked what medicines were used to treat malaria, the head of the household cited chloroquine, a medicine that is no longer effective in Africa due to the evolution of drug resistance by *P. falciparum*. During the survey, all who tested positive for malaria were given an effective artemisinin combination drug for malaria, which is now the recommended treatment.

Dr. Patricia Graves and Amy Patterson from the Carter Center Malaria Program in Atlanta designed the Nigeria survey, and Dr. Graves and colleague Elizabeth Cromwell helped train the survey teams with Adamu Sallau, Dr. Emmanuel Emukah, and others at the Carter Center's Nigeria offices. "The Carter Center aims to help reach optimal coverage with long-lasting insecticidal nets in villages like Fobur by using established village distribution networks," said Dr. Graves.

The baseline results of the survey in Plateau and Abia states will provide an accurate measure in the future of how much the scaled-up efforts of the malaria program have increased net coverage and decreased malaria prevalence and anemia.

Patricia Graves

A survey team leader obtains consent from a village chief to conduct a malaria survey.