Summary Proceedings

Fifteenth Annual Trachoma Program Review

Focus on Impact

THE
CARTER CENTER

Waging Peace. Fighting Disease. Building Hope.

Atlanta, Georgia

February 25-27, 2014

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"Focus on Impact"

The Fifteenth Annual

Trachoma Control Program Review

The Carter Center

Atlanta, Georgia

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Table of Contents

Acronyms	1
Executive Summary	2
Trachoma Control Country Program Summaries	
Amhara Trachoma Control Program	3
Ethiopia Trachoma Control Program	9
Mali Trachoma Control Program	12
Niger Trachoma Control Program	17
Nigeria Trachoma Control Program	22
South Sudan Trachoma Control Program	29
Sudan Trachoma Control Program	34
Uganda Trachoma Control Program	40
Summary Tables & Figures	
Table 1: Summary of National Data from Trachoma Control Programs (Carter Center-Assisted Countries)	45
Table 2: National Trachoma Control Program Annual Targets 2014 (Carter Center-Assisted Countries)	46
Table 3: Carter Center-Assisted Implementation of SAFE (Carter Center-Assisted Output)	47
Table 4: Carter Center-Assisted Implementation of SAFE (1999-2013)	48
Figure 1: Persons Operated for Trichiasis, Carter Center-Assisted Countries	49
Figure 2: Azithromycin Distribution, Carter Center-Assisted Countries	50
Figure 3: Health Education, Carter Center-Assisted Countries	51
Figure 4: Household Latrines Constructed, Carter Center-Assisted Countries	52
Special Sessions	
Post-treatment surveillance and elimination verification	53
Ethiopia: Improving coverage in MalTra weeks and post-MDA assessments	55
Is surgery the only option?	57
Mali: Sub-district-level surveys (cost and surveillance)	58
Nigeria: Integrated trachoma and other NTD mapping in Southeast Nigeria	62
Global Trachoma Mapping Project update	64
Niger trichiasis surgery week and other strategies to improve surgical uptake	65
Lessons learned from rational use of antibiotics studies	67
Trachoma education in Amhara: Making it work for teachers and students	70
Appendix Materials	
Appendix I: 2014 Program Review Recommendations	73
Appendix II: Trachoma: The Disease	75
Appendix III: Program Review Agenda	76
Appendix IV: List of Participants	79
Appendix V: Ultimate Intervention Goal Definitions	81
Appendix VI: List of Papers Published by Carter Center Trachoma Program Staff in 2013	82

Acronyms

CBM	Christoffel Blindenmission
DfID	Department of International Development
FGD	Focus Group Discussion
FMoH	Federal Ministry of Health
GET 2020	Alliance for the Global Elimination of Blinding Trachoma by 2020
GTMP	Global Trachoma Mapping Project
HEW	Health Extension Worker
HKI	Helen Keller International
IECW	Integrated Eye Care Worker
ITI	International Trachoma Initiative
JHU-CCP	John Hopkins University – Center for Communications Programs
KAP	Knowledge, Attitudes, and Practices
LCIF	Lions Club International Foundation
LF	Lymphatic Filariasis
LGA	Local Government Area (specific to Nigeria)
MalTra	Malaria and Trachoma Week
MDA	Mass Drug Administration
MoH	Ministry of Health
NEI	National Eye Institute
NIH	National Institute of Health
NGO	Non-governmental Organization
NPPB	National Program for Prevention of Blindness
NTD	Neglected Tropical Disease
OCO	Opthalmic Clinical Officer
PCR	Polymerase Chain Reaction
PNLC(C)	Programme National de Lutte contre la Cecité (National Prevention of Blindness Program)
RAP	Rapid Assessment Procedure
RHB	Regional Health Bureau (specific to Ethiopia)
SAFE	Surgery, Antibiotics, Facial Cleanliness, and Environmental Improvement
SCH	Schistosomiasis
SMoH	State Ministry of Health
STH	Soil-Transmitted Helminthiasis
TANA	Trachoma amelioration in Northern Amhara
TAP	Trachoma Action Plan
TCC	The Carter Center
TEO	Tetracycline Eye Ointment
TF	Trachomatous Inflammation-Follicular
TF_{1-9}	Trachomatous Inflammation-Follicular (for children between one and nine years of age)
TI	Trachomatous Inflammation-Intense
TIRET	Tripartite International Research for the Elimination of Trachoma
TS	Trachomatous Scarring
TT	Trachomatous Trichiasis
UCSF	University of California San Francisco
UIG/UTG	Ultimate Intervention/Treatment Goal
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNICEF	United Nations Children's Fund (formerly United Nations Children's Education Fund)
UNMHCP	Uganda National Minimum Health Care Package
USAID	United States Agency for International Development
WASH	Water, Sanitation, and Hygiene
WHA	World Health Assembly
WHO	World Health Organization
WoHO	Woreda Health Office (specific to Ethiopia)

Executive Summary

Focus on Impact

The Carter Center's Fifteenth Annual Trachoma Control Program Review was held February 25-27, 2014 at The Carter Center in Atlanta, Georgia. Ministry of Health and Carter Center representatives from all Carter Center-assisted programs attended (Ethiopia, Mali, Niger, Nigeria, South Sudan, and Sudan), as did representatives from Uganda, where The Carter Center has proposed to assist beginning in 2014. Coordinating partners and donors attending the event included Cristoffel Blindenmission, Conrad N. Hilton Foundation, Emory University, Helen Keller International, the International Trachoma Initiative, Kilimanjaro Centre for Community Ophthalmology, Lions Clubs International Foundation, London School of Hygiene and Tropical Medicine, Pfizer Inc, Abbott, AbbVie Foundation, RTI International, Sightsavers, the Task Force for Global Health, U.S. Centers for Disease Control and Prevention, Swiss Tropical and Public Health Institute, Noor Dubai Foundation, Fred Hollows Foundation, and the Francis I. Proctor Foundation of the University of California San Francisco.

The purpose of the 2014 Program Review was to assess the status of the Trachoma Control Program, promote sharing and standardization of interventions and approaches, and discuss problems and solutions. By conducting such reviews, we are able to identify challenges in planning implementation, discuss research and assessment strategies and improve the overall delivery of services—we participate in these reviews so that we may *Focus on Impact.*

During 2013, we continued to see improvements and achievements in the effort to eliminate blinding trachoma through our collaboration and coordination with global partners. A notable milestone was reached in November 2013 with the distribution of the Carter Center's 100 millionth dose of Zithromax®, donated by Pfizer Inc., which was celebrated at Pfizer's headquarters in New York by President Carter and Pfizer CEO Ian Read, and in Ethiopia during the launch of MalTra XI. Following the theme of *Focus on Impact*, presentations centered on the current impact of SAFE interventions, strategies for improving impact, and future plans for assessing program impact. Two highlights of the Program Review included presentations on post-treatment surveillance and elimination verification, and the cost of sub-district level surveys. The impact of current interventions and strategies for increasing impact were discussed as presenters described how to improve coverage during mass drug administration campaigns, how to improve surgical uptake, lessons learned from the rational use of antibiotics, improving trachoma education in schools to better reach students, and what strategies may be used if surgery is not an option. A presentation on The Global Trachoma Mapping Project, which has mapped 77% of the original target of 1,238 districts in 30 countries and has expanded to include an additional 512 districts and 3 countries, made it clear that there is a lot more work to be done.

As we review the progress made in controlling and preventing trachoma using the SAFE strategy (**S**urgery, **A**ntibiotics, **F**acial Cleanliness, **E**nvironmental Improvement), we must refine ways to measure our progress toward the goal of eliminating blinding trachoma by 2020. We should focus not simply on the quantifiable outputs of the number of surgeries (S) or doses of azithromycin distributed (A) but rather on the impact of the interventions. Carter Center VP and TCP Acting Director Dr. Donald Hopkins emphasized in his opening remarks that counting services provided is not enough; that measuring the proportion of population served is better; but assessing the impact of services is best, and is what programs should focus on. <u>How close are we to the ultimate goal of achieving TT prevalence below 0.1% or TF prevalence below 5%?</u>

With the ultimate goal of eliminating blinding trachoma by 2020 just six years away, we need to continue to work on improving service delivery to be efficient, collaborative, and ultimately, focused on impact.

SAFE in Amhara Region, Ethiopia

Presented by Mr. Tesfaye Teferi, Senior Program Officer, The Carter Center Ethiopia

Background

The national blindness and low vision survey completed in 2006 found a national trachomatous inflammation-follicular (TF) prevalence of 26.2% among children ages one to nine years old and a trachomatous trichiasis (TT) prevalence of 3.1% among adults ages 15 years and older. These results showed that Ethiopia had the highest known burden of trachoma in the world, with the Amhara region the most trachoma endemic (62.6%) among all 10 regional states. Despite this, trachoma is not among the top health priorities in the region. The regional trachoma program is part of the National Committee for the Prevention of Blindness and there is a trachoma focal person assigned in the Amhara Regional Health Bureau (RHB). There are no organized coordination meetings for government and partners with the exception of the MalTra Taskforce-RHB and The Carter Center (TCC). All components of SAFE are supported by the Carter Center-Lions SightFirst Initiative and the RHB and are being conducted in all warranted areas. During 2013, the program conducted trachoma impact surveys in 41 districts, with 33 more districts being surveyed in early 2014. Additionally, in November 2013, the 100 millionth Carter Center-assisted dose of Pfizer-donated Zithromax® was distributed during MalTra XI. Representatives from Pfizer Inc, the Ethiopian government, International Trachoma Initiative (ITI), Lions Club International Foundation (LCIF), the Lions of Ethiopia, and The Carter Center attended the launch of MalTra XI to celebrate this milestone. Generous support for 2013 activities was provided by the Lions Clubs International Foundation, United States Agency for International Development's ENVISION project led by RTI International**,** Noor Dubai Foundation, and other donors.

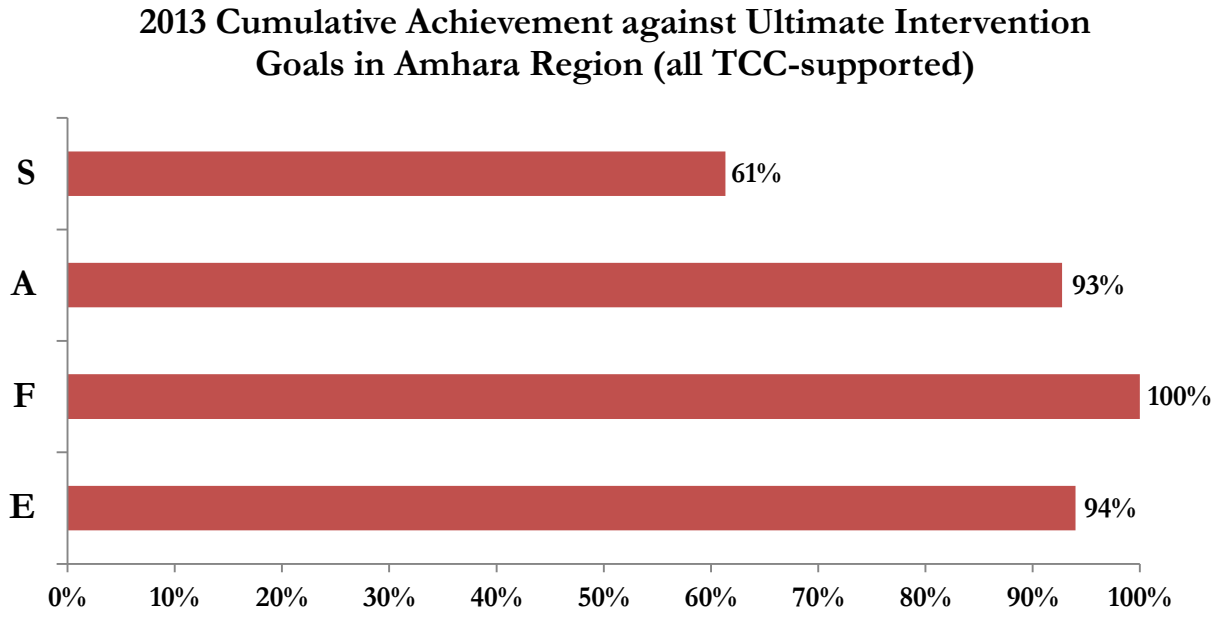
Timeline of Events

2001: Phase I agreement (4 districts)
2001: First 5-year trachoma action plan (TAP), updated every 5 years
2001: S, F, and E implementation begins
2003: Full SAFE implementation begins
2004: Phase II agreement signed (expansion; 19 districts-inclusive)
2005: National baseline survey
2006: Phase III agreement (scale up/MalTra)
2006-2007: Amhara region-level baseline survey
2008: MalTra week campaign approach for mass drug administration (MDA)
2019: Target year for elimination

Table 1. Program Achievements in 2013

Indicator	Ultimate Intervention Goals (UIG)	Amhara Regional Program (All TCC-Supported)	
		Target	Achieved
Persons operated	560,278	110,754	44,867 (40%)
Surgeons trained	N/A	110	0
Doses azithromycin distributed during MDA	16,361,459 (2014 target)	16,518,561	15,318,259 (92%)
Doses tetracycline distributed during MDA		337,113	359,374 (106%)
Villages with health education	3,459	3,459	3,459 (100%)
Household latrines built	4,469,438	551,172	141,970 (26%)

Figure 1.[1]



[1] See Appendix V for UIG definitions

Surgery (S)

Of 167 mapped districts, 156 districts have a TT prevalence greater than 1% among adults ages 15 years and older. The program completed 44,867 surgeries in 2013, 40% of its targeted 110,754 surgeries. All surgeries were supported by TCC. At the current rate of surgeries per year, it will take the program six years to clear the backlog of 280,881 patients. In 2013, the program was successful in conducting an inventory of all TT surgical kits in order to identify and replace missing pieces.

Antibiotic Therapy (A)

Out of 167 mapped districts, 147 have TF ≥ 10% among children ages one to nine years; 12 have TF prevalence between 5-9%; and eight were found to be non-endemic (TF< 5%). In 2013, Amhara met 92% of its target, with 15,318,259 doses of azithromycin distributed during MDA, all with Carter Center support. Of the 159 districts conducting MDA in 2013, all but two districts reported a greater than 80% coverage rate; zero reported less than a 60% coverage rate. These results were verified by a coverage survey conducted in all zones.

Facial Cleanliness (F)

All 3,459 *kebeles* targeted for health education were reached with Carter Center support. An impact assessment conducted in North Gondar, South Gondar, West Gojam, and East Gojam districts showed that the proportion of children one to nine years of age with a clean face rose to 75% over the 2003 historical baseline results of 28%.

Environmental Improvement (E)

The program constructed 141,970 new latrines in 2013, 26% of its targeted 551,172 latrines. There are 269,093 latrines remaining to be constructed in order for the region to reach its stated Ultimate Intervention Goal (UIG). An impact assessment conducted in North Gondar, South Gondar, West Gojam, and East Gojam districts showed that the proportion of households with a used latrine increased to 40% from the baseline survey results of 4% in 2003.

Programmatic Challenges

Most of the challenges faced by the program relate to TT surgery and environmental improvement. These include inadequate social mobilization for TT surgery, low TT surgery service uptake, and low attention for static surgery by integrated eye care workers (IECWs). Though many latrines have been built, there continues to be low levels of household latrine utilization.

Status of 2013 Program Review Meeting Recommendations

Recommendation 1: The Ethiopia National Program should conduct annual program reviews, suggested in October 2013.

Not completed.

Targets for 2014 and Plans to Meet Targets

Surgery (S)

- Operate on 61,537 trichiasis patients, all with Carter Center support
- Train 41 surgeons, all with Carter Center support

Woredas with a large backlog will be prioritized for surgical outreach in 2014. Efforts will be made to sensitize health center heads in order to gain their support for static surgical services. The program will improve/standardize the training of IECWs, with a focus on practical skills. More focus will be placed on enhancing the quantity and quality of IECWs' output. There will be an improvement in the supply chain management of the TT kits and consumables. Social mobilization will be strengthened with an emphasis on using the health extension worker (HEW) program and *kebele* structures such as the Health Development Army. HEWs will be linked with IECWs and used in conducting TT case searches. In order to meet these goals, the program has stated that there will be aggressive integrated collaboration on community mobilization; follow-up on validity of reported surgeries, quality of surgery, and patient satisfaction of TT surgeries; improved competency on planning and organizing campaigns; increased supervision; and initiation of assigning "lead-IECWs" to provide assistance and guidance to new IECWs.

Antibiotic Therapy (A)

- Distribute 16,361,469 doses of azithromycin, all with Carter Center support
- Distribute 498,610 doses of tetracycline, all with Carter Center support

Of the districts warranting MDA, 41 require impact assessments in 2014 before further MDA; 55 require one additional round of MDA; and 69 require two additional rounds before impact assessments are necessary.

Facial Cleanliness (F)

- Conduct health education in 3,459 *kebeles*, all with Carter Center support

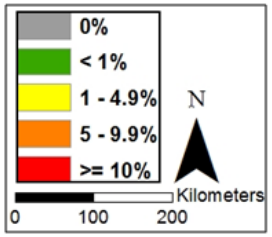
Environmental Improvement (E)

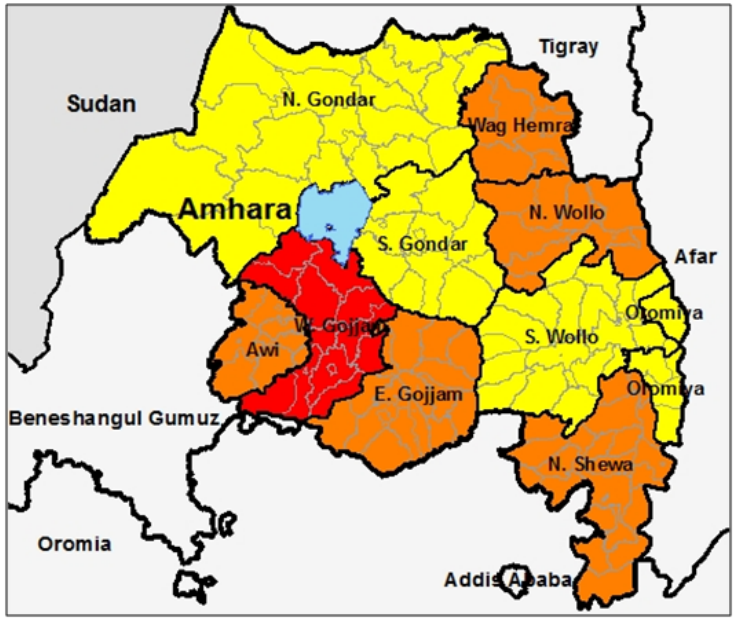
- Construct 284,405 latrines, all with Carter Center support

The program will continue to promote latrine construction in endemic communities. It costs approximately 13 USD per latrine for all the materials. Operational research will be conducted in order to determine the root causes of why some people continue not to use latrines.

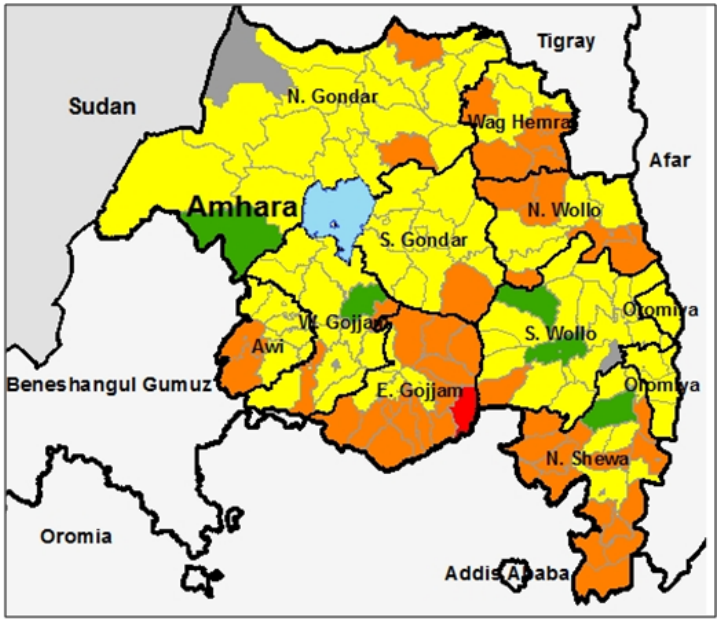
Maps of Amhara

Baseline TT Prevalence among Adults ages 15 and above, 2007

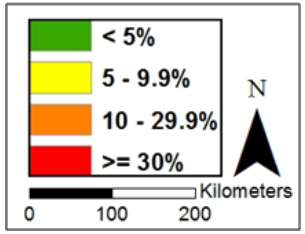


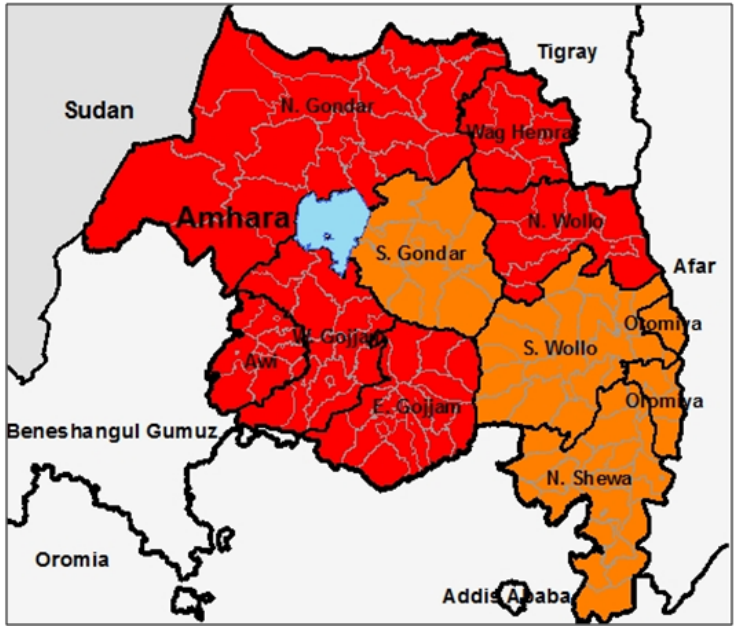


TT Prevalence among Adults ages 15 and above, 2013

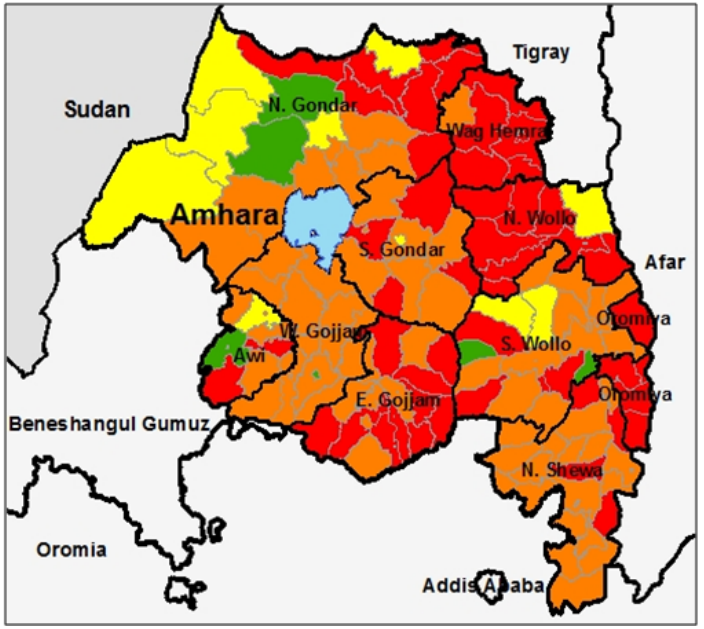


Baseline TF Prevalence among Children ages 1-9, 2007

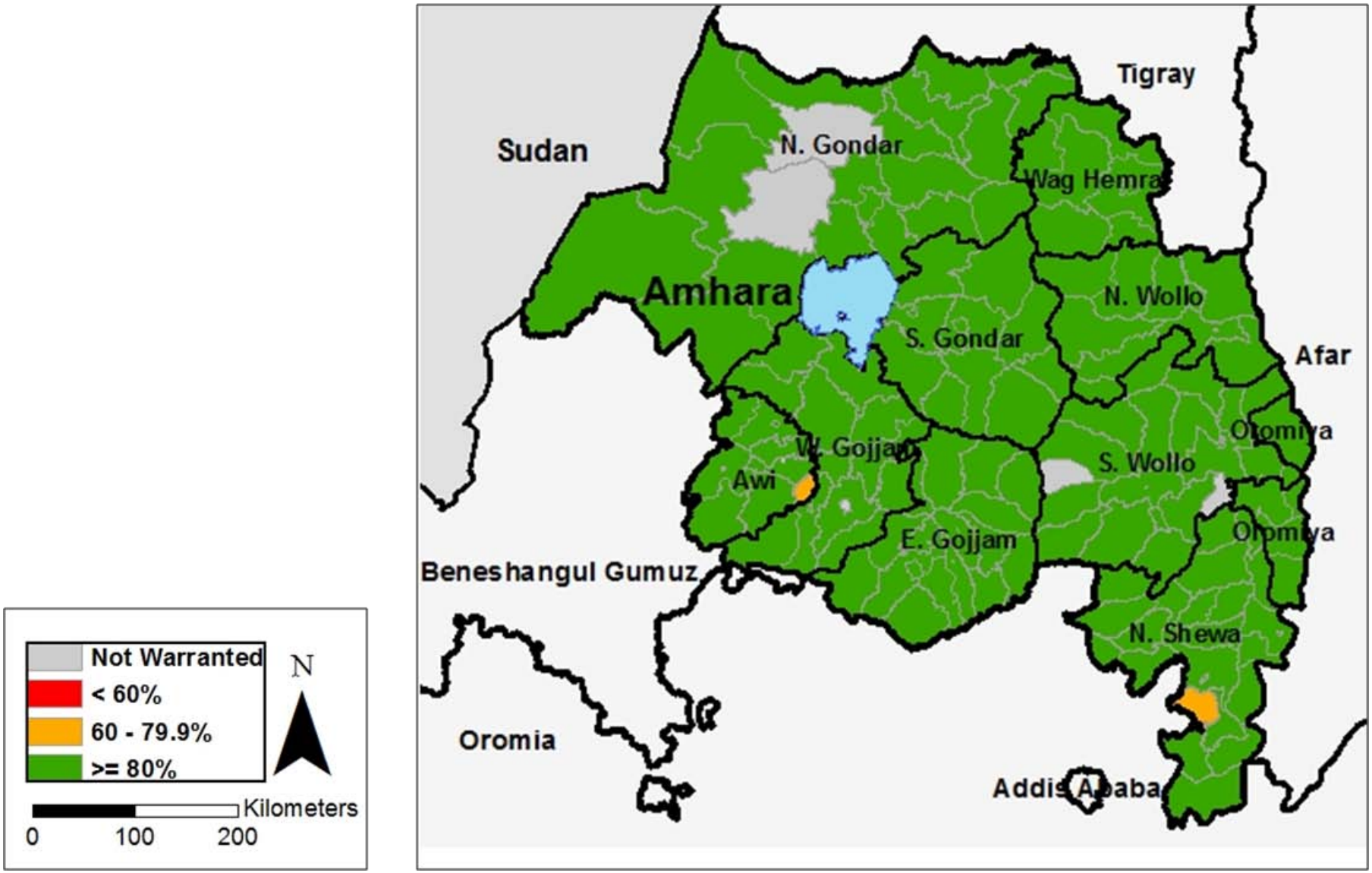




TF Prevalence among Children ages 1-9, 2013



Reported MDA Coverage, 2013



SAFE in Ethiopia

Presented by Mr. Oumer Shafi, NTD Team Leader, Federal Ministry of Health, Ethiopia

Background

The National Survey on Blindness, Low Vision, and Trachoma conducted in 2006 revealed that 2.8 million people in Ethiopia had low vision and 1.2 million people were blind. It was estimated that 87% of blindness was from avoidable diseases. The survey revealed that active trachoma was endemic in virtually all regions of the country, with more than 1.3 million people in the country living with trachomatous trichiasis (TT). The results of the survey showed that Ethiopia had approximately 30% of the burden of trachoma in sub-Saharan Africa.

There is growing momentum on the issue of Neglected Tropical Diseases (NTDs) in Ethiopia. In 2013, a national NTD master plan was launched, with regional states preparing their own NTD master plans. A NTD team was formed within the Federal Ministry of Health (FMoH) and NTD indicators became part of the national health management information system. National treatment registers and health extension worker (HEW) pocket guidelines are in the process of being developed, with plans for NTDs to be integrated into the existing health system. In order to better understand the NTD burden in Ethiopia, mapping of diseases that can be treated with preventative chemotherapy (PCT), such as lymphatic filariasis (LF), schistosomiasis (SCH), and soil-transmitted helminthiasis (STH) was conducted. The results from the Global Trachoma Mapping Project (GTMP) will further assist with the NTD effort.

Timeline of Events

2001: National guideline for Primary Eye Care developed[2]
2006: National taskforce for trachoma control established
2009: National guideline for mass antibiotics distribution developed
2006-2007: The Carter Center (TCC) surveyed Amhara region's baseline survey at zonal level
2008: MalTra was launched in the Amhara region[3]
2012: National trachoma action plan (TAP) was prepared
2013: National NTD master plan was launched
2013: Trachoma becomes part of national NTD program under disease prevention and control directorate
2020: Target date for elimination

[2] A five-year document, currently in 3rd cycle.
[3] MalTra (Malaria and Trachoma) week is a biannual weeklong outreach campaign that involves the mass distribution of azithromycin to prevent and treat trachoma. Additionally, recipients are provided with health education and testing and treatment for malaria with Coartem®.

Table 1. Program Achievements in 2013

Indicator	National Program[4]	
	Target	Achieved (%)
Persons operated	**242,462**	**133,940 (55%)**
Surgeons trained	**N/R[5]**	**N/R**
Doses azithromycin distributed during MDA	**24,931,984**	**17,714,445 (71%)**
Doses tetracycline distributed during MDA	**508,816**	**361,519 (71%)**
Villages with health education	**12,000**	**12,000 (100%)**
Household latrines built	**1,872,150**	**1,632,414 (87%)**

Surgery (S)

A total of 133,940 surgeries were performed in Ethiopia in 2013. No new surgeons were trained; however, refresher trainings were conducted in SNNPR[6] and Oromia regions. There are an estimated 444,509 TT cases remaining to be operated in order to clear the backlog, which at the 2013 surgical rate will take approximately three years to complete.

Antibiotic Therapy (A)

In 2013, Ethiopia met 71% of its treatment target, with 17,714,445 doses of azithromycin distributed during MDA. Of the 225 districts conducting MDA in 2013, all but one reported greater than 80% coverage; no district reported less than 60% coverage. Coverage surveys were conducted in East Amhara with 90.6% of respondents reporting they received treatment and in West Amhara with 86.2% of the respondents reporting treatment. Coverage surveys were not conducted in SNNRP and Oromia.

Facial Cleanliness (F)

All 12,000 villages targeted for health education reportedly received it in 2013. There have been no national surveys that address the prevalence of facial cleanliness. Surveys conducted by TCC in the Amhara region reported that 75.5% of children ages one to nine years had a clean face. Orbis International conducted a survey in SNNPR which showed that 69% of children had a clean face.

Environmental Improvement (E)

A total of 1,632,414 latrines were constructed in 2013, achieving 87% of the annual target. It is challenging to measure the national latrine coverage because of variance in the types of latrines, which therefore makes it difficult to compare. For example, improved latrines make up 31% of all latrines within households, and approximately 60% of households have improved latrines. There are an estimated 6,668,468 latrines remaining to be built in order for the National Program to reach its ultimate intervention goal. Though

[4] Carter Center support in the Amhara region is included in the national data provided. For detailed statistics on TCC's activities in the Amhara region please see page 5.
[5] N/R: Not reported by the program
[6] The Southern Nations, Nationalities, and People's Regional (SNNPR) state

almost eight million latrines have been built in Ethiopia to date, latrine usage is still a problem. The national strategic sanitation action plan (2011-2015) states that only 21% of the at-risk population use latrines. The WHO/UNICEF Joint Monitoring Program for Water Supply and Sanitation estimates that only 13.3% of the population use provided latrines.

Programmatic Challenges:

The GTMP highlighted that there are still many areas with high prevalence of trachoma, such as areas in the regions of Oromia, SNNPR, and Tigray. There is currently limited funding for SAFE activities to be implemented in all the areas warranting them. In regards to TT surgery, there are inadequate numbers of surgical supplies and a high attrition rate of integrated eye care workers (IECWs). Additional challenges are limited collaboration with the water, sanitation, and hygiene (WASH) community, and low awareness and limited use of improved sanitation.

Status of 2013 Program Review Meeting Recommendations:

Recommendation 1: The National Program should conduct annual program reviews, suggested in October 2013.

Not completed.

Targets for 2014 and Plans to Meet Targets:

Surgery (S)

- Operate on 150,000 trichiasis patients

Although there is a national TAP, only the Amhara region has developed a specific plan to clear its TT backlog. Areas are currently prioritized by highest backlog. In order to reach all TT cases, the National Program will use static services at health centers, outreach services to neighboring health facilities, and mobile campaigns. HEWs and women health development army members are expected to identify, register, and refer TT patients. In order to achieve these surgical goals, the program has stated that they are in need of TT surgical kits.

Antibiotic Therapy (A)

- Distribute 43,829,038 doses of azithromycin
- Distribute 894,470 doses of tetracycline

Facial Cleanliness (F)

- Conduct health education in 11,514 villages

Environmental Improvement (E)

- Construct 2,000,000 new latrines

In order to better provide latrines and increase latrine use, the National Program would like to focus on community-led total sanitation and hygiene. This method uses an approach that encourages villages to become free of open defecation. The program will also utilize the predominantly female Health Development Army.

SAFE in Mali

Presented by Professor Lamine Traoré, Coordinator PNLC, Ministry of Health, Mali

Background

In 1994, the National Blindness Prevention Program (PNLC) was created. Following prevalence surveys conducted in 1996-1997, trachoma was identified as a major public health issue in Mali. Although the Ministry of Health's (MoH) top three priorities were malaria, HIV, and tuberculosis, a national trachoma control program was established in 1999. Trachoma is integrated into the Neglected Tropical Disease (NTD) department within the MoH, with meetings held the last Thursday of each month. Though Mali does not have a formal trachoma action plan (TAP), at the end of each year, the PNLC develops a plan of action during an annual program review meeting. The Carter Center (TCC), along with other partners, currently supports the implementation of all SAFE components. For the A component, TCC is limited to the purchase of tetracycline eye ointment.

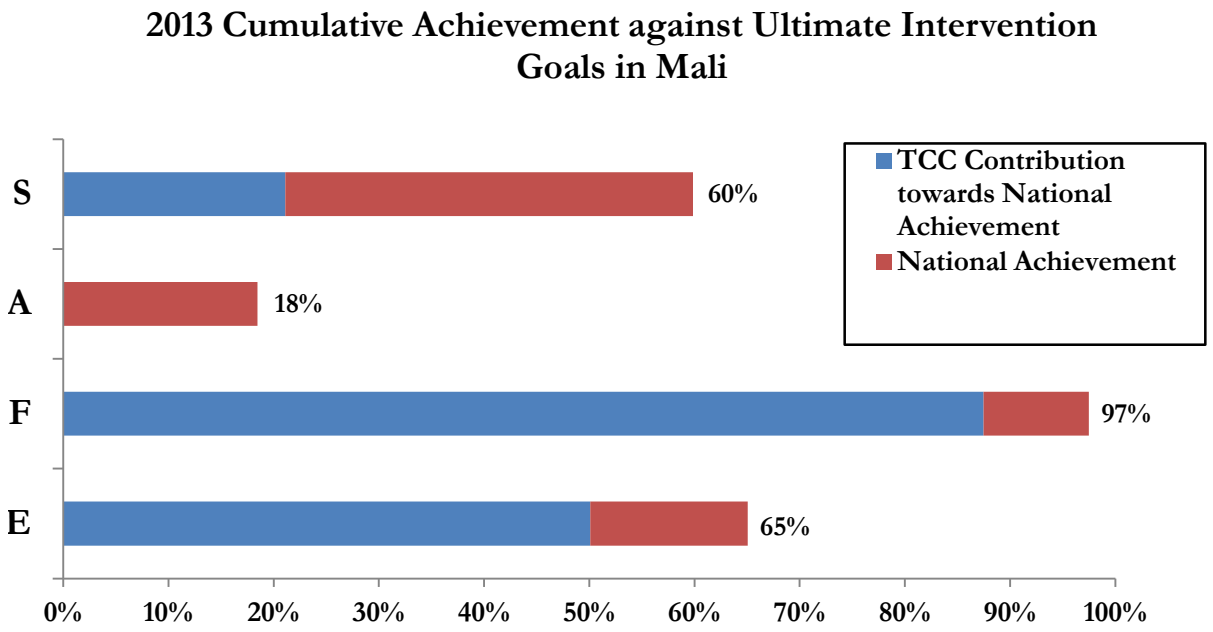
Timeline of Events

1994: National Blindness Prevention Program launched
1996-1997: National baseline prevalence survey
1999: Mali Trachoma Control Program launched
1999: Surgeries initiated
2001: Distribution of Pfizer Inc-donated Zithromax® begins
2003: Facial cleanliness and Environmental improvements activities initiated
2005-2013: Impact surveys conducted
2015: Target date for elimination of blinding trachoma in Mali

Table 1. Program Achievements in 2013

Indicator	Ultimate Intervention Goal (UIG)	National Program		Carter Center-Supported	
		Target	Achieved (%)	Target	Achieved (%)
Persons operated	121,773	10,000	4,930 (49%)	4,000	2,830 (71%)
Surgeons trained	N/A	20	17	0[7]	0
Doses azithromycin distributed during MDA	981,882	981,882	181,259 (18%)	N/A[8]	N/A
Doses tetracycline distributed during MDA		19,637	3,625 (18%)	N/A	N/A
Villages with health education	2,997	2,747	2,622 (95%)	2,747	2,622 (95%)
Household latrines built	180,527	22,149	3,233 (13%)	5,500	1,438 (26%)

Figure 1.[9]



[7] Though The Carter Center normally supports the training of surgeons, no trainings were planned for 2013.
[8] N/A = Not applicable, the program did not support azithromycin intervention in 2013.
[9] See Appendix V for UIG definitions

Surgery (S)

Of 53 mapped districts, 18 have a trachomatous trichiasis (TT) prevalence greater than or equal to 1% in adults ages 15 years and older. This is a 63% reduction (down from 48 districts) from baseline survey results in 1997. In 2013, the national program conducted 4,930 surgeries (49% of the targeted 10,000), with 2,830 of these surgeries supported by TCC. Additionally, 17 surgeons were trained out of the targeted 20 surgeons, though none of these trainings were supported by TCC. There are an estimated 25,949 cases remaining to be operated in order to reach the national ultimate intervention goal (UIG). At the current rate of surgeries completed per year, it will take 5 years to clear this surgical backlog. TCC and other NGO partners are working with the national program to identify ways to increase annual surgical output.

Antibiotic Therapy (A)

Out of 53 mapped districts, 5 currently have trachomatous inflammation-follicular (TF) ≥ 10% among children ages one to nine years; 11 have TF prevalence between 5-9%; and 37 were found to be non-endemic (TF< 5%). Mass drug administration (MDA) began in Mali in 2001. In 2013, Mali met 18% of its 981,882 target, with 181,259 doses of azithromycin distributed during MDA. Apart from the sentinel sites, no other regions received treatment in 2013. It is only those districts in the North that still need to start treatment; however, impact surveys are required first. Due to insecurity in the region, these areas have not yet been surveyed.

Facial Cleanliness (F)

A total of 2,747 villages were targeted to receive health education. Of these, 2,622 were reached (95%), all with the assistance of TCC. According to the strategic plan, the target is for at least 90% of children ages one to nine years to have a clean face. Based on impact surveys conducted in Kayes, Koulikoro, and Segou districts, 82% of children were found to have clean faces, an increase over the mid-term assessment of 70%.

Environmental Improvement (E)

In 2013, 3,233 latrines were built, and 1,438 of which were supported by TCC. According to the national program, there are 63,058 latrines still to be built in order to reach the UIG of 180,527 latrines. In the strategic plan, no specific figures regarding latrine construction were detailed in order for the country to reach this goal before 2015. Prevalence surveys conducted in Kayes, Koulikoro, and Segou showed that 86% of households had latrines and used them.

Programmatic Challenges

There are challenges in reaching the target elimination date of 2015, primarily related to insecurity in the North, which limits implementation and evaluation activities. Other challenges relate to TT surgeries, such as the need to operate on the remaining backlog of patients (25,949 cases) in two years; the management of cases who refuse surgeries and those that require repeat surgeries; and the need to ensure the quality of surgeries at all levels. Additionally, there is a need to identify possible pockets of TT cases at the sub-district level. In order to overcome some of these challenges the National Program has stated that they need logistical support in the form of vehicles and motorcycles for the teams and operators; quality human resources in regards to surgeons, a data manager and surveyors; and funding of activities until elimination in 2015.

Status of 2013 Program Review Meeting Recommendations

Recommendation 1: The national program should focus surgical services on districts known still to have a high burden of un-operated cases and villages that have not benefitted from campaigns in the past.

Completed. Currently all "auto sorties" are being conducted in these areas.[10]

Recommendation 2: The national coordinator should present a report on results of post-endemic surveillance activities at the 2014 Program Review.

Completed.

Recommendation 3: The program should be ready to provide service (MDA and TT) and conduct impact assessments in the desert regions (Gao, Kidal and Timbuktu) as soon as the opportunity presents.

The National Program has stated that as soon as the security conditions become better, there will be a resumption of activities in the desert regions. Helen Keller International (HKI) has proposed to support the Timbuktu region and TCC will support the regions of Gao and Kidal.

Targets for 2014 and Plans to Meet Targets

Surgery (S)

- Operate on 15,569 trichiasis patients, 6,228 with Carter Center support

In order to reduce TT prevalence to <0.1% in the total population, Mali plans to operate on approximately 15,000 patients in 2014 and 11,000 patients in 2015. Districts with 1% or higher prevalence of TT among adults ages 15 years and older will be prioritized. The only way to meet these surgical goals is by greatly increasing the number of "auto sorties" and "moto sorties"[11] surgical campaigns; however, this will depend on logistical support and purchasing of more equipment. The program would like to retrain some of the surgeons and issue certifications to ensure TT surgeries are performed with high quality. In order to better understand patient refusal of surgery, a Knowledge, Attitude, and Practice (KAP) survey is being conducted.

Antibiotic Therapy (A)

- Distribute 385,934 doses of azithromycin
- Distribute 4,285 doses of tetracycline, all of which is anticipated to be distributed by TCC

There are five districts warranting impact assessments in 2014 before further MDA can be carried out. Other than potential areas in the North, there are no other districts warranting MDA or impact assessments.

Facial Cleanliness (F)

- Conduct health education in 250 villages, all of which will be supported by TCC

The national program is leveraging the NTD/schistosomiasis training manuals to implement behavior change programs in schools and communities as well as water, sanitation, and hygiene (WASH) programs.

Environmental Improvement (E)

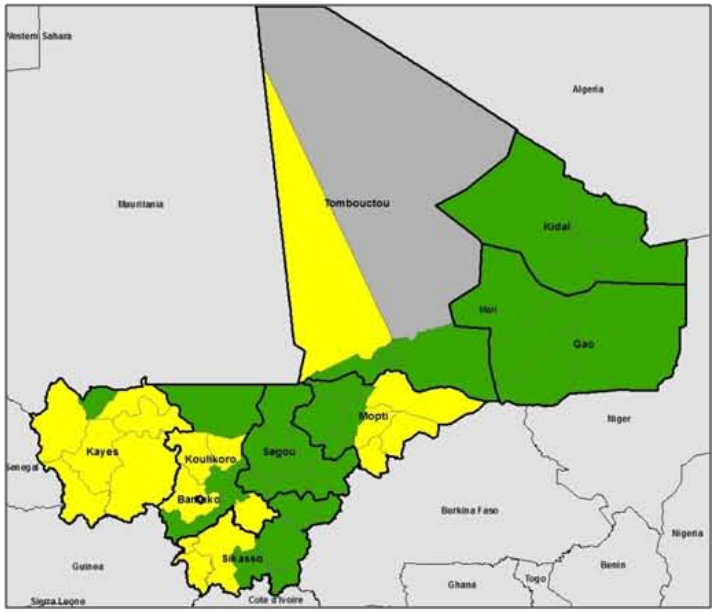
- 15,000 latrines are targeted for construction, all of which will be supported by the Carter Center

[10] "Auto sorties" are surgeries conducted by surgeons who travel from Bamako by car to join surgeons from rural posts.

[11] "Moto sorties" are surgeries conducted by individual surgeons using motorcycles.

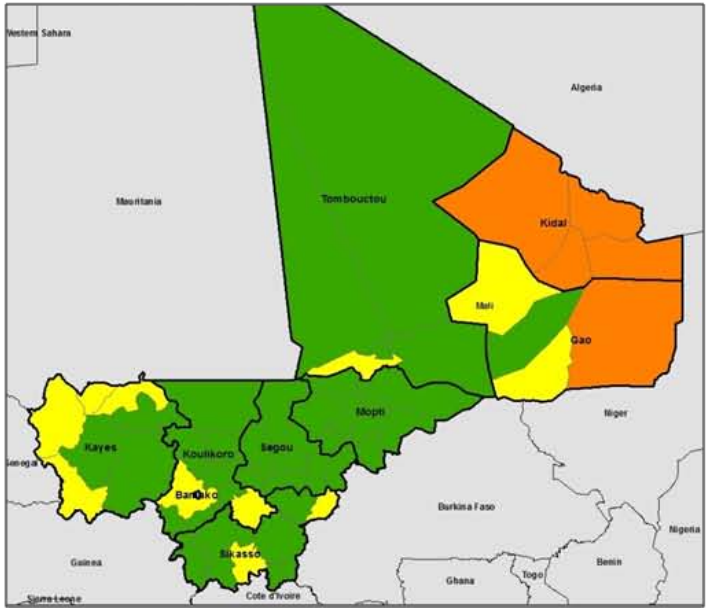
Baseline TT Prevalence among Women ages 14 and above, 1996

TT Prevalence among Adults ages 16 and above, 2013



Baseline TF Prevalence among Children ages 10 and below, 1996

TF Prevalence among Children ages 1-9, 2013



SAFE in Niger

Presented by Dr. Kadri Boubacar, Deputy Coordinator, Federal Ministry of Health, Niger

Background

The National Prevention of Blindness Program (PNLC) was established in 1987 following national surveys showing a prevalence of blindness of 2.2%, with one-quarter due to trachoma. Regional baseline surveys conducted from 1997 to 1999 found that 44% of children ages one to nine had active trachoma (TF and/or TI) and 1.7% of women over 15 years of age had trichiasis. In 1999, the PNLC formed the National Trachoma Task Force and, beginning in 2001, prevalence surveys were conducted at the district level. Currently, trachoma is part of the Department of Neglected Tropical Diseases (NTDs) and is not considered a high priority disease. Though trachoma is integrated into the NTD department, trachoma partners organize trachoma specific coordination and annual review meetings at the regional level. The program implements all components of the SAFE strategy where warranted.

In 2013, the Minister of Health made a statement of appreciation for the work of the Ministry of Health (MoH) trachoma coordinators and the two main partners, The Carter Center (TCC) and Helen Keller International (HKI). These statements were made during a trachomatous trichiasis (TT) surgical outreach week in March 2013.

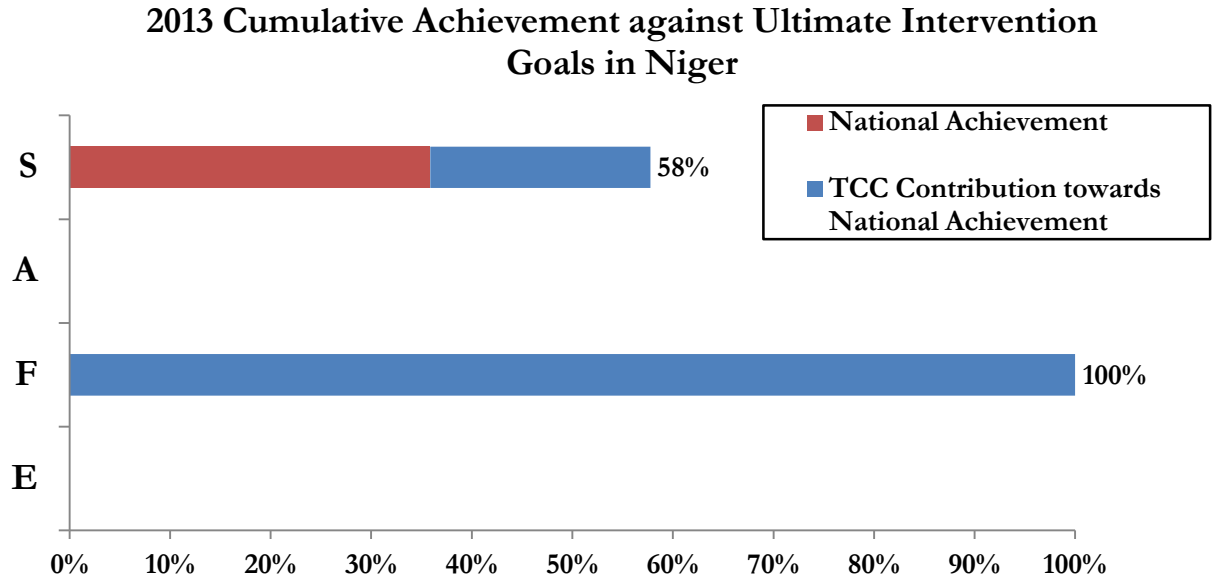
Timeline of Events

1987: National Prevention of Blindness Program started
1997-1999: Baseline surveys conducted at regional level
2000: TCC begins support to the program
2001: District level baseline surveys started
2001: SAFE strategy implementation begins
2006: Impact surveys
2007: NTD Program launched
2010 and 2012: Impact surveys
2015: Target date for the elimination of blinding trachoma

Table 1. Program Achievements in 2013

Indicator	Ultimate Intervention Goals (UIG)	National Program		Carter Center-Supported	
		Target	Achieved (%)	Target	Achieved (%)
Persons operated	25,995	15,000	11,228 (75%)	11,000	9,134 (83%)
Surgeons trained	N/A	20	10 (50%)	20	10 (50%)
Doses azithromycin distributed during MDA	8,319,987	8,319,387	On-going[12]	N/A[13]	N/A
Doses tetracycline distributed during MDA		170,000	N/R[14]	170,000	170,000 (100%)
Villages with health education	634	634	634 (100%)	634	634 (100%)
Household latrines built	N/R	15,000	11,019 (73%)	15,000	11,019 (73%)

Figure 1.[15]



[12] The 2013 MDA was ongoing in February 2014 and results were unavailable at the time of the presentation.
[13] N/A = Not applicable, the program did not support specified intervention in 2013.
[14] N/R = Not reported by the program
[15] See Appendix V for UIG definitions. The distribution of azithromycin was not available to report at the Program Review and therefore not included in this figure. Additionally, the UIG for household latrines built was not reported and therefore it was not possible to calculate the cumulative achievement against the UIG.

Surgery (S)

Of the 35 mapped districts, 15 have a TT prevalence greater than 1% in adults ages 15 years and older, a 57% decrease from baseline surveys results, where all 35 of these districts had a TT prevalence of 1% or more. In 2013, the program completed 11,228 surgeries, 9,134 (81%) of which were supported by TCC. The training for all 10 surgeons trained in 2013 was supported by TCC. There are an estimated 25,995 cases remaining to be operated, with the majority of cases concentrated in the Maradi and Zinder regions. At the current rate of surgeries completed per year, it will take over two years to clear the surgical backlog.

An analysis of TT surgeries was conducted in 2013 in order to evaluate their quality. Of the 303 cases analyzed, 262 cases (86.5%) were considered successful and 41 cases (13.5%) required repeat surgery. This showed that the number of recurrent cases drastically decreased in the last few years from 33.3% in 2011 to 13.5% in 2013.[16]

Antibiotic Therapy (A)

As of 2013, 15 of 35 mapped districts had a prevalence of trachomatous inflammation-follicular (TF) ≥ 10% among children ages one to nine years; one has TF prevalence between 5-9%; and 14 had prevalence below 5%. The planned 2013 mass drug administration (MDA) activities were delayed until early 2014 due to a delay in funding.

Facial Cleanliness (F)

All of the 634 villages targeted for health education were reached with Carter Center support.

Environmental Improvement (E)

Out of the 15,000 latrines targeted for construction, 11,019 (73%) were completed, all with Carter Center support.

Programmatic Challenges

Challenges in the trachoma program involve difficulties reaching TT patients in remote areas and managing care for patients who refuse surgery. The program has expressed that it needs more financial, logistical, and material support for program activities.

Status of 2013 Program Review Meeting Recommendations

Recommendation 1: Investigate of trichiasis surgery services along the border with Nigeria.

This recommendation was not completed; however, the program states that TT patients treated along the border are recorded and that though all the statistics have not yet been officially compiled, it is thought that approximately 5% of patients along the border come from Nigeria.

[16] The current acceptable rate of recurrence is 10% so additional steps are planned to improve patient outcomes.

Targets for 2014 and Plans to Meet Targets

Surgery (S)

- Operate on 15,000 trichiasis patients, 11,000 with Carter Center support
- Train 40 surgeons, 25 with Carter Center support

In order to complete the TT backlog, the program plans to continue screening for patients in endemic areas and providing surgeries in health centers. Data collection will be enhanced to collect more information about patients including how to contact them. Lastly, the program will increase logistical and financial support, and the provision of medicine, surgical consumables and trichiasis surgical kits to those conducting surgeries.

Antibiotic Therapy (A)

- Distribute 4,682,611 doses of azithromycin
- Distribute 170,000 doses of tetracycline, all with Carter Center support

Of the 18 districts warranting MDA, seven require impact assessments in 2014 to determine whether additional MDA is warranted; seven require one additional round of MDA; three require two additional rounds; and one requires three or more additional rounds before impact assessments are necessary.

Facial Cleanliness (F)

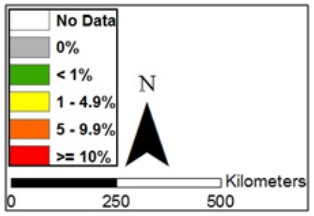
- Conduct health education in 634 villages, 534 with Carter Center support

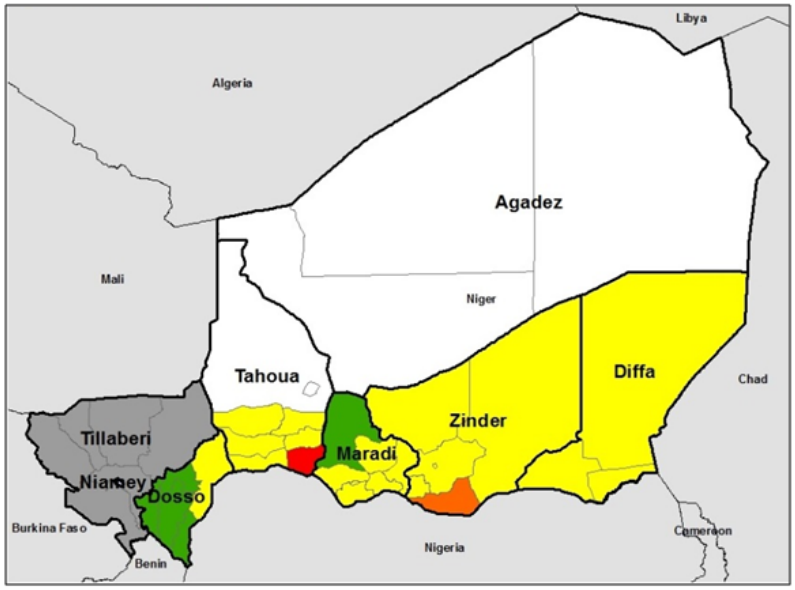
Environmental Improvement (E)

- Construct 15,000 latrines, all with Carter Center support

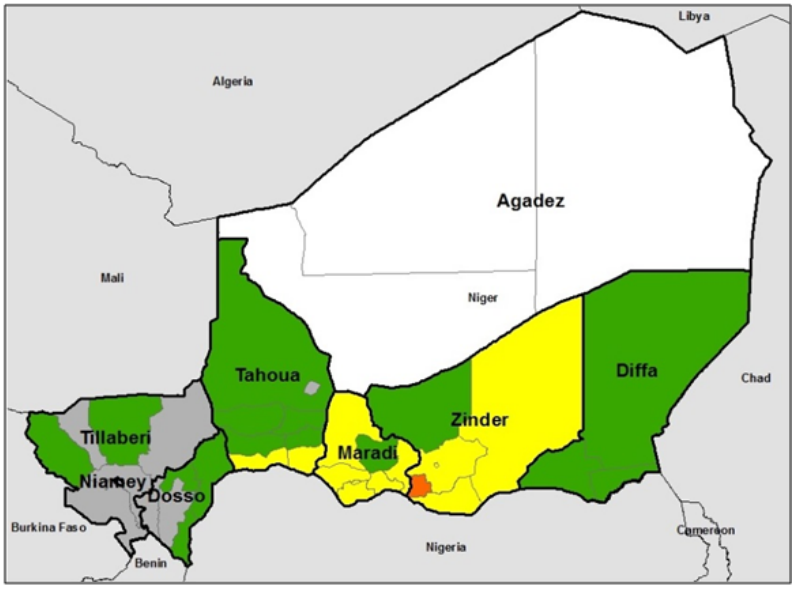
Maps of Niger

Baseline TT Prevalence, 2000-2007

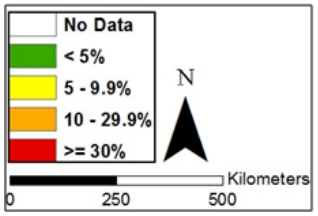


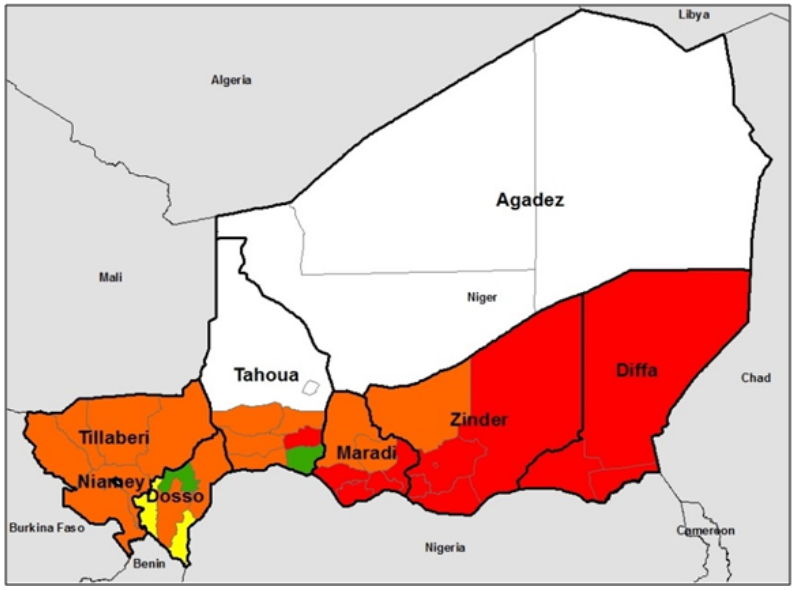


TT Prevalence among Adults ages 16 and above, 2013

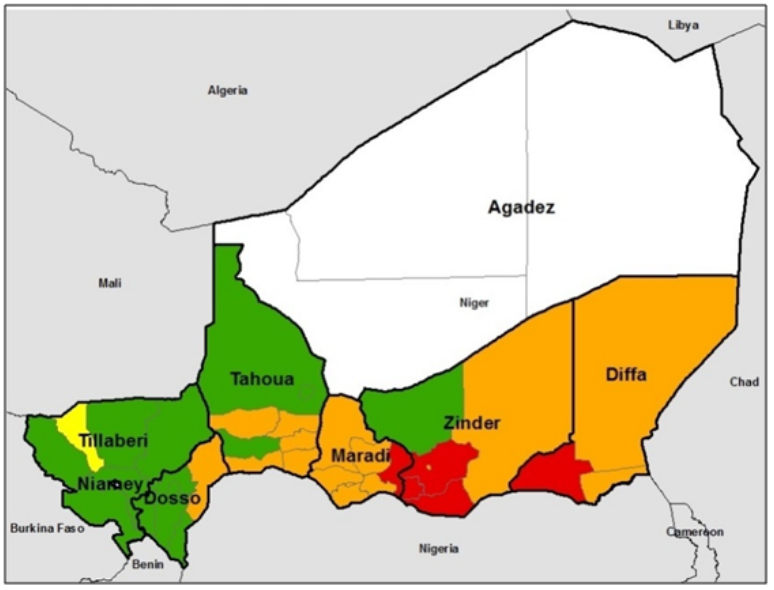


Baseline TF Prevalence, 2000-2007





TF Prevalence among Children ages 1-9, 2013



SAFE in Nigeria

Presented by Dr. Uwaezuoke Onyebuchi, National Neglected Tropical Diseases Coordinator, Federal Ministry of Health, Nigeria

Background

The Nigeria Blindness and Low Vision Survey of 2005-2007 noted that the overall prevalence of blindness in Nigeria was 0.78% and that the prevalence varied across the different geopolitical zones of the country (range: 2.8-6.1%). The survey identified cataracts as the main cause of avoidable blindness in Nigeria, followed by trachoma. Trachoma is among the top health priorities in the country and part of the Neglected Tropical Diseases (NTDs) division of the Federal Ministry of Health.

Though eye care activities have been conducted in Nigeria since 1991 under the National Program for Prevention of Blindness, in 2001 the National Trachoma Control Program was established in order to better focus on trachoma control activities. Regular coordination meetings are held for government and partners in trachoma control. With the support of the United States Agency for International Development (USAID) ENVISION project led by RTI International, the meeting for the development of a trachoma action plan (TAP) was held in Abuja from 24-28 June 2013. The Nigerian TAP sets out the implementation details of the SAFE strategy in Nigeria with the goal of eliminating blinding trachoma by 2018.

In 2013, the Global Trachoma Mapping Project (GTMP) and USAID's ENVISION project led by RTI International supported household surveys to gather new data and update previous figures on active and blinding trachoma and access to sanitation and safe water. By the end of 2014, the mapping project is expected to have mapped all local government areas (LGAs) suspected of being endemic for trachoma in the country. The Carter Center (TCC) assisted with the mapping in five states in the Southeast. Currently, only Adamawa and Borno states remain to be mapped.

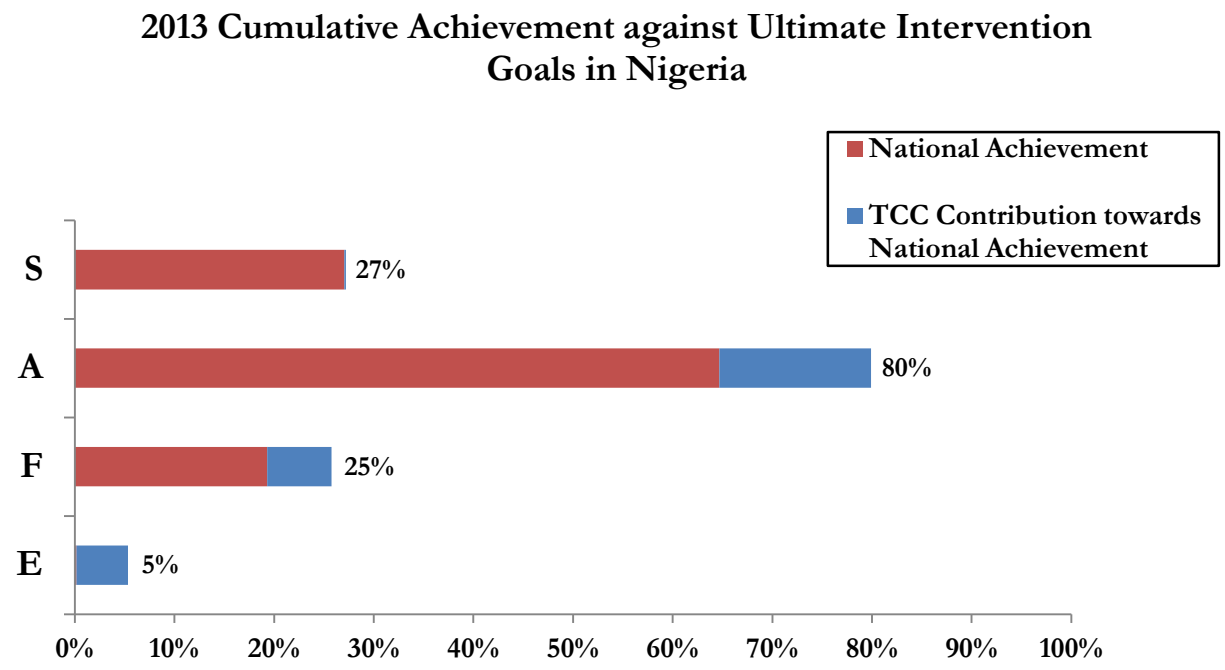
Timeline of Events

1991: National Program for Prevention of Blindness launched
2000-2013: Baseline mapping (on-going)
2001: National Trachoma Control Program began and Trachoma Task Force formed
2003: TCC-assisted program began
2005-2007: National blindness survey conducted
2010: Mass drug administration (MDA) for trachoma control with Pfizer-donated Zithromax® launched
2013: TAP established
2014: Impact assessments in Plateau and Nasarawa States scheduled
2018: Target date for the elimination of blinding trachoma (in mapped areas)

Table 1. Program Achievements in 2013

Indicator	Ultimate Intervention Goal (UIG)	National Program		Carter Center-Supported	
		Target	Achieved (%)	Target	Achieved (%)
Persons operated	40,700	18,620	14,321 (77%)	250	120 (48%)
Surgeons trained	N/A	69	22 (32%)	N/A[17]	N/A
Doses azithromycin distributed during MDA	5,419,781	6,062,807	5,820,080 (96%)	1,083,254	1,107,708 (102%)
Doses tetracycline distributed during MDA		98,214	96,377 (98%)	21,665	21,173 (98%)
Villages with health education	1,404,378	N/R[18]	3,410	855	855 (100%)
Household latrines built	587,038	N/R	0	N/A	N/A

Figure 1.[19]



[17] N/A: Not applicable, the program does not support specified intervention
[18] N/R: Not reported by the program
[19] See Appendix V for UIG definitions

Surgery (S)

Of 332 mapped LGAs, 173 LGAs have a trachomatous trichiasis (TT) prevalence greater than 1% in adults ages 15 years and older. There are currently 140 trained surgeons in the country. The program completed 18,620 surgeries in 2013, a 37% increase from 2012 (13,556). Of these surgeries, TCC supported 120 in Plateau state.

Antibiotic Therapy (A)

Out of 332 mapped LGAs, 68 have trachomatous inflammation-follicular (TF) ≥ 10% among children ages one to nine years; 56 have TF prevalence between 5 and 9%; and 208 were found to be non-endemic (TF< 5%). MDA began in Nigeria in 2010, though challenges in clearing the Zithromax® shipment in 2012 resulted in a delay of the distribution scheduled for 2012 until the first quarter of 2013.

In 2013, Nigeria met 96% of its target, with 5,820,080 doses of azithromycin distributed during MDA. Of this amount, TCC distributed 1,107,708 doses (19%). Of the 41 districts conducting MDA in 2013, the majority (34) reported a greater than 80% coverage rate; four reported less than 60% coverage. However, these results were not verified by a coverage survey.

Facial Cleanliness (F)

There is currently no national target for villages receiving health education; however, 3,410 villages were reported to have received health education in 2013, with 855 of these villages reached through initiatives supported by TCC.

Environmental Improvement (E)

There are currently no trachoma partners that specifically fund latrine construction; however, Nigeria's Environmental Sustainability Millennium Development Goal has supported access to improved sanitation and safe water since 2005, reporting 51.6% national access to sanitation and 58.9% access to safe water. This commitment to improved sanitation is further reinforced a monthly environmental sanitation exercise in various states and communities.

Programmatic Challenges

Challenges in implementing the Trachoma Control Program have been identified and plans have been developed to overcome them. There have been serious concerns about the Zithromax® supply chain integrity in Nigeria. In order to address this concern, pipeline integrity for Zithromax® was discussed at a stakeholders meeting in January 2014. Efforts to scale up the S, F, and E components of the SAFE strategy are much further behind then the A component; therefore, there have been increased efforts to encourage intersectional collaboration and linkages with relevant agencies. The TAP has prioritized scaling up all SAFE components in endemic LGAs. Lastly, though Nigeria has set 2018 as its elimination date, some LGAs will not be eligible for impact assessments until 2019 after completing the required number of rounds of MDA. To address this issue, the country plans to have all MDA and TT surgeries completed by the end of 2018 and to have impact surveys conducted in 2019 in order to confirm the elimination of trachoma.

Status of 2013 Program Review Meeting Recommendations

Recommendation 1: The National Program should present findings from the mapping work at the 2014 review meeting.

Completed.

Recommendation 2: The program should generate a TAP to achieve all of the SAFE interventions.

Completed June 2013.

Recommendation 3: The program should present progress on findings from the implementation of the school curriculum and progress on financing from the World Bank for TT surgery service provision at the 2014 review.

Not completed.

Recommendation 4: Cross-border collaboration with Niger.

Not completed.

Targets for 2014 and Plans to Meet Targets

Surgery (S)

- Operate on 40,700 trichiasis patients, 500 with Carter Center support
- Train 47 surgeons

In order to meet the surgical ultimate intervention goal by the 2018 target date, Nigeria has standardized the training curriculum to ensure that all TT surgeons have demonstrated an accepted level of surgical competency. A certification process has been implemented to motivate more ophthalmic nurses to be trained. Furthermore, in order to understand more clearly the burden of TT, a new surgical ultimate intervention goal will be established as trachoma mapping is completed and new data become available. Based on current prevalence information, Nigeria has identified that at least 207 more surgeons need to be trained. Additionally, community health workers will be trained and used in community mobilization and for referring patients to surgical camps.

The number of surgical camps will be increased, though additional financial support is needed by the National Program for successful implementation. In addition to the financial need, the national NTD program and the World Health Organization (WHO) have been tasked with advocating on behalf of the Trachoma Control Program in order to ensure commitment from all levels of government, donors, UN agencies, non-governmental development organizations, and the private sector. Partners have been requested to assist in organizing and facilitating review meetings at all levels in order to monitor progress of the program against the trachoma elimination plan.

Antibiotic Therapy (A)

- Distribute 5,313,511 doses of azithromycin
- Distribute 106,270 doses of tetracycline

Of the 68 districts warranting MDA, two require impact assessments in 2014 before further MDA can be implemented; four require one additional round of MDA; six require two additional rounds; and 58 require three or more additional rounds before impact assessments are necessary. A stakeholders meeting to strengthen the Zithromax® supply chain in Nigeria was held in January 2014 with assistance from the International Trachoma Initiative. During this meeting, the protocol for MDA for trachoma control in Nigeria was shared with stakeholders. The group developed an action plan to ensure the integrity of the Zithromax® supply chain in Nigeria to ensure that there would not be any future delays in receiving drugs and hence MDAs can be completed as scheduled.

Facial Cleanliness (F)

- Conduct health education in 1,403,523 villages, 855 with Carter Center support

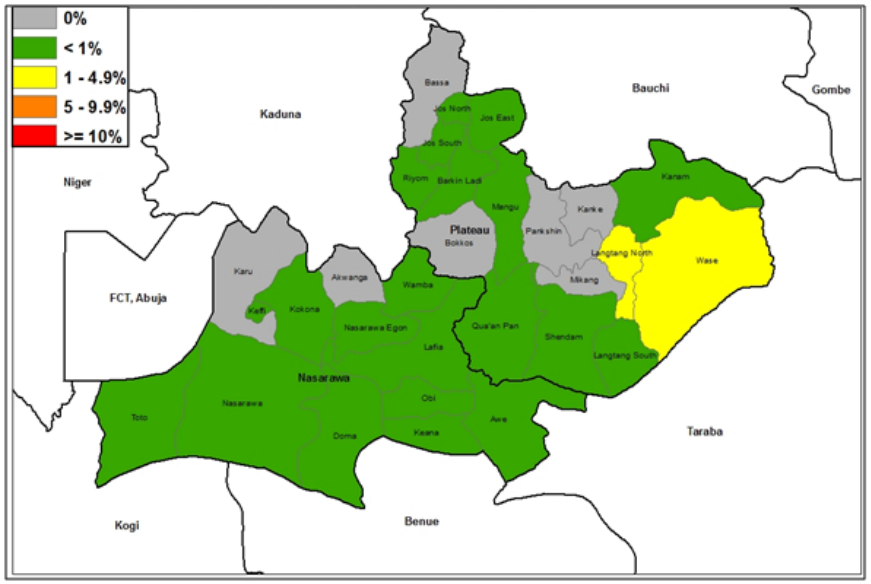
The national program is leveraging the NTD/schistosomiasis training manuals to implement behavior change programs in schools and communities as well as water, sanitation, and hygiene programs.

Environmental Improvement (E)

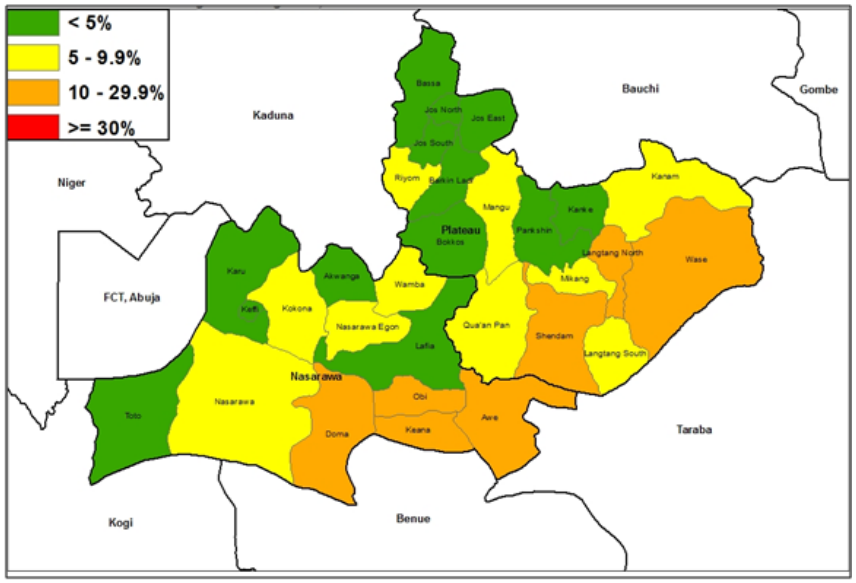
- Promote latrine construction in endemic communities

The current trachoma mapping initiatives in Nigeria include latrine and safe water access indicators in order to ascertain what proportion of the population in the LGAs endemic for trachoma have access to these environmental improvements.

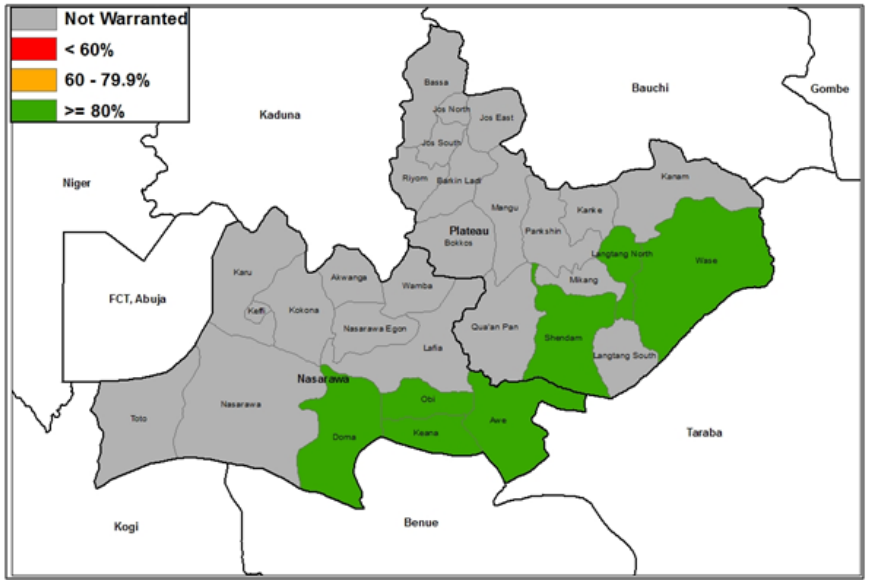
Baseline TT Prevalence among Adults ages 15 and above, 2007



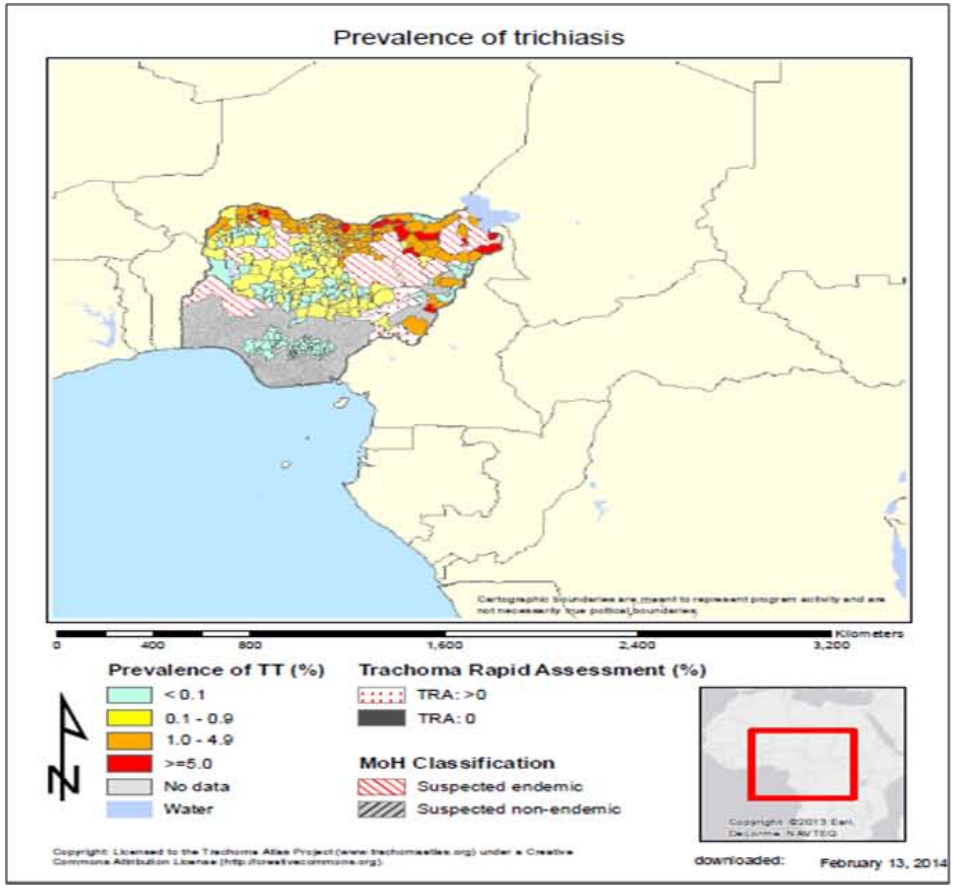
Baseline TF Prevalence among Children ages 1-9, 2007

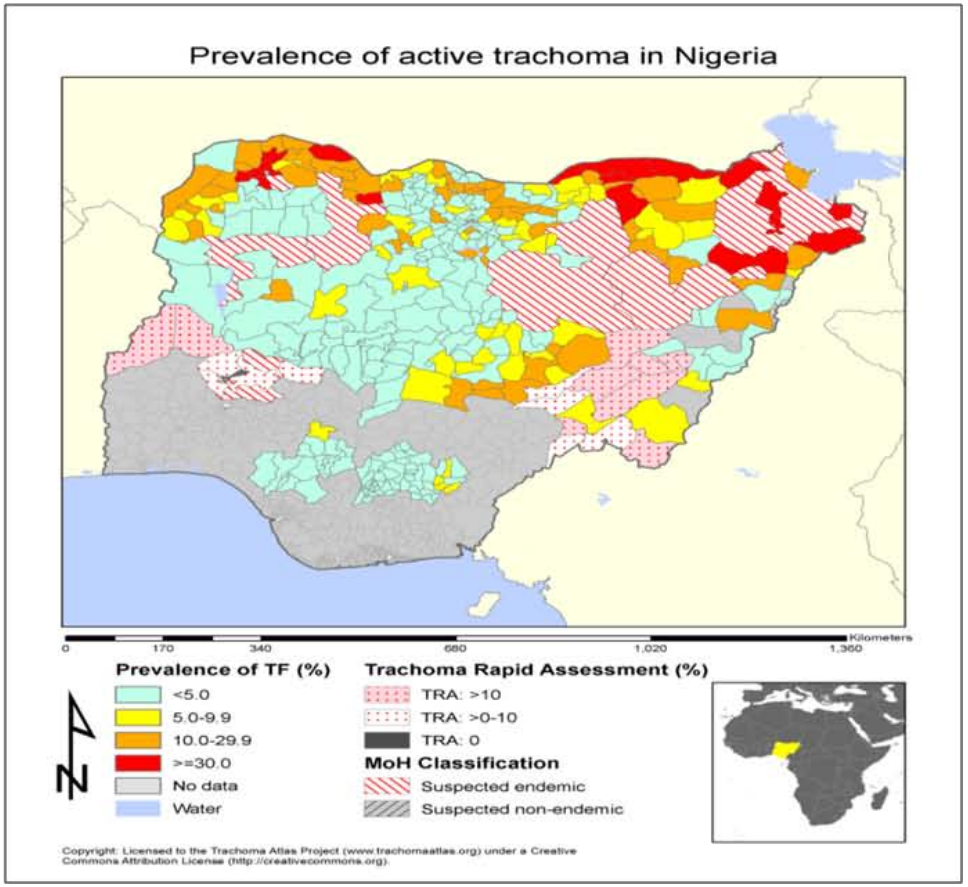


Reported MDA Coverage, 2013



Maps of Nigeria





SAFE in South Sudan

Presented by Ms. Angelia Sanders, Technical Advisor, The Carter Center South Sudan

Background

Prevalence surveys conducted between 2001 and 2006 showed trachomatous inflammation-follicular (TF) prevalence as high as 77.2% among children one to nine years old and trachomatous trichiasis (TT) prevalence as high as 15.1% among adults ages 15 years and older in some districts in the Greater Upper Nile region. Despite the high prevalence, trachoma is not currently a top priority for the government. The trachoma program was previously under the Department of Eye Care Services; however, in late 2013 it was relocated to the Department of Neglected Tropical Diseases. SAFE activities have not been conducted in all the districts due to a lack of resources. In those districts that have received SAFE interventions, most activities focus on the S and A components.

The trachoma action plan (TAP) was completed in 2012 and the Trachoma Control Program held an annual review meeting in December 2013. Outcomes from the meeting included: Trachoma Taskforce finalizing a monthly national trachoma reporting system and form; the Trachoma Control Program to request the State Ministry of Health in Upper Nile and Eastern Equatoria states to appoint a Trachoma State Field Coordinator; and partner non-governmental organizations (NGOs) to host ophthalmic clinical officer (OCO) students in the field to facilitate TT surgical practice.

The taskforce reached an agreement as to which districts would be mapped as part of the Global Trachoma Mapping Project (GTMP) and to begin mapping in early 2014. Additionally, The Carter Center (TCC) planned to conduct impact assessments in seven districts in 2014. All partners had increased their surgical goals for 2014 and more partners were planning on becoming involved in conducting mass drug administration (MDA). These plans, however, were suspended when fighting erupted in mid-December 2013 between government troops and rebel factions. Since the conflict began, more than 800,000 people have fled their homes, many of which were located in districts supported by the Trachoma Control Program. It is unknown when implementing partners will resume their activities.

Timeline of Events

1999-2010: Baseline mapping
2001: Trachoma control activities began
2005: Comprehensive Peace Agreement Signed
2007: Ministry of Health Government of Southern Sudan Trachoma Control Program established
2008: Trachoma Taskforce established
2011: South Sudan gains independence
2012: TAP finalized
2013-2014: Fighting in parts of the country causes displacement of population
2020: Target year for elimination

Table 1. Program Achievements in 2013

Indicator	National Program		Carter Center-Supported	
	Target	Achieved (%)	Target	Achieved (%)
Persons Operated	**3,400**	**3,617 (106%)**	**1,000**	**1,430 (143%)**
Surgeons trained	**15**	**13 (87%)**	**5**	**3 (60%)**
Doses azithromycin distributed during MDA	**468,530**	**425,540 (91%)**	**338,530**	**283,652 (84%)**
Doses tetracycline distributed during MDA	**47,470**	**10,470 (22%)**	**10,470**	**10,344 (99%)**
Villages with health education	**63**	**117 (185%)**	**20**	**117 (585%)**
Household latrines built	**>10**	**207 (207%)**	**10**	**102 (1,020%)**

Surgery (S)

All of the 28 mapped districts have a TT prevalence greater than 1% in adults ages 15 years and older. The program completed 3,617 surgeries in 2013. Of these surgeries, TCC supported 1,430. Of the 13 surgeons trained in 2013, three were trained by TCC and five were hosted in the field for one week at Carter Center-supported surgical camps in order to give the new surgeons experience working in rural conditions. At the current rate of annual surgeries, it is expected to take more than 32 years before South Sudan can achieve its surgical ultimate intervention goal (UIG).

Antibiotic Therapy (A)

Out of 28 mapped districts, 23 have a TF prevalence ≥ 10% among children ages one to nine years; one has TF prevalence between 5-9%; and four were found to be non-endemic (TF< 5%). In 2013, South Sudan met 91% of its target, with 425,540 doses of azithromycin distributed during MDA. Of this amount, TCC distributed 283,652 doses (67%). Of the 10 districts conducting MDA in 2013, five reported a greater than 80% coverage rate and only one reported less than a 60% coverage rate, though these were based on administrative reports and not validated coverage surveys. MDA was not completed in the district where coverage was less than 60% due to insecurity. No coverage surveys were carried out following distributions in 2013.

Facial Cleanliness (F)

Over 117 villages received health education, all with Carter Center support. Trachoma specific and other sanitation-related messages were incorporated into the Skills for Life training manual developed by UNICEF and UNESCO under the Ministry of Education. This manual will be used in conflict-affected regions and will also be the basis of the future primary school curriculum currently in development.

Environmental Improvement (E)

Latrine construction is promoted as part of health education messaging. This resulted in 207 latrines built, 102 with Carter Center support.

Programmatic Challenges:

There are numerous challenges in South Sudan. First and foremost is insecurity, making it difficult for implementing partners to reach certain parts of the country, particularly in Jonglei and Upper Nile states. The recent violence caused a mass displacement of people, a large percentage of which lived in highly endemic areas. Many of these people have become internally displaced in other parts of South Sudan or have become refugees in the neighboring countries of Ethiopia, Kenya, Sudan, and Uganda. There is a lack of government personnel assigned to trachoma-related activities and poor coordination with the water, sanitation, and hygiene sector. There are a limited number of TT surgeons in the country and a lack of surgical kits for those surgeons who know how to perform the surgeries and are assigned to a government clinic/hospital.

Currently, there is no standardized data collection system or an archive of past activities. Limited baseline data and changes in district names and boundaries since South Sudan became independent in 2011 render it difficult to adequately measure progress in a district against previous surveys. Additionally, it is difficult to measure the National Program's progress towards achieving its UIGs since implementing partners often work in districts that have and have not received baseline surveys.

Status of 2013 Program Review Meeting Recommendations:

Recommendation 1: When planning for global trachoma mapping project surveys, the program should consider aggregating districts in high prevalence areas (East of the Nile) to form "super districts," but conduct district level surveys in areas where implementation has been ongoing.

The program developed a plan for mapping Upper Nile, Jonglei, Lakes, Eastern Equatoria and Central Equatoria states; however, this plan has been postponed due to insecurity.

Recommendation 2: The program should fix dates for the quarterly meetings for the National Trachoma Task Force and the annual review meeting at the beginning of the year.

Quarterly meetings were held throughout 2013 and an annual review meeting was held in December 2013. No dates have been set for 2014.

Recommendation 3: Formalize the relationship between the national program and the Juba Teaching Hospital for the training of TT surgeons, and provide on the job training opportunities in field-based trichiasis training camps.

Completed. TCC hosted five of the ten ophthalmic clinical officer (OCO) students in the field in order to provide TT surgical experience. The other five are scheduled for 2014.

Targets for 2014 and Plans to Meet Targets:

Due to the uncertainty of the political and security climate and the mass population displacement in areas where the trachoma program was implementing SAFE activities, the program has not established targets for 2014. Information is given below on how the program plans to tackle each component of SAFE in order to reach elimination by 2020.

Surgery (S)

It was identified that the number of surgeries completed each year must be dramatically increased. The Trachoma Control Program and the Department of Eye Care Services were requested to lobby/advocate for the inclusion of trachoma management into the training curriculum for all health personnel, including the training of TT surgical procedures to OCOs and nursing students. The program is requesting additional financial support for the training of more OCOs and ophthalmic nurses. The provision of surgical kits for graduating OCOs and nurses is also needed in order to ensure that they have the capacity to perform the surgeries in their assigned duty station. Implementing partners that conduct TT surgeries are now requested to host OCO students in the field for one to two weeks in order to facilitate TT surgical practice.

Antibiotic Therapy (A)

Moving forward, there are 12 districts requiring impact assessments in 2014 before further MDA can be implemented; however, two of these did not have a baseline survey conducted before five rounds of MDA were carried out. There is one district that requires three or more rounds before an impact assessment should be conducted. There are 12 districts previously surveyed that require MDA but have not yet received any rounds due to either a lack of funds or an implementing partner. It is expected that the trachoma mapping surveys will reveal an even greater number of districts needing MDA, thereby increasing the need for more MDA implementing partners in the country. The Carter Center does not currently have plans to support MDA in 2014, due to insecurity, but is willing to resume activities once the security situation in stable.

Facial Cleanliness (F)

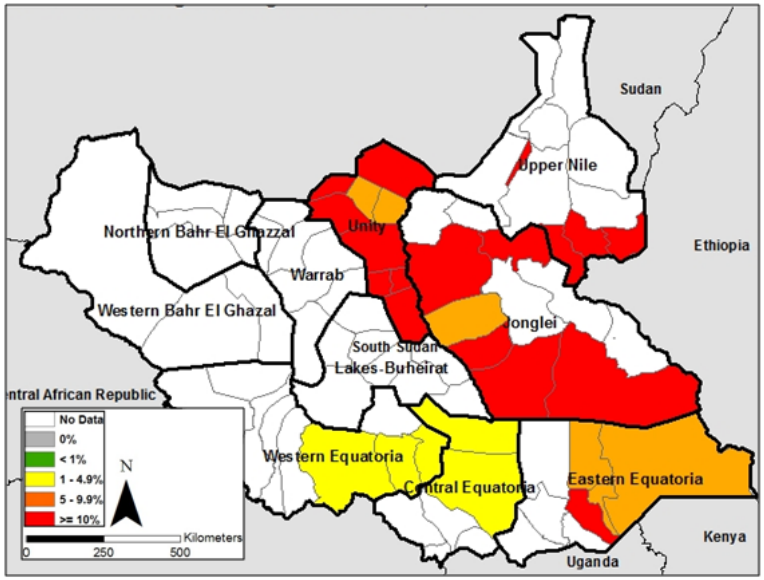
Implementing partners will continue to carry out health education in communities where they work. The program also will work with the Ministry of Education to ensure that trachoma and related sanitation messages are included in the primary school curriculum.

Environmental Improvement (E)

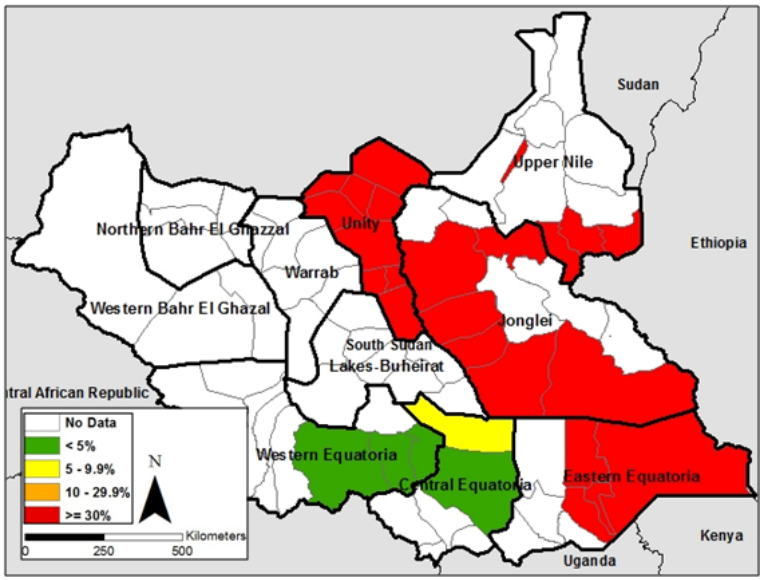
The program will continue to promote latrine construction in endemic communities and throughout South Sudan.

Maps of South Sudan

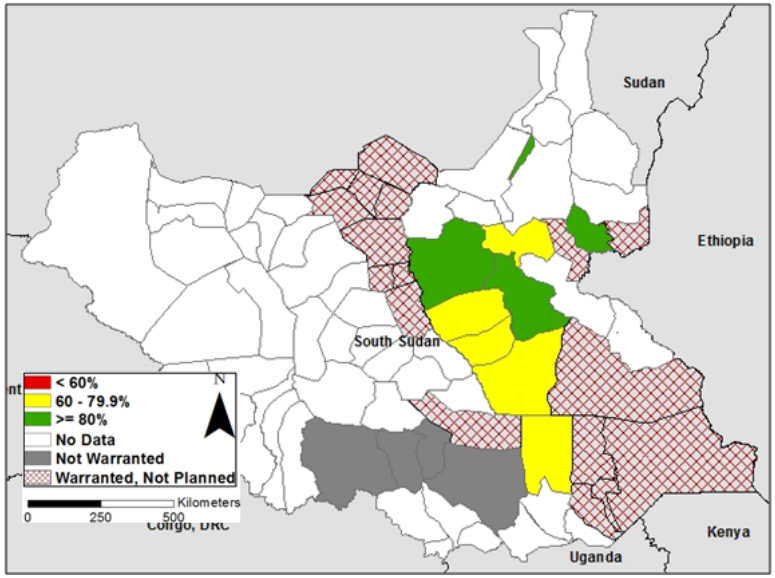
TT Prevalence among Adults ages 15 and above, 2013



TF Prevalence among Children ages 1-9, 2013



Reported MDA Coverage, 2013



SAFE in Sudan

Dr. Kamal Hashim, National Neglected Tropical Diseases Coordinator, National Program for Prevention of Blindness, Federal Ministry of Health, Sudan

Background

The Federal Ministry of Health (FMoH) has been working towards trachoma control since 1962, when trachoma was incorporated into the National Program for Prevention of Blindness (NPPB). The Academy of Medical Sciences and Technology (AMST) took over the leadership of the program in the 1990s as contractors on behalf of the FMoH. In 2005, the FMoH relocated the Trachoma Control Program to the NPPB. The elimination of blinding trachoma is one of the FMoH's priorities and government funds are allocated to support the program. In 2012, the government allocated 1.5 million USD for five years; with 162,764 USD paid in 2012 and 75,000 paid in 2013. There is a strong coordination mechanism between the government, represented by the FMoH and Federal Ministry of Finance, and implementing partners such as The Carter Center (TCC) and Sightsavers.

National prevalence mapping began in 2006 and finished in 2010. Mapping has not been done in Darfur due to insecurity. The full SAFE strategy is implemented in seven out of 13 targeted districts. S, A & F components are supported by TCC, Sightsavers, and the FMoH. The E component is implemented by the FMoH and State Ministries of Health (SMoH) and supported by UNICEF and other organizations. Though TCC does not directly support E activities, it provides advocacy for this component.

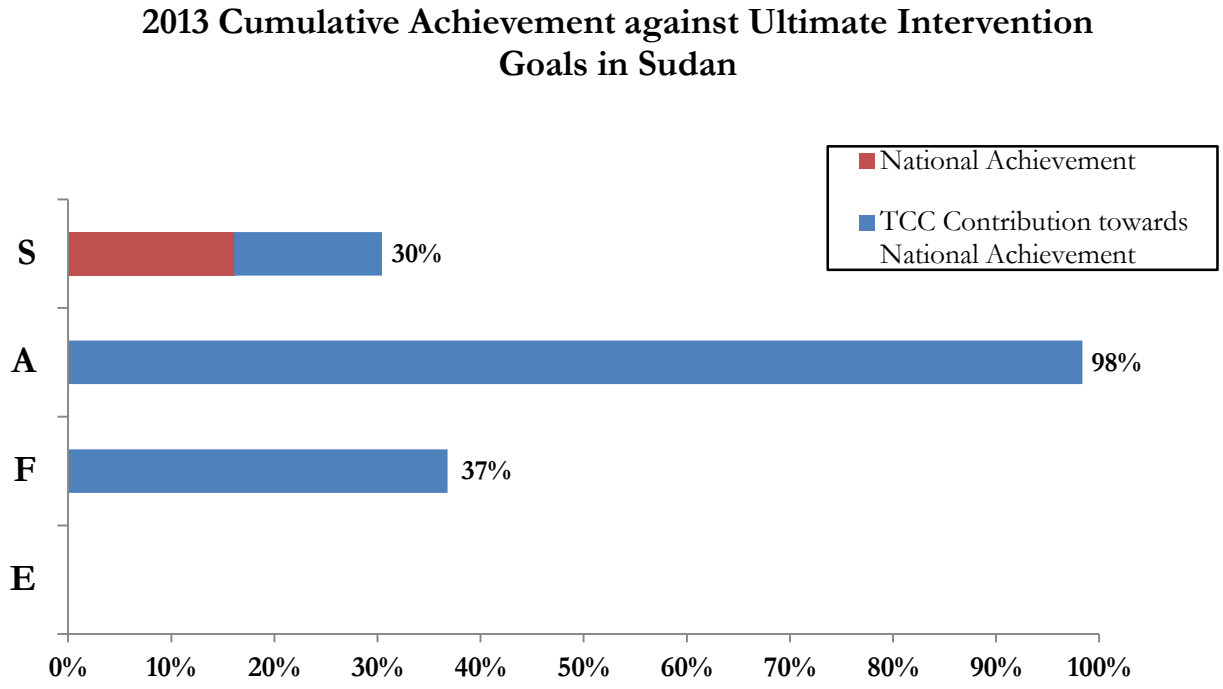
Timeline of Events

1999: TCC began supporting the Trachoma Control Program
2000: Zithromax® donation by Pfizer Inc began
2005: National Trachoma Program moved to the FMoH
2005-2010: Baseline prevalence surveys conducted (except for Darfur states)
2006: Trachomatous trichiasis (TT) surgery training manual locally adapted in Arabic
2010: Impact surveys conducted in Northern and Blue Nile states
2013: Impact surveys conducted in Red Sea and Gedarif states
2013: Sightsavers began supporting the Trachoma Control Program
2015: Target date for elimination of blinding trachoma (with exception of Darfur states)

Table 1. Program Achievements in 2013

Indicator	Ultimate Intervention Goals (UIG)	National Program		Carter Center-Supported	
		Target	Achieved	Target	Achieved
Persons operated	54,575	5,000	2,757 (55%)	5,000	595 (11.9%)
Surgeons trained	N/A	30	30 (100%)	N/A[20]	N/A
Doses azithromycin distributed during MDA	6,355,067	1,330,057	210,912 (16%)	1,330,057	210,912 (16%)
Doses tetracycline distributed during MDA		31,601	3,998 (13%)	31,601	3,998 (13%)
Villages with health education	1,101	535	123 (22%)	535	123 (22%)
Household latrines built	N/A	N/R[21]	N/R	N/A	N/A

Figure 1.[22]



[20] N/A: Not applicable, the program does not support specified intervention
[21] N/R: Not reported by the program
[22] See Appendix V for UIG definitions. Latrine construction is not supported by TCC and therefore not reported in this figure.

Surgery (S)

Of 88 mapped districts (all districts excluding those in Darfur), 19 have a TT prevalence greater than 1% in adults ages 15 years and older. The National Program completed 2,757 surgeries in 2013, meeting 11.9% of its target. TCC supported 595 of the total completed surgeries. The National Program successfully met its target of training 30 new surgeons. Based on the current rate of surgeries, it is expected to take another nine years before the estimated backlog of 30,408 patients are operated. Surgeries are currently provided through static facilities, mobile outreaches, and fixed site campaigns within every locality, though the majority of surgeries are conducted through the Khartoum Eye Teaching Hospital. The center is responsible for training resident doctors in TT surgery as well as other ophthalmic surgical interventions. There is a 10 USD cost recovery fee paid by the patient, though TCC will pay this fee if the patient is unable to pay. Surgical residents currently are required to perform 10 TT surgeries to be eligible to sit for their final exam; however, the board of examinations will be requested to increase this requirement to 100 TT surgeries.

Antibiotic Therapy (A)

Out of 88 mapped districts, three have trachomatous inflammation-follicular (TF) ≥ 10% among children ages one to nine years; eight have TF prevalence between 5-9%; and 77 were found to be non-endemic (TF< 5%). In 2013, Sudan met 16% of its target and distributed 210,912 doses of azithromycin, all of which were distributed with TCC support. This distribution was conducted in one district (East El Galabat locality, Gedarif state), reaching a greater than 80% reported coverage rate based on administrative reports, though this was not verified by a coverage survey. Due to insecurity in 2012 and 2013, mass drug administration (MDA) was not conducted in the other two districts, Geissam amd Kurmuk in Blue Nile state, where TF ≥10%. Additionally, the 2013 MDA was scheduled to take place in five localities where baseline TF prevalence was between 5-9%, however, distribution was delayed until 2014 due to Zithromax® shipment clearing problems.

Facial Cleanliness (F)

In 2013, with TCC support, a total of 123 villages were reached with health education, out of the target 535 villages. The national ultimate intervention goal (UIG) for facial cleanliness states that at least 80% of children less than nine years of age in endemic communities will have clean faces. Impact surveys in Baw and Dongola districts showed that the proportion of children ages one to nine with a clean face had increased to 86% of children over the 74% found during the baseline survey.

In order to improve health education, in 2013, the National Program trained 59 district health educators on community participation for trachoma control activities. Progress has been made toward incorporating trachoma messages into basic and secondary school curricula. The program produced new health education materials such as posters, stickers, caps, t-shirts and 2014/2015 calendars. The program conducted multiple radio and television broadcasts. Lastly, in order to strengthen relationships with the water, sanitation, and hygiene sector (WASH) a meeting was held with UNICEF to encourage the prioritizing of trachoma-endemic areas needing WASH services.

Environmental Improvement (E)

No latrines were constructed in 2013 by the National Program or its implementing partners; however, UNICEF, development partners and private companies have been responsible for constructing latrines since 2005. According to Sudan's Strategic Plan, the UIG for latrine usage is for at least 50% of households in

trachoma endemic communities will have a latrine. Overall household latrine ownership was 45% out of 25,624 households surveyed in baseline trachoma prevalence surveys. Impact surveys in Baw and Dongola districts showed that the proportion of households owning and using a latrine increased from 46% to 80%. It is estimated that a latrine costs 1,375 USD, which includes building materials and labor costs.

Programmatic Challenges:

Insecurity is a continual challenge in Sudan. In 2013, insecurity delayed program activities in some targeted areas of Blue Nile and South Kordofan states and has prevented the program from working in the Darfur region. Zithromax® shipment clearance also presented a challenge to the program in 2013, causing distribution delays.

Status of 2013 Program Review Meeting Recommendations:

Recommendation 1: The program should be prepared to complete trachoma mapping in the three Darfur states if the opportunity arises.

This recommendation will be completed in 2014 if security is acceptable.

Recommendation 2: The program should consider an alternative strategy of TT surgery service delivery in order to provide service for the remaining cases of TT and report their progress in 2014.

The program has increased the number of surgeons and is supplying state hospitals with TT kits and TT surgical consumables. The program also is recommending that the graduation requirement for surgical residents be increased from 10 to 100 TT surgeries. There currently are 150 resident doctors; it is expected that this policy change will greatly increase the number of surgeons trained and TT surgery output.

Targets for 2014 and Plans to Meet Targets:

Surgery (S)

- Operate on 5,000 trichiasis patients, 2,000 with TCC support
- Train 30 surgeons, 30 with TCC support

In order to increase uptake and quality of surgeries, all districts with TT ≥ 1% among adults ages 15 years and older will be reached by mobile surgical units, while the districts with TT ≥ 0.1% (total population) will be accessed through government and private sector hospitals. The program will facilitate TT surgeries in existing static facilities, provide the surgical instruments and consumables needed by the facility, and pay 10 USD for patients unable to afford the cost of surgery. Epilation also has been proposed by the NPPB as an alternative option for TT cases. The epilation approach will target elderly people with fewer than five peripheral lashes and those with minor TT who decline the operation. TCC is expected to provide epilation forceps and training.

Antibiotic Therapy (A)

- Distribute 1,701,316 doses of azithromycin, all with TCC support
- Distribute 34,026 doses of tetracycline, all with TCC support

Of the 11 districts currently warranting MDA, one requires an impact assessment in 2014 to determine whether MDA can be stopped; two require one additional round of MDA; four require two additional rounds

of MDA; four require three or more additional rounds of MDA prior to impact assessment. In addition, 64 districts (all in Darfur) still require mapping. The program plans to conduct post-MDA coverage surveys for those districts conducting MDAs in 2014.

The program is currently conducting a study to determine whether one district-wide MDA is sufficient to control active trachoma in districts with TF between 5-9%. Due to drug shipment delays, this study was not completed in 2013 and will instead be finalized in 2014.

Facial Cleanliness (F)

- Conduct health education in 651 villages, all with TCC support

There will be increased efforts to raise trachoma awareness among politicians, community and religious leaders, and all community members through the dissemination of health education messages via mass media, local TV and radio, and group discussions. In 2014, health education practices will be reviewed in several localities to see how they can be improved. Additional training will be held for school teachers to develop their knowledge about trachoma and their capacity to lead school health education sessions. The program will continue to work closely with the Ministry of Education to incorporate trachoma messaging into the school curriculum.

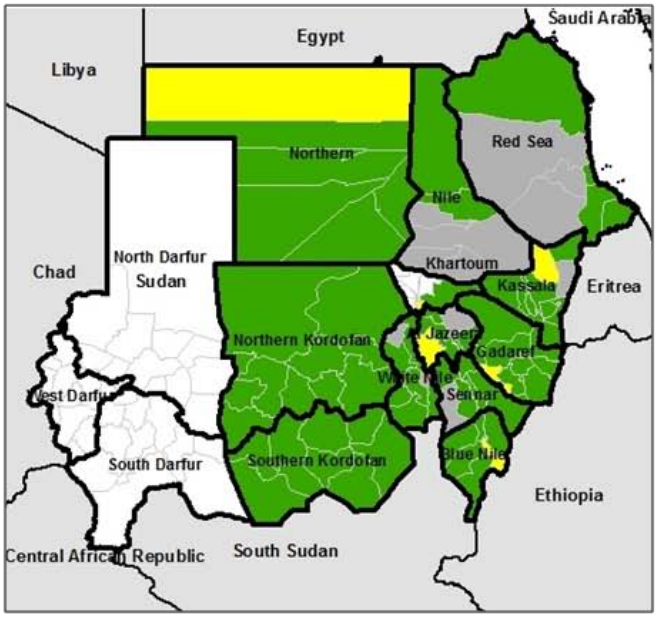
Environmental Improvement (E)

- The program has no set numbers for latrine construction.

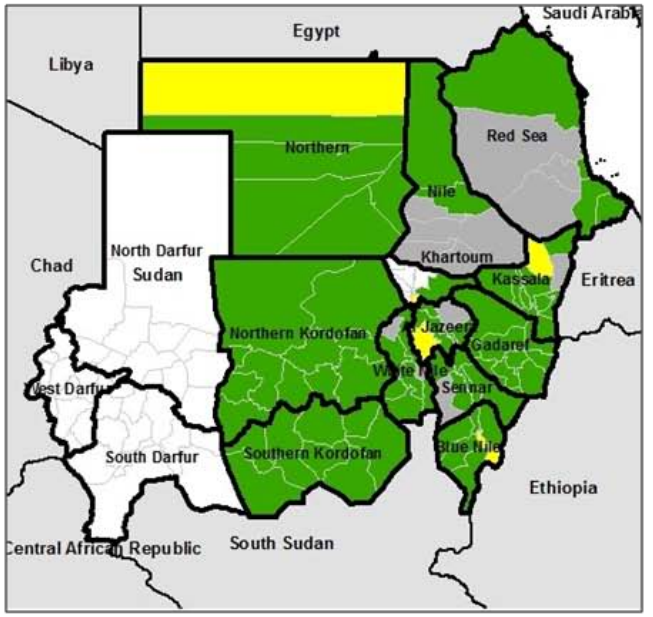
The program will continue to promote latrine construction in endemic communities as part of its health education efforts.

Maps of Sudan

Baseline TT Prevalence among Total Population, 2006-2010



TT Prevalence among Total Population, 2013



Baseline TF Prevalence among Children ages 1-9, 2006-2010

TF Prevalence among Children ages 1-9, 2013

SAFE in Uganda

Presented by Dr. Patrick Turyaguma, Trachoma Program Manager, Ministry of Health, Uganda

Background

Eye care is a key component of the Uganda National Minimum Health Care Package (UNMHCP). Trachoma is included in the five-year Integrated Neglected Tropical Diseases (NTDs) Master Plan and is highlighted in the Uganda National Development Plan for the years 2011-2015. Trachoma and four other NTDs are earmarked for elimination by 2020 in the Health Sector Strategic and Investment Plan (HSSIP II).

Trachoma is known to be endemic in 36 of 112 districts in Uganda. An estimated one million children less than 10 years old have active trachoma and 10.8 million more people are at risk. Currently, there are approximately 10,000 persons in Uganda who have become blind due to trachoma. With regards to the implementation of the SAFE strategy, trachomatous trichiasis (TT) surgery is available in the two regions of Busoga and Karamoja and antibiotic distributions have been conducted annually in all 36 known endemic districts. The facial cleanliness and environmental improvement components of SAFE have not been adequately and uniformly addressed in endemic areas.

Impact assessments have been conducted in 11 districts following three years of mass drug administration (MDA). Results from the assessments indicate that trachomatous inflammation-follicular (TF) prevalence is between 5% and 10% in four districts and less than 5% in six districts. The program, therefore, is planning for sub-district level surveys in the 2014/2015 fiscal year, which will be able to demonstrate whether blinding trachoma has been eliminated or whether additional treatment is required in some sub-districts. Desk reviews[23] were conducted in eight districts not previously mapped, with four ear-marked for baseline surveys in 2014. The NTD program has developed advocacy strategies and tools to support the program and a trachoma action plan (TAP) has been drafted, though it has not yet been officially launched by the Ministry of Health.

Timeline of Events

2006: Baseline mapping (on-going)
2007: National Trachoma Control Program began
2007: MDA for trachoma control with Pfizer-donated Zithromax® officially launched
2013: TAP drafted and impact assessments began
2020: Target date for the elimination of blinding trachoma

[23] Desk reviews involve compiling available data, such as prevalence rates from surrounding districts, data on development indicators within the district, evidence health officials have found on TF and/or TT in the district and then using that data to determine whether it may be endemic. If it is believed to potentially be endemic, then plans will be made to conduct baseline surveys.

Table 1. Program Achievements in 2013

Indicator	National UIG	National Program	
		Target	Achieved (%)
Persons operated	230,000	5,138	10,738 (209%)
Surgeons trained	N/A	No target	25
Doses azithromycin distributed during MDA	7,055,657	7,055,657/27 districts	565,468/3 districts*
Doses tetracycline distributed during MDA	143,993	143,993/27 districts	1,800/3 districts*
Villages with health education	All villages	All villages in endemic districts	Assume 100% coverage
Household latrines built	75% of households	N/R[24]	N/R

*MDA conducted in 27 districts in 2013. However, results from only three districts were available at the time of the 2014 Program Review.

Surgery (S)

Of 42 mapped districts, 39 have a TT prevalence greater than 1% in adults ages 15 years and older. The program completed 10,738 surgeries in 2013, 209% of its goal of 5,138 surgeries. 25 new surgeons were trained, which brings the total number of trained TT surgeons to 69.

Antibiotic Therapy (A)

Out of 46 mapped districts, 36 have TF ≥ 10% among children ages one to nine years; four have TF prevalence between 5-9%; and six were found to be non-endemic (TF< 5%). MDAs began in Uganda in 2007. At the time of the 2014 Program Review, only three out of 27 districts had submitted their distribution data for 2013. Within these three districts, 565,468 doses of azithromycin were distributed during MDA. Of these three districts, two reported a coverage rate greater than 80%; and none reported less than a 60% coverage rate. Though there are no plans for post-MDA coverage surveys, in July 2013 a data quality analysis was conducted to evaluate the timeliness, completeness, and availability of reports as part of the NTD program.

Facial Cleanliness (F)

Currently, the national target is 100% of all villages in endemic districts to receive health education. The program did not report specific numbers of villages reached with health education messaging, but stated that it assumed that 100% of villages were reached. In 2013, Sightsavers supported health promotion activities in Jinja and Napak districts, and John Hopkins University – Center for Communications Programs (JHU-CCP) conducted research on the F & E components of SAFE in Busoga and Karamoja regions. Additionally, the NTD Program developed a communication strategy and integrated eye care materials for community medicine distributors and teachers.

[24] N/R: Not reported by the program

Environmental Improvement (E)

There is currently no information available on environmental improvement related activities for 2013. The program has set the ultimate intervention goal (UIG) of 75% of all households having access to a latrine.

Programmatic Challenges

There are a limited number of health workers available to be trained as TT surgeons. This makes it difficult to address the estimated backlog of more than 220,000 TT patients. There is currently no support for TT surgeries in West Nile, Bunyoro, Gulu, and Lira regions. MDA challenges involve volunteer fatigue and low levels of advocacy and mobilization. This often results in low and inconsistent MDA coverage. Lastly, the F & E components of SAFE are not uniformly addressed and require additional support.

Status of 2013 Program Review Meeting Recommendations

Uganda attended the Program Review for the first time in 2014; therefore, there are no relevant 2013 program review meeting recommendations.

Targets for 2014 and Plans to Meet Targets

Surgery (S)

- Operate on 14,000 trichiasis patients
- Train 34 surgeons

Greater emphasis will be placed on working with partners to conduct TT surgeries to address the backlog. In order to better understand the number of unoperated cases remaining and their location, the National Program will streamline the reporting process for TT surgeries. Additionally, the National Program will follow-up on operated TT patients to address issues of recurrence. There is a plan to expand support for surgeries to additional districts and to support regional referral hospitals so that they can conduct outreach and mobile TT surgeries. Lastly, the program hopes to develop standardized guidelines for TT surgeon training and to require certification for all surgeons.

Antibiotic Therapy (A)

- Distribute azithromycin in 20 districts
- Distribute tetracycline in 20 districts

In 2014, the national program plans to continue with MDAs in 20 districts. The National Program has not yet calculated the number of doses of azithromycin and tetracycline eye ointment that they will need to distribute in these districts. Post-endemic surveillance will begin in six districts where TF prevalence is < 5%, and baseline surveys will be conducted in four suspected endemic districts. There will be an intensification of mobilization and increased support supervision at all levels. ENVISION, a project funded by the United States Agency for International Development (USAID) and implemented by RTI International, has stated that it will assist with baseline mapping, impact assessments and MDA in all eligible areas.

Facial Cleanliness (F)

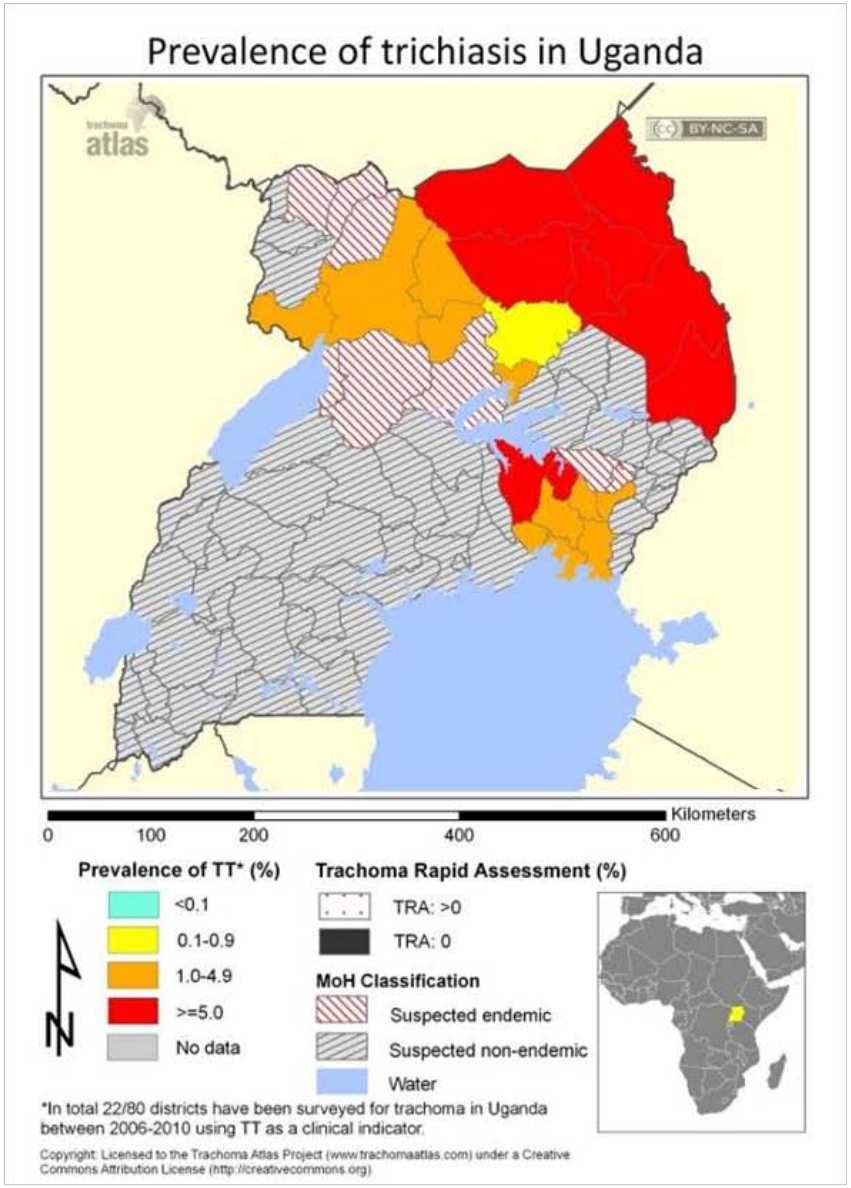
- Conduct health education in all endemic districts

Currently, the JHU-CCP is developing trachoma specific behavior change communication strategies and tools that focus on the F&E components and will be used in endemic villages.

Environmental Improvement (E)

- Promote latrine construction in endemic communities

Maps of Uganda



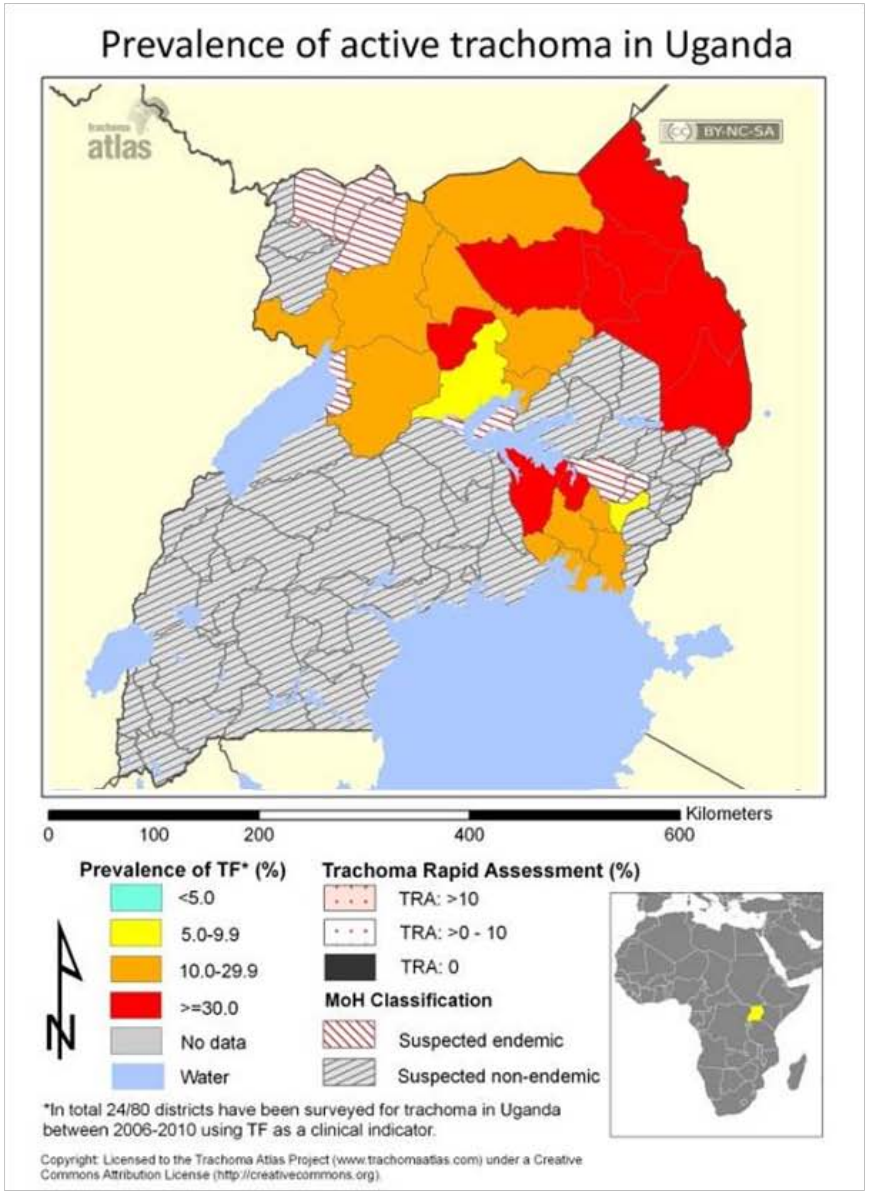


Table 1. Summary of National Data from Trachoma Control Programs (Carter Center-Assisted Countries)

National Data as Reported for 2013 at the Fifteenth Annual Program Review, Atlanta, Georgia, February 25-27, 2014

	Mali	Niger	Sudan	South Sudan	Ethiopia	Nigeria	Total
Surgery							
Surgeries	4,930	11,228	2,757	3,617	133,940	14,321	**170,793**
2013 Target	10,000	15,000	5,000	3,400	242,462	18,620	**294,482**
Percent Coverage	49.3%	74.9%	55.1%	106.4%	55.2%	76.9%	**58.0%**
Antibiotics							
Azithromycin							
Doses	181,259	N/R	210,912	425,540	17,714,445	5,820,080	**24,352,236**
2013 Target	981,882	8,319,387	1,330,057	468,530	24,931,984	6,062,807	**42,094,647**
Percent Coverage	18.5%	N/A	15.9%	90.8%	71.1%	96.0%	**57.9%**
Tetracycline							
Doses	3,625	N/R	3,998	10,470	361,519	96,377	**475,989**
2013 Target	19,637	170,000	31,601	47,470	508,816	98,214	**875,738**
Percent Coverage	18.5%	N/A	12.7%	22.1%	71.1%	98.1%	**54.4%**
Facial Cleanliness and Health Education							
Villages with Health Education	2,622	634	123	117	12,000	3,410	**18,906**
2013 Target	2,747	634	535	63	12,000	N/A	**15,979**
Percent Coverage	95.4%	100.0%	23.0%	185.7%	100.0%	N/A	**118.3%**
Environmental Improvements							
Latrines	3,233	11,019	N/A	207	1,632,414	N/A	**1,646,873**
2013 Target	22,149	15,000	N/A	10	1,872,150	N/A	**1,909,309**
Percent Coverage	14.6%	73.5%	N/A	2070.0%	87.2%	N/A	**86.3%**

N/A=Not Applicable

N/R=Not Reported

In Nigeria, only data on villages with health education supported by The Carter Center were available.

Table 2. National Trachoma Control Program Annual Targets 2014 (Carter Center-Assisted Countries)

Targets[†] as Presented at the Fifteenth Annual Program Review, Atlanta, Georgia, February 25-27, 2014[§]

	Mali	Niger	Sudan	South Sudan*	Ethiopia	Nigeria	Total**
Surgery							
Persons to operate for trichiasis	15,569	15,000	5,000	N/R	150,000	40,200	**225,769**
Antibiotics							
Doses of azithromycin to distribute during MDA†	385,934	4,682,611	1,701,316	N/R	43,829,038	5,313,511	**55,912,410**
Doses of tetracycline ointment to distribute during MDA	4,285	170,000	34,026	N/R	894,470	106,270	**1,209,051**
Facial cleanliness							
Villages to reach through health education	250	634	651	N/R	11,514	1,403,523	**1,416,572**
Environmental improvement							
Household latrines to construct	15,000	15,000	N/A	N/R	2,000,000	N/A	**2,030,000**

N/A=Not Applicable

N/R=Not Reported

[§]All targets are subject to change.

†Antibiotic targets to not reflect ITI-approved allocations of Zithromax®

*Trachoma program temporarily suspended December 2013 due to insecurity

**Totals only include countries where data are available.

Table 3. Carter Center-Assisted Implementation of SAFE (Carter Center-assisted output)

Summary of Interventions per Country, January - December 2013

Indicators	Mali	Niger	Sudan	South Sudan	Ethiopia-Amhara	Nigeria	Total
Surgery							
Persons operated for trichiasis	2,830	9,134	595	1,430	44,867	120	**58,976**
2013 Target	4,000	11,000	5,000	1,000	110,754	250	**132,004**
Percentage	70.8%	83.0%	11.9%	143.0%	40.5%	48.0%	**44.7%**
Antibiotics							
Doses of azithromycin distributed	N/A	N/A	210,912	283,652	15,318,259	1,107,708	**16,920,531**
2013 Target	N/A	N/A	1,330,057	338,530	16,518,561	1,083,254	**19,270,402**
Percentage	N/A	N/A	15.9%	83.8%	92.7%	102.3%	**87.8%**
Facial cleanliness and health education							
Villages with ongoing health education	2,622	634	123	117	3,459	855	**7,810**
2013 Target	2,747	634	535	20	3,459	855	**8,250**
Percent Coverage	95.4%	100.0%	23.0%	585.0%	100.0%	100.0%	**94.7%**
Environmental improvement							
Household latrines constructed	1,438	11,019	N/A	102	282,078	N/A	**294,637**
2013 Target	5,500	15,000	N/A	10	551,172	N/A	**571,682**
Percentage	26.1%	73.5%	N/A	1020.0%	51.2%	N/A	**51.5%**

N/A=Not Applicable

Table 4. Carter Center-Assisted Implementation of SAFE

Cumulative Interventions per Country, 1999-2013

Indicators	Mali	Niger	Sudan	South Sudan	Ethiopia-Amhara	Nigeria	Total
Persons operated for trichiasis	25,343	31,340	6,476	9,023	339,409	433	**412,024**
Doses of azithromycin distributed	698,083	3,780,384	2,529,659	2,658,359	93,591,007	2,817,167	**106,074,659**
Villages with ongoing health education	2,622	1,122	664	3,574	3,459	855	**12,296**
Household latrines constructed	91,279	85,311	N/A	646	2,686,123	31,979	**2,895,338**

N/A=Not Applicable

Figure 1. Persons Operated for Trichiasis, Carter Center-Assisted Countries

National program data as presented for January - December 2013

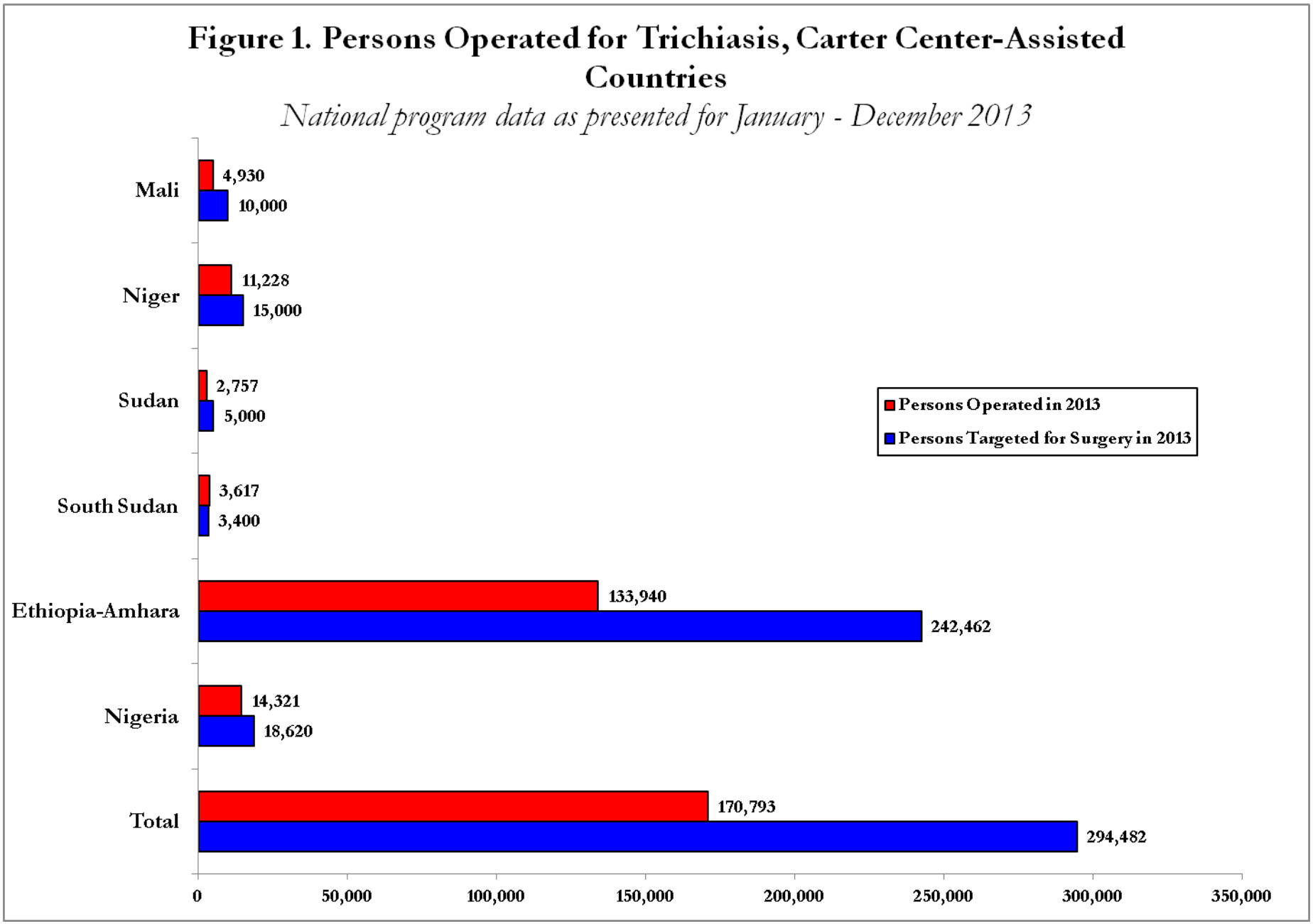


Figure 2. Azithromycin Distribution, Carter Center-Assisted Countries

National program data as presented for January - December 2013

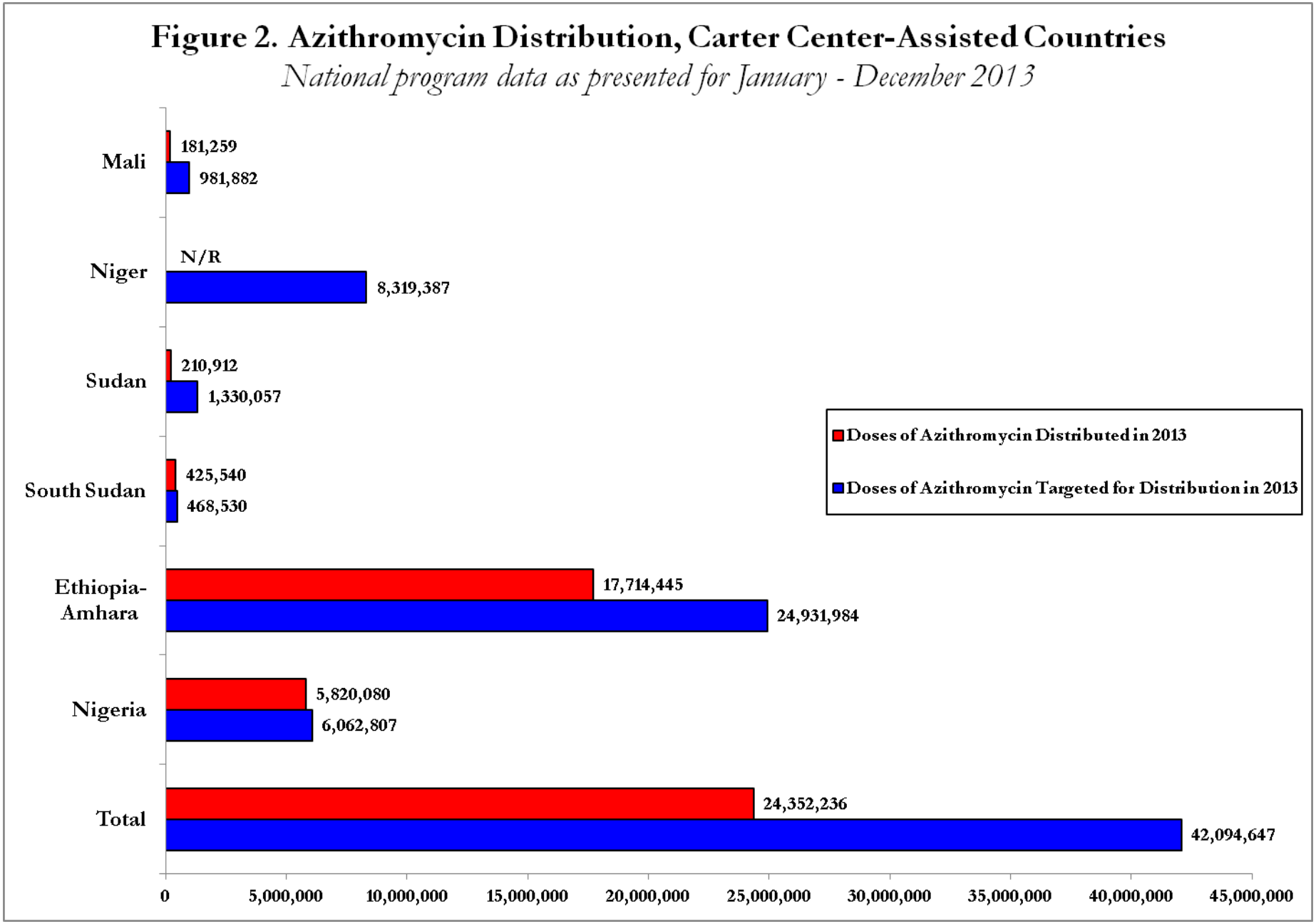


Figure 3. Health Education, Carter Center-Assisted Countries

National program data as presented for January - December 2013

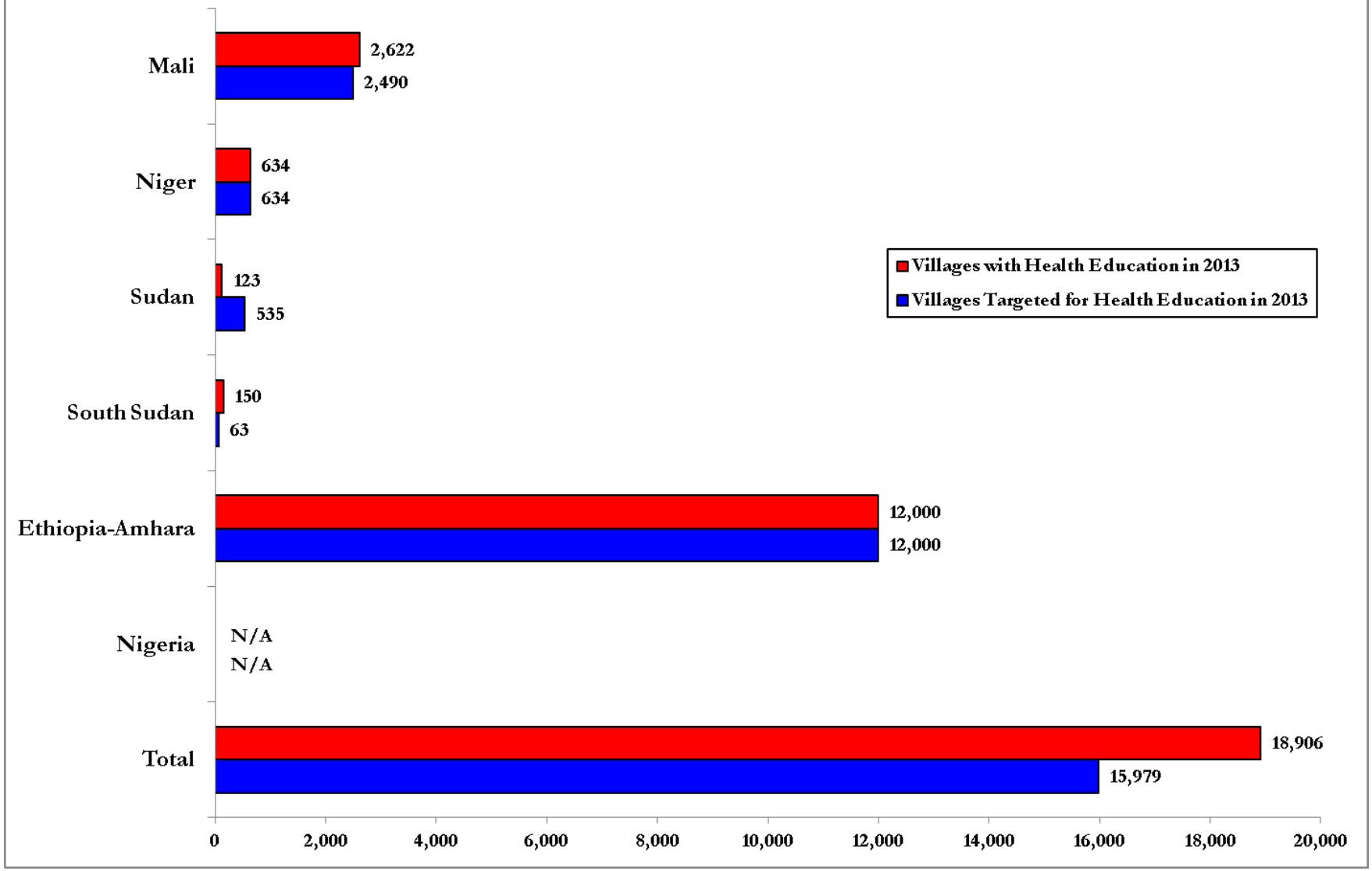
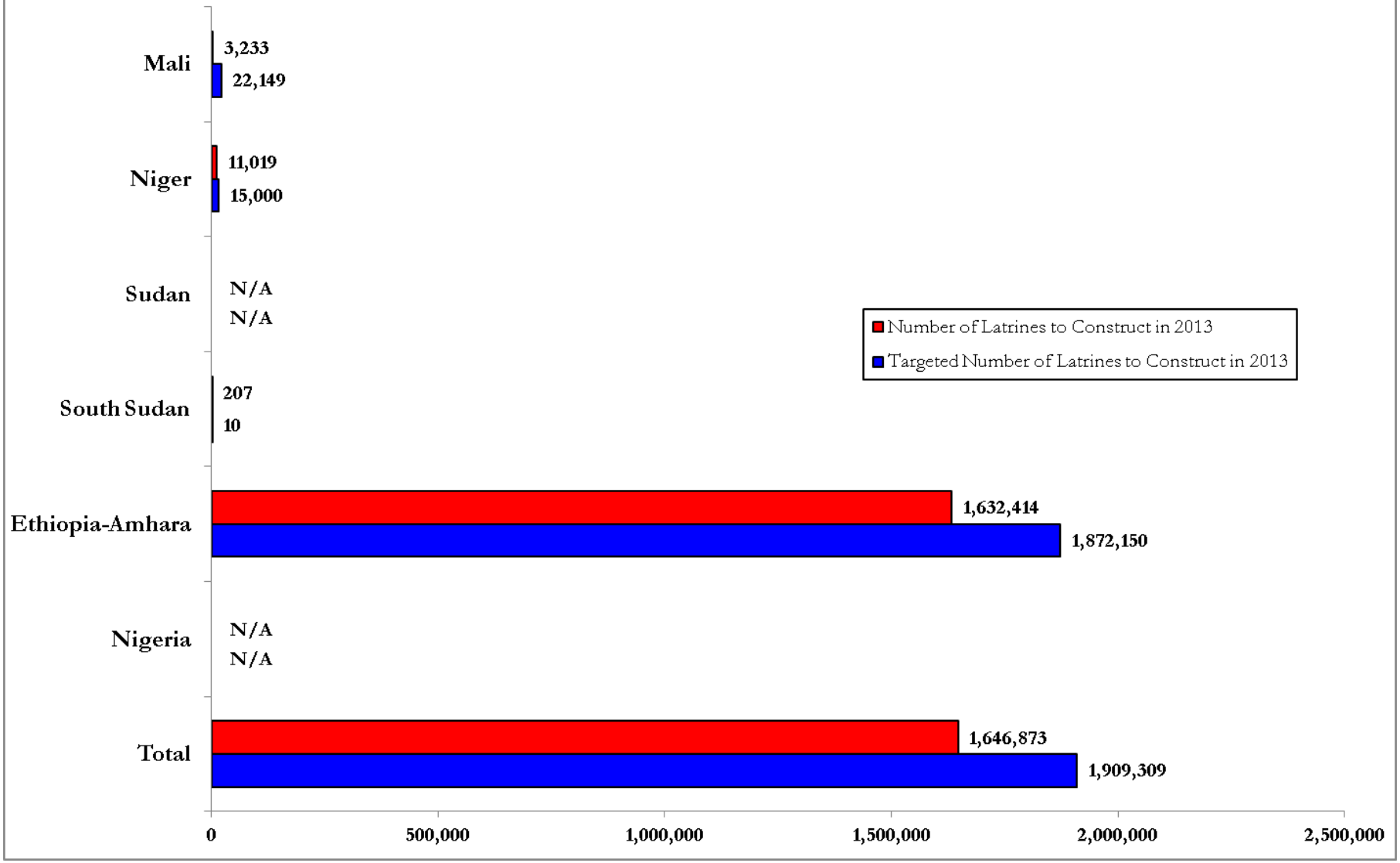


Figure 4. Household Latrines Constructed, Carter Center-Assisted Countries

National program data as presented for January - December 2013



Post-Treatment Surveillance and Verification of Elimination

Presented by Dr. Jonathan King, World Health Organization, former Epidemiologist for the Trachoma Control Program at The Carter Center

Background

In 1998, the World Health Assembly (WHA) called on its member states to adopt resolution 51.11 to eliminate blinding trachoma as a public health problem. Since then, references and recommendations regarding achieving and verifying elimination have been documented, but formal World Health Organization (WHO) guidelines on trachoma post-treatment surveillance or verification of elimination have not been published. Elimination of trachoma as a public health problem is defined as:

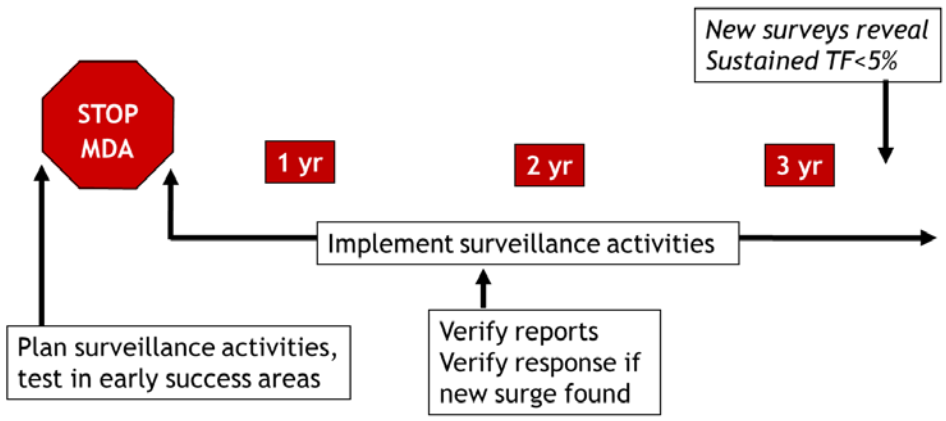
1. A rate of trachomatous inflammation-follicular (TF) among children ages one to nine years old of less than five percent at the sub-district level;
2. Less than one trichiasis case per thousand population (not counting those patients who have declined surgery and/or who prefer to epilate).

The elimination strategy involves mapping, implementation of the SAFE strategy in eligible areas, post-treatment surveillance, and finally verification of elimination.

Trachomatous inflammation-follicular (TF) Surveillance

Once the TF threshold has been reached, countries need to enter into a three-year period of post-treatment surveillance (see Figure 1).

Figure 1. Post-treatment surveillance.



At minimum, two communities per district, biased to the least developed and suspected most endemic areas, should be selected on an annual basis for surveillance activities. During surveillance, at least 50 children ages five years and younger need to be examined in each community; if feasible, all children in this age group in

the community should be examined. Should the surveillance system detect a TF prevalence of greater than 5% in any community, the following response should be followed:

- Examine all children ages one to nine years and treat TF
    - If >5% TF prevalence is found among one to nine year olds, assess A, F, and E coverage and treat community
- Examine school entrance age children in all communities in the surrounding sub-district
    - If >5% TF prevalence is found in the sub-district re-implement A, F, and E interventions for three years and assess TF in other sub-districts to determine whether district warrants A, F, and E

Trachomatous Trichiasis (TT) Surveillance

For TT surveillance, eye care services need to be available to operate recurrent and incident cases, as well as to monitor incidence of the condition through:

- Ongoing collection and review of TT surgical output data
- Incorporate TT into National Health Information Management System or similar national surveillance system
- In each community assessed for TF, examine adults for TT

Conclusions

Despite the above recommendations, no formal guidelines on post-treatment surveillance or verification of elimination have been set forth by the WHO to date. In addition, no guidelines exist for countries to prepare or submit dossiers to receive acknowledgement of elimination. Therefore, a number of issues related to trachoma surveillance and verification remain uncertain, including:

- Can current minimum surveillance activities ensure sustained control?
- Are there surveillance activities superior to those currently suggested?
- How can trachoma surveillance be integrated into the current health system?
- What are the best methods to find and classify TT cases for surveillance?
- Will WHO formally recognize national programs achieving "*elimination as a public health problem"?*

Improving Coverage in MalTra Weeks and Post-MDA Coverage Assessments

Presented by Eshetu Sata, The Carter Center Ethiopia

Background

Mass drug administration (MDA) with azithromycin and tetracycline eye ointment (TEO) for the prevention and control of trachoma is conducted in the Amhara Region through the MalTra Week campaigns. These are conducted annually by The Carter Center (TCC) in partnership with the Federal Ministry of Health (FMoH), Regional Health Bureau (RHB), Lions Clubs International Foundation (LCIF), Lions Clubs of Ethiopia, Pfizer Inc, and the International Trachoma Initiative (ITI). In 2013, additional support for this effort was provided by RTI/ENVISION and Noor Dubai Foundation. At present, the campaign has been conducted 11 times in the Amhara region (MalTra I was conducted in November 2008 and the most recent campaign, MalTra XI, was conducted in November 2013). The result of the 11 campaigns has been the distribution of 76,855,626 doses of Zithromax® (the brand name of azithromycin, donated by Pfizer Inc) and TEO for the prevention and treatment of trachoma.

MDA coverage during MalTra campaigns has improved over time. The reasons for improved coverage include: high involvement of government leaders at all levels (RHB, zone, district, and *kebele*); the involvement of the Health Development Army (MalTra X and XI); the partnership between the government and TCC; and community mobilization through advocacy meetings in the districts and *kebeles* who resist taking Zithromax®.

Post-MDA Coverage Assessments

The MalTra X campaign was conducted in 70 *woredas* within the five zones of East Amhara from May 18-24, 2013 and the MalTra XI campaign in 75 *woredas* within the five zones of West Amhara from November 10-16, 2013. Preliminary reports show that 5,985,520 (96.2% of the target population) and 9,692,113 (95.8% of the target population) received treatment with antibiotics during MalTra X and MalTra XI, respectively.

Upon the completion of the campaigns, MDA coverage validation surveys were conducted in selected districts. A multi-stage random sampling process was used where districts were selected in the first stage, then *kebeles* (administrative unit with an estimated 5,000 population) were selected next, and then specific households were selected in the final stage households were selected. The survey was conducted in 10 districts of East Amhara and 10 districts of West Amhara. The questionnaire was administered to 4,444 people residing in the districts.

In MalTra X, of the 1,873 people asked whether they had received treatment, 1,697 (90.6%) confirmed having received treatment (Table 1). During MalTra XI, 2,217 of the 2,571 people who were asked whether they received treatment confirmed having received it (86.2%) (Table 2). The proportion of people who received treatment varied across districts during both campaigns. In East Amhara, the highest proportion was reported from Sekota Zuria district of WagHemira (95.9%) and the lowest in Tehuldere district of South Wollo (83.5%). The highest proportion in West Amhara was reported from Sekota Zuria district of WagHemira (95.9%) and the lowest in Tehuldere district of South Wollo (83.5%). The survey also showed variation between the survey findings and the report received by Woreda Health Offices (WoHOs). Absenteeism during the campaign was the main reason for not taking the treatment.

Table 1: MDA coverage, MalTra X (East Amhara)

Zone	Woreda	Number of Persons Interviewed	Received Treatment		95% CI	
			N	%		
	Ayna Bugna	183	153	83.6	78.7	89.6
North Wollo	Lasta	187	171	91.4	84.0	93.3
	Daway Harewa	146	129	88.4	81.2	92.5
Oromia	Dawa Chefa	167	160	95.8	90.8	97.9
	Minijar	155	147	94.8	90.9	98.2
North Shoa	Angolelana Tera	265	226	85.3	79.6	88.7
	Tehuldere	164	137	83.5	79.0	90.4
South Wollo	Legambo	175	167	95.4	91.2	98.0
	Ziquala	187	173	92.5	87.1	95.4
WagHemira	Sekota Zuria	244	234	95.9	92.1	97.7
Total		**1,873**	**1,697**	**90.6**	**88.9**	**91.6**

Table 2: MDA coverage, MalTra XI (West Amhara)

Zone	Woreda	Number of Persons Interviewed	Received Treatment		95% CI	
			N	%		
	Dangila Zuria	274	240	87.6	83.1	91.3
Awi	Guagusa Shikudad	287	248	86.4	81.9	90.2
	Debay Tilatgin	242	202	83.5	78.2	87.9
East Gojjam	Debre Elias	228	136	59.6	53.0	66.1
	Dembecha	298	272	91.3	87.5	94.2
West Gojjam	Sekela	165	151	91.5	86.2	95.3
	Dera	297	242	81.5	76.6	85.7
South Gondar	Libo Kemkem	275	265	96.4	93.4	98.2
	West Belesa	271	247	91.1	87.1	94.2
North Gondar	Wogera	234	214	91.5	87.1	94.7
Total		**2,571**	**2,217**	**86.2**	**84.8**	**87.5**

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Epilation for the management of minor trachomatous trichiasis: four-year results of a randomized controlled trial

Presented by Dr. Matthew Burton, London School of Hygiene & Tropical Medicine

Background

Many individuals with trachomatous trichiasis (TT), particularly those with mild disease, decline the offer of surgery and practice epilation instead. We conducted a randomized controlled trial of epilation versus surgery for the management of minor TT in Ethiopia. Here, we report the four-year outcome data.

Methods

1300 individuals ages 18 years and older with previously un-operated minor trichiasis (<6 eyelashes touching the eye) were enrolled between March and June 2008. A detailed eye examination was performed. Participants were randomized to one of two intervention groups: posterior lamella tarsal rotation surgery, or repeated epilation using high quality, machine-manufactured epilation forceps (Tweezerman). The patient and an accompanying adult with good near vision were trained to perform epilation. Participants were re-examined at 6, 12, 18, and 24 months. Participants who showed evidence of disease progression during the follow-up period (≥5 lashes) were immediately offered surgery (epilation arm) or repeat surgery (surgery arm). All epilating patients were offered free surgery at two-years. Participants were re-examined four years after the initial enrollment.

Results

At four years, 1151 (88.5%) people were reassessed [572 (88%) and 579 (89%) epilation and surgery arm, respectively]. By four years, 383 (67%) patients randomized to the epilation arm declined surgery and were still epilating; 189 (33%) had received operations. Uptake of surgery was associated with being younger ($p<0.001$) and having more marked baseline entropion ($p=0.001$). Among the epilating patients at four years: 207 (53.9%) were successful (no lash touching the eye), 150 (39.2%) had minor trichiasis and 26 (6.8%) had major trichiasis (≥5 lashes); 259 (67.6%) reported frequent epilation and 325 (85%) reported that they are "happy and still did not want surgery." Among the 579 individuals randomized to the surgery arm, 31 (5.4%) had recurrent TT at four years. We found no evidence of a difference in change in vision ($p=0.9$) or change in corneal status ($p=0.96$) between the epilating and surgery arm groups.

Conclusion

More than two-thirds of epilating patients declined surgery and chose to continue epilation. Epilating patients controlled their trichiasis with only a few showing signs of significant progression, and had comparable rates of change in vision and corneal disease with those randomized to surgery. These findings suggest that epilation can be considered a reasonable alternative to surgery for minor trichiasis where patients either decline surgery or do not have access to surgical treatment and could be offered as a temporizing measure for minor cases until services can be delivered.

Financial Disclosure

This work was supported by a grant from the Band Aid Foundation and Pfizer Inc.

Sub-District Surveys in Mali

Presented by Professor Lamine Traoré, National Coordinator, National Blindness Prevention Program

Background

A national blindness survey conducted in 1996-1997 in Mali quantified the magnitude of the problem of trachoma. Active trachoma prevalence among children ages one to nine years was greater than 30% in all regions except Segou, where prevalence was greater than 20%. Implementation of control activities began in 1999 with support from a consortium of partners, including The Carter Center (TCC). Full SAFE implementation country-wide was not achieved until 2008, thanks to support from the Conrad N. Hilton Foundation. Between 2005 and 2011, district-level impact surveys were conducted in all districts throughout Mali; in many districts, the prevalence of trachomatous inflammation-follicular (TF) among children ages one to nine years was less than 10%, the prevalence at which mass drug administration (MDA) with azithromycin is no longer warranted. Since the majority of these impact assessments demonstrated that TF had decreased and MDA was no longer required, the National Program has since focused its efforts on clearing the backlog of surgical cases.

The criteria for elimination consist of two proxy targets: 1) TF less than 5% among children ages one to nine years at the sub-district level (a sub-district is an administrative unit of approximately 50,000 population) and 2) less than one trichiasis case per 1,000 population (not counting those cases who have declined surgery and/or prefer to epilate). In 2013, the National Program began conducting sub-district-level surveys in order to identify areas that have met the elimination criteria, and identify areas to prioritize for trichiasis surgery interventions. With support from Helen Keller International, Sightsavers, and TCC, four sub-district-level surveys were completed by the end of 2013: Bafoulabé district (Kayes region); Koulikoro district (Koulikoro region); and Tominian and Segou districts (Segou region).

Methods

Cross-sectional, sub-district level surveys using multi-stage cluster-randomized sampling were carried out between May and November 2013. Each district was first divided into sub-districts. Because Mali does not have an administrative unit smaller than the district, multiple adjacent health zones were selected to create each sub-district. In each sub-district, 17 villages (clusters) were selected using probability of selection proportional to the size of the village. In each village, 30 households were randomly selected and all consenting household members present at the time of the survey received clinical examinations. In addition, heads of household were asked questions about water and sanitation access and latrine usage was verified by survey teams.

Results

Table 1 shows the household and clinical characteristics of the sample. A total of 49,907 persons were examined for clinical signs of trachoma in 323 villages and 19 sub-districts. In all but one sub-district (Bafoulabé 5), TF among children ages one to nine years was less than 5%, indicating that those sub-districts had met that elimination target. Only one sub-district met its elimination target for TT (Koulikoro 3), though nine others have a TT prevalence of less than 1% among adults ages 15 years and older, indicating that enhanced intervention (i.e. surgical outreach campaigns) is no longer needed. Reported coverage with at least one dose of azithromycin during previous MDAs varied greatly among sub-districts (range: 21.7-99.7%), but the majority of people in all but one sub-district (Bafoulabé 5) had received at least one dose (range: 48.0-

99.7%). However, the proportion of respondents who had received all three doses was considerably lower: 2.6-71.5%. In most areas, except Tominian, latrine ownership was over 80% though the proportion of those with improved SanPlat latrines was much lower and ranged from 0.0-76.0%.

In addition, an analysis on costs was conducted to compare costs between past district-level surveys and the sub-district-level surveys (Table 2). The total costs of the sub-district-level surveys was approximately 25% more than the district-level assessments conducted in the same districts, and the cost per cluster of the sub-district surveys was nearly twice that of the district-level surveys. Further analysis needs to be conducted to determine the reason for these increased costs, particularly since the number of households in each cluster in the sub-district-level surveys was fewer than the number surveyed at the district level, and how these costs might be reduced in order to complete impact assessments necessary for Mali to demonstrate that it has reached its elimination targets.

Conclusions and Recommendations

Active trachoma is under the elimination threshold in all but one of the 19 sub-districts surveyed; the National Program should consider a protocol for intervention in sub-districts where TF is greater than 5%. In sub-districts that have reached their elimination target, surveillance activities need to be pursued consistently. While TF is low, there is still a high prevalence of trichiasis. However, surgeons conducting outreach have difficulties finding patients, indicating that services are either not reaching those who require it; trichiasis cases do not wish to undergo the surgery; or those with trichiasis, particularly mild cases, may not realize that they are in need of the services offered. The National Program should conduct an additional investigation into the reasons behind these data.

Ownership of traditional latrines is generally high, though access to a water source within the compound is generally low. Greater attention needs to be given to areas with lower latrine ownership, such as Tominian, in order to ensure that there is not a resurgence in disease, and the National Program should monitor proximity to clean water sources to advocate for provision where access is low.

Table 1. Sub-district-level survey clinical and household characteristics (N=49,907)

Region	District	Sub-district	TF children 1-9 years % (95% CI)	TT adults ≥ 15 years % (95% CI)	TT all ages % (95% CI)	Received ≥ 1 MDA round % (95% CI)	Received 3 MDA rounds % (95% CI)	Own a latrine % (95% CI)	Owns a SanPlat improved latrine % (95% CI)	Water source in compound % (95% CI)
Kayes	Bafoulabe	1	1.1 (0.6-1.91)	1.49 (0.88-2.51)	0.71 (0.41-1.21)	92.78 (75.78-98.15)	4.5 (3.6-5.62)	90.55 (81.73-95.35)	8.88 (2.85-24.45)	5.25 (1.31-18.81)
		2	0.89 (0.53-1.5)	1.86 (1.13-3.06)	0.81 (0.5-1.33)	65.15 (48.85-78.55)	46.53 (35.69-57.71)	92.8 (84.48-96.83)	29.74 (17.6-45.62)	6.43 (2.07-18.21)
		3	2.14 (1.15-3.98)	1.6 (.097-2.64)	0.83 (0.5-1.38)	81.39 (73.60-87.28)	36.34 (25.92-48.21)	87.7 (71.61-95.27)	7.08 (2.56-18.1)	6.24 (2.74-13.59)
		4	3.47 (2.17-5.49)	1.49 (0.91-2.45)	0.75 (0.48-1.16)	58.47 (38.62-75.91)	6.96 (3.76-12.52)	94.05 (88.04-97.13)	25.05 (12.93-42.94)	18.34 (8.15-36.25)
		5	5.58 (3.69-8.37)	1.54 (0.8-2.96)	0.78 (0.43-1.42)	21.68 (9.92-41.02)	2.62 (1.95-3.51)	100 (99.0-100.0)	1.73 (0.3-9.45)	1.73 (0.53-5.5)
Koulikoro	Koulikoro	1	0.52 (0.16-1.66)	0.44 (0.12-1.56)	0.22 (0.00064-0.77)	65.95 (53.16-76.78)	20.24 (12.8-30.48)	99.82 (98.68-99.97)	34.38 (16.9-57.45)	41.33 (21.15-64.91)
		2	0.17 (0.00045-0.63)	1.16 (0.72-1.88)	0.48 (0.31-0.76)	77.37 (74.53-79.98)	14.59 (9.96-20.86)	94.48 (67.95-99.28)	18.16 (6.37-42.0)	4.79 (0.92-21.46)
		3	0.64 (0.32-1.28)	0.17 (0.00043-0.64)	0.00077 (0.0002-0.29)	46.02 (39.90-52.27)	13.65 (9.3-19.6)	98.9 (97.16-99.57)	15.37 (5.66-35.47)	22.79 (10.03-43.88)
		4	0.63 (0.02-1.96)	0.52 (0.26-1.06)	0.3 (0.14-0.61)	94.60 (93.03-95.83)	46.19 (38.51-54.06)	100 (99.0-100.0)	0 (0.0-1.0)	0 (0.0-1.0)
	Tominion	1	1.15 (0.07-1.88)	0.69 (0.31-1.5)	0.31 (0.14-0.61)	99.73 (99.21-99.91)	71.49 (68.28-74.5)	39.04 (29.86-49.07)	46.22 (30.77-62.43)	10.87 (5.01-21.99)
		2	0.38 (0.13-1.11)	0.31 (0.1-0.93)	0.14 (0.00047-0.42)	94.70 (87.72-97.81)	65.11 (58.9-70.84)	38.14 (21.72-58.16)	52.98 (31.64-73.27)	39.16 (24.31-56.33)
		3	0.95 (0.37-2.43)	0.87 (.045-1.68)	0.37 (0.2-0.71)	81.03 (74.67-86.08)	46.89 (39.51-54.4)	46.23 (34.71-58.16)	62.08 (44.47-77.0)	21.12 (9.63-40.22)
Segou	Segou	1	1.02 (0.54-1.95)	1.01 (0.55-1.86)	0.48 (0.26-0.9)	66.0	23	99.8 (98-100)	20.9 (8.6-43)	4.0 (1.4-10.0)
		2	0.65 (0.22-1.88)	0.79 (0.34-1.85)	0.37 (0.15-0.87)	65.0	14	98.3 (96-99)	18.5 (9.7-32)	10.1 (3.8-24)
		3	0.31 (0.00075-1.26)	0.55 (0.24-1.23)	0.26 (0.11-0.59)	64.0	16	99.0 (97-100)	14.5 (5.9-31.4)	17.8 (6.8-39)
		4	1.42 (0.75-2.65)	0.9 (0.4-2.0)	0.44 (0.2-0.96)	57.0	13	97.1 (91-99)	27.5 (14-46)	36.4 (23-53)
		5	2.53 (1.28-4.91)	1.01 (0.58-1.76)	0.52 (0.3-0.91)	62.0	33	98.7 (96-99)	19.1 (9.4-34.9)	29.3 (15-50)
		6	0.71 (0.26-1.93)	1.08 (0.5-2.29)	0.54 (0.25-1.16)	67.0	25	98.2 (92-99)	25.0 (12-44)	10.6 (6.0-18)
		7	1.21 (0.54-2.7)	0.56 (0.25-1.25)	0.32 (0.14-0.72)	48.0	19	95.9 (87-99)	76.0 (55-89)	69.8 (51-84)

Table 2. Cost comparison of district-level and sub-district-level surveys

	Kayes, Koulikoro, Segou (district-level)*	Kayes, Koulikoro, Segou (sub-district-level)
Number of districts/sub-districts	24	19
Number of clusters	480	323
Number of households/cluster	24	17
Total cost	$49,651	$65,801
Cost per district/sub-district	$2,068	$3,463
Cost per cluster	$103	$204
Cost per household visited	$4.31	$11.98

*Chen et al., PLoS NTDs, 2011

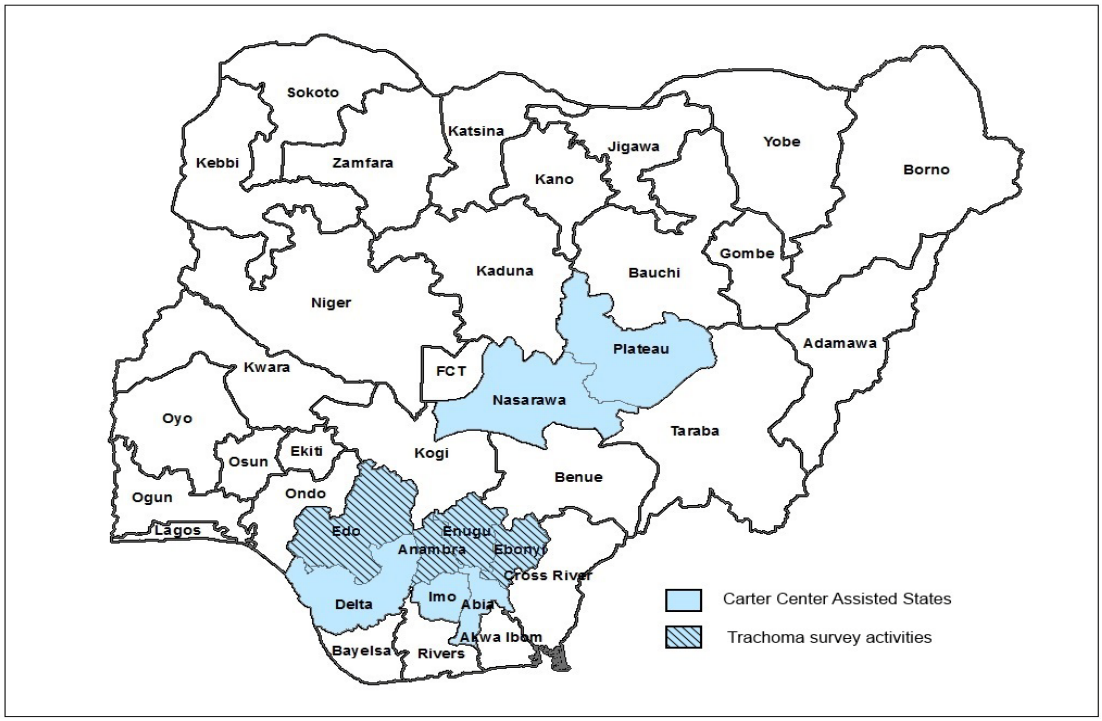
Nigeria Integrated NTD Mapping in Anambra, Ebonyi, Edo, and Enugu States

Presented by Dr. Nimzing F. Jip, Trachoma Program Officer, The Carter Center Nigeria

Background

As a result of the global push towards control and elimination of Neglected Tropical Diseases (NTDs), the United States Agency for International Development's ENVISION project led by RTI International partnered with The Carter Center to support the mapping of four NTDs in Nigeria: trachoma, schistosomiasis, soil transmitted helminthiasis, and loiasis in the Carter Center-assisted southeast states of Anambra, Ebonyi, Edo, and Enugu.

Figure 1. Area of NTD mapping and surrounding Carter Center-Assisted States



Sampling Method

Trachoma mapping was integrated with loiasis (eye worm) mapping, in which the rapid assessment procedure (RAPLOA) was utilized. The trachoma/RAPLOA survey was household-based. In each enumeration area (EA), a minimum of 40 households were sampled to achieve a minimum sample size of 80 adults, ages 15 years and above, and 60 children, ages one to nine years. All household residents were examined for all clinical grades of trachoma while only adults were examined for loiasis. If a child was at school at the time of the survey team's visit, the survey team attempted to find the child at school.

Data was collected using Android smart phones. Each of the four states was considered a separate sampling domain.

Results

A total of 69 local government areas (LGAs), which included 544 clusters, 20,186 households, and 84,753 persons were surveyed. Among those surveyed, 30,359 were children ages one to nine years and 46,672 were adults ages 15 years and older. Out of 69 LGAs, five were found to have a trachomatous inflammation-follicular (TF) prevalence ≥ 5% (Table 1). There was no evidence of trachomatous trichiasis (TT) in adults ages 15 years and older.

Table 1. LGAs with TF >5%.

	TF ages 1-9 years			TT ages ≥ 15 years	
	N	% with TF (95% CI)		N	% with TT (95% CI)
Ebonyi	464	6.90 (.02-.19)		554	0
Ezza North	471	5.73 (.03-.12)		519	0
Ezza South	429	5.13 (.02-.13)		542	0
Ikwo	703	5.26 (0.02-.11)		688	0
Akoko Edo	323	5.57 (.03-.12)		469	0

Conclusions and Recommendations

Trachoma was found to be hypo-endemic or non-endemic in all 69 of the LGAs sampled. Based on the data from the survey, we recommend that some degree of F and E interventions be incorporated in the five LGAs with TF prevalence between 5% and 9.9%, as well as the incorporation of community-targeted treatment.

Global Trachoma Mapping Project Progress Report

Presented by Rebecca Mann Flueckiger, Information Analyst, International Trachoma Initiative

Background

The goal of the Global Trachoma Mapping Project (GTMP) is to complete the global baseline mapping of trachoma by March 2015. The catalyst for this work was a grant of £10.6 million provided by the Department for International Development (DfID). Additional funding and support has been provided by the United States Agency for International Development (USAID) and other partners, including The Carter Center (TCC). These additional resources have contributed greatly in filling the funding gaps and expediting the completion of baseline mapping.

The original plan for the GTMP was to map 1,238 districts in 30 countries. However, due to the dynamic nature of this work the goal has increased to 1,746 districts in 33 countries. In order to reach this lofty goal, standardization is critical. The GTMP has instituted standardized practices in data collection, data processing and data validating.

Data Collection, Cleaning, and Approval Process

A two-person team, consisting of a certified trachoma grader and a data recorder, is used for GTMP data collection. The certified grader examines individuals for trichiasis and active trachoma while the recorder asks and documents responses to a series of water, sanitation, and hygiene (WASH) questions. Data is recorded using Android smart phones and a web-based database application (LINKS).

At the conclusion of data collection for each cluster, the GTMP data manager cleans the raw data by removing any noise generated by the data transmission process, checking for errors, and querying any inconsistencies with the field team.

To ensure the validation of the data for each country, an epidemiologist appointed by the relevant Ministry of Health (MoH) evaluates the data, and then either approves the dataset or queries it with the GTMP Chief Scientist. This process is streamlined through the automation of analyses generating prevalence and summary data.

Once the methodology is validated by the MoH epidemiologist, the MoH or designee signs off on the summary data. This allows the categorical trachomatous inflammation-follicular (TF) and trachomatous trichiasis (TT) prevalence data to be displayed on the Trachoma Atlas (www.trachomaatlas.org).

Progress

The progress of the project is impressive. In the last 14 months, 954 districts have completed mapping (77% of original target), and of these, 95% were mapped using GTMP methodology. In the next four months, 21 countries are planning to conduct mapping. There remain 792 districts to map.

Trichiasis Surgery Week: Scale-up of surgery activities in Niger

Presented by Dr. Kadri Boubacar, Deputy National Coordinator, National Eye Care Program

Background

At the end of 2012, it was estimated that the number of trichiasis cases requiring surgery in Niger was greater than 35,000. However, trichiasis surgery was not being prioritized by district and regional health directorates or by administrative and traditional leaders. Thus, in 2013, the National Eye Care Program decided to organize a "Trichiasis Surgery Week" to bring more attention to this important public health problem and reach more patients requiring surgery.

Preparations

In preparation for the week, authorities within the Ministry of Health (MoH) were consulted and contact was made with the districts and regions. High-level administrative authorities including the Minister of Public Health, governors and prefects, traditional authorities such as sultans and canton leaders, national press, and health personnel at all levels were mobilized to participate.

In order to reach the surgical objective of operating on 5,400 patients in one week, 80 trichiasis surgeons and 30 ophthalmic technicians were recruited to dedicate their week to trichiasis surgeries.

Results

A total of 3,091 patients were operated on in five days, for an average of 618 cases per day and 23 cases per surgeon (see Table 1). This accomplished 57.2% of the targeted number of surgeries for the "Trichiasis Surgery Week". The majority of cases were operated in Zinder region, followed by Maradi region, though the estimated backlog in Maradi is about twice as high as that of Zinder. Women accounted for the majority of cases operated, at 62%, which is in line with the overall proportion of women with trichiasis. Surprisingly, the "Trichiasis Surgery Week" did not significantly increase the National Program's overall surgical output in 2012: 11,021 patients were reported as operated in 2012 compared to11,228 patients reportedly operated in 2013.

The Minister of Public Health presided at the opening ceremony near Zinder; the governors of the five districts involved in the Trichiasis Surgery Week also participated, as did prefects from the districts and a number of traditional leaders.

The total cost of the surgery week, supported by The Carter Center and Helen Keller International, was $77,782, or around $25.16/person operated. Approximately 50% of the total cost was spent in mobilizing the authorities to participate.

Conclusions

The Trichiasis Surgery Week did mobilize many patients in a short amount of time; however, it did not help the program to increase its overall yearly output, an issue to which the National Program believes there is a solution. The National Program believes that future surgical weeks can achieve increased output with improved logistical planning and budgeting, increased involvement of the communities themselves, detection and pre-registration of trichiasis cases, and a protocol to manage refusal cases.

Table 1. Number of Trichiasis Cases Operated by Region and by Sex

Region	Number of Cases Operated	Women (%)
Dosso	134	93 (69.40%)
Diffa	390	260 (66.67%)
Tahoua	262	174 (66.41%)
Maradi	806	519 (64.39%)
Zinder	1,499	869 (57.97%)
TOTAL	**3,091**	**1,915 (61.95%)**

Trichiasis patients were given free transport to the site where they received surgery during Trichiasis Surgery Week in April 2013.

Lessons learned from rational use of antibiotics

Presented by Nicole Stoller, F. I. Proctor Foundation, University of California, San Francisco

Since 2006, the F.I. Proctor Foundation at The University of California, San Francisco (UCSF) has been collaborating with The Carter Center (TCC) and the Amhara Regional Health Bureau to carry out two randomized control trials funded by the National Eye Institute (NIH/NEI). The overall objective of Trachoma Amelioration in Northern Amhara (TANA) was to see how best to lower infection in a community; while in Tripartite International Research for the Elimination of Trachoma (TIRET), it was to see how to best keep infection from returning.

Communities were randomly selected for inclusion in the studies. Treatment coverage was 80% or better across the board. The main outcomes were clinical activity and chlamydial Polymerase Chain Reaction (PCR) tests.

TANA study aims:

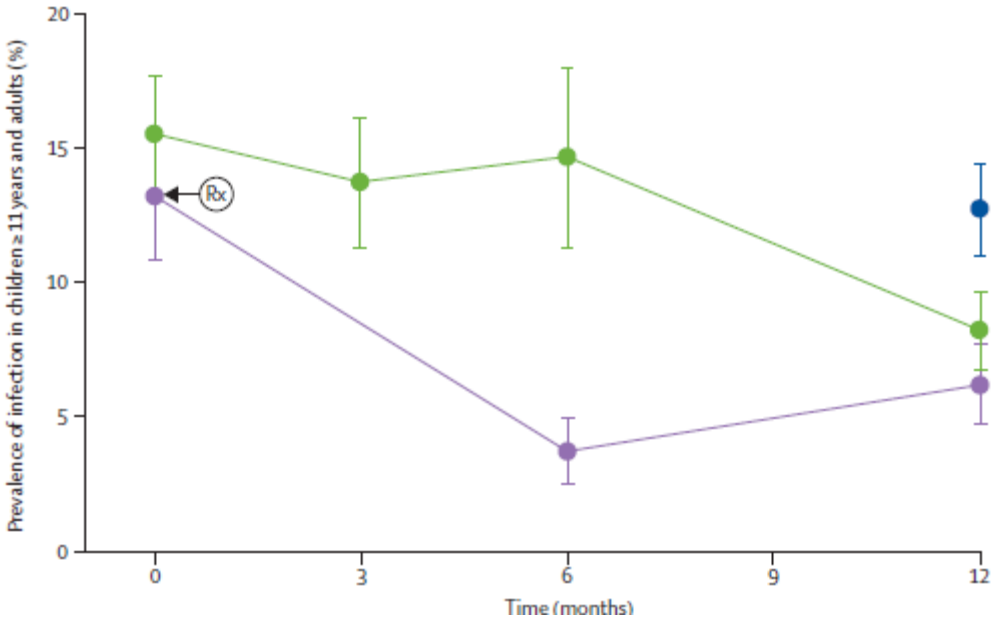
1. To determine whether mass treatments can eliminate ocular chlamydia from hyper-endemic communities. **Will biannual repeat treatment be sufficient to reduce ocular infection in a community to zero?** Numbers in the following tables reflect an average of communities in a treatment arm. Some communities did get to 0% infection, but infection continues to come in from outside communities.

Table 1. Prevalence of Infection: PCR for children ≤ 9 years

Arm	Prevalence of Infection: PCR for children ≤9 years							
	0 Months	6 Months	12 Months	18 Months	24 Months	30 Months	36 Months	42 Months
Annual	41.9%	14.2%	14.6%	4.5%	5.0%	1.7%	3.5%	1.9%
Biannual	36.8%	13.4%	9.1%	4.2%	2.2%	1.4%	1.7%	3.2%

2. To determine whether children form a core group for the transmission of trachoma. **Can treatment that targets children alone eventually eliminate infection in the entire community?** Figure 1 shows the prevalence of infection in adults during the first year of the study. Green indicates communities where only children were treated; purple indicates communities where everyone was treated; blue is the control group. With treatment, infection in adults drops almost immediately. Without treatment, infection drops more slowly, but soon is similar to the other arm.

Figure 1. Prevalence of Infection in Adults and Children ≥ 11 years



TIRET study aims:

1. **Can we stop antibiotics after three years?** We hypothesized that infection would return, even from low levels. Twenty-four communities, which received repeated mass treatments for four years, were monitored for an additional three years to determine if chlamydial infection returns.

Table 2. Prevalence of Infection: PCR for children ≤ 9 years

Arm	Prevalence of Infection: PCR for children ≤9 years								
	0 Months	6 Months	12 Months	18 Months	24 Months	30 Months	36 Months	42 Months	72 months
Annual	41.9%	14.2%	14.6%	4.5%	5.0%	1.7%	3.5%	1.9%	13.9%
Biannual	36.8%	13.4%	9.1%	4.2%	2.2%	1.4%	1.7%	3.2%	12.8%

2. **Can infection be completely eliminated if mass treatments continue for six years?** We hypothesized that infection would be completely eliminated in all communities: 12 of which continued receiving annual treatment and 12 of which continued receiving biannual treatment.

Table 3. Prevalence of Infection: PCR for children ≤ 9 years

Arm	Prevalence of Infection: PCR for children ≤9 years								
	0 Months	6 Months	12 Months	18 Months	24 Months	30 Months	36 Months	42 Months	72 months
Annual	41.9%	14.2%	14.6%	4.5%	5.0%	1.7%	3.5%	1.9%	2.2%
Biannual	36.8%	13.4%	9.1%	4.2%	2.2%	1.4%	1.7%	3.2%	3.9%

3. **Can targeted treatment prevent infection from returning into the community?** We monitored 12 communities where annual treatment was targeted to clinically active cases and their households; and 12 communities where annual treatment was targeted to pre-school children.

Table 4. Clinical Activity in Children (≤9 years)

Arm	Clinical Activity in Children (≤9 years)			
	48 months	60 months	72 months	84 months
Continue Annual	42.0%	42.7%	38.7%	40.9%
Target Age	39.4%	42.9%	43.4%	39.1%
Target Exam	39.0%	34.2%	38.6%	37.7%

Trachoma Education in Amhara: Making it Work for Teachers and Students

Presented by Kim Jensen, Assistant Program Coordinator for the Trachoma Control Program, The Carter Center

Background

The importance of health education as it relates to the prevention of blinding trachoma has long been acknowledged, and The Carter Center (TCC) has been involved in supporting health education in the Amhara region of Ethiopia since 2001. In 2004, TCC developed a trachoma education curriculum to be incorporated as supplemental material to the government-regulated school curriculum. As it has been five years since the curriculum was revised, redistributed, and teachers trained in 2008-2009, TCC determined that it would be beneficial to conduct formative research to assess the current use of the curriculum and potential opportunities for trachoma education.

Methods

We conducted a two-part qualitative assessment. During phase one of the formative study, in-depth interviews were conducted with teachers and directors to assess facilitators of and barriers to trachoma education in schools. In-depth interviews of one director and one teacher from each of the selected schools were conducted, ranging in length from 45-75 minutes. Each interview was conducted in Amharic with one interviewer and a note-taker. During the second phase, primary school children, who attended schools from phase one, participated in focus group discussions (FGDs), led by a female moderator. During the FGDs, participatory activities were utilized to elicit student discussion; the activities included community mapping, message critique, and poster creation. The purpose of the discussions was to establish image preferences and current knowledge and behavioral practices related to trachoma. The purpose of the interviews and discussions was to determine what prevents teachers from including trachoma education in their lesson plans, what characteristics of a curriculum may facilitate its inclusion in teachers' plans, and to which images and concepts children most respond, so that we may establish the health education materials that best fit within the constraints and preferences of the target audience.

Findings and Recommendations

Preliminary findings indicate that teachers' time constraints prevent the inclusion of trachoma education into the lesson plans, as determined from the 35-55% of recordings that have been transcribed to date. As the trachoma curriculum developed by TCC is supplemental to the government-mandated curriculum, teachers struggle to find time to incorporate lessons into their plans. Some teachers were able to incorporate trachoma and other health education into the lesson plans; however, these were not complete lessons but rather five-minute truncated lessons at the beginning of class. Considering the lack of materials and time for teachers to develop supplemental activities for trachoma education, a trachoma education toolbox could be created to increase use. If short, self-contained activities with the supporting materials (such as a poster or storybook) were included in one toolbox, it could ease the workload of the teachers and increase the opportunity for greater inclusion of trachoma education throughout the year.

Numerous teachers and directors also described the need for additional training and follow-up. Since the trachoma curriculum is additive to the standard curriculum, it is not included in the required lessons on which teachers are trained or assessed. Currently, supervision is through TCC-Ethiopia staff; when the Ministry of

Education is not involved, teachers and directors are less inclined to implement these lessons, as they prioritize those mandated by the government.

Focus group discussions with school-going children revealed school as the best place for children to receive health education. While a large portion of children is missed through school-based health education, as attendance rates are estimated to be 60.6%, it is still a majority of school-age children that may be reached. Further, school-going children, if not at school, are in the fields caring for cattle or at home assisting with housework and not in another location where health education for a large group of children can be achieved. If this pattern holds true, it may determine that health education in schools is currently the best way to reach the majority of the school-age children, and at scale.

Upon review of the students' knowledge and understanding of trachoma, there was an apparently strong connection between flies and trachoma. In terms of students' preferred health education images, most students preferred comparisons between positive and negative images (e.g. clean vs. dirty face). Though many students had visible adverse reactions to negative pictures, they acknowledged the importance of seeing the negative photos next to the positive picture. When given the opportunity to produce examples of educational materials for family and friends, the students depicted these concepts in their drawings (Figures 1 & 2). However, though an understanding of trachoma exists, including the risk factors and preventive strategies, it appeared as though some students experienced *message overload*. Some students misinterpreted messages and confused concepts; they related risk factors attributed to trachoma to risk factors of other health issues, such as intestinal parasites or HIV. It appeared that students were, indeed, receiving health messages, though perhaps not at the necessary depth to elicit understanding or message retention; this should be considered when developing additional health education materials for trachoma and other health topics.

Figure 1: *A student drawing depicting the connection between flies and trachoma*

Figure 2*: Drawing demonstrating the side-by-side comparison of the positive and negative.*

Health education is paramount in eliminating trachoma and, due to the challenges discussed by teachers to incorporate health lessons into the current government-mandated curriculum, we recommended that further assessments be conducted to determine if trachoma, among other health topics, can be incorporated into the government-mandated curriculum. The inclusion of such lessons will address many constraints raised by educators and observed by the students. By incorporating various health topics into the curriculum, there will be sufficient time allotted for health lessons. In addition, routine supervision by Carter Center staff to ensure that trachoma lessons are taught will be unnecessary as it will be a regulated subject and assessed by the Ministry of Education. Further, teacher attrition will not be as large of a challenge to trachoma/health education, as it will be a required subject and all teachers will present the same required material from the curriculum. Finally, by including trachoma and other health-related topics as a unit in the government-approved curriculum, the material could be presented in an organized and age-appropriate manner, potentially limiting the message overload and confusion of messages that were observed during the evaluation.

There exist potential benefits to the community as a whole from improving health education in schools as children acknowledge the importance of school and their ability to educate their family. As we move forward toward our goal of eliminating blinding trachoma, we must focus on the behavioral components of prevention and focus our attention on health education and the resulting behavior change. If children recognize their ability to educate their mothers and fathers, we should find ways to best educate them so they may serve as agents of change in this effort to prevent and eliminate blinding trachoma

2014 Program Review Recommendations

General Recommendations

1. Whenever possible, national trachoma programs should publish data documenting their experiences related to levels of trachomatous inflammation-follicular (TF), stopping of mass drug administration (MDA), follow up, and sampling frames used to assess levels of TF.

2. All programs should consider conducting a brief survey to assess MDA coverage after every drug distribution.

3. All countries should encourage their World Health Assembly (WHA) delegates to raise the issue of criteria for verification for the elimination of blinding trachoma as a public health problem.

4. Where possible, country programs should examine the costs of sub-district surveys according to the needs of the country and consider presenting this information at next year's program review, if applicable.

5. All country programs should consider developing detailed plans to increase trachomatous trichiasis (TT) surgical output and quality to present at next year's program review meeting.

6. Conduct cross-border collaborative meetings and plans by both the implementing partners and member states (Niger and Nigeria; South Sudan and Uganda).

7. National Programs should consider strengthening their system of mobilization and sensitization at the community level.

8. National Programs should identify what resources, skills, and personnel are required to strengthen their data management and intervention reporting and convey these needs to implementing partners.

9. Enhance collaboration with all stakeholders of WATSAN/WASH.

10. All countries should collaborate on cross-border issues to ensure that eligible populations, specifically displaced persons, receive MDA and other trachoma interventions, where needed.

Country-Specific Recommendations

Ethiopia

1. Ethiopia should create regional trachoma task forces.

Mali

1. Resume activities in the North in 2014 if security permits.
2. Have a meeting between Mali and Niger to discuss putting in place post-endemic surveillance as well as strategies that will enable them to reach elimination by 2015.

Niger

1. Complete mapping in Agadez before the rainy season, if security permits.
2. Have a meeting between Mali and Niger to discuss putting in place post-endemic surveillance as well as strategies that will enable them to reach elimination by 2015.

South Sudan

1. Partners should meet to discuss the feasibility of working together to provide training for TT surgeons, who are currently living in Juba and in countries bordering South Sudan to ensure enough surgeons are trained and able to provide quality services once interventions are able to begin again.
2. Partners should support the national program to achieve a high level of coordination of trachoma activities.

Sudan

1. TCC should continue to pay the revolving cost for surgeries conducted at hospitals as part of routine services and extend to district hospitals.
2. The National Program should survey accessible areas of Darfur if possible.

Trachoma: The Disease

Trachoma, the world's leading cause of preventable blindness, can be found in over 50 countries. More than 300 million people are at risk for trachoma, and over 4 million are at immediate risk for blindness from trichiasis. Trachoma is caused by repeated infections of the conjunctiva (the lining of the eye and eyelid) by the bacterium *Chlamydia trachomatis*, and can be prevented through simple hygiene practices. Most cases occur in rural, arid areas of developing countries, such as the Sahelian region of Africa, where access to clean water is limited.

The early stage of the disease is called *inflammatory trachoma*, and is most common among children. Inflammatory trachoma can present as either the formation of whitish follicles on the conjunctiva under the upper lid or around the cornea, or as an intense painful or uncomfortable inflammation with thickening of the conjunctiva. Repeated cycles of infection and resolution lead to the formation of scar tissue on the conjunctiva. Women are repeatedly exposed to inflammatory trachoma in their role as primary caretakers of children. It is therefore not surprising to find that women develop chronic trachoma twice as often as men. Trachoma is transmitted through discharge from the eyes and nose of infected individuals by contact with hands, towels and clothing, or by flies, which are attracted to ocular and nasal discharge. As trachoma patients' eyelids are repeatedly infected with *Chlamydia trachomatis*, subsequent scarring of the conjunctiva deforms the eyelid margin, resulting in eyelashes turning inward and rubbing against the cornea. This condition, called *trichiasis*, causes disabling pain and physically abrades the cornea, scratching it and introducing other infections. Trichiasis is horrific in itself, but also rapidly leads to blindness.

Recent developments have brought new hope that we can effectively control this disease. In 1987, eye care experts and the World Health Organization (WHO) developed a simplified trachoma grading scale, which facilitated and standardized the diagnosis and identification of all stages of trachoma. In 1997, the WHO established the GET 2020 (Global Elimination of Trachoma) Alliance, which brought international non-governmental development organizations, donors and researchers together to work collectively in controlling trachoma. In addition, with support from the Edna McConnell Clark Foundation and WHO, the *SAFE strategy* (**S**urgery, **A**ntibiotics, **F**acial cleanliness, and **E**nvironmental improvement) was created to control trachoma through community-based interventions.

Another important development was the finding that the oral antibiotic azithromycin, taken once or twice annually, is as effective in preventing chronic trachoma as six weeks of daily treatment with tetracycline eye ointment, the previously recommended therapy. In 2009, Pfizer Inc, manufacturer of Zithromax®, recommitted to supporting the WHO GET 2020 goal of eliminating blinding trachoma by the year 2020. Since the beginning of the donation in 1998, approximately 275 million doses of Zithromax® have been donated by Pfizer Inc and managed by the International Trachoma Initiative. The donation has reached 23 countries with plans to expand to an additional five countries in 2013. The existence of the donation program has served to invigorate national trachoma programs and global support for the elimination of blinding trachoma.

"Focus on Impact"
The Fifteenth Annual Trachoma Control Program Review
The Carter Center
February 25-27, 2014

Tuesday, February 25		
8:00	*~Depart the Renaissance Hotel for The Carter Center~*	
8:30 – 9:00	Breakfast	
9:00 – 9:30	Welcome & Opening Remarks	Dr. Donald Hopkins Acting Director, Trachoma Control Program Vice President, Health Programs The Carter Center
9:30 – 10:30	Ethiopia: Amhara Perspective Program Status	Mr. Tesfaye Teferi Tego Senior Program Officer The Carter Center—Ethiopia
10:30 – 11:00	Coffee Break & Group Photo	
11:00 – 12:00	Mali Program Status	Professor Lamine Traore National Coordinator National Coordinator, Prevention of Blindness Program Ministry of Health—Mali
12:00 – 1:00	Niger Program Status	Dr. Kadri Boubacar Deputy Coordinator, National Eye Care Program Ministry of Health—Niger
1:00 – 2:00	Lunch	
2:00 – 2:15	Announcements	
2:15 – 3:15	Sudan Program Status	Dr. Kamal Eldin Hashim Mohamed Osman National Coordinator, Prevention of Blindness Program Federal Ministry of Health—Sudan
3:15 – 3:45	Coffee Break	
3:45 – 4:30	Post-treatment Surveillance and Elimination Verification	Dr. Jonathan King Former Epidemiologist, Trachoma Control Program The Carter Center
5:00 – 7:00	**Reception at The Carter Center Presidential Library and Museum** **In honor of Dr. Paul Emerson**	
7:30	*~Shuttle Departure to the Renaissance Hotel~*	

"Focus on Impact"
The Fifteenth Annual Trachoma Control Program Review
The Carter Center
February 25-27, 2014

Wednesday, February 26

8:00	*~Depart the Renaissance Hotel for The Carter Center~*	
8:30 – 9:00	Breakfast	
9:00 – 9:15	Introduction of Meeting Chairs	Dr. Emmanuel Miri & Mr. Sadi Moussa Country Representatives The Carter Center—Nigeria & The Carter Center—Mali
9:15 – 10:15	Ethiopia: National Program Status	Mr. Oumer Shafi NTD Team Leader Federal Ministry of Health—Ethiopia
10:15 – 10:45	Ethiopia: Improving Coverage in MalTra Weeks and Post-MDA Assessments	Mr. Eshetu Sata Shanka Monitoring & Evaluation Officer The Carter Center—Ethiopia
10:45 – 11:15	Coffee Break	
11:15 – 12:00	Is Surgery the Only Option?	Dr. Matthew Burton Senior Lecturer & Wellcome Trust Senior Research Fellow London School of Hygiene & Tropical Medicine
12:00 – 1:00	Mali: Sub-District-Level Surveys (Cost and Surveillance)	Professor Lamine Traoré National Coordinator, Prevention of Blindness Program Ministry of Health—Mali
1:00 – 2:00	Lunch	
2:00 – 2:15	Announcements	
2:15 – 3:15	Nigeria Program Status	Dr. Uwaezuoke Onyebuchi NTD Coordinator Federal Ministry of Health—Nigeria
3:15 – 3:45	Coffee Break	
3:45 – 4:15	Nigeria: Integrated Trachoma and other NTD Mapping in Southeast Nigeria	Dr. Falam Jip Nimzing Director, Trachoma Control Program The Carter Center—Nigeria
4:15 – 5:00	Global Trachoma Mapping Project Update	Rebecca Mann Information Analyst International Trachoma Initiative
5:00	*~Shuttle Departure to the Renaissance Hotel~*	

"Focus on Impact"
The Fifteenth Annual Trachoma Control Program Review
The Carter Center
February 25-27, 2014

Thursday, February 27

8:00	*~Depart the Renaissance Hotel for The Carter Center~*	
8:30 – 9:00	Breakfast	
9:00 – 9:15	Introduction of Meeting Chairs	Dr. Zerihun Tadesse & Mr. Salissou Kane Country Representatives The Carter Center—Ethiopia & The Carter Center—Niger
9:15 – 10:15	Uganda Program Status	Dr. Patrick Turyaguma Trachoma Program Manager Ministry of Health—Uganda
10:15 – 11:15	South Sudan Program Status	Ms. Angelia Sanders Technical Advisor, Trachoma Control Program The Carter Center—South Sudan
11:15 – 11:45	Coffee Break	
11:45 – 12:15	Niger Trichiasis Surgery Week and other Strategies to Improve Surgical Uptake	Dr. Kadri Boubacar Deputy Coordinator, National Eye Care Program Ministry of Health—Niger
12:15 – 12:45	Lessons Learned from Rational Use of Antibiotics Studies	Ms. Nicole Stoller Program Manager Francis I. Proctor Foundation—UCSF
12:45 – 1:45	Lunch	
1:45 – 2:00	Announcements	
2:00 – 2:30	Trachoma Education in Amhara: Making it Work for Teachers and Students	Ms. Kim Jensen Assistant Program Coordinator, Trachoma Control Program The Carter Center
2:30 – 3:00	Coffee Break	
3:00 – 5:00	Conclusions & Recommendations	
5:15	*~Depart The Carter Center for the Renaissance Hotel*~*	

**Time subject to change. Bus will depart The Carter Center shortly after the conclusion of the review meeting.*

Program Review Participants

Ethiopia
Mr. Mulugeta Debasu Yismaw (ARHB)
Mr. Oumer Shafi Abdurahman (FMOH)
Dr. Zerihun Tadesse Gebrelassie (The Carter Center)
Mr. Tesfaye Teferi Tego (The Carter Center)
Mr. Mohammed Aderajew (The Carter Center)
Mr. Eshetu Sata Shanka (The Carter Center)
Mr. Mulat Zerihun Lemu (The Carter Center)

Mali
Prof. Lamine Traoré (MOH)
Mr. Sadi Moussa (The Carter Center)
Mr. Yaya Kamissoko (The Carter Center)

Niger
Dr. Boubacar Kadri (MOH)
Mr. Mohamed Salissou Kane (The Carter Center)
Dr. Sabo Hassan Adamou (The Carter Center)

Nigeria
Dr. Bridget Okoeguale (FMOH)
Dr. Uwaezuoke Onyebuchi (FMOH)
Dr. Emmanuel Miri (The Carter Center)
Dr. Falam Jip Nimzing (The Carter Center)

South Sudan
Ms. Angelia Sanders (The Carter Center)

Sudan
Dr. Kamal Hashim Osman (FMOH)
Dr. Nabil Aziz Awad Alla (The Carter Center)
Ms. Zeinab Abdalla Mohammed Ahmed Abdaua (The Carter Center)

Uganda
Dr. Edridah Muheki Tukahebwa (MOH)
Dr. Patrick Turyaguma (MOH)
Ms. Peace Habomugisha (The Carter Center)

Abbott Laboratories
Ms. Ann Matz-Tirado

AbbVie Foundation
Mr. Jeff Richardson

CBM
Dr. K.H. Martin Kollman

The U.S. Centers for Disease Control and Prevention
Dr. Christine Dubray
Dr. Diana Martin

Conrad N. Hilton Foundation
Mr. Gregory Andersen

Emory Eye Center
Dr. Danny Haddad

Francis I. Proctor Foundation, UCSF
Ms. Nicole Stoller

The Fred Hollows Foundation
Mr. Wondu Alemayehu
Dr. Richard Le Mesurier
Ms. Virginia Sarah

Helen Keller International
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Ultimate Intervention Goals (UIGs) Definitions

Surgery	$\frac{\text{Sum of surgeries to date}}{\text{Sum of surgeries to date + most recent backlog}}$
Antibiotics*	$\frac{\text{Annual sum of azithromycin and TEO distributed}}{\text{Total population where TF in children ages 1-9 > 10\%}}$
Facial Cleanliness	$\frac{\text{Number of villages in which there is routine health education}}{\text{Total number of villages in districts where TF in children ages 1-9 > 10\% + any villages where TF in children ages 1-9 >10\% in non-endemic districts}}$
Environmental Improvement**	$\frac{\text{Sum of household latrine construction to date}}{\text{Total households without a latrine x 0.5}}$

NB: Progress against UIGs was calculated for both Carter Center-assisted output and for national program output.

**The goal for antibiotic distribution is not strictly a UIG; it is the proportion of the Annual Treatment objective obtained.*

***The Millennium Development Goal 7c (MDG7c) calls to halve the proportion of the population without access to a latrine by 2015.*

List of Papers Published by Carter Center Trachoma Program Staff in 2013

1. Cromwell EA, Amza A, Kadri B, King JD, Sankara D, et al. (2013) Trachoma prevalence in Niger : Results of 31 district-level surveys. *Transactions of the Royal Society of Tropical Medical and Hygiene* **108**(1): 42-48.

2. Cromwell EA, King JD, McPherson S, Jip FN, Patterson AE, et al. (2013) Monitoring of mass distribution interventions for trachoma in Plateau State, Nigeria. *PLoS Neglected Tropical Diseases* **7**(1): e1995. doi:10.371/journal.pntd.0001995.

3. Freeman MC, Ogden S, Jacobson J, Abbott D, Addiss DG, et al. (2013) Integration of water, sanitation, and hygiene for the prevention and control of neglected tropical diseases: A rationale for inter-sectoral collaboration. *PLoS Neglected Tropical Diseases* **7**(9):e2439. Doi:10.1371/journal.pntd.0002439.

4. Freeman MC, Clasen T, Brooker SJ, Akoko DO, & Rheingans R. (2013) Impact of school-based hygiene, water quality and sanitation intervention on soil-transmitted helminth reinfection: a cluster-randomized trial. *American Journal of Tropical Medicine and Hygiene* **89**(5):875-883.

5. Hay SI, Battle KE, Pigott DM, Smith DL, Moyes CL, et al. (2013) Global mapping of infectious disease. *Philosophical Transations of the Royal Society of Biological Sciences* 368(1614):20120250. doi:10.1098/rstb.2012.0250.

6. Keenan JD, Emerson PM, Gaynor BD, Porco TC, & Lietman TM. (2013) Adult mortality in a randomized trial of mass azithromycin for trachoma. *Journal of the American Medical Association Internal Medicine* **173**(9):821-823.

7. King JD, Buolamwini J, Cromwell EA, Panfel A, Teferi T, et al. A novel electronic data collection system for large-scale surveys of neglected tropical diseases. (2013) *PLoS ONE* **8**(9): e74570. doi:10.1371/journal.pone.0074570.

8. King JD, Odermatt P, Utzinger J, Ngondi J, Bamani S, et al. (2013) Trachoma among children in community surveys from four African countries and implications of using school surveys for evaluation prevalence. *International Health* **5**(4):280-287. doi:10.1093/inthealth/iht027.

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10. Pearson K, Habte D, Zerihun M, King JD, Gebre T, et al. (2013) Evaluation of community-based trichiasis surgery in Northwest Ethiopia. *Ethiopian Journal of Health Sciences* **23**(2): 131-140.

11. Rajak SN, Habtamu E, Weiss HA, Kello AB, Abera B, et al. (2013) The outcome of trachomatous trichiasis surgery in Ethiopia: Risk factors for recurrence. *PLoS Neglected Tropical Diseases* **7**(8): e2392. doi: 10.1371/journal.pntd0002392.

12. Smith JL, Flueckiger RM, Hooper PJ, Polack S, Cromwell EA, et al. (2013) The geographical distribution and burden of trachoma in Africa. *PLoS Neglected Tropical Diseases* **7**(8): e2359. doi:10.1371/journal/pntd.0002359.