



I N P R A C T I C E

Eliminating Blindness from Trachoma Infection

*Lessons learned from the
Conrad N. Hilton Foundation*

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This paper has been revised from the initial publication.

Foreword

As a teenager, Conrad Hilton developed a lifelong admiration for Helen Keller. In his last will, our founder expressed his wish that the Foundation would never abandon those who “wander alone in poverty and darkness.” Today, the Conrad N. Hilton Foundation works to prevent blindness through a major program area, confronting sight loss.

We made our first grants to help control trachoma—a significant cause of preventable blindness—in 1997. Since then, we have contributed more than \$40 million to the elimination of this infectious disease in several countries, most notably Ghana, Mali, and Niger. All three of these countries are poised to eliminate trachoma by 2015.

From the beginning, our grantmaking has focused on implementing elements of the World Health Organization’s SAFE strategy, which recommends Surgery, Antibiotics, Facial cleanliness, and Environmental improvements. Our grantees also work to strengthen the ability of countries and international organizations to eliminate trachoma, develop curriculum to encourage health education in schools around the world, generate and share knowledge in the field, and improve the quality, delivery, and outcomes of trachoma control programs.

In this report, experienced philanthropic evaluator and consultant Dr. Nancy J. Allen turns a critical eye to the Hilton Foundation’s trachoma-related grantmaking and draws out lessons that will be valuable to our future grantmaking decisions. Dr. Allen also assesses the continuing impact and effectiveness of the SAFE strategy.

We are grateful to Dr. Allen for this paper, and for her recommendations. We hope it will be of benefit to the many organizations working to eliminate blinding trachoma and other neglected tropical diseases.



Steven M. Hilton
Chairman, President & CEO, Conrad N. Hilton Foundation
December 2012

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About the Author

Dr. Nancy J. Allen is an organizational sociologist, providing consulting services to philanthropic foundations and international development agencies, currently specializing in strategic program evaluation. She brings to her work a wealth of international and organizational experience and a broad set of skills in organizational, institutional, systems, and policy analysis, evaluation, and development. She is currently working as an independent consultant based in Davis, California; formerly based in Nairobi, Kenya. She received her Ph.D. from Harvard University, in a joint degree of the Harvard Business School and the Department of Sociology. She also holds an M.B.A. from Santa Clara University and a B.S. in Arabic and Middle East Studies from Georgetown University. Dr. Allen began her career in the private sector. Immediately prior to beginning her consulting career, she worked for six years at the Harvard Institute for International Development as an economic advisor to the Ministry of Finance in Indonesia, specializing in foreign direct investment, trade and industrial policy, and export manufacturing. Her most recent international assignments have been as team leader for USAID evaluations in South Sudan.

About the Conrad N. Hilton Foundation

The **Conrad N. Hilton Foundation** was created in 1944 by international business pioneer Conrad N. Hilton, who founded Hilton Hotels and left his fortune to help the world's disadvantaged and vulnerable people. The Foundation currently conducts strategic initiatives in five priority areas: providing safe water, ending chronic homelessness, preventing substance abuse, helping children affected by HIV and AIDS, supporting transition-age youth in foster care, and extending Conrad Hilton's support for the work of Catholic Sisters. Following selection by an independent international jury, the Foundation annually awards the \$1.5 million Conrad N. Hilton Humanitarian Prize to a nonprofit organization doing extraordinary work to reduce human suffering. From its inception, the Foundation has awarded more than \$1 billion in grants, distributing more than \$80 million in 2011. The Foundation's current assets are approximately \$2 billion. For more information, please visit www.hiltonfoundation.org.

About In Practice

In Practice is a series of knowledge papers published by the Conrad N. Hilton Foundation. It reports on Foundation program strategies and partnerships, and seeks to help inform the practice of other funders and policymakers working in areas of great human need.

The views expressed in this report are those of an independent consultant and are not necessarily shared by the Conrad N. Hilton Foundation staff or its board of directors.

Great progress has been made in the international effort to combat trachoma, even as significant challenges must be met in order to reach the ultimate goal of global elimination by 2020.

Introduction

The Conrad N. Hilton Foundation began its support for the elimination of blinding trachoma in 1997, immediately following the establishment of the Alliance for the Global Elimination of Blinding Trachoma by 2020 (GET 2020). Now, almost 15 years later, the Foundation has cumulatively contributed more than \$40 million toward reducing the spread of trachoma. Great progress has been made in this international effort to combat trachoma, even as significant challenges must be met in order to reach the ultimate goal of global elimination by 2020.

What Is Trachoma?

Trachoma, a highly contagious infection caused by the bacteria *Chlamydia trachomatis*, is the most common infectious cause of blindness worldwide, presenting initially in young children as an inflammation of the eyelid. The bacteria spread easily from an infected person's hands or clothing, or can be carried by flies that have come in contact with discharge from the eyes or nose of an infected person. Over many years of repeated infection and chronic inflammation, visible scar tissue forms on the inside of the upper eyelid forcing eyelashes inward (called trichiasis). The combination of abrasion of the cornea as a result of trichiasis and secondary infections causes acute pain, impairs vision, and, if untreated, eventually leads to permanent blindness.

Who Is Affected by Trachoma?

Worldwide, more than 40 million people are estimated to have active trachoma, and approximately 8 million are estimated to be suffering from trichiasis. Although estimates vary, trachoma is responsible for the visual impairment of about 1.8 million people, of whom 1.3 million are irreversibly blind.¹ Trachoma imposes significant economic and personal hardship on the infected individual, and on families and communities. In poor families, the burden of caring for a visually impaired parent falls on family members who are then unable to work or attend school themselves. Estimates of the economic burden of trachoma suggest the total loss of productivity for the vision-impaired or blind and their caregivers is between \$3 billion and \$6 billion every year.²

Trachoma declined in developed countries as populations shifted out of poverty and communities benefitted from less crowded and more hygienic living conditions. The last cases of trachoma in North America and Europe were reported in the 1950s. This history leads to a near universal conclusion: "Good hygiene and sanitation are the most powerful prevention tools available for trachoma."³ The disease persists among women and children, often the most vulnerable members of society, and occurs where people live in crowded conditions with limited access to water and health care.

¹ Global estimates of trachoma prevalence have been significantly reduced from highs in the 100 millions to current estimates around 40 million. Mariotti et al (2009) conclude that the lower estimates "can be explained by the success in implementing control strategy, by more accurate data, as well as by socio-economic development in endemic countries. Burton et al (2009) analyze reasons for high variability in estimates of trachoma disease burden.

² ICTC (July 2011) citing work of Frick et al (2003).

³ Orbis website discussion of trachoma. <http://www.orbis.org/Default.aspx?cid=5616&lang=1>

Where Is Trachoma Found?

The World Health Organization (WHO) identifies 56 countries as endemic for trachoma (see Appendix 1, Table 1). However, 80 percent of the burden of trachoma occurs in just 14 countries, almost all in sub-Saharan Africa (the single exception is Pakistan).

How Can Trachoma Be Eliminated?

In 1998, GET 2020 formally adopted the **SAFE** strategy (**S**urgery, **A**ntibiotics, **F**acial cleanliness and hygiene, and **E**nvironmental improvements) for the prevention and control of trachoma.

Four Elements of the **SAFE** Strategy

- S** **Surgery**
to halt pain and damage for people at immediate risk of blindness
- A** **Antibiotic therapy**
to treat individual active cases to reduce the levels of infection in a community via mass drug administration
- F** **Facial cleanliness and improved hygiene**
to reduce transmission
- E** **Environmental improvements**
focused on access to water and basic sanitation, so living conditions no longer facilitate transmission of trachoma

The WHO sets targets, or ultimate intervention goals, in the context of the SAFE strategy, that when met on a country-by-country basis, would constitute “elimination of trachoma as a public health problem.” Nine countries report having achieved or nearly achieved WHO ultimate intervention goals for the elimination of trachoma. (See Appendix 1).

The trachoma elimination sector is a relatively cohesive community of practice.

Who Are the Major Players in the Fight Against Trachoma?

The trachoma elimination community is an engaged and relatively cohesive community of practice, communicating regularly through two important strategic coalitions: the Alliance for the Global Elimination of Blinding Trachoma by 2020 (GET 2020) and, more recently, the International Coalition for Trachoma Control (ICTC). The WHO plays a critical role as convener of GET 2020. It is through the official processes of the WHO that “best practice” is legitimized and communicated to health bureaucracies in trachoma-endemic countries and through which elimination can ultimately be certified. Knowledge emerging from centers of research excellence (including The Wilmer Eye Institute at Johns Hopkins, The Francis I. Proctor Foundation for Research in Ophthalmology at the University of California, San Francisco, and the London School of Hygiene and Tropical Medicine) continues to inform the evidence base for programmatic action.

Important leadership roles are exercised by the International Trachoma Initiative (ITI), The Carter Center, Helen Keller International, the Kilimanjaro Centre for Community Ophthalmology, and Sightsavers. The Pfizer Corporation provides antibiotics free to national health programs implementing the SAFE strategy and has, by its own count, donated more than 225 million Zithromax[®] treatments (retail value estimated at over \$5 billion in the past 15 years). Pfizer has pledged to continue the donation through 2020. Implementing the SAFE strategy would almost certainly not be possible without this contribution. The single most important implementing agents, however, are national health systems in trachoma-endemic countries. Building capacity for national trachoma control programs is, accordingly, a core component of Hilton Foundation grants.

Direct funding sources for trachoma remain limited, although growing attention to the broader effort for ending Neglected Tropical Diseases (NTDs) presents the possibility of improved resources. Conrad N. Hilton Foundation funding in this arena focuses on supporting the four components of the SAFE strategy for trachoma elimination, rather than elimination of multiple NTDs. This relatively singular (yet comprehensive) focus on trachoma, as well as its long history of support to leaders in the field, raises the profile of the Foundation as a significant private funder of trachoma elimination interventions.

Evolution of Hilton Foundation Funding for Trachoma Elimination

Since 1997, the Foundation has provided more than \$40 million toward reducing the spread of trachoma, with approximately 90 percent of funding extended to just two organizations: The Carter Center and Helen Keller International.

Recent shifts in Foundation policy are leading to greater emphasis on evidence-based programming and measurable results.

Guiding Principles of Hilton Foundation Grantmaking

Conrad Hilton established the Conrad N. Hilton Foundation in 1944, and his last will and testament continue to guide the work of his foundation. Hilton warned strongly against charities spending too much money on unnecessary overhead. This caution has been heeded with an historic policy of lean staffing relative to its peers in the foundation world. One result of those staffing patterns has been the continuation of grants to a few select organizations based in sound understanding that important work was being accomplished, with grantmaking decisions more rarely based on measurable results. The Foundation's initial grants for work in trachoma control and prevention fall squarely in this category, and recent shifts in Foundation policy are leading to greater emphasis on evidence-based programming and measurable results.

Strategic Restructuring at the Conrad N. Hilton Foundation

In 2007, the Foundation embarked on an effort to review and reflect on past grantmaking and to devise a strategy going forward that would increase the Foundation's philanthropic leadership by achieving "greater clarity of purpose, improving focus on results and measurable impact, investing in organizational capacity of grantees, and exploring tools beyond grantmaking (e.g., convening, advocacy, evaluation)."⁴ This paper is a continuation of that reflective process and aims to identify and share lessons learned with the philanthropic community.

Origins of the Trachoma Program

At the board meeting of August 26, 1997, the Hilton Foundation:

“RESOLVED, that a \$20 million grant be awarded to go toward the treatment and elimination of trachoma to be paid over 10 years at \$2 million per year to The Carter Center and Helen Keller International. Specific details of the two grants are to be negotiated with the respective payee organizations and reported back to the board.”

⁴ Consultant Memo (May 10, 2008)

While the Foundation has always implicitly understood the link between trachoma and water investments, grantmaking related to trachoma has been, for the most part, made separately from water.

This decision came quickly on the heels of a presentation by Dr. Joe Cook of the Edna McConnell Clark Foundation. Notes from this presentation provide a record of the salient facts that informed the board's decisive action. The board noted that trachoma is "easily preventable" and that "good education in face washing and environment[al]" improvements could make a dramatic difference.

The Hilton Foundation decided to fund only the F and E components of the SAFE strategy, as "F and E were the neglected components of the SAFE strategy," "the E component ties in nicely with our water project," and F and E can have broader impact for health and sanitation.

Ten-year grants were awarded for \$13.7 million to The Carter Center and for \$5 million to Helen Keller International. Additional grants were made to World Vision (\$1.13 million) and the International Trachoma Initiative (\$250,000). The International Trachoma Initiative (ITI) grant was intended to assist in establishing the public-private joint venture of the Edna McConnell Clark Foundation and Pfizer for the distribution of the antibiotic Zithromax®.

Links to Water and Sanitation Funding

One unique aspect of the Hilton Foundation's grantmaking for trachoma elimination is that the Foundation has sought to both integrate this work with, and separate it from, aspects of its Water investments. Although the Foundation's trachoma-related grantmaking has been, for the most part, made separately from its Water program, the board was attracted to trachoma as a focus for confronting sight loss because it integrated with elements of the WASH (Water Access, Sanitation and Hygiene) work.

The Foundation's water and sanitation funding began, and continues today, with a focus on access to safe water, and can be divided into three broad phases.⁵

Phase 1 (1990–2000)

Improving Access to Potable Water (\$17.4 million)

In this first phase, approximately 80 percent of Hilton Foundation funding in water and sanitation went to World Vision USA to work in the most isolated and rural areas in Ghana, where Guinea worm disease was endemic. Success was gauged almost exclusively in terms of the number of boreholes dug. The first grants for trachoma were made at the end of this phase.

⁵ A more detailed look at the Foundation's WASH program is available in the In Practice report, "Providing Access to Safe Water" (September 2012). <http://hiltonfoundation.org/images/stories/Impact/InPracticeRpts/CNHF-WASHInPractice.pdf>

The lessons learned from grantmaking in water and blindness, followed by a Foundation-wide strategic development process, led to a board-approved strategy for sustainable water access.

Phase 2 (2001–2008)

Emerging focus on WASH with emphasis on targeted disease outcomes (\$23.7 million)

At a 2001 retreat, the board commissioned a study on how to best address developing countries' need for water. A "Global Water Initiative" report, prepared by the Pacific Institute, advised a broader, more integrated approach that addressed WASH. The Foundation incorporated these principles in the next round of grantmaking, expanding its geographic coverage from Ghana to also include Mali and Niger. An increased focus on health outcomes emerges in this period, particularly related to Guinea worm disease, but also trachoma.

Phase 3 (2009–Present)

Development of a Strategic Initiative for Safe Water Access

The lessons learned from grantmaking in water and blindness, followed by a Foundation-wide strategic development process, led to a board-approved strategy for sustainable water access that no longer incorporates specific health outcomes. The focus of the Foundation is on safe water access, with grants to organizations working in partnership with others in the broader WASH sector.

West Africa Water Initiative Components Addressed Trachoma

Attention to water-related diseases was most evident in the intermediate phase (2001–2008) when the Foundation launched the West Africa Water Initiative (WAWI) for WASH-related work in Ghana, Mali, and Niger to "address the interconnectedness across socio-economic, health, and environmental goals." WAWI began as a loosely defined partnership of approximately 15 organizations, and, following a strategic planning process in 2006 explicitly adopted four ambitious objectives, including:

"to reduce the prevalence of water-borne and sanitation-related disease, particularly trachoma, guinea worm and diarrheal diseases through the promotion of personal hygiene and environmental sanitation practices."

Strategic and structural tensions developed in a number of areas, including multiple challenges emerging from an increased focus on health outcomes in the context of a program otherwise dominated by World Vision's historical strengths in well drilling and pump installation. The Carter Center was listed initially as a WAWI partner, but reduced its level of participation on grounds that WAWI was not contributing adequately to water and sanitation improvements in areas of greatest disease incidence.

The partnership was able to identify important accomplishments, the most certain of which is that WAWI partners "significantly increased access to safe water by rural households in all three countries."⁶ Monitoring and evaluation systems and organizational capacity were not sufficient to allow assessment of other objectives.⁷ Ultimately, it was decided that the relationship, time, and financial costs of formal partnership exceeded

⁶ Allen, Nancy J. (2008). WAWI: A Preliminary Assessment for the Conrad N. Hilton Foundation. Available on-line at http://www.hiltonfoundation.org/images/stories/PriorityAreas/Water/Downloads/WAWI_PrelimAssessJan08.pdf.

⁷ USAID funded a monitoring and evaluation plan for WAWI that was never fully implemented (see http://www.ehproject.org/PDF/Activity_Reports/AR%20124%20WAWI%20M&E.pdf).

Important lessons were learned from the Foundation's WASH-related period of trachoma grantmaking, including the challenges of coordinating efforts to achieve targeted health outcomes within general water and sanitation projects.

the benefits. The Hilton Foundation continues to make grants to a number of the original WAWI partners, and those organizations continue to cooperate in the region. Their contribution to trachoma elimination in Ghana, Mali, and Niger deserves to be more fully examined and potentially quantified.

Important lessons were learned from the Foundation's WASH-related period of trachoma grantmaking, including the challenges of coordinating efforts to achieve targeted health outcomes within general water and sanitation projects. The lesson, very simply, is that integrated WASH programming is difficult to achieve, and health-related outcomes are exceedingly difficult to measure—especially those emerging from highly focused eradication and elimination programs like trachoma and Guinea worm disease. Additional planning would be required to ensure strategic alignment and to nurture collaborative advantages across fundamentally different organizations and government agencies in the community development, water and sanitation, and public health sectors. The need for improved monitoring and evaluation methods in the WASH sector remains critical.⁸ Very important lessons were also learned about the high transaction costs, both financial and emotional, of managing partnerships imposed through grantmaking, rather than those born and built out of natural collaborative advantages.

Establishment of a Major Program Area for Confronting Sight Loss

Lessons learned from the Foundation's trachoma grantmaking, followed by a Foundation-wide strategic development process, led to the decision to structure trachoma elimination grants more clearly within the program for confronting sight loss.

In 2008, the Foundation reconfirmed its commitment to blindness-related programs and established a "major program area" for confronting sight loss. This portfolio currently contains two significant but quite separate philanthropic endeavors: (1) educating, enabling, and empowering children with visual impairment and multiple disabilities, and (2) trachoma control and prevention. The education program has been focused almost exclusively on support to the Perkins School for the Blind, the world leader in education for children both blind and deaf, and for the visually impaired with multiple disabilities.

There are enormous similarities across these two endeavors, but almost no programmatic overlap. Ethically, the two programs embody the important charitable virtues enshrined in Conrad Hilton's founding commitment: to "relieve the suffering, the distressed and the destitute," never to allow others to "wander alone in darkness and poverty," and to provide charity to children. In programmatic practice, trachoma and blindness education are two different fields informed by different communities of practice and research.

⁸ The Hilton Foundation made a grant in 2012 to the Water Institute at the University of North Carolina to develop a Monitoring, Evaluation, and Learning Framework that seeks to address some of these challenges.

Review of Grants for the Elimination of Trachoma

This section of the paper reflects on insights gained through the Hilton Foundation's grants to The Carter Center, Helen Keller International, Word Vision, the World Health Organization, Lions Club International Foundation, and the International Trachoma Institute. The experiences with some of these organizations are presented here for purposes of elucidating lessons learned.

In 2008, the Hilton Foundation expanded its grantmaking to the full SAFE strategy, given the synergistic effect of implementing all four components.

Major Grants

The Carter Center

The Conrad N. Hilton Foundation has provided a total of \$23.6 million for trachoma elimination to The Carter Center (TCC) over the past 14 years, in two broadly structured grants:

Years	Amount: \$23.6 million	Purpose
1997–2008	\$13.6 million over ten years	Trachoma control and prevention in Ghana, Mali, Niger, Nigeria, and Yemen; funding for the F and E components of SAFE strategy.
2008–2012	\$10 million over five years	Trachoma control and prevention in Ghana, Mali, Niger, and Southern Sudan; funding for all four elements of SAFE strategy.

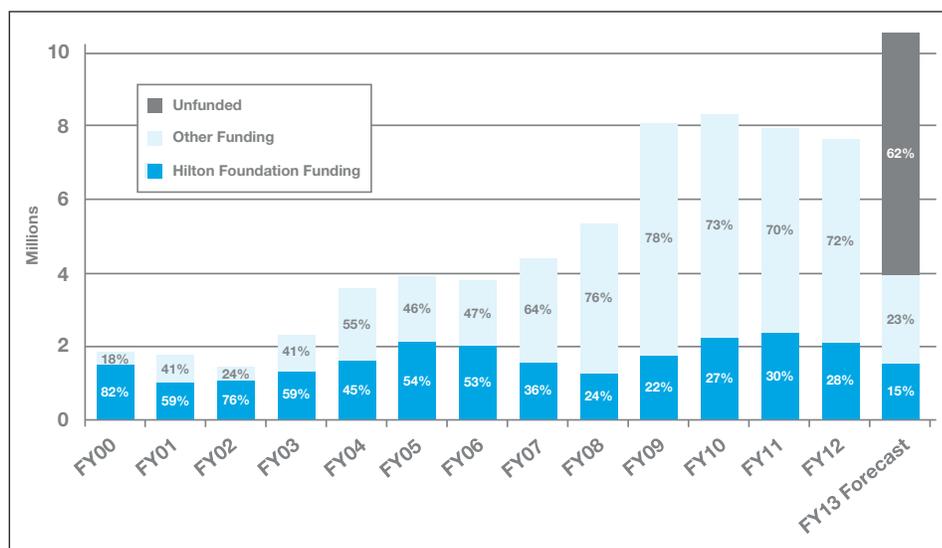
In 1997, when the Hilton Foundation decided to begin funding trachoma control, international NGO for SAFE interventions capacity was limited. The Foundation sought out The Carter Center and requested they initiate a trachoma control program based in the developing SAFE strategy. The Foundation's decision was based chiefly in two considerations: The Carter Center's demonstrated success in the near eradication of Guinea worm disease, and the Foundation's belief that President Jimmy Carter's involvement was essential in mobilizing the in-country political will necessary for an elimination effort. The Carter Center has remained the leading recipient of Hilton Foundation funding for trachoma elimination since 1997. The Carter Center emerged rapidly as a leader in the trachoma control field, quickly assuming the role of chief advocate for the integrated SAFE strategy.

In 2008, The Carter Center was instrumental in convincing the Hilton Foundation to expand coverage in the second grant to the full SAFE strategy, arguing for the synergistic effect of implementing all four components. By this time, trachoma was no longer tied so closely to the Foundation's water and sanitation program, permitting the Foundation to focus more sharply on the goal of trachoma *elimination* rather than trachoma *control*.

The selection of The Carter Center, as well as the long-term and open nature of Hilton Foundation grants, has profoundly shaped the trachoma elimination field. The Center began its trachoma control effort with funding entirely from Hilton Foundation grants. Over the past nearly 15 years, the Hilton Foundation proportion of The Carter Center's Trachoma Control Program funding has steadily declined as The Center has successfully expanded its donor base and range of activities.

The Carter Center Trachoma Program Expenses
FY00-FY13 (excluding in-kind donations)

Activities funded by Hilton Foundation grants to The Carter Center have been geographically targeted with longest and deepest attention in Ghana, Mali, and Niger.



Key Achievements

The Carter Center's contributions to the trachoma field are substantial and can be identified in three broad areas:

Technical Assistance and Capacity Building: The Carter Center has worked closely with government health systems, from assisting with establishing national trachoma control program plans through developing post-endemic surveillance systems. The capacity and commitment of national trachoma control programs is essential to the success of national elimination efforts. The initial 10-year grant provided The Carter Center with the security and leveraging basis to build a strong program and establish field offices. The Center credits the long-term commitment by the Conrad N. Hilton Foundation with allowing them a "continuity and consistency" in building national programs, not available to other partners who were "subject to cyclical funding trends."

Carter Center staff members have been active participants, lead investigators, collaborators, and co-authors in operational research.

SAFE Implementation: Activities funded by Hilton Foundation grants to The Carter Center have been geographically targeted with longest and deepest attention in Ghana, Mali, and Niger.⁹ In the first 10-year grant period, activities were focused exclusively in the F and E components. The Carter Center explicitly credits the Hilton Foundation with having provided the freedom in the initial 10-year grant to explore, develop, and document F and E innovations.

Specific achievements¹⁰ by The Carter Center in SAFE implementation include providing over 50 percent of global trichiasis surgery in the past five years, distributing 22 percent of global azithromycin in the past five years, and delivering health education to more than 9,000 villages each year between 2008 and 2011. The Carter Center has also been a champion of latrine construction, facilitating the construction of over 2.3 million latrines as part of its trachoma programming.

Operational Research and Knowledge Generation: Carter Center staff members have been active participants, lead investigators, collaborators, and co-authors in operational research with their peers at the more traditional research institutions. Its trachoma control program has produced three or four scientific publications each year since 1997. The Carter Center remains an ardent proponent of SAFE, asserting that antibiotics cannot succeed permanently without the F and E component.

Carter Center leadership in the trachoma elimination effort is premised not primarily on its achievements in the implementation of SAFE, although clearly those have been substantial. Leadership status is identified in The Center's contributions to knowledge generation, development of practical guidelines for wide use in the field, advocacy for elimination promoted through the motivational and knowledge-building power of annual program review meetings, and participation in international trachoma convenings.

⁹ Activities in Yemen were discontinued in 2003 due to inadequate support of the national program as well as security issues. Activities in Nigeria were integrated with river blindness program efforts and expanded to the full SAFE strategy in 2006 with funding from donors other than the Hilton Foundation.

¹⁰ These figures are reported by TCC and include extensive programming in Ethiopia not funded by the Hilton Foundation.

Helen Keller International

Over the past 15 years, the Foundation has provided almost \$12 million to Helen Keller International (HKI) for trachoma control and prevention as identified below:

Years	Amount: \$11.77 million	Purpose
1998–2008	\$5 million over 10 years (Initiating grant \$500,000; continuing grant \$4,500,000)	Trachoma control and prevention initially in Mali, Morocco, Nepal, Tanzania, and Vietnam; later also in Burkina Faso, Cambodia, Niger, and Nigeria for F and E components of the SAFE strategy.
2001–2005	\$1 million (Additional grant to WHO: \$1 million)	In partnership with WHO, to develop a “model” universal guide for the design and implementation of primary school trachoma curricula, with pilot testing in Burkina Faso and Tanzania.
2004	\$260,000	Emergency grant to continue very successful school-based trachoma prevention program in Nepal.
	\$25,000	Grant for evaluation of trachoma control and prevention activities.
2006–2008	\$251,750 (Additional grant to WHO: \$328,220)	In partnership with WHO, to implement the “Prevention through School Health Curriculum Development Guide” produced in Phase I of the project, in six trachoma-endemic countries: Ghana, Guinea, Mali, Nepal, Niger, and Vietnam.
2008–2012	\$5.26 million over five years	Trachoma control and prevention in Mali, Niger, and Tanzania; funding for all components of the SAFE strategy.

Helen Keller International brought a particular expertise in hygiene education and behavioral change important to the implementation and measurement of the F and E components of SAFE.

Helen Keller International began its work in trachoma control in Taiwan in the 1950s and was already an experienced, leading practitioner in the trachoma field when the Hilton Foundation extended its first 10-year grant (1998–2008) to the organization. Under that grant, Helen Keller International provided technical assistance across a range of planning and implementation activities to a number of national trachoma programs in Asia and Africa. Helen Keller International and The Carter Center share a history of successful commitments to working closely with local governments and to community-based planning and implementation. Helen Keller International also brought particular expertise in hygiene education and behavioral change important to the implementation and measurement of the F and E components of SAFE. Two additional grants were made during this period for work in partnership with the World Health Organization for the development of a “model” universal guide for the design and implementation of primary school trachoma curriculum.

The Foundation extended a second major grant in 2008 on the basis of Helen Keller International’s known organizational strengths, including strong ties on the ground in Africa as well as demonstrated partnership capacity. Helen Keller International has been an effective partner in the Hilton Foundation’s trachoma activities, collaborating closely with The Carter Center, participating in the West Africa Water Initiative, and engaging actively with other trachoma stakeholders in leadership and supporting capacities. In this second grant, Hilton Foundation funding was narrowed to Mali, Niger, and Tanzania;

Helen Keller International has periodically redirected its activities to areas of emerging need. Such dynamic response to local needs can be highly effective, and the resulting contributions to local capacity for trachoma elimination are notable achievements.

and attention was expanded to all four components of the SAFE strategy. This grant reflected what the Foundation and Helen Keller International had learned regarding the improvement of country impact through a more focused program approach in a smaller number of countries.

The Hilton Foundation places high value on an organization's ability to leverage funds for greater impact in a field. Historically, Helen Keller International had not diversified its funding sources for trachoma as successfully as The Carter Center. Helen Keller International has derived the majority of its direct trachoma funding from the Hilton Foundation, with more than 90 percent of its funding coming from the Foundation in the final five years of the first grant. The second major grant was made with expectations of improving capacity to raise matching funds, and internal capacity building was established as a goal of the grant. In the past few years, Helen Keller International has raised significant additional funds from USAID for integrated NTD control and mass drug administration. In addition, the organization has secured just a few sustained sources of additional funds exclusively for trachoma work. The Foundation has struggled to assess Helen Keller International in this area, recognizing this as a limitation but uncertain to what extent it may or may not reflect broader organizational capacity.

Key Achievements

Helen Keller International has worked across a wide range of trachoma control and prevention activities, periodically redirecting activities to areas of emerging need. Such dynamic response to local needs can be highly effective, and the resulting contributions to local capacity for trachoma elimination are notable achievements. The work plans created under the second grant were explicitly designed to align funding with identified gaps in national trachoma control efforts. Local capacity building has remained a particular success of Helen Keller International.

Helen Keller International's strengths have also been evident in areas of education and behavioral change, including the measurement of that behavioral change through knowledge; attitude; and practices, surveys, and other methods. In recent years, Helen Keller International has demonstrated increasing expertise in the facilitation of trichiasis surgery through training, planning, and mobilization efforts with measurable reductions in surgical backlog. Currently, the organization is actively engaged in Mali in the provision of trichiasis surgery, antibiotic distribution, and community trachoma education. In Niger, Helen Keller International supports surgery and the certification of new trichiasis surgeons, as well as education efforts. It has applied funds toward the rehabilitation of radio stations as a channel for public education regarding face-washing behaviors and has piloted a primary school health curriculum related to trachoma. In Tanzania, Helen Keller International supports a range of educational and surgical activities. Some outputs (e.g., numbers of radio producers retrained) are easily counted, and efforts to measure the impact of some of its educational work have produced credible and positive results. Other outputs, however, are less measurable, and standard progress leaves many open questions about the sustained effectiveness of particular efforts.

Helen Keller’s experience with onchocerciasis, trachoma and nutrition-related response to blindness has positioned them well for work in the NTD field. They are active in NTD control, now working across five of the targeted diseases, regularly advocating for attention to water and sanitation issues in the NTD community. Helen Keller International’s early entry and growing experience in integrated NTD work is a notable asset as the Foundation considers the strategic relationship between its trachoma work and the broader NTD elimination effort.

World Health Organization

The Foundation has sought to extend its contribution in the trachoma field beyond the borders of specific countries. Grants were extended to the World Health Organization (WHO) and Helen Keller International for the joint development of a “model” guide for the design and implementation of a trachoma curriculum for global adaptation and use in primary schools.¹¹

Years	Total Grants: \$1,328,220	Purpose
2001-2005	\$1 million	In partnership with Helen Keller International, to develop a “model” universal guide for the design and implementation of primary school trachoma curricula, with pilot testing in Burkina Faso and Tanzania.
2006-2008	\$328,220	In partnership with Helen Keller International, to implement the “ <i>Prevention through School Health Curriculum Development Guide</i> ” produced in Phase I of the project, in six trachoma-endemic countries: Ghana, Guinea, Mali, Nepal, Niger, and Vietnam.

The Foundation anticipated that WHO would publish and circulate this guide for curriculum development in multiple countries. This curriculum is still used in the original piloted countries in sub-Saharan Africa, but there is limited evidence that the curriculum is vigorously used as a universal model.

¹¹ These grants were preceded by a \$250,000 grant in 1999 to ITI for development of trachoma curriculum.

World Vision

The Hilton Foundation extended a grant of \$1.125 million to World Vision at the outset of its trachoma program. World Vision was already a long-time partner of the Foundation, and they continue a highly productive relationship in the area of water and sanitation.

Years	Total Grants: \$1,281,000	Purpose
1997-2008	\$1.125 million over 10 years	Trachoma control and prevention in Tanzania, Vietnam, and Ethiopia. In 2004, the grant was renewed for work in Ethiopia only.
2005-2008	\$156,000 matching grant to support \$311,700 study	In partnership with Johns Hopkins University, to study the impact of water provision, sanitation, and health education on trachoma prevalence in Niger.

Comparing these grants is instructive and underscores the value of community-based, data-driven, government-coordinated work for positive public health outcomes.

The initial grant was made for trachoma control and prevention in Tanzania, Vietnam, and Ethiopia. Six years into the grant, World Vision and the Hilton Foundation agreed to change the scope of work to focus on Ethiopia only, on the grounds that the country's needs were greatest and funding most limited.

World Vision's progress and final reports, in the manner of many general aid agencies, identified multiple achievements from its Ethiopia work. The evidence for success was based on long lists of outputs and under-examination of outcomes. Although World Vision reported working with government staff, it is not clear that the work was coordinated through the national trachoma program and community-wide Mass Drug Administration was not used. The program was implemented in four of World Vision's Area Development Programs, only one of which had obviously high trachoma prevalence rates. It may be that the extensive hygiene education along with water and sanitation provision in those Area Development Programs has had long-lasting impact on trachoma prevalence in those communities; but the indications for continuing success in 2007 were not promising, and the Hilton Foundation decided to continue working with World Vision in more general water and sanitation projects, rather than specifically in trachoma control.

Another grant, made to World Vision in 2005 to study the impact of water and sanitation interventions on trachoma prevalence, failed to reach stated objectives and the project was abandoned. Communication issues between governments and World Vision, across World Vision departments, and between World Vision and the Foundation were cited as the proximate cause for failure. These communication challenges also reflect the structural complexities and multiple government agencies involved in health-directed programming and general water and sanitation developments. It was also clear that the timelines and other controls imposed by the trachoma research agenda were a significant challenge for an organization operating in the context of general community development.

Comparing World Vision with The Carter Center and Helen Keller International is instructive and underscores the value of community-based, data-driven, government-coordinated work for positive public health outcomes. The contrasting experiences should also alert donors to the differences in organizational skills necessary for elimination-driven public health programming and multi-sector community-based development.

Learning Grants

Recent growth in program staff and policy shifts at the Foundation towards greater evidence-based grantmaking has enabled and empowered staff to experiment with, and learn from, smaller, exploratory grants. Such “learning” grants are proving useful as the Hilton Foundation looks to future grantmaking.

Kilimanjaro Centre for Community Ophthalmology

The Kilimanjaro Centre for Community Ophthalmology (KCCO), based in Tanzania, has been a vital partner to the international trachoma community in its contributions to field-based operational research. The Conrad N. Hilton Foundation, concerned with growing evidence of poor trichiasis surgery outcomes and weak acceptance, made its first grant to the Kilimanjaro Centre in 2010 to explore improvements.

The Kilimanjaro Centre was tasked, in partnership with The Carter Center and Helen Keller International, to lead a two-year research project and provide technical advisory services for improving trichiasis surgery delivery in four national trachoma control programs: Ethiopia, Mali, Niger, and Tanzania.

Years	Total Grants: \$337,400	Purpose
2010-2012	\$337,400 over two years	Conduct two-year research and implementation project aimed at improving the quality, delivery, and outcomes of surgery for trichiasis.

The Kilimanjaro Centre was tasked, in partnership with The Carter Center and Helen Keller International, to lead a two-year research project and provide technical advisory services for improving trichiasis surgery delivery in four national trachoma control programs: Ethiopia, Mali, Niger, and Tanzania. In the first year, the project evaluated existing surgical delivery systems in each country. In the second year, the plan is to implement the recommendations from this assessment to improve surgical output and quality. The project has moved forward rapidly and early reports suggest that those capacity improvements already implemented are increasing the number of surgeries performed. An unexpected output of the grant is emerging evidence that trichiasis surgery needs may have been overestimated in some areas.

This grant has allowed Foundation partners to quickly assess the possibilities for reducing trichiasis recurrence, including discovering that trichiasis recurrence may not be as intractable a problem as originally perceived. It appears that improving national systems’ capacity for greater acceptance of trichiasis surgery can be rapidly implemented where grantees have well-established relationships with national eye health systems. Improving and monitoring quality of surgery is likely to be a bigger challenge. This grant is a positive indication for continued investment in improving surgical outcomes.

International Center for Eye Health

The International Center for Eye Health (ICEH) is based at the London School for Hygiene and Tropical Medicine (LSHTM), and is a WHO collaborative center for the prevention of blindness. A grant was awarded to International Center for Eye Health to support the publication and distribution of the Community Eye Health Journal.

The value of such small grants for the generation and distribution of knowledge have potentially high return on investment, but impact is difficult to measure.

Years	Total Grants: \$647,000	Purpose
2002-2005	\$135,000 over three years	Support for publication and distribution of Community Eye Health Care Journal to eye health workers in low- and middle-income countries.
2005-2009	\$212,000 over four years	Support for publication and distribution of Community Eye Health Care Journal to eye health workers in low- and middle-income countries.
2011-2014	\$300,000 over three years	Support for publication and distribution of Community Eye Health Care Journal to eye health workers in low- and middle-income countries.

The *Community Eye Health Journal* is a quarterly publication of the International Center for Eye Health. The journal provides up-to-date information and educational material to eye health workers in low- and middle-income countries who have limited access to such information. At the time of this writing, this grant for a well-established product is being implemented as anticipated. The Foundation has every reason to expect that the original grounds for extension of the grant (i.e., the ability of the International Center and London School for Hygiene and Tropical Medicine to produce important and reliable material and information, the enthusiastic appreciation and testimony of past subscribers, and distribution coverage to approximately 20,000 individuals) are being realized. The value of such small grants for the generation and distribution of knowledge have potentially high return on investment, but impact is difficult to measure.

Successful trachoma control effects in Africa have been rooted in close cooperation with governments, a commitment to community-based initiatives, and support for data-driven programming.

Summary of Lessons Learned

The Hilton Foundation has learned and/or confirmed a number of powerful lessons in working with these organizations and from these grants. These include:

- **Identifying critical success factors in public health programming.** Successful trachoma control efforts in Africa have been rooted in close cooperation with governments, a commitment to community-based initiatives, and support for data-driven programming. Local capacity building should remain an essential component of the Hilton Foundation's public health programming for trachoma prevention, as well as additional priority areas that include a robust public health component.
- **Recognizing and accepting the extreme challenge of programming for, and measuring targeted health outcomes from, water, sanitation, and hygiene investments.** The challenge of integrated WASH programming and evaluation are abundant, requiring coordination and communication across multiple agencies of government as well as implementing organizations. These structural complexities proved especially challenging in the context of highly focused eradication and elimination programs, as in the case of trachoma and Guinea worm disease. This experience has informed the monitoring, evaluation, and learning effort currently underway in the Foundation's safe water initiative. As calls for improved coordination between the NTD and WASH communities grows, difficulties encountered during the Foundation's experience with trachoma investment and anticipated monitoring, evaluation, and learning results could prove highly instructive.
- **Recognizing the power and limitations of leveraging requirements.** The Carter Center has successfully leveraged Hilton Foundation financial support for fundraising purposes, substantially expanding their range of activities and achievements. Helen Keller International has been less successful in that regard, yet has been an effective partner. World Vision's prodigious private fundraising capacity has allowed them to match Hilton Foundation funding in water and sanitation for many years, cementing their partnership and securing grants for trachoma control. Organizational ability to leverage Hilton Foundation funds for greater impact in a field has been, and continues to be, a fundamental consideration in all Hilton Foundation grantmaking. Leveraging capacity is often, but not always, an indicator of organizational capacity in a particular field. This understanding needs to be explored further and potentially integrated more systematically into the Foundation's grantmaking decisions.

Long-term funds permit grantees the time to establish productive relationships with local agencies and national government actors, which is fundamental to capacity-building efforts and sustainable impact.

- Accepting the benefits and responsibilities of long-term grantmaking.** Long-term grantmaking allows for the development of trust between the Foundation and its grantees, creating opportunities for innovation and learning, and dynamic reallocation of grant funds.¹² Long-term funds permit grantees the time to establish productive relationships with local agencies and national government actors, which is fundamental to capacity-building efforts and sustainable impact. Long-term grantmaking confers legitimacy on actors in a philanthropic field and has the power to shape leadership patterns in that field, as has been the case with The Carter Center. The Foundation must always do its best to ensure that such long-term funds are being granted to organizations capable of providing credible, legitimate intellectual leadership in a field. The Foundation is obligated to monitor new directions and developments across the field to ensure that key grantees are maintaining their leadership on the grounds of continued success and learning rather than past reputation.
- Enabling partnership.** The benefits of strategic partnerships are profound. The official partnership, Alliance for the Global Elimination of Blinding Trachoma by 2020 (GET 2020), and the informal working relationships animating the work of International Coalition for Trachoma Control, have contributed greatly to the effort to eliminate blinding trachoma. The ability of Hilton Foundation grantees to work in partnership has been an implicit, and often explicit, component of grants. As always, there is a degree of good fortune in the patterns of organizational participation, individual personalities, and leadership that result in genuine commitment to a shared goal. Likewise, the transaction costs of formal partnerships, as was the case with WAWI, can be very high. Transaction costs can easily exceed benefits where partnership is imposed rather than enabled. There are no simple guidelines for ensuring successful partnerships, as regularly confirmed in literature on the subject. Where and when natural collaborative advantage has emerged, as has been the case in recent years in the International Coalition for Trachoma Control and among Foundation grantees, the Foundation should seize the opportunity to assist such collaborations.

¹² The most recent example occurred in August 2012, when USAID funds for trachoma in Mali were abruptly discontinued due to political unrest. The Carter Center and Helen Keller International were able to work with the Foundation to quickly reallocate Hilton Foundation funds to areas no longer being served with USAID funds.

Lessons in Evidence-Based Programming: Analysis of the SAFE Strategy

Grants from the Hilton Foundation and other funders have contributed to a growing body of knowledge about the SAFE strategy. The following analysis reflects the Foundation's interest in assessing the SAFE strategy to help guide its future trachoma-related grantmaking. Additionally, this critical examination is informing internal dialogue at the Foundation regarding what constitutes “evidence-based” programming.

Improving the Evidence Base

The official adoption of the integrated SAFE strategy in 1998 by the Alliance for the Global Elimination of Blinding Trachoma by 2020 (GET 2020) was a catalytic moment in the global effort to eliminate blinding trachoma.

Early experiences with the SAFE strategy were extremely promising.¹³ The Hilton Foundation entered the field in 1997, accepting the claim that the approach was “based on proven and cost-effective interventions.”¹⁴ By 2003, three critical reviews of the SAFE strategy¹⁵ had been completed, and although these studies revealed that the evidence for the F and E components was weaker than for the S and A components, they fundamentally concluded that the rationale for the full strategy was sound. These studies concluded with an emphatic call for continuing research. There was a clear expectation that the evidence base and operational guidelines would grow stronger over time. Hilton Foundation funds at The Carter Center (TCC) were expressly channeled to improve the knowledge base for the F and E components of the SAFE strategy.

The SAFE strategy provides an instructive benchmark for philanthropic decision making where, as is so often the case, the challenges of measurement are high and the scientific evidence is mixed. Foundation staff members have come to recognize that although the evidence base for the SAFE strategy is not as unassailable as its champions first suggested, it is, nonetheless, well grounded in operational research and marked by an unusually high level of consensus among practitioners in the field. The following analysis of the SAFE strategy reflects the Foundation's interest in determining whether substantive challenges or new evidence have emerged to guide its effort to support the elimination of blinding trachoma by 2020.

In the past few years, the Foundation has begun to examine the evidence base for SAFE with a more critical eye.

¹³ Morocco's experience with rapid control of trachoma following the implementation of SAFE was well documented and widely circulated.

¹⁴ Mariotti et al (2003), p.33.

¹⁵ Bailey, R. and T. Lietman (2001); Kuper, H., A.W. Solomon, J. Buchan, M. Zondervan, A. Foster and D. Mabey (2003); and West, S. (2003).

In the past decade, the international development field has entered a phase in which there is a valid (yet often poorly informed) demand for more rigorous methodological standards of programmatic evidence.

Challenges of Measurement

The SAFE strategy poses a number of challenges for measurement. By design, SAFE is an integrated strategy in which all four components must be present for a trachoma control program to sustainably break the cycle of transmission. In short, in the absence of F and E components, the prevalence of infections in the community might return to previous levels requiring repeated antibiotic treatment (A) and ongoing need for surgery (S). Methodologically, it would be extremely difficult to design a study that assigns proportional effect to one element over another. Such a study would be nearly impossible in most trachoma-endemic regions, and no such study has been attempted. As a result, most studies of the SAFE strategy have examined individual components within relatively short time frames, with only a few attempting to examine a mix of elements.

In the past decade, the international development field has entered a phase in which there is a valid (yet often poorly informed) demand for more rigorous methodological standards of programmatic evidence. This demand has prompted an increasing reliance on meta-analyses or “systematic reviews”¹⁶ as a screening mechanism for assessing the evidence base for programmatic interventions. Trachoma has been the subject of a number of Cochrane Library systematic reviews. These reviews pose some important challenges to the evidence base for the SAFE strategy.

Studies of those elements of the SAFE strategy in which treatment is most standardized and can be most uniformly delivered (i.e., antibiotics trials) have, of course, produced more certain evidence than studies which must measure outcomes over longer periods of time, such as complex context-dependent interventions, with high variability in delivery format, or those which require behavioral change (i.e., many F and E interventions). The challenge is one of both implementation and measurement: it is difficult to implement such complex interventions and difficult to design studies that measure outcomes from them.

The Hilton Foundation's experience provides no simple answers to the difficulties of measuring disease outcomes from investments in environmental improvements, but suggests the need for funding at the field/research level and at the program/operations level. Investment at both levels is essential: (1) research funding is needed to establish or improve the validity of process indicators and (2) operational funding is needed to improve monitoring and evaluation of validated process indicators.

¹⁶ The Cochrane Library defines a “systematic review” as follows: “A systematic review attempts to identify, appraise and synthesize all the empirical evidence that meets pre-specified eligibility criteria to answer a given research question. Researchers conducting systematic reviews use explicit methods aimed at minimizing bias, in order to produce more reliable findings that can be used to inform decision making.” Cochrane specializes in health care and health policy.

Analysis of Individual Components of the SAFE Strategy

Surgery

Trichiasis can be reversed by surgery, and community health workers can be trained to perform surgery effectively. Trichiasis recurrence rates, however, are high, and surgery participation is low.

The bottom line is that without surgery for severe trichiasis, blindness is virtually inevitable.

General reviews of SAFE often begin with straightforward assertions such as “surgery is the most direct and efficient way to prevent blindness.”¹⁷ A quick read of most trachoma program reports suggests the problem is simply too few trained surgeons available to meet demand. Yet, Cochrane systematic reviews of the literature report that while surgery can effectively abolish trichiasis in the immediate or intermediate term, there is no direct evidence demonstrating that surgery reduces rates of blindness.¹⁸ This is, in part, because long-term studies to track the impact of trichiasis surgery on blindness have not been done, nor are they likely to be done.

Surgery *has* been shown to reduce the pain of trichiasis, reduce ocular discharge, and improve visual acuity to a modest degree. Surgery does not necessarily reduce the progress to blindness for various reasons, including the very real possibility that trachomatous trichiasis will recur. In a 2011 review of trachomatous trichiasis recurrence, Sheila West cites alarming numbers:

“One study of trichiasis surgery cases with follow-up of at least two years, carried out in several districts of Tanzania, found a recurrence rate of trichiasis of 28 percent, varying by district from 16 to 38 percent. In The Gambia, trichiasis recurrence rates at one year were 41 percent, and varied among surgeons from zero percent to less than 80 percent. Data from Oman also showed a high rate of recurrence, 56 percent on average.”¹⁹

The bottom line, however, is that without surgery for *severe* trichiasis, blindness is virtually inevitable.

The most critical early evidence for the surgery component was research showing that community eye health workers and ophthalmic nurses could be trained to be as effective as professionally trained ophthalmologists in performing trichiasis surgery. This finding remains largely intact and has not been challenged by the high recurrence rates and high inter-surgeon variability.²⁰ Given the lack of ophthalmologists in most of Africa, trichiasis surgery could not be delivered at scale in trachoma-endemic countries without the use of community health workers.

¹⁷ Bailey, R. and T. Lietman (2001).

¹⁸ Yorston, D., D. Mabey, S.R. Hatt and M. Burton (2009).

¹⁹ West, S. (2011)

²⁰ Review of the literature in this matter by Hale et al (2012) suggests that comparison across generalist eye care workers and surgical specialists is difficult and the review introduces some important questions; but generally upholds the conclusion that community eye health workers can provide effective trachomatous trichiasis surgery.

Antibiotics are used to treat infection in an individual patient, thereby preventing progression of the disease, and to reduce transmission of infection from one person to another.

The surgical backlog in trachoma-endemic countries remains enormous, estimated to be 4.6 million by the International Trachoma Initiative. Even with active control of trachoma infection, trichiasis cases will continue to emerge for many years. The backlog represents a problem of too few trained and skilled surgeons, and a problem of demand: acceptance of surgery is very low. Various studies have been conducted to analyze barriers to acceptance of surgery with results indicating personal fears, the awareness that trichiasis often recurs, and barriers to access (e.g., cost, distance, family support). Other studies are underway to address the multiple causes of recurrence (e.g., surgical technique, severity of pre-operative disease, post-operative conditions, suture type). Evidence is accumulating to show that surgeon skill is the most likely source of poor surgical outcomes and a number of avenues are being explored to improve recruitment, training, standardization, certification, and supervision of surgeons. A more critical examination of the SAFE strategy, and growing awareness of high trichiasis recurrence rates and low surgical participation, prompted the Hilton Foundation to make a 2010 grant to the Kilimanjaro Centre for Community Ophthalmology (previously discussed) to address the problem.

Antibiotics

Antibiotics reduce the prevalence of ocular infection from trachoma, but much remains to be learned about the targeting, frequency, and duration of treatment for greatest effectiveness. New questions are emerging as the prevalence of disease declines and as understanding of the immunology and pathogenesis of trachoma improves.

Antibiotics are used for two reasons: to treat infection in an individual patient, thereby preventing progression of the disease, and to reduce transmission of infection from one person to another. Evidence from antibiotic trials indicates that antibiotic treatment is more effective at reducing transmission at the community level than it is for limiting disease at the individual level. The strongest conclusion emerging from an updated Cochrane Library systematic review (2011) of antibiotic trials is that “mass antibiotic treatment with single-dose azithromycin reduces the prevalence of active trachoma and ocular infection in communities.”

This finding has been developed into a broad WHO recommendation of annual administration of a single-dose of azithromycin for three years to all members of communities in which the prevalence of trachomatous trichiasis is more than 10 percent in children from 1 to 9 years of age. In fact, many uncertainties remain with regard to how often and for how long mass antibiotic therapy needs to be conducted, and what level of treatment coverage is sufficient. Multiple research studies are underway to address these uncertainties.²¹ Some of these questions are becoming more acute as national health

²¹ An emerging question is increasing concern about potential drug resistance. There is no firm evidence of continuing resistance to azithromycin for chlamydia or other bacteria.

programs enter the post-endemic surveillance phase and as the global trachoma effort expands to communities with very different patterns of trachoma prevalence. Current WHO guidelines may not suffice in the final stages of an accelerated effort to eliminate trachoma.

Facial Cleanliness and Environmental Improvements

Statistically rigorous evidence for the effectiveness of specific F and E interventions, particularly latrine construction, on trachoma reduction is limited. Yet the evidence for the general value of improved water, sanitation, and hygiene education remains compelling, and F and E interventions are focused in those same three areas in an effort to limit the transmission of Chlamydia trachomatis from one individual to another.

Substantial effort has gone into developing standards for a “clean face” and testing whether those standards can be reliably used for evaluation and research purposes.

Hygiene Education: Face Washing

Numerous early epidemiological studies established the association between dirty faces and active trachoma in children.²² Formative studies suggested facial cleanliness could be achieved through hygiene education even where water was scarce. On the basis of those studies, the WHO recommended facial cleanliness as a primary intervention for trachoma control. However, only two studies of facial cleanliness interventions (from 67 citations) met randomization standards for inclusion in a 2004 Cochrane Library systematic intervention review. The study was updated in 2007 and re-issued in 2009 with “no change to conclusions.”²³ The authors of that review reported:

“Face washing combined with topical tetracycline was compared to topical tetracycline alone in three pairs of villages in one trial. The trial found a statistically significant effect for face washing combined with topical tetracycline in reducing ‘severe’ active trachoma compared to topical tetracycline alone. No statistically significant difference was observed between the intervention and control villages in reducing (‘non-severe’) active trachoma.”

First, this does suggest some benefit of facial cleanliness for severe trachoma. The absence of additional evidence from randomized and quasi-randomized trials is not a sufficient basis to dismiss the abundant data available from cross-sectional studies, observational reporting, or knowledge, attitudes, and practice-based surveys.

As one reviews this material, it becomes clear why it is so difficult to find comparable studies. Programs continue to wrestle with many basic design questions: How much water is actually needed to achieve “clean faces”? Are children in school or mothers at

²² As reported in field reviews: Emerson, Paul et al (2000); Kuper, H. et al (2003). Various studies reported and discussed in West, Sheila (2003).

²³ Ejere, H.O.D. et al (2009). This Cochrane Collaboration review was first published in 2004; edited and published again in 2009 with “no change to conclusions.”

Although abundantly logical, the evidence of the effect of latrines on fly control, and therefore in the reduction of trachoma, remains very limited.

home better targets for health messaging? Is radio a good medium for health messaging in a particular region? What opportunities are there for combining trachoma facial cleanliness knowledge with UNICEF hand washing campaigns?

Even where the interventions are well grounded in existing knowledge, measuring effectiveness remains a challenge: At what intervals should facial cleanliness be measured? Should facial cleanliness be measured in school or at home?

Substantial effort has gone in to developing standards for a “clean face”²⁴ and testing whether those standards can be reliably used for evaluation and research purposes. Too few studies compare findings from different programs and regions. There is a need to systematize this knowledge base for better presentation of evidence drawn from this complex, behavioral change intervention. Abundant soft evidence indicates that personal hygiene education should continue as part of trachoma control programs.

Sanitation: Fly Control and Latrine Promotion

Latrines have been intensively promoted as an environmental improvement tool in trachoma control for more than a decade. Three important research findings informed the original recommendation. First, multiple studies suggested that the presence of pit latrines protected against trachoma—although the protective mechanism was not well understood. Second, the musca sorbens fly, a common face-seeking fly, was positively incriminated as a mechanical vector for trachoma. Flies were presumed to be carrying *Chlamydia trachomatis*, but this was not definitively demonstrated until the late 1990s.²⁵ Third, these same studies postulated that musca sorbens breeds in solid feces lying on the ground, but do not breed in latrines where fecal matter quickly liquefies. These findings led quickly to the conclusion, and subsequent WHO recommendation, that latrines would reduce trachoma by controlling fly populations. Although abundantly logical, the evidence of the effect of latrines on fly control, and therefore in the reduction of trachoma, remains very limited. A Cochrane systematic review was completed in 2007 in the area of “environmental sanitation measures in reducing trachoma transmission.” The study was recently reissued on-line with an updated check for environmental sanitation studies through September 2011. The authors conclude:

“Two trials on latrine provision as a fly control measure have not demonstrated significant trachoma reduction. Health education had shown significant reduction of trachoma in one study but another study did not demonstrate similar findings. Generally there is a dearth of data to determine the effectiveness of all aspects of environmental sanitation in the control of trachoma.”

The most recent, serious study of note (a cluster-randomized trial of latrine promotion after mass drug administration in Ethiopia²⁶) did not “detect a difference in the prevalence of ocular chlamydial infection in children due to latrine construction.”

²⁴ Zack, M. et al (2008)

²⁵ Emerson, Paul et al (2000).

²⁶ Stoller, Nicole E. et al (2011).

Evidence for the effectiveness of the integrated SAFE strategy is based primarily on progress towards elimination in those districts and countries where the full strategy has been implemented.

The Carter Center has been at the center of much of the research, establishing the link between the *musca sorbens* fly, latrines and trachoma. Latrine construction has been championed heavily by that organization, becoming a central intervention in its trachoma program. The Carter Center has amassed an enormous quantity of valuable programmatic information on methods for latrine promotion and latrine construction, innovating in a number of important areas. The costs of latrine construction programming are high. There are good reasons to invest in latrine promotion in combination with broadly cast hygiene education, but there is insufficient evidence to invest in latrines for trachoma control alone.

Evidence of Effectiveness of the Integrated SAFE Strategy

Evidence for the effectiveness of the integrated SAFE strategy is based primarily on progress towards elimination in those districts and countries where the full strategy has been implemented. Case study evidence from the initial pilot countries is well documented. Subsequent experience from the other eight countries (Appendix 1, Table 1) that report meeting Ultimate Intervention Goals for the elimination of trachoma have provided additional support. Experience from a number of other countries such as Mali and Niger continues to build the case for implementing the full SAFE strategy.

Despite this evidence, an often unspoken question circulates among funders and laypersons, as well as some proponents of NTD control: Could the same results be achieved with antibiotics alone? First, there is no doubt that antibiotics have vastly accelerated trachoma control and elimination. Second, although the statistical evidence for specific F and E interventions is weaker than it is for S and A, it is not, as discussed, absent entirely. Observational and cross-sectional data from SAFE implementation is strong, but is not documented consistently or well. Third, historical evidence for the importance of environmental improvements in combating trachoma is profound, including numerous early studies on the immunology and pathogenesis of the disease. Some recent studies also conclude that trachoma is disappearing due to improvements in water and hygiene programs in the absence of antibiotic treatments. Finally, ongoing antibiotic research for trachoma is currently based on the hypothesis that trachoma infection will resume in the absence of ongoing investment in improved water, sanitation, and hygiene.

Cost Effectiveness of the SAFE Strategy

Little reliable data exist to provide donors with guidance on the cost-effectiveness or return on investment for particular components of SAFE. The cost-effectiveness of trachoma control programs has been examined in just a few studies, invariably concluding with very positive assessments regarding healthy life globally (as measured by the number of disability-adjusted life years averted globally.) These estimates are based entirely on broad assumptions regarding the effectiveness of surgery, effectiveness of donated or reduced-price antibiotics, and presumed sustainability of those achievements in the context of a full SAFE strategy. These estimates are reliable only at a macro-level and cannot be used to guide donors about investing for particular components of the SAFE strategy.

The most well-documented ancillary benefits of SAFE implementation arise from mass distribution of azithromycin, which can be used to treat multiple infections.

Ancillary Benefits

In addition to the benefits of SAFE for trachoma control and prevention, a very strong case is put forward for multiple and dramatic ancillary benefits. Simply put, individuals, households, and communities experience important additional benefits from the implementation of each element of the SAFE strategy. For example, conducting surgery and relieving trichiasis among adults reduces parents' reliance on their school-age children, permitting children to attend school. Improved hygiene has been demonstrated to reduce mortality and morbidity from respiratory tract infections and diarrheal disease, and so on.

The most well-documented ancillary benefits of SAFE implementation arise from mass distribution of azithromycin. Azithromycin can be used to treat multiple infections (e.g., middle ear and throat infections, tonsillitis, laryngitis, bronchitis, pneumonia, bacterial skin infections). Azithromycin will generally have all of these same effects in populations receiving azithromycin for trachoma. These benefits have been substantiated in carefully designed research. In a randomized trial of the mass distribution of azithromycin for trachoma control in Ethiopia, child mortality was reduced by 50 percent among those receiving treatment compared to those who did not.²⁷ These ancillary benefits support the case that trachoma control and prevention efforts contribute directly to meeting Millennium Development Goals and serve to justify the investment in trachoma elimination.

Summary of Lessons Learned: SAFE as Template for Action and Research

The review above concludes that sufficient evidence exists to continue, even accelerate, the pace for elimination of trachoma on the basis of the SAFE strategy. The power of the SAFE strategy, as a template for coordinated action and ongoing research, cannot be overstated.

Some scientists phrase support for SAFE more cautiously than others, describing the strategy as the “safest bet” or the “most validated” approach. Everyone interviewed for this paper asserted that the evidence points in the direction of the effectiveness of a comprehensive SAFE strategy, anchored in improving knowledge of each of the components. Very few communities of practice have coalesced as strongly around a formally articulated strategy as has the trachoma community around the SAFE strategy. As in any scientific or philanthropic field, there are ongoing disagreements, even technical and intellectual fault lines. However, the shared commitment to operational research, enabled by strong communication between the university-based research community and field-rooted program managers, has prevented these divisions from overly interfering with program practice. There are important lessons here for field building, and much credit goes to the Edna McConnell Clark Foundation for establishing the scientific groundwork, and to the Hilton Foundation for kickstarting action with substantial initial investments in organizations that have strong leadership and are capable of learning.

²⁷ Porco, T.C. et al (2009)

Progress Toward Elimination

The most optimistic advocates in the trachoma field insist that blinding trachoma can “certainly be eliminated by 2020” with a substantial scaling-up of efforts. Most members of the trachoma community express a more cautious confidence that trachoma can be eliminated in a large number of countries by 2020, and in additional countries in the following 10 to 15 years. Progress toward elimination can be evaluated on two fronts: (1) declining numbers of people affected by trachoma, and (2) demonstrated and improving capacity for scaling up the effort.

Most members of the trachoma community express a confidence that trachoma can be eliminated in a large number of countries by 2020, and in additional countries in the following 10 to 15 years.

Declining Numbers

According to the WHO, “the estimated number of people affected by trachoma has fallen from 360 million people in 1985 to approximately 80 million people today.”²⁸ The WHO asserts that this is the result of a concerted effort by the WHO Alliance for the Global Elimination of Blinding Trachoma (GET 2020) combined with socioeconomic development in endemic countries. It also appears that initial estimates of trachoma prevalence were likely overstated. It is difficult, of course, to sort what part of that decline can be attributed to GET 2020 and the SAFE strategy.

The contribution of the organized effort to combat trachoma since the establishment of the GET 2020 is better analyzed on a country-by-country basis. More than 30 countries have worked with GET 2020 since the early 2000s, and most are implementing the full SAFE strategy and reporting annually to the WHO on achievements. Nine of these countries report achievement of Ultimate Intervention Goals set by the WHO, and an additional 20 countries anticipate meeting these targets by 2015 or earlier (see Appendix 1, Table 1). The experience of many of these countries is well documented in the annual meeting reports of the GET 2020 alliance.

It is absolutely clear in reading WHO meeting reports that, following the establishment of the GET 2020 Alliance, the pace of trachoma control activities expanded dramatically and accelerated rapidly in many countries. It is also demonstrably evident that this expansion of activity is leading to dramatically lowered rates of trachoma prevalence, with elimination of trachoma imminently possible.

With its support to The Carter Center and Helen Keller International, the Conrad N. Hilton Foundation has been instrumental in the expansion of trachoma control and prevention efforts in Ghana, Mali, and Niger, all of which are poised for the elimination of blinding trachoma before the 2020 deadline. Foundation target geographies in Ghana met almost all elimination targets for trachoma in 2010,²⁹ and Mali and Niger anticipate eliminating trachoma by 2015.

²⁸ GET 2020 Report, 14th meeting, 2010

²⁹ Ghana has announced reaching elimination targets for trachoma infection, but must still address a backlog of individuals in need of trichiasis surgery.

Some challenges continue to loom large, but it is also evident that some of the greatest threats have been, or are being, actively addressed.

Improving Capacity

In a 2007 review of its grants for trachoma, the author of this paper concluded that:

“The constraints to elimination of blinding trachoma remain large. The WHO argues that there is still insufficiently reliable data on the prevalence of blinding trachoma in many countries, severely limiting the capacity to plan elimination activities. The paucity of trained personnel to carry out trichiasis surgery remains a serious constraint. The basic primary health care infrastructure and sustainable water sources needed to deliver a multidisciplinary public health strategy like SAFE is poorly developed in most trachoma-endemic areas. Most immediately, the high costs of drugs and distribution are a serious threat to continued achievement. Although substantial consensus has emerged around process and outcome indicators, the field is far from agreement on protocols for certifying achieved elimination.”

Certainly, some of these challenges continue to loom large, but it is also evident that some of the greatest threats have been, or are being, actively addressed, reflecting substantially improved capacity to reach elimination goals. These include:

- In August 2012, the UK’s Department for International Development (DFID) announced an award of \$16.4 million to Sightsavers to lead a consortium in completing the final global mapping of trachoma. This will entail mapping in an additional 1,200 districts suspected of being endemic for trachoma.
- Pfizer continues to affirm its commitment to donating Zithromax® through the 2020 elimination deadline, and USAID funding for antibiotic distribution continues to grow.
- Access to safe water has improved in a number of trachoma-endemic countries, although sanitation improvements continue to fall far short of Millenium Development Goals.
- Consensus has been reached around a methodology for Certification of Elimination, although this has not been formally approved by the WHO.³⁰

³⁰ A final and critical step in trachoma elimination is to assess whether Ultimate Intervention Goals have been met, including establishing systems for final case management and post-endemic surveillance. Districts are required to maintain three years of post-endemic surveillance before achieving certification.

Trachoma is one of the NTDs targeted for “elimination as a public health problem” by a growing coalition of funders, public health advocates, scientists, and NGOs, with important support from the pharmaceutical industry.

Knowledge Base for SAFE Interventions

The preceding review of the SAFE strategy highlighted continuing challenges in the trachoma field. However, those sections also provide evidence of a continually improving knowledge base. Additionally, as identified in previous sections:

- The trachoma community through the International Coalition for Trachoma Control has adopted a strategic plan (InSight 2020) to accelerate action for the elimination of trachoma by 2020.
- Attention to high rates of trichiasis recurrence and low acceptance of trichiasis surgery are receiving substantially greater attention in the past two or three years than in the previous decade, with promising early results for improved outcomes and acceptance.

Opportunities Presented by Growing Attention to NTDs

Momentum has been gathering in recent years for the control, elimination, and eradication of “neglected tropical diseases (NTDs).” NTDs are a group of about 17 parasitic and bacterial diseases that collectively affect over 1 billion men, women, and children worldwide.³¹ Trachoma is one of the NTDs targeted for “elimination as a public health problem” by a growing coalition of funders, public health advocates, scientists, and NGOs, with important support from the pharmaceutical industry. NTDs share a number of dismaying characteristics: they are found among the world’s poorest people, and are debilitating and disabling, thereby contributing to a persistent cycle of poverty. They have been neglected in comparison to the attention and funding focused in recent decades on HIV/AIDS, malaria, and tuberculosis. The first seven targeted NTDs also are commonly treated at the community level with “preventive chemotherapy” via mass drug administration. Shared strategies for mass drug administration, as well as substantial geographic overlap, present the possibility of integrated programming for the elimination of these diseases.

In 2006, USAID reorganized its support for trachoma into an NTD program, focused exclusively on mass drug administration. USAID has substantially increased funding for NTDs each year since 2006, for a cumulative total of more than \$300 million. In 2007, the WHO produced a “*Global Plan to Combat Neglected Tropical Disease: 2008–2015*,” updated in 2012 with publication of a roadmap for “*Accelerating Work to Overcome the Global Impact of Neglected Tropical Diseases*.”

³¹ Sabin Vaccine Institute, <http://www.sabin.org/programs/global-networks/about-ntds>. Targeted NTDs include soil transmitted helminths (roundworm/ascariasis; whipworm/trichuriasis; hookworm); schistosomiasis; lymphatic filariasis/elephantiasis; trachoma; onchocerciasis/river blindness, and dracunculiasis/Guinea worm disease.

The trachoma community appears prepared to embrace the opportunities presented by increased international focus on NTDs.

This momentum gained tremendous strength in January 2012, with the “London Declaration on Neglected Tropical Diseases,” at which pharmaceutical companies, the Bill & Melinda Gates Foundation, the World Bank, USAID, the Department for International Development (United Kingdom), and other government agencies announced an accelerated effort toward eliminating or controlling NTDs. The Gates Foundation pledged \$363 million for the effort. This was followed by a Department for International Development announcement of a five-fold increase in aid for NTDs, increasing support to £245 million (US\$380 million), including \$50 million for trachoma. The first funding from the Department for International Development through its NTD program has been directed at trachoma; a \$10 million grant to Sightsavers to complete the mapping of trachoma worldwide was announced in August 2012.

Embracing Opportunities Presented by NTD Elimination Efforts

The trachoma community was somewhat skeptical of the USAID and WHO reorganization around NTDs in 2006. Some organizations thought that country programs might shift from an integrated SAFE strategy to an emphasis on antibiotics, and possibly away from areas of highest trachoma prevalence to areas of greater co-endemicity with other NTDs. Integrated NTD programming has not advanced as quickly as expected and USAID funding has, in fact, been integral to the expansion of both Helen Keller International’s and The Carter Center’s trachoma programming to the full SAFE strategy after 2008.

Today, the trachoma community’s fundamental critique is voiced with increasing clarity both internally and externally:

“The NTD effort is focused too exclusively on drug treatment, and lacks sufficient focus on sustainable solutions to disease from water and sanitation and hygiene interventions or other vector control measures.”³²

Such criticisms, however, are now paired with positive suggestions directed at improving attention to water and sanitation, rather than a focus on mass drug administration.³³

The explicit goal in the trachoma community is now to work with the NTD community and influence the agenda in favor of improved attention to water and sanitation issues in disease control. The trachoma community has much to offer and much to gain by partnering in NTD efforts.

³² Additionally, the focus on drug treatment raises the specter of increased drug resistance. It is beyond the scope of this paper to address drug resistance for NTDs. Concern is expressed quite vehemently among some in the immunological research community, with acknowledgement of the need to “remain vigilant” from NTD advocates.

³³ Others argue also that the trachoma community can bring attention to morbidity management in NTDs. The trachoma field’s experience with trichiasis surgery can be shared for improved attention to hydrocele surgery in the lymphatic filariasis community.

Conclusions and General Recommendations

Hilton Foundation Has Played a Significant Role in Trachoma Elimination

The preceding discussion suggests that by working with leaders in the trachoma field, the Hilton Foundation has:

1. **Played a critical role in the trachoma elimination effort**, contributing directly to elimination in a number of countries, including Ghana, which met almost all elimination targets for trachoma in 2010, and Mali and Niger, which are poised to eliminate trachoma by 2015.
2. **Contributed formatively to development of the SAFE strategy**, with particular support to development of the F and E components in the early years of the GET 2020 campaign.
3. **Built capacity at national and international levels for the continuing effort to eliminate blinding trachoma by 2020** by shaping leadership patterns in the field with its initial and ongoing support to The Carter Center and Helen Keller International.
4. **Continued to contribute to knowledge generation** in the field in a variety of ways, including recent grants for trichiasis surgery improvement, past grants for trachoma curriculum development, support to international partnerships, and annual progress meetings hosted by The Carter Center.

The Foundation has made critical contributions to trachoma control and prevention, but the goal of elimination is not yet met. Elimination of trachoma as a public health problem is imminent in a number of countries, and trachoma prevalence levels remain acute in only a few countries.

Strategic and practical tools exist for continued success. The 2020 elimination deadline provides a unique opportunity (rarely available in philanthropy) for meeting an ambitious goal and planning a thoughtful exit. The Foundation enjoys a certain stature as a founding donor to the GET 2020 effort and has developed a relatively public profile in the trachoma field. The next round of grants should be structured with a renewed commitment to participating in the trachoma “end game” and with a strategic view to linking current activities to future endeavors.

Planning for, and Funding, the Late Stages of Elimination

Final mapping of trachoma may increase the geographic scope for trachoma control and could set back the clock for reaching elimination by 2020. Continued grants from the Hilton Foundation, and from other funders in the sector, should be targeted toward ensuring that 2020 is still a viable goal.

1. **Renew and adapt the SAFE strategy.** Although the SAFE strategy is still the “best bet” for accelerated and concerted action, the Hilton Foundation can work to renew and adapt the strategy in the following areas:

The argument for continued funding is implicit in the preceding pages: the Foundation has made critical contributions to trachoma control and prevention, but the goal of elimination is not yet met.

Growing momentum for ending NTDs presents multiple opportunities for the Foundation to accelerate the push to eliminate trachoma within the NTD network.

- **Address the surgical backlog** to decrease the high recurrence rates of trichiasis.
 - **Develop more targeted antibiotic distribution strategies** in response to findings from the final mapping of trachoma.
 - **Compile and/or update best practice guidelines** in all areas of the SAFE strategy to accelerate or expand implementation following final trachoma mapping.
 - **Systematically document abundant F and E program knowledge** for broader and more effective application.
2. **Expand the elimination of trachoma within the NTD network.** Growing momentum for ending NTDs presents multiple opportunities for the Foundation to accelerate the push to eliminate trachoma within the NTD network, including:
 - Raising the profile of WASH interventions in combating all NTDs.
 - Encouraging the possibility of increased funding for trachoma elimination from the NTD sector.
 - Expanding efforts to a larger set of NTDs or other NTD issues (e.g., morbidity management).
 3. **Accelerate the formal adoption and approval by the WHO of Guidelines for Certification of Elimination.** Methodology for assessing whether a country achieves ultimate intervention goals has been in development since the inception of GET 2020. The WHO has marshaled this material into formal documentation for bureaucratic review on more than one occasion, but has not yet approved a process for certifying elimination. The Foundation should investigate opportunities and means to spur the process of formalizing and adopting these guidelines.

Opportunities for Impact Beyond Trachoma

The Foundation has multiple opportunities for future impact beyond trachoma. The most obvious is continued engagement in water and sanitation-related public health efforts, taking the substantial knowledge gained from trachoma (as well as the motivating force of disease elimination) forward to other NTDs or in support of integrated NTD programming.

The Foundation has had a long-standing interest in confronting sight loss, and important contributions to this work can be made beyond the trachoma elimination effort. By definition, major program areas, including confronting sight loss, are structured around historic areas of interest rather than around a strategic plan. Looking to the future, the Foundation should develop policies or principles to guide its overall funding for confronting sight loss.

Appendix 1: Trachoma Facts and Figures

Table 1: Countries Endemic for Trachoma

Countries Reporting Elimination (9) Population Endemic: 0%	High Burden Countries (14) % Population Endemic: 83%	Other Countries (33) % Population Endemic: 17%	
<i>Trachomatous Trichiasis</i> Burden: 6%	<i>Trachomatous Trichiasis</i> Burden: 71%	<i>Trachomatous Trichiasis</i> Burden: 23%	
Algeria	Burkina Faso	Afghanistan	Kiribati
Ghana	Ethiopia	Australia	Laos
Iran	Sudan	Benin	Mali
Libya	South Sudan	Botswana	Malawi
Mexico	Guinea	Burundi	Mauritania
Morocco	Kenya	Cambodia	Myanmar
Oman	Mozambique	Cameroon	Namibia
The Gambia	Niger	CAR	Nauru
Vietnam	Nigeria	Chad	Nepal
	Pakistan	Cote d'Ivoire	Papua New Guinea
	Senegal	Djibouti	Solomon Islands
	Tanzania	Egypt	Somalia
	Uganda	Eritrea	Togo
	Zambia	Fiji	Vanuatu
		Guatemala	Yemen
		Guinea Bissau	Zimbabwe
		Iraq	

Source: International Coalition for Trachoma Control (2011). "2020 INSight: The end in sight," p. 17

Table 2: Ultimate Intervention Goals

The WHO set targets, or Ultimate Intervention Goals, in the context of the SAFE strategy that, when met on a country-by-country basis, would constitute "elimination of trachoma as a public health problem." *The WHO has specified the following goals:*

Trachomatous Trichiasis

For blinding trachoma to eventually be eliminated as a public health problem, each country must reduce the number of people with trichiasis to fewer than one per 1,000 people in a district.

Active Trachoma

For blinding trachoma to eventually be eliminated as a public health problem, each country must reduce the number of cases of active trachoma (TF) in children between the ages of 1 and 9 to less than 5 percent of the population of children in any district.

Facial Cleanliness and Environmental Improvement

Hygiene promotion and environmental improvement should be conducted in a community so that, at any given time, 80 percent of the children in the community will have clean faces.

Appendix 2: Persons Interviewed

Name	Organization
Ellen Agler	The END Fund
Sanoussi Bamani	Ministry of Health, Mali
Kadri Boubacar	Ministry of Health, Niger
Simon Bush	Sightsavers
Paul Courtright	Kilimanjaro Centre for Community Ophthalmology
Paul Emerson	The Carter Center
Danny Haddad	International Trachoma Initiative
Julie Jacobson	Bill & Melinda Gates Foundation
Chad MacArthur	Helen Keller International
Silvio Mariotti	World Health Organization
Neeraj Mistry	Global Network for Neglected Tropical Diseases, Sabin Vaccine Institute
Laura Payne	Global Network for Neglected Tropical Diseases, Sabin Vaccine Institute
Lisa Rotondo	RTI International
Virginia Sarah	The Fred Hollows Foundation
Anthony Solomon	London School of Hygiene & Tropical Medicine
Lieven van der Veken	McKinsey & Company
Sheila West	Johns Hopkins University

Except as otherwise noted, all interviews were conducted via telephone or Skype video.

References

- Ayele, B., and T. Gebre, J. Moncada, JI. House, NE. Stoller, Z. Zhou, TC Porco, BD Gaynor, PM Emerson, J Schachter, JD Keenan (December 2011) *Risk Factors for Ocular Chlamydia after Three Mass Azithromycin Distributions*. **PLoS Neglected Tropical Disease** 5(12): e1441. Available on-line via: <http://www.plosntds.org/article/info%3Adoi%2F10.1371%2Fjournal.pntd.0001441>
- Bailey, R. and T. Lietman (2001). *The SAFE strategy for the elimination of trachoma by 2020: will it work?* **Bulletin of the World Health Organization** 79 (3): 233-236. Available on-line at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2566372/pdf/11285668.pdf>
- Breslin, N. (2 August, 2012). *The London Declaration and Eliminating NTDs*. **Huffington Post**. Available on-line at: http://www.huffingtonpost.com/ned-breslin/london-declaration-ntds_b_1264063.html
- Burton, MJ. and DCW Mabey (2009). *The Global Burden of Trachoma: A Review*. **PLoS Neglected Tropical Diseases**: 3 (10). Available on-line at: <http://www.plosntds.org/article/info%3Adoi%2F10.1371%2Fjournal.pntd.0000460>
- Burton, MJ. (2007). *Trachoma: an overview*. **British Medical Bulletin** 84: 99-116. Available on-line at: <http://givewell.org/files/DWDA%202009/Interventions/Trachoma-An%20overview.pdf>
- Coles CL, Seidman JC, Levens J, Mkocho H, Munoz B, West S. (2011). *Association of mass treatment with azithromycin in trachoma-endemic communities with short-term reduced risk of diarrhea in young children*. **American Journal of Tropical Medicine and Hygiene** October 2011; 85(4): 691-6. Abstract available on-line at: <http://www.ncbi.nlm.nih.gov/pubmed/21976574>
- Coles CL, Levens J, Seidman JC, Mkocho H, Munoz B, West S. (2012) *Mass distribution of azithromycin for trachoma control is associated with short-term reduction in risk of acute lower respiratory infection in young children*. **Pediatric Infectious Disease Journal** April 2012; 31(4): 341-46.
- Courtright P, Sheppard J, Lane S, Sadek A, Schachter J, Dawson CR. (June 1991). *Latrine ownership as a protective factor in inflammatory trachoma in Egypt*. **British Journal of Ophthalmology** 75 (6): 322-5. Available on-line via: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1042373/?tool=pubmed>
- Emerson, Paul M. and Robin L. Bailey (1999). *REVIEW ARTICLE: Trachoma and fly control*. **J Comm Eye Health** 1999; 12(32): 57. Available on-line at: http://www.cehjournal.org/0953-6833/12/jceh_12_32_057.html
- Emerson PM, Cairncross S, Bailey RL, Mabey DC (2000a) *Review of the evidence base for the 'F' and 'E' components of the SAFE strategy for trachoma control*. **Trop Med Int Health** 5: 515-527
- Emerson PM, Bailey RL, Mahdi OS, Walraven GE, Lindsay SW. (2000b). *Transmission ecology of the fly *Musca sorbens*, a putative vector of trachoma*. **Trans R Soc Trop Med Hyg** January 2000; 94 (1): 28-32. Available on-line via: <http://www.ncbi.nlm.nih.gov/pubmed/10748893>

Emerson PM, Lindsay SW, Alexander N, Bah M, Dibba SM, Faal HB, Lowe KO, McAdam KP, Ratcliffe AA, Walraven GE, Bailey RL. (April 2004). *Role of flies and provision of latrines in trachoma control: cluster-randomised controlled trial*. **Lancet** 3: 363(9415): 1093-8. Available on-line via: <http://www.ncbi.nlm.nih.gov/pubmed/15064026>

Emerson, Paul, Laura Frost, with Robin Bailey and David Mabey (2006). *Implementing the SAFE Strategy for Trachoma Control: A Toolbox of Interventions for Promoting Facial Cleanliness and Environmental Improvement*. **The Carter Center and International Trachoma Initiative**.

Hoechsmann A, N. Metcalfe N, Kanjaloti S, Godia H, Mtambo O, Chipeta T, Barrows J, Witte C, Courtright P (2001) *Reduction of trachoma in the absence of antibiotic treatment: evidence from a population-based survey in Malawi*. **Ophthalmic Epidemiology**: 8 (2-3): 145-53. Available on-line at: <http://www.ncbi.nlm.nih.gov/pubmed/11471084/>

Kuper, H., Solomon AW, Buchan J, Zondervan M, Foster A, Mabey D. (June 2003). *A critical review of the SAFE strategy for the prevention of blinding trachoma*. **Lancet Infectious Disease** 3 (6): 372-81. Available on-line via: <http://www.ncbi.nlm.nih.gov/pubmed/12781509>

Lietman, Thomas M., Teshome Gebre, Berhan Ayele, Kathryn J. Ray, M. Cyrus Maher, Craig W. See, Paul M. Emerson, Travis C. Porco and The TANA Study Group (2011). *The epidemiological dynamics of infectious trachoma may facilitate elimination*. **Epidemics** 3 (2011): 119-124.

Mariotti, Silvio, Ramachandra Pararajasegaram, and Serge Resnikoff (2003). *Trachoma: Looking Forward to Global Elimination of Trachoma by 2020 (Get 2020)*. **American Journal of Tropical Medicine And Hygiene**: 69 (Supplement 5): 33-35.

Mariotti, S.P., D. Pascolini and J. Rose-Nussbaumer (2009). *Trachoma: global magnitude of a preventable cause of blindness*. **British Journal of Ophthalmology** 93:563-568. Available on-line at: <http://bj.o.bmj.com/content/93/5/563>

Merbs, Shannath L., Sheila K. West, and Emily S. West (April 2005). *Pattern of Recurrence of Trachomatous Trichiasis after Surgery: Surgical Technique as an Explanation*. **Ophthalmology**: 112(4). Available on-line at: http://www.hopkinsmedicine.org/wilmer/danacenter/publications/west_docs/pattern_of_recurrence_of_trachomatous_trichiasis_after_surgery_technique.pdf

Michel, CE, and AW Solomon, JPV Magbanua, PA Massae, L Huang, J Mosha, SK West, ECB Nadala, R Bailey, C Wisniewski, DCW Mabey, HHLee (2006). *Field evaluation of a rapid point-of-care assay for targeting antibiotic treatment for trachoma control: a comparative study*. **Lancet** (2006): 367: 1585-90. Available on-line at: http://www.hopkinsmedicine.org/wilmer/danacenter/publications/west_docs/field_eval_rapid_poc_assay_targeting_antibio_tx_trachoma.pdf

Miller K., Pakpour N., Yi E., Melese M., Alemayehu W., Bird M., Schmidt G, Cevallos V, Olinger L., Chidambaram J., Gaynor B., Whitcher J., Lietman T. (2004). *Pesky trachoma suspect finally caught*. **British Journal of Ophthalmology** 2004: 88 (6): 750.

Polack, Sarah, Simon Brooker, Hannah Kuper, Silvio Mariotti, David Mabey, and Allen Foster (December 2005). *Mapping the global distribution of trachoma*. **Bulletin of the World Health Organization**: 83 (12). Available on-line at: <http://www.who.int/bulletin/volumes/83/12/913.pdf>

Porco TC, Gebre T, Ayele B, House J, Keenan J, Zhou Z, Hong KC, Stoller N, Ray KJ, Emerson P, Gaynor BD, Lietman TM (2009). *Effect of mass distribution of azithromycin for trachoma control on overall mortality in Ethiopian children: a randomized trial*. **JAMA** September 2009; 302(9): 962-8.

Rabiu M., M.B. Alhassan MB, and H.O.D. Ejere (2009). *Environmental sanitary interventions for preventing active trachoma (Review)*. **Chochrane Library** 2009: vol. 1. The Cochrane Collaboration published by John Wiley & Sons Ltd. Available on-line at: <http://www.thecochranelibrary.com/userfiles/ccoch/file/Water%20safety/CD004003.pdf>

Solomon, A.W., Z. Mohammed, P.A. Massae, J.F. Shao, A. Foster, D.C. Mabey, and R.W. Peeling (November 2005). *Impact of mass distribution of azithromycin on the antibiotic susceptibilities of ocular Chlamydia trachomatis*. **Antimicrobial Agents Chemother**: 9(11): 4804-6. Available on-line at: <http://www.ncbi.nlm.nih.gov/pubmed/16251338>

Sumamo, Elizabeth, Paul Emerson, Krystal Harvey, and Matthew Burton (2007). *The Cochrane Library and Trachoma: An Overview of Reviews (PDF)*. **Evidence-Based Child Health: A Cochrane Review Journal** 2: 943–964. John Wiley & Sons, Ltd. Available on-line at: http://www.cartercenter.org/resources/pdfs/news/health_publications/trachoma/sumamo_2007_trachoma_umbrella_review.pdf

Taylor, Hugh and Russell Gruen. (2010) *Antibiotic Treatments of Trachoma: A Systematic Review*. Monash University: **The Global Evidence Mapping Initiative 2010**. Available on-line at: <http://www.iehu.unimelb.edu.au/?a=380228>

West, Emily, Wondu Alemayehu, Beatriz Munoz, Muluken Melese, Alemush Imeru and Sheila K. West (2005). *Surgery for Trichiasis, Antibiotics to Prevent Recurrence (STAR) Clinical Trial Methodology*. **Ophthalmic Epidemiology**: 12: 279–286. Available on-line at: http://www.hopkinsmedicine.org/sebin/g/n/surgery_trichiasis_antibiotics_prevent_recurrence_star_methodology.pdf

West, Sheila K. (2003). *Blinding Trachoma: Prevention with the SAFE Strategy*. **American Journal of Tropical Medicine and Hygiene** 69 (Supplement 5): 18-23. Available on-line at: http://www.hopkinsmedicine.org/wilmer/danacenter/publications/west_docs/blinding_trachoma_safe_strategy.pdf

West, Sheila K. (2011). *Trichiasis Recurrence—Why the Surgery Part of Trachoma Control is Still Uncontrolled*. **US Ophthalmic Review**: 4(1): 77-79. Available on-line via: <http://www.touchophthalmology.com/articles/trichiasis-recurrence-why-surgery-part-trachoma-control-still-uncontrolled>

Zack, Rachel, Harran Mkochab, Elizabeth Zack, Beatriz Munoz, and Sheila K. West (2008). *Issues in defining and measuring facial cleanliness for national trachoma control program*. **Transactions of the Royal Society of Tropical Medicine and Hygiene** 102: 426–431. Available on-line at: http://www.hopkinsmedicine.org/sebin/q/e/issues_defining_measuring_facial_cleanliness_national_trachoma_control.pdf

Zondervan, Marcia, Hannah Kuper, Anthony Solomon, John Buchan (2004). *SAFE STRATEGY: Health promotion for trachoma control*. **Community Eye Health Journal** 2004: 17(52): 57-58. Available on-line at: http://www.cehjournal.org/0953-6833/17/jeh_17_52_057.html