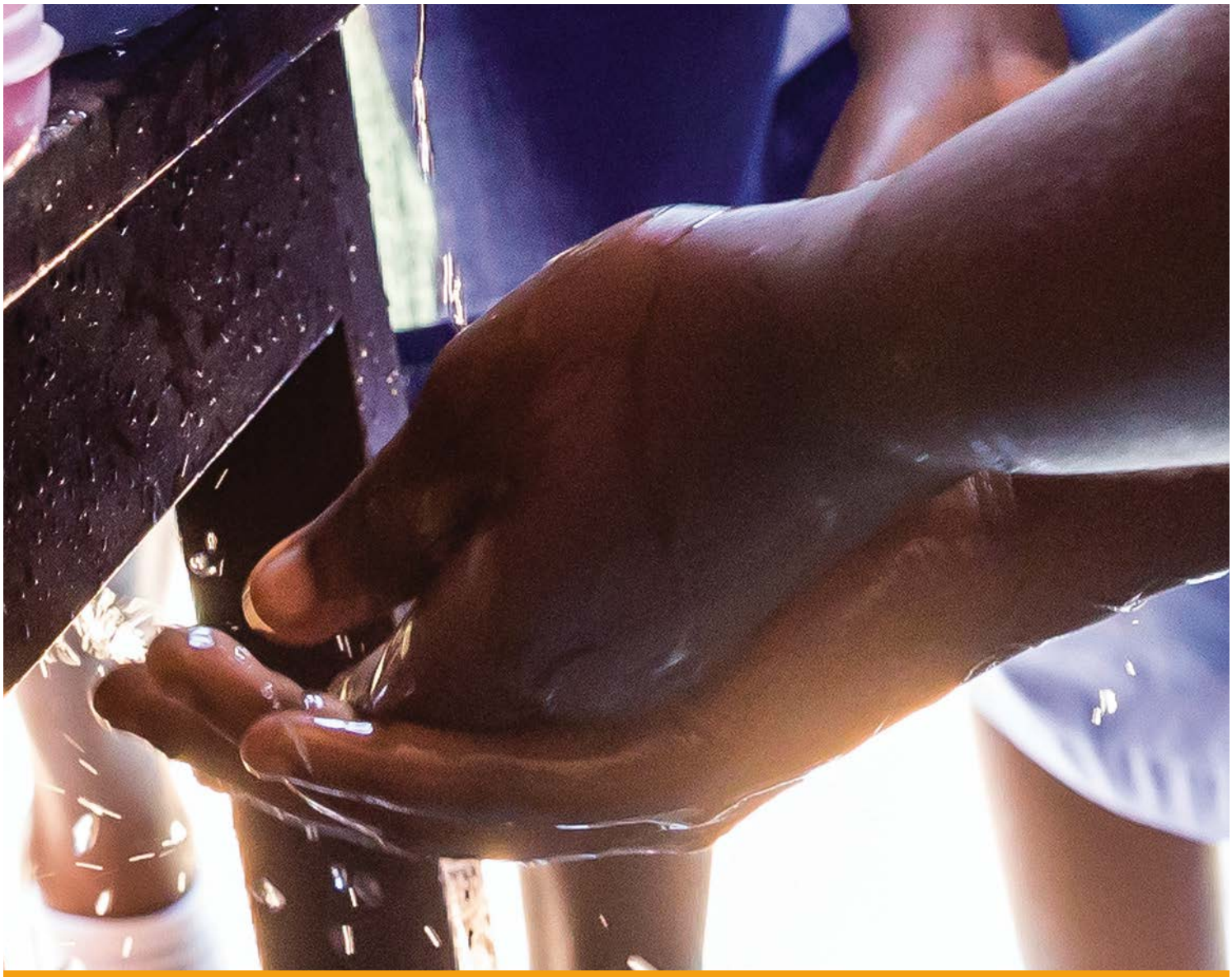

WASH and the Neglected Tropical Diseases

A GLOBAL MANUAL FOR WASH IMPLEMENTERS

Sightsavers | Department for International Development
The International Trachoma Initiative | Children Without Worms | WaterAid
WASH Advocates | Center for Global Safe Water, Emory University | CARE USA

Disclaimer: The content in this manual has not been formally reviewed or approved; the authors are responsible for any misstatements or inaccuracies. All graphics and photos have been used with the permission of the copyright holder.

This document will be updated as new or improved information becomes available. Please share your comments, case studies and data regarding NTDs and WASH integration with us by emailing info@washntds.org.

Visit www.washntds.org to download country-specific versions of this manual, and for the most up-to-date maps and information.

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Cover Photo: Good hygiene, such as handwashing, can help prevent infection with several of the neglected tropical diseases. *Photo courtesy of GlaxoSmithKline.*

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Schoolchildren in Nicaragua washing their hands.
Photo: Children Without Worms

Executive Summary

Introduction and Background

For centuries, humans have recognized the vital roles that access to safe water and toilets and practicing good hygiene play in maintaining human health and dignity. In spite of this recognition, development professionals must still justify investments in water, sanitation, and hygiene (WASH), typically by demonstrating the health impacts of such investments. The WASH sector often uses reduced incidence of diarrhea as the main indicator of improved health.

While many donors or practitioners know of the impact of WASH on reducing diarrhea, few are aware that controlling and eliminating five of the so-called "neglected tropical diseases" (NTDs) also requires WASH. The NTDs are a set of 17 chronic, disabling diseases that disproportionally affect the world's poorest communities. While these diseases are rarely fatal, they cause high rates of morbidity that compromise the health, educational attainment, and economic opportunity of communities across the globe.

The WASH and NTD sectors have a common target population—the world's poorest citizens. This population lacks access to safe and reliable water services and sufficient sanitation or the tools to practice good hygiene behaviors. As a result, they suffer disproportionately from debilitating disease.

Although the WASH and NTD sectors work in the same communities, they have historically worked in parallel rather than coordinating their efforts. This lack of coordination is due in part to the different health outcomes on which each sector focuses. The WASH sector focuses on improved health, such as reduced diarrheal disease, and also on additional desired outcomes like improved livelihoods and overall well-being. The NTD sector, however, focuses mainly on providing treatment for diseases, with less emphasis on prevention.

To better serve the poor, we urge the NTD and WASH sectors to collaborate. Such collaboration should ensure that communities have adequate and equitable access to water and sanitation, as well as the tools to practice good hygiene—all of which serve as the basis for prevention of the NTDs and other disabling diseases.

We intend this manual to serve as a practical guide to WASH practitioners working to implement, support, and sustain WASH interventions at the country level. This manual will equip WASH-implementing organizations with the knowledge they need to target their interventions to NTD-vulnerable communities; to engage in and promote collaborative monitoring for NTD-specific health outcomes; and to communicate the impact of WASH on the NTDs for the purposes of advocacy and policy change.

Why Should WASH Practitioners Care about the Neglected Tropical Diseases?

Worldwide, at least one billion people are infected with one or more of the 17 NTDs—and two billion more may be at risk of infection. As diseases of poverty, many NTDs occur in areas with limited access to water and sanitation, and where hygiene practices, household infrastructure and health services are limited. These diseases are called "neglected" because they receive less attention and fewer resources than diseases such as HIV/AIDs, malaria, and tuberculosis. NTDs are also diseases of neglected people, with the majority of people at risk of infection from them living in the poorest regions of the world. All 17 NTDs are entirely preventable.

The global impact of NTDs is remarkable; they cause blindness, disability, malnutrition and anemia, stunted growth, social stigma, and chronic pain. Beyond their negative impact on health, NTDs contribute to an ongoing cycle of poverty and stigma that leaves people unable to work, go to school, or participate in family and community life.

Increasing sustainable water, sanitation, and hygiene (WASH) services is a central element in the prevention, control, and elimination of five of the NTDs: soil-transmitted helminthiasis (STH), trachoma, schistosomiasis, lymphatic filariasis (LF), and Guinea worm. Reducing levels of these WASH-preventable NTDs not only improves health and alleviates suffering, but can also lead to improved educational outcomes for children and increased economic progress for communities and nations.

The WASH sector can significantly impact health and development of people living in these areas by targeting WASH activities where these diseases occur at the highest rates and by incorporating into existing hygiene promotion efforts behavior change messages relevant to specific NTDs. Currently, there is global momentum toward control and elimination of these diseases. WASH organizations and programs can highlight the impact they can make on those diseases to capitalize on this momentum, elevating global interest and public investment in WASH as a vital component of good health.

The Case for Coordinated WASH/NTD Programming

The WASH and NTD sectors have a strategic opportunity to work together to address multiple needs of those in their common target population who are vulnerable to various WASH-preventable diseases. Through expanding and enhancing WASH interventions for NTD control, both sectors can take an integrated approach to health and development.

Clearly harmonized efforts between the two sectors will improve the livelihoods and well-being of this population. But from an implementation perspective, what activities can the WASH sector undertake to contribute to this integrated programming? From a strategic perspective, what does it stand to gain by doing so?

Essentially, the WASH sector must make a concerted effort to target appropriate WASH interventions to communities where NTDs are most prevalent. This will require them to increase their coordination with governments, non-governmental organizations (NGOs), and donors to fund sufficient and appropriate interventions, targeting, and progress tracking in NTD-endemic communities.

There are 17 neglected tropical diseases, many of which have connections to WASH. However, this manual focuses on only those with the strongest links to WASH. For more information about the connections between WASH and all 17 NTDs, look at Table 1 of the document "WASH: The Silent Weapon against the NTDs," a joint publication of WaterAid and the NTD NGDO Network, available at http://trachoma.org/sites/default/files/guidesandmanuals/WASH%20The%20Silent%20Weapon%20Against%20NTDs.pdf

By undertaking these activities, the WASH sector will substantially contribute to the reduction of NTDs, and thus contribute to the overall health of the world's poorest citizens. Furthermore, the WASH sector stands to gain proof of effectiveness because reductions in NTDs, which can be measured more concretely than reduction of diarrheal disease, may prove to be valuable indicators of WASH sector impact. Concrete evidence of the WASH sector's impact on health and development can be used to advocate for greater investment in WASH as foundational to a nation's health, education, and economic potential.

Objectives of This Manual

This manual is intended to enable WASH practitioners who work at the country level to contribute to the reduction of WASH-preventable NTDs. To achieve this, the manual is designed to:

- Deepen WASH practitioners' understanding of how WASH services can prevent the five mentioned WASH-preventable NTDs.
- Promote targeting of WASH-sector activities in NTD-endemic areas to facilitate deliberate and sustainable WASH programs for health gains.
- Promote collaborative measurement and evaluation of NTD-specific health outcomes by WASH sector implementers (governmental and NGOs) and health professionals (governmental and NGOs).
- Drive funding to integrated WASH and health programming by providing key strategies and messages for advocacy and policy development.

What's in This Manual

To help achieve those objectives, this manual includes:

- A background discussion on WASH and the NTDs.
- Disease-specific chapters that describe how WASH services can alleviate the disease burden of five WASH-preventable NTDs: soil-transmitted helminthiasis, trachoma, schistosomiasis, lymphatic filariasis, and Guinea worm.
- Monitoring and evaluation tools to help WASH practitioners collaborate with health professionals to jointly measure program impact on NTDs.
- Advocacy tools and policy resources to help WASH practitioners drive funding to interventions with proven health impacts.

This manual also provides further resources and links for learning more about WASH and the NTDs. By making connections with NTD control programs, WASH sector implementers may discover opportunities to share existing human and capital resources with NTD control programs to maximize the efficiency of these programs.

Country Manuals

Country-specific versions of "WASH and the NTDS: A Manual for WASH Implementers" will be available in early 2014. These versions will contain country-specific information, and are intended to provide useful information for WASH practitioners at the country level about the NTDs endemic to their country of practice. Visit http://www.washntds.org to access country-specific versions.

WASH and NTDs – A Global Overview

NTD Landscape

Quick Facts about NTDs

- More than one billion people in 149 countries are infected with at least one NTD, and up to two billion may be at risk of infection. (WHO, 2013)
- Controlling and even eliminating five of the WASH-impacted NTDs – soil-transmitted helminthiasis, schistosomiasis, trachoma, lymphatic filariasis, and Guinea worm – requires improved WASH conditions.

Disease Distribution

Each disease chapter in this manual contains information about where the WASH-impacted NTDs occur in the world, and how many people are at risk.

Global NTD Policy

Appendix E: Policy Landscape for NTD Control provides information about the global NTD policy landscape.

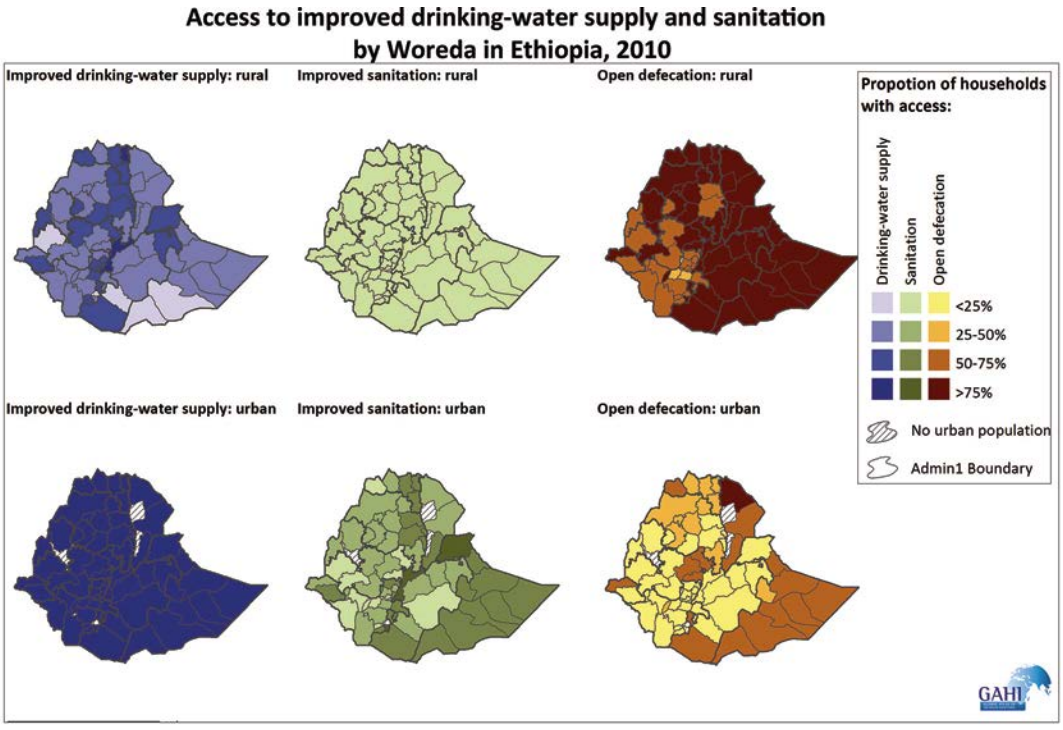
WASH Landscape

Sub-national WASH Coverage Mapping

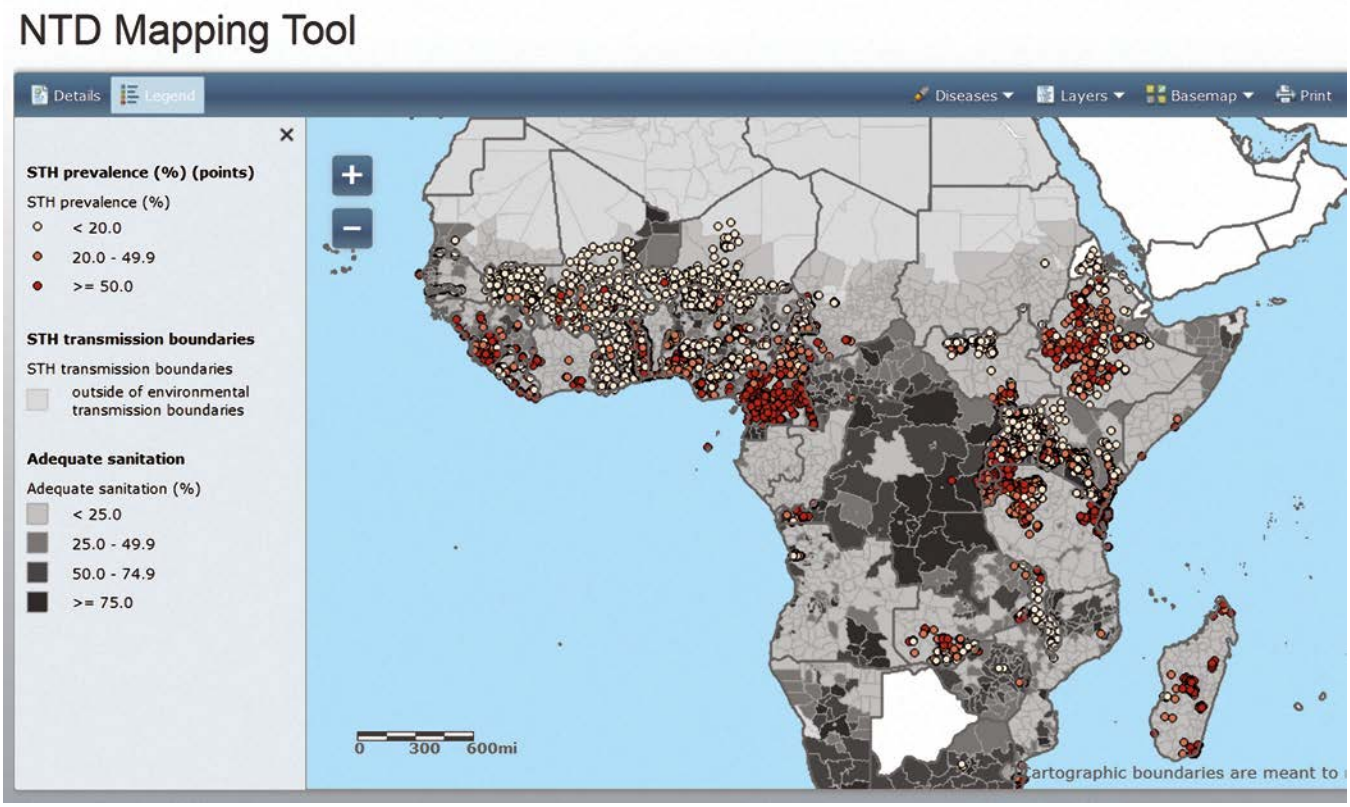
Recently, the London School of Tropical Medicine and Hygiene has used household survey data to develop the first comprehensive maps of drinking water supply and sanitation coverage at sub-national levels for Sub-Saharan Africa. These maps can provide insight into the epidemiology of the WASH-impacted NTDs, help track progress in provision of water and sanitation, and prioritize resource allocation to areas of greatest impact. An example of sub-national WASH coverage mapping is shown below. Maps can be accessed at http://www.thiswormyworld.org in early 2014.

School WASH

Improving WASH conditions in schools can help prevent infection with NTDs amongst children. Schools are often used as a platform for treatment of school-age children for NTDs such as soil-transmitted helminthiasis and schistosomiasis. Integration of school-based treatment programs with school WASH is an opportunity to implement a comprehensive approach to NTD control at the school level, as well as provide benefit to communities. For more information on school WASH, visit http://www.washinschools.info.



Maps of sub-national coverage of improved drinking water and sanitation for the Sub-Saharan African region, such as the examples shown at left, will be available in 2014 at the Global Atlas of Helminth Infection website: http://www.thiswormyworld.org. *Map courtesy of Dr. Rachel Pullan and the Global Atlas of Helminth Infection.*



An example of the mapping information that can be viewed using the NTD Mapping Tool available at http://www.ntdmap.org.

Mapping WASH and NTDs Together

The newly created, interactive NTD Mapping Tool (www.ntdmap.org) allows users to visualize the geographic distribution of NTDs as well as data on access to improved sanitation and improved water sources. Users can select layers, such as improved sanitation access, open defection, and safe water access, along with the diseases they want to map, and visually explore the relationship between NTDs and water and sanitation. See the image above for a screenshot of the NTD Mapping Tool.

Currently, the NTD Mapping Tool includes only information on soil-transmitted helminthiasis, schistosomiasis and trachoma in Sub-Saharan Africa; future releases will cover other diseases and geographic regions. The NTD Mapping Tool is possible thanks to funding from The Bill & Melinda Gates Foundation.

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World Health Organization. (2013, November 20) Neglected Tropical Diseases. Retrieved from http://apps.who.int/neglected_diseases/en.

WASH for Control of Multiple NTDs

WASH Interventions for Integrated NTD Control

In areas where multiple NTDs are present, a single WASH intervention can impact multiple NTDs. The table below shows how water and sanitation interventions can be implemented to target multiple diseases.

Type of intervention	Specific intervention	Diseases Impacted
Water	Increasing access to sufficient amounts of safe water for personal hygienic purposes (e.g., washing hands, face, or body; bathing; and doing laundry)	Soil-transmitted helminthiasis, schistosomiasis, trachoma, lymphatic filariasis, Guinea worm disease
	Increasing access to sufficient amounts of safe water for environmental sanitation (e.g., cleaning latrines)	Soil-transmitted helminthiasis, schistosomiasis, trachoma
	Increasing access to safe water for drinking/food preparation	Guinea worm disease, soil-transmitted helminths
	Monitoring impact of water resource development, waste water management, and sanitation programs on vector breeding levels	Schistosomiasis, lymphatic filariasis
Sanitation	Reducing open defecation	Soil-transmitted helminthiasis, schistosomiasis, trachoma
	Disposing of infant/child feces properly	Soil-transmitted helminthiasis, schistosomiasis, trachoma
	Increasing improved sanitation coverage	Soil-transmitted helminthiasis, schistosomiasis, trachoma
	Promoting maintenance and cleaning of latrines	Soil-transmitted helminthiasis, schistosomiasis, trachoma

Combining Hygiene Messages for Maximum Impact

Specific hygiene messages for prevention and management of NTDs can be integrated into existing hygiene education at little to no cost. The table below summarizes NTD-specific hygiene messaging.

Type of intervention	WASH Messages – *Emphasizing the importance of:*	Diseases Impacted
Hygiene	Hand washing	Soil-transmitted helminthiasis
	Face washing	Trachoma
	Wearing shoes outside	Soil-transmitted helminthiasis
	Daily washing, with soap, of swollen limbs, feet, and between toes to prevent bacterial infections	Lymphatic filariasis
	Washing of soiled clothing/bedding	Trachoma
	Avoiding physical contact with contaminated surface water	Schistosomiasis
	Use of safe water for bathing, clothes washing, and swimming	Schistosomiasis
	Avoiding physical contact with or entering bodies of water used for drinking	Guinea worm disease

Targeting Your WASH Work to High-risk Areas

You can the following approaches to target WASH efforts to high-risk areas for WASH-preventable NTDs.

- Utilize the mapping resources presented in this manual to identify the areas of high disease prevalence in the countries in which you work, and where they overlap with your intervention areas.
- Familiarize yourself with national NTD Plans of Action and with WASH recommendations included in these plans.
- Identify organizations working in your implementation zones that are preventing or treating the NTDs, and collaborate with them to conduct joint monitoring of WASH program impact. The Reference sections in each disease chapter of this guide serve as one source for identifying organizations working in NTD control.

A child in Nepal washes his face, which helps protect against the blinding disease trachoma. *Photo: International Trachoma Initiative*

Preventing Soil-transmitted Helminths (Intestinal Worms) with WASH Interventions

What Are Soil-transmitted Helminths (STH)?

Soil-transmitted helminths (STH) refer to a group of parasites that live in the human digestive system. These parasites include roundworm, whipworm, and hookworm. The parasites live in the soil in warm and humid climates and are spread through contact with feces of infected people. Worldwide, approximately 1 billion people are infected with STH or at risk of infection (WHO, 2013a).

Health and Development Impacts of STH

STH infection can cause blood loss, leading to anemia. It can also lead to nutritional deficiencies, which are especially harmful to children and women of child-bearing age. Infections can limit development and result in poor physical and cognitive growth in children. Girls are particularly affected due to lost educational gains and productivity. At the community level, this results in decreased educational outcomes and economic loss (Hotez, 2008; Baird, Kremer, Hicks, & Miguel, 2011).

WASH for STH Control

STH are spread through contact with feces of infected individuals. Infection happens when fecally contaminated soil or food is ingested, or when larvae living in soil penetrate bare skin. Infections can be treated with deworming drugs. However, reinfection nearly always occurs following treatment when WASH conditions remain poor (WHO, 2013b). Thus, improved and sustained water and sanitation and good hygiene practices are essential to stop the cycle of STH transmission.

Ascaris, also known as roundworms. *Photo: James Gathany, CDC.*

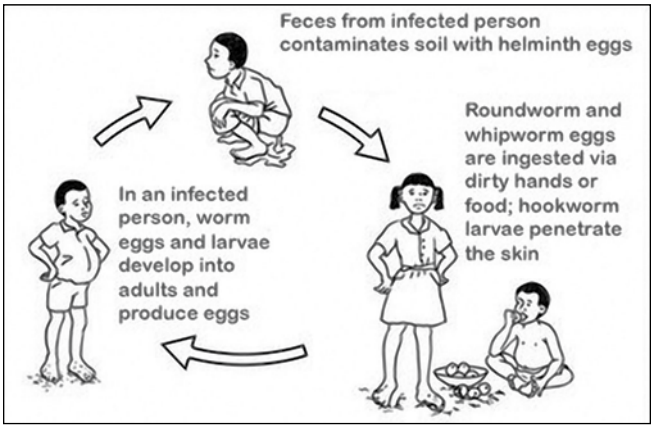
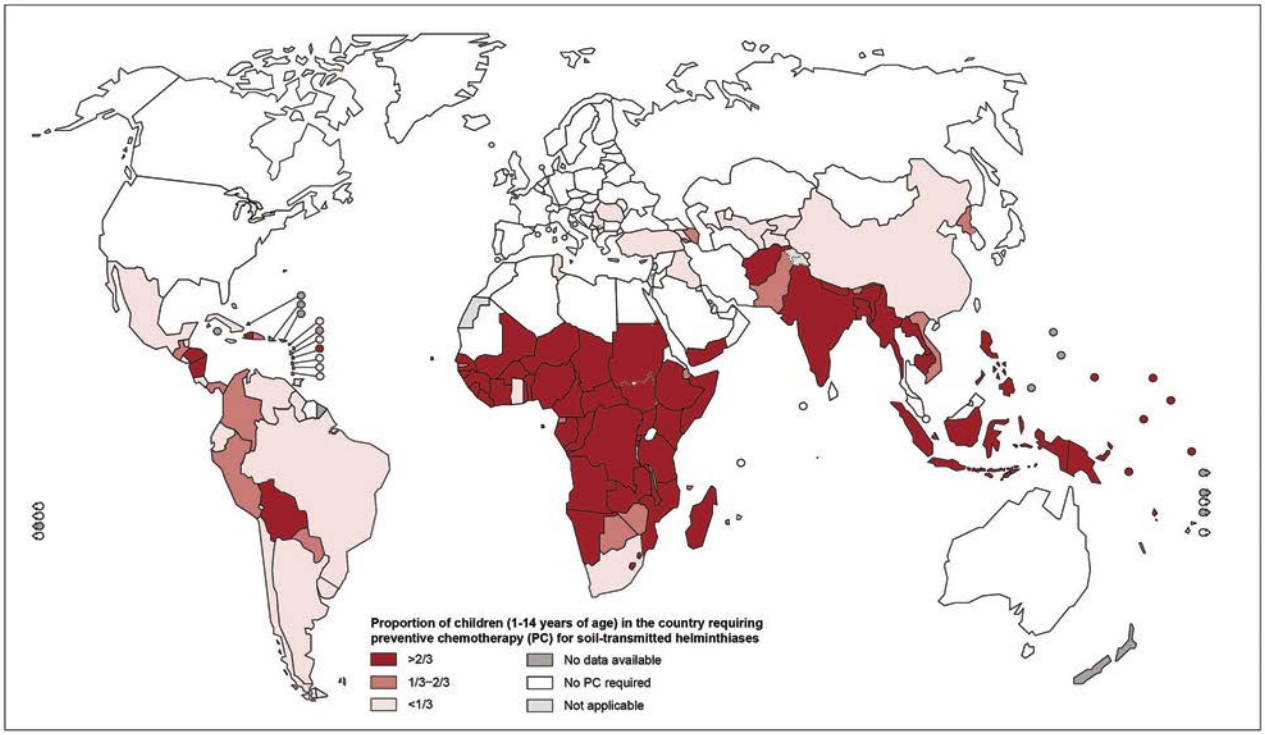


Image: World Health Organization

Global Burden of STH

Worldwide, over one billion people are estimated to be at risk of infection with STH, including over 800 million children. (World Health Organization [WHO], 2013a).

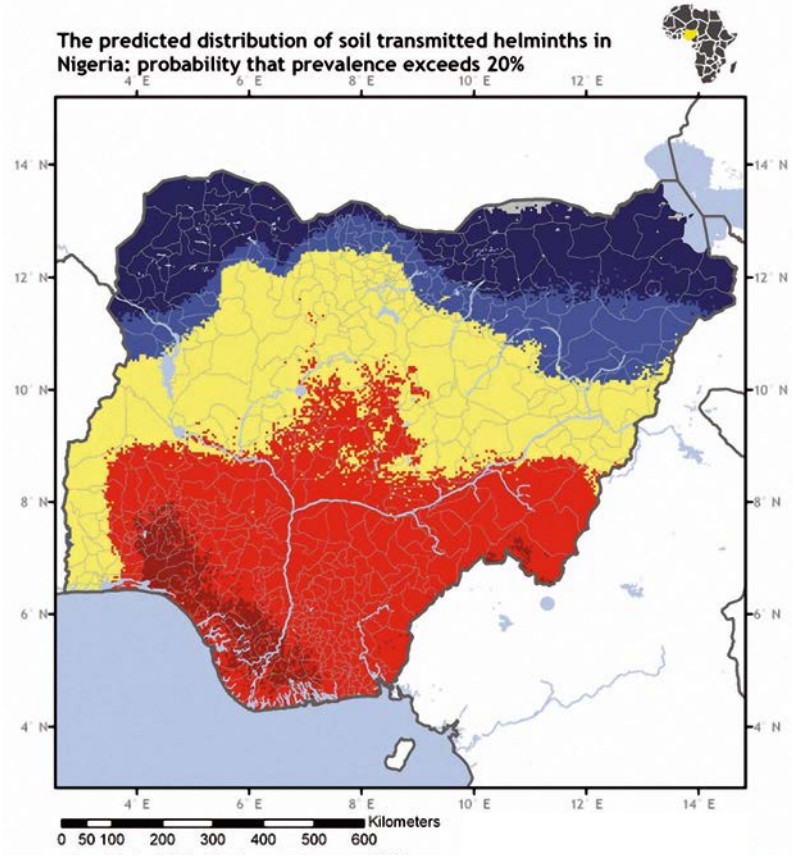


Data Source: World Health Organization
Map Production: Control of Neglected Tropical Diseases (NTD)
World Health Organization

World Health Organization

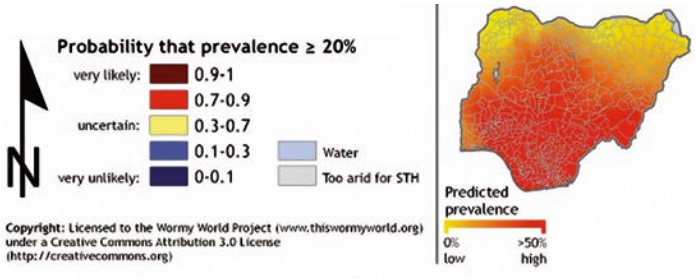
Global distribution of STH infection

The map above shows the global distribution of the burden of STH infection. Countries in dark red have a very high burden of STH, with more than 2/3 of all children requiring annual treatment. Countries in medium red have a moderate to high burden of STH, with 1/3 - 2/3 of all children requiring annual treatment. Light red countries have a low to moderate burden of STH, with 1/3 or fewer of all children requiring annual treatment. (Image: World Health Organization)



Country maps of STH infection risk

Country-specific maps showing the estimated risk of STH infection, as in the example at left, are available from the Global Atlas of Helminth Infection. Visit http://www.thiswormyworld.org to access the maps.



Treating STH Infection

The WHO recommends annual or bi-annual treatment of at least 75% of pre-school and school-age children. STH infections can be treated with deworming drugs such as albendazole or mebendazole. Pharmaceutical companies donate these drugs to Ministries of Health (The Bill & Melinda Gates Foundation, 2012). Governments frequently distribute deworming treatments as part of immunization and vitamin A programs, or in schools in coordination with Ministries of Education.

In 2012, approximately 336 million children aged 1 to 14 years were reached with mass treatment for STH. This represents approximately 26% of the total number of children at risk for infection worldwide. (WHO, 2013a)

The Evidence Base for WASH Prevention of STH

A recent WASH/NTD meta-analysis estimated the average association of WASH variables with STH infection. See **Appendix B** for the complete results of the meta-analysis. The relationship between WASH and STH is summarized in the results* below

- Wearing shoes reduces hookworm infection by an average of 71%.
- Access to a household latrine was associated with reduced risk of infection with roundworm and whipworm by more than 40%.
- Hand washing with soap at critical times, such as after defecation and before eating, can reduce risk of infection with all three STH species by more than 30%.
- Households that have piped water access have a markedly reduced risk of infection (43% to 60%), although this may be related to other sanitation and hygiene practices that occur due to having a water source close to home.

* Results of analysis as of December 2013.

Another systematic review and meta-analysis of the effect of sanitation availability and use on STH infection (Ziegelbauer et al., 2012) found:

- People who either had or used a latrine were 49% less likely to be infected with STH as people who neither had nor used a latrine.
- Exclusive of use, people with access to sanitation facilities were 51% less likely to be infected with STH compared to people with no access to sanitation facilities.

Key WASH Activities to Prevent STH

HYGIENE

- Promoting hand washing before eating, after working, and after defecation.
- Promoting proper disposal of infant/child feces.
- Promoting wearing shoes when walking outside.

Girls washing their hands at school. *Photo: GlaxoSmithKline.*

SANITATION

- Reducing open defecation to minimize soil contamination.
- Ensuring access to a household latrine and latrines in schools to minimize open defecation.
- Ensuring that processes are in place for regular cleaning and maintenance of latrines because these are necessary to encourage consistent use.

WATER

- Facilitating access to sustainable safe water services for hygiene, drinking, and food preparation.
- Promoting household water treatment and proper storage.

If You Only Do ONE Thing

Reduce the "fecal footprint": Ensure that hygiene education emphasizes wearing shoes when outside and on dirt floors inside the home to help prevent hookworm transmission.

Bangladesh Case Study – Save the Children

A 2002 study by Save the Children in Bangladesh found that children in primary schools in Nasirnagar region suffered from a wide range of worm infections, diarrheal diseases, and micronutrient deficiencies. At baseline, the enabling environment in schools for practicing good hygiene and sanitation was poor; hand washing stations were rare, and latrines were often unusable.

To address these issues, Save the Children worked with the Ministry of Primary Education and implemented several activities in all schools in the region. These activities included deworming and vitamin A supplementation; improving the school environment with safe water and child-friendly sanitation facilities; school and community-based health education activities; and training for community groups to sustain the practices after the completion of the program.

Follow-up assessments showed that the number of children with heavy levels of worm infection was reduced from 66% to nearly zero, and that nearly all schools installed a hand washing system. In part due to the demonstrated success of these interventions, the government of Bangladesh has expanded deworming coverage to all school-age children in the country and undertaken hygiene promotion activities in schools (Save the Children, 2009).

Additional Resources

Below we have provided a selection of information that may be helpful to you as you explore opportunities for collaboration. Please note that this is not an exhaustive list; you should seek to identify many more partners, resources, and documents at both a global level and specific to your country context.

Partners and Programs Working in STH Control

- Children Without Worms
  http://www.childrenwithoutworms.org
- Deworm the World
  http://www.dewormtheworld.org
- World Health Organization
  http://www.who.int/intestinal_worms/en

Maps of STH Geographic Distribution

- The Global Atlas of Helminth Infections
  http://www.thiswormyworld.org

Information, Education, and Communication Materials

- WHO Fact sheet on STH
  http://www.who.int/mediacentre/factsheets/fs366/en/index.html
- STH Health Education Materials by Country
  http://www.who.int/intestinal_worms/resources/health_education/en/index.html

Policy

- World Health Assembly Resolution 54.19
  http://www.who.int/entity/neglected_diseases/mediacentre/WHA_54.19_Eng.pdf
- *Helminth control in school-age children: A guide for managers of control programs* (WHO)
  http://whqlibdoc.who.int/publications/2011/9789241548267_eng.pdf
- *Eliminating STH as a public health problem in children: Progress report 2001-2010 and strategic plan* (WHO) http://whqlibdoc.who.int/publications/2012/9789241503129_eng.pdf

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Preventing Trachoma with WASH Interventions

What is Trachoma?

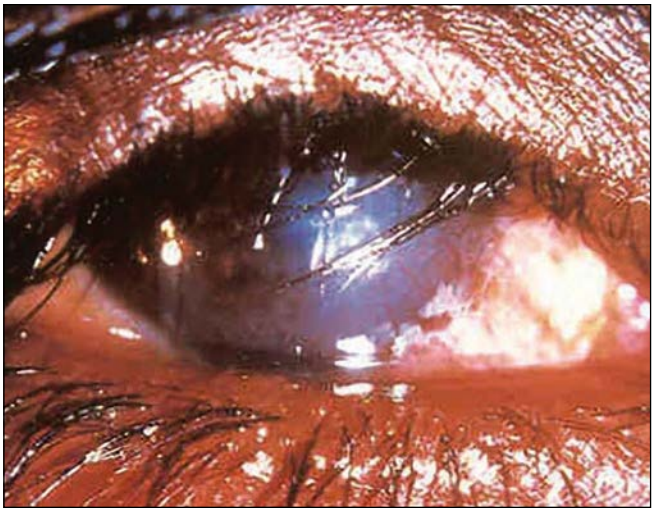
Trachoma is an infectious eye disease that is the leading cause of preventable blindness worldwide. Blinding trachoma is caused by recurring bacterial infection of the eyes, which result in scarring of the eyelids. Eventually the eyelids turn inwards, causing the eyelashes to scrape the cornea and resulting in pain and irreversible blindness. Infection is spread by eye-seeking flies that breed in human feces, or with fingers, hands, clothing, or bedding contaminated with discharge from the eyes and nose of an infected individual. The number of people living in areas where trachoma occurs is estimated at 229 million (WHO, 2013).

Health and Development Impacts of Trachoma

Worldwide, 2.2 million people are visually impaired, and nearly 1.2 million people are irreversibly blind as a result of trachoma (WHO, 2013). Blinding trachoma causes immense pain, and results in long-term health, economic, and social impacts for the blind individuals, their families, and communities. Women and girls are particularly vulnerable to infection, as they are often the primary caregivers of children, and children are the greatest source of infection with trachoma (Centers for Disease Control and Prevention [CDC], 2009).

Global Burden of Trachoma

Over 1.2 billion people live in areas where trachoma is a known risk. More than 8.7 million have the advanced stage of disease that leads to visual impairment and permanent blindness (Global Atlas of Trachoma, 2013).



Eye damage caused by repeated infection with trachoma.
Photo: World Health Organization.

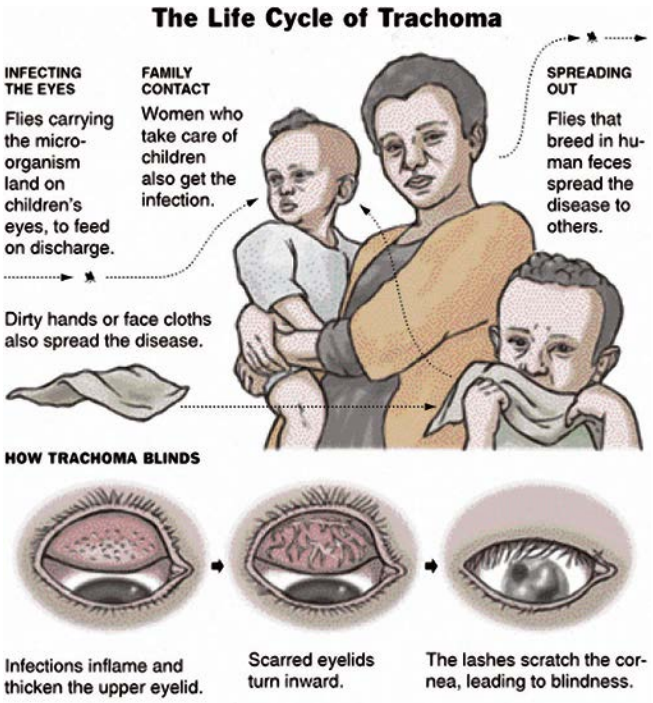
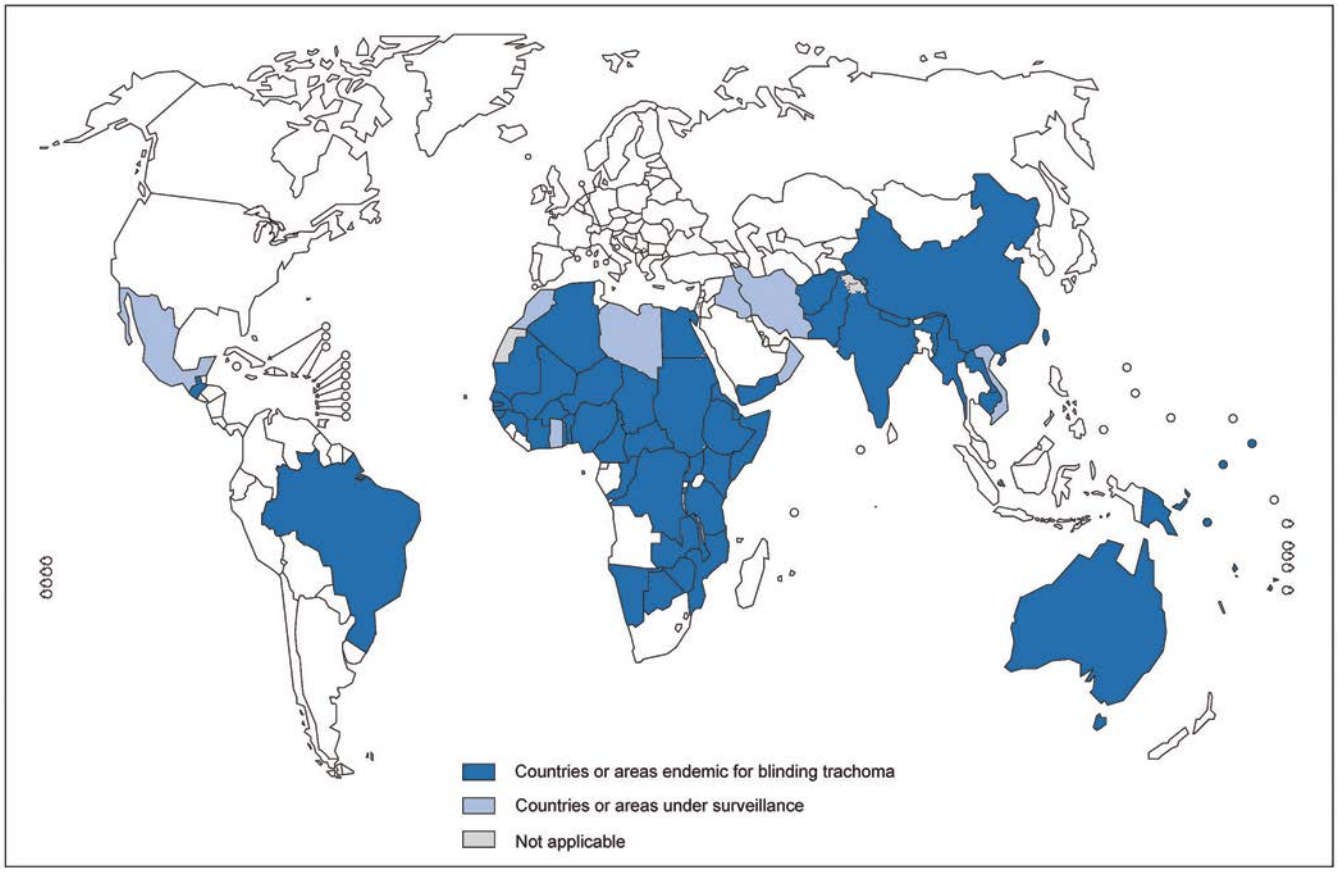


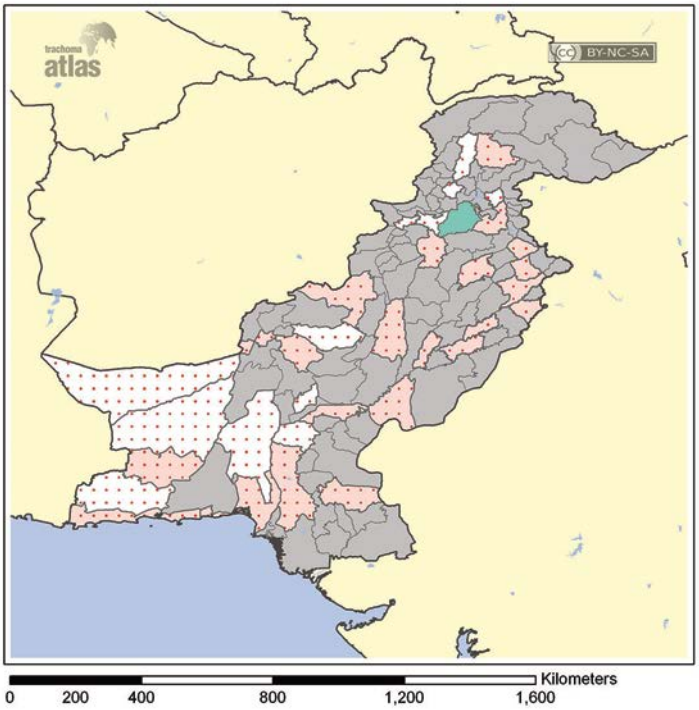
Image: The Carter Center.



Global distribution of Trachoma

The map above shows the global distribution of blinding trachoma. Dark blue countries indicate countries where blinding trachoma is known to be a risk. Lighter blue countries are under surveillance for the disease. *Image: World Health Organization*

Prevalence of active trachoma in Pakistan



Country maps of trachoma prevalence

Country-specific maps showing levels of trachoma infection and blindness, as in the example at left, are available from the Global Trachoma Atlas. Visit http://www.trachomaatlas.org to access the maps.

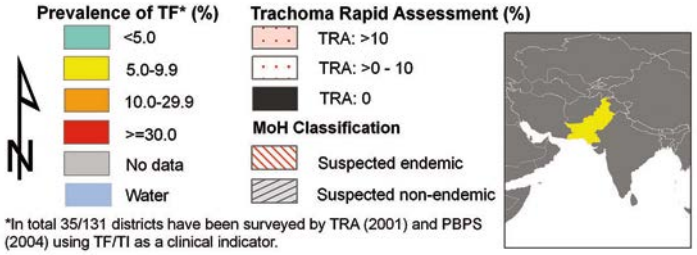


Image: The International Trachoma Initiative.

An Integrated Approach to Trachoma Control through WASH and Treatment: The Safe Strategy

Trachoma is a preventable disease. The WHO-recommended SAFE strategy is an integrated approach to combating the disease. SAFE stands for: **S**urgery to correct inturned eyelids, **A**ntibiotic treatment with azithromycin to treat and prevent infection, **F**acial cleanliness to remove infectious discharge, and **E**nvironmental improvement to reduce open defecation and improve access to water. Blinding trachoma is targeted for global elimination by 2020 using the SAFE strategy (World Health Assembly, 1998).

For up-to-date maps displaying district-level implementation of each of the components of the strategy, including facial cleanliness and environmental improvement, visit www.trachomacoalition.org/maps.

Treating Trachoma

The pharmaceutical industry donates the antibiotic azithromycin to treat communities where trachoma is a risk (The Bill & Melinda Gates Foundation, 2012).

To see up-to-date maps displaying district-level implementation of antibiotic treatment for trachoma by country, visit www.trachomacoalition.org/maps.

The Evidence Base for WASH Prevention of Trachoma

A recent WASH/NTD meta-analysis estimated the average association of WASH variables on signs of trachoma and trachoma infection. See **Appendix B** for the complete results of the meta-analysis. The relationship between WASH and trachoma is summarized in the results below:

- Face washing and facial cleanliness is an important variable in trachoma control. An individual having a clean face and no visible ocular discharge is associated with a 68% reduction in risk of infection with *C. trachomatis*, the bacteria that causes trachoma.
- Access to household latrines is also important to achieve control of trachoma, as the flies that spread the disease breed in human feces. Individuals living in households with access to a latrine have an estimated 57% reduction in risk of infection with *C. trachomatis*.

In addition to these results, studies have shown that risk of infection with trachoma becomes higher as a household's distance to a water source increases (West et al., 1989), as well as when time needed to collect water increases (Polack et al, 2006).

Key WASH Activities to Prevent Trachoma

HYGIENE

- Promoting regular face washing with soap to remove eye and nasal discharge contaminated with bacteria.
- Promoting regular washing of clothing and bedding with soap to prevent further spread of disease.

SANITATION

- Helping communities to reduce open defecation, which removes the breeding sites for eye-seeking flies.
- Increasing access to and use of household latrines to minimize open defecation deposits near the home.
- Promoting latrine maintenance is also important, as it increases latrine use by all members of the family, and prevents accumulation of feces in the open, which can attract flies.

WATER

- Improving access to water, which can lead to increased water use for household hygiene practices, including face washing and washing of clothing and bedding.

If You Only Do ONE Thing

Incorporate face washing into hand washing and hygiene education programs that are already being conducted – adding this message can have a big impact on trachoma.

Case Study: The SAFE Strategy in Morocco

Morocco was the first country to implement the full SAFE strategy at a national scale. In 1992, approximately 5.4% of Morocco's population had trachoma. Nearly all of these cases were concentrated in five rural provinces in southeast Morocco.

In 1991, the National Blindness Control Program was formed to eliminate trachoma by 2005. Between 1997 and 1999, Morocco implemented all four parts of the SAFE strategy. Community health workers used slide shows, videos, films, community theater, meetings, photos, notices, pamphlets and even megaphones to communicate lessons on the importance of facial cleanliness. The Ministry of Education developed a model lesson on trachoma that was incorporated into the curriculum for all schoolchildren in the endemic provinces. The National Office of Potable Water oversaw the construction of latrines in 32 villages. An additional 350 local village associations drilled wells, built latrines and found safe ways of storing valuable animal dung without making it accessible to flies. Access to potable water increased from 13% in 1992 to 60% in 2000 and at least 80% in each trachoma endemic region by 2005.

The impact of the full SAFE strategy was enormous. Prevalence fell by 99% after 1997, from 28% to less than 2.5% in 2005. In the Zagora Province, the most endemic in the country, prevalence of trachoma fell from 69% in 1997 to 3.3% in 2005 (Center for Global Development, n.d.).

Additional Resources

Below we have provided a selection of information that may be helpful to you as you explore opportunities for collaboration. Please note that this is not an exhaustive list; you should seek to identify many more partners, resources, and documents at both a global level and specific to your country context.

Partnerships and Programs Working in Trachoma Control

- Alliance for Global Elimination of Trachoma by 2020 (GET 2020) http://www.who.int/blindness/causes/trachoma/en/index.html
- The International Trachoma Initiative http://www.trachoma.org
- The Carter Center http://www.cartercenter.org
- SightSavers http://www.sightsavers.org
- Helen Keller Institute http://www.hki.org
- International Coalition for Trachoma Control http://www.trachomacoalition.org

Maps of Global Trachoma Distribution

- The Trachoma Atlas http://www.trachomaatlas.org

Information, Education and Communication Materials

- Trachoma Toolkit for Face Washing and Environmental Improvement: http://www.k4health.org/toolkits/trachoma-prevention
- http://trachoma.org/guides-and-manuals
- A Guide to Trachoma Prevention Through School Health Curriculum Development: http://www.who.int/blindness/CHF%20GUIDE%20FINAL%20EN.pdf

Policy Documents

- World Health Assembly 51.11 calling for global elimination of blinding trachoma. English. http://trachoma.org/sites/default/files/guidesandmanuals/WHA51.11.pdf. French. http://trachoma.org/sites/default/files/guidesandmanuals/WHA51.pdf
- 2020 InSight http://trachoma.org/global-strategy-2020-INSight

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Preventing Schistosomiasis with WASH Interventions

What is Schistosomiasis?

Schistosomiasis is caused by infection with parasitic blood flukes, which live in the veins leading to the urinary and intestinal tracts. People become infected when they come into contact with water bodies harboring freshwater snails that have been infected when urine and feces of infected people contaminate the water body in which they live. The parasite leaves the snail and enters the skin of people when they are in the water. The eggs of these parasites cause massive damage to tissues and organs, resulting in illness and even death.

There are two main types of schistosomiasis: intestinal and urogenital. Intestinal schistosomiasis results in damage to the liver, and urogenital schistosomiasis can significantly increase the probability of a woman contracting HIV, human papilloma virus (HPV), syphilis, herpes, and other sexually-transmitted infections (WHO, 2012).

Health and Development Impacts of Schistosomiasis

The diagram below lists the various symptoms and health impacts of schistosomiasis infection (WHO, 2012).

A child with schistosomiasis. *Photo: The Global Atlas of Helminth Infections.*

Global Burden of Schistosomiasis

Worldwide, nearly 250 million people are at risk of schistosomiasis infection. (WHO, 2013). Individuals at high risk include people whose occupations or activities put them in contact with surface water, such as fishermen, agricultural workers and miners; children playing in water; and women, who come into contact with water during clothes washing and bathing.

Hepato-Intestinal

- Abdominal pain
- Diarrhea
- Blood in stool
- Liver, spleen enlargement in advanced cases
- Can result in death

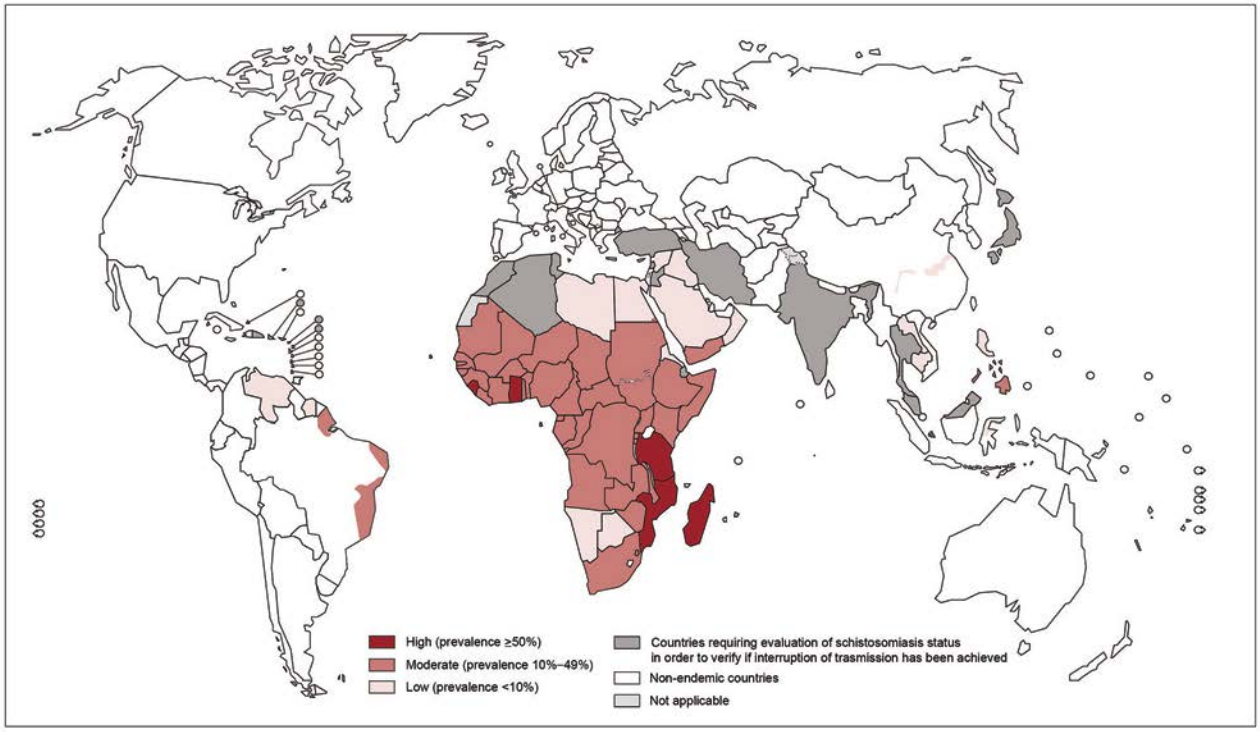
Fatigue and malaise resulting in:

- Reduced ability to concentrate and learn
- Reduced productivity and economic gains

Urogenital

- Blood in urine
- Female genital schistosomiasis: lesions of the cervix and vagina, vaginal bleeding and pain during sexual intercourse; a risk factor for sexually transmitted infections
- Men: pathology of the seminal vesicles, prostate and other organs, leading to infertility and possible bladder cancer

Discrete and shared effects of intestinal schistosomiasis (caused by *S. mansoni*, *S. japonicum*) and urogenital schistosomiasis (caused by *S. haemotobium*)



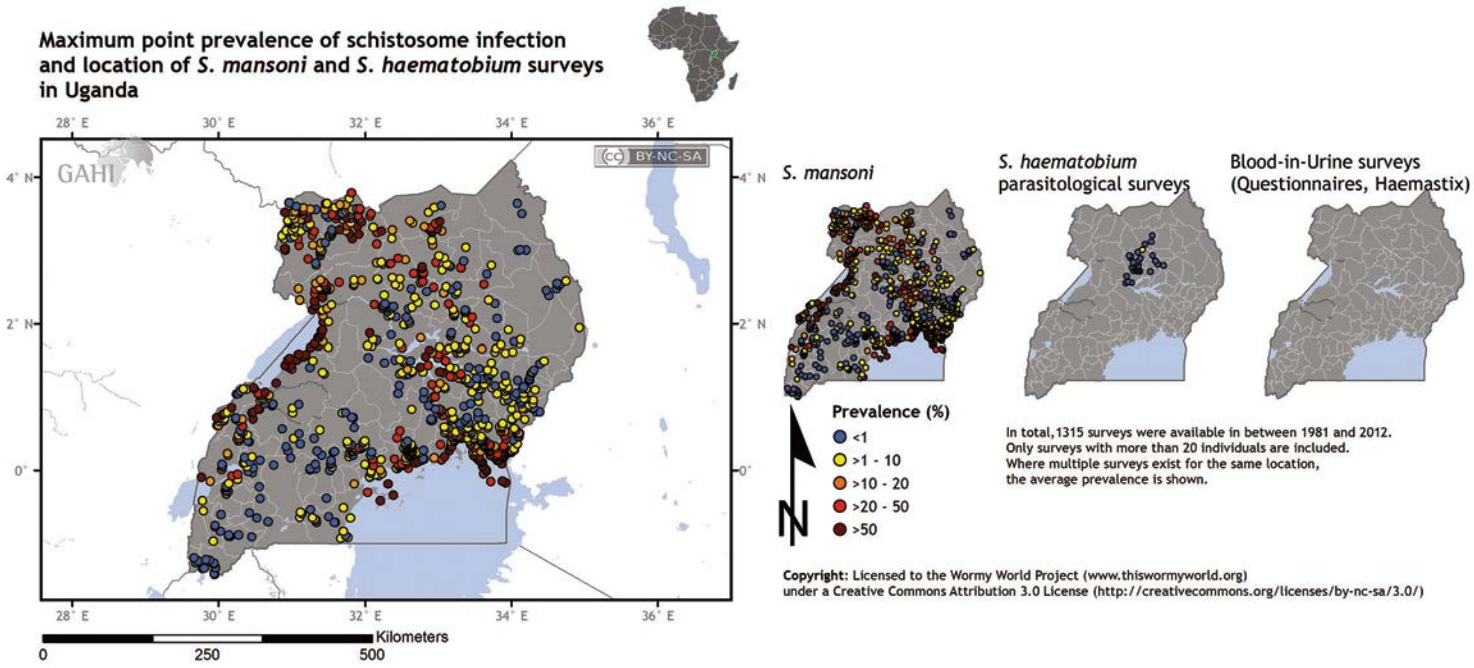
The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement. © WHO 2012. All rights reserved

Data Source: World Health Organization
Map Production: Control of Neglected Tropical Diseases (NTD)
World Health Organization

World Health Organization

Global distribution of schistosomiasis

The map above shows the global distribution of schistosomiasis. Countries in dark red have high prevalence (>50%). Medium red countries have moderate prevalence (10-49%). Light red countries have low prevalence (<10%).
Image: World Health Organization



Country maps of schisosomiasis surveys

Country-specific maps estimating point prevalence of schistosomiasis based on survey data, as in the example above, are available from the Global Atlas of Helminth Infection. Visit http://www.thiswormyworld.org to access the maps.

WASH for Schistosomiasis Control

The eggs of the parasites causing schistosomiasis are shed by infected individuals through the feces and urine, which if deposited in surface water bodies, contaminate these water bodies and infect snails. People bathing, washing clothes or working in the water acquire the disease when larvae released from the snail enter the skin (Gryseels, Polman, Clerinx, & Kestens, 2006).

Community-wide sanitation facilities are essential to prevent contamination of water bodies with urine and feces. Household-level sanitation improvements are not typically sufficient, as even a few infected individuals practicing open defecation or urination can cause contamination of water bodies. If reaching high levels of improved sanitation throughout a community is not achievable in the short-tem, in order to decrease schistosomiasis transmission it is essential to discourage contact with contaminated surface water bodies and to increase access to safe water for activities such as bathing, clothes washing, and recreation.

Treating Schistosomiasis

The drug praziquantel is used to treat schistosomiasis by targeting high-risk groups—school-age children, adults in occupations involving contact with water, and pregnant and lactating women (WHO, 2012). The pharmaceutical industry donates praziquantel to treat school-age children at risk of the disease (The Bill & Melinda Gates Foundation, 2012).

In 2012, 42.1 million people were reached with mass treatment for schistosomiasis. This represents nearly 17% of the global at-risk population (WHO, 2013).

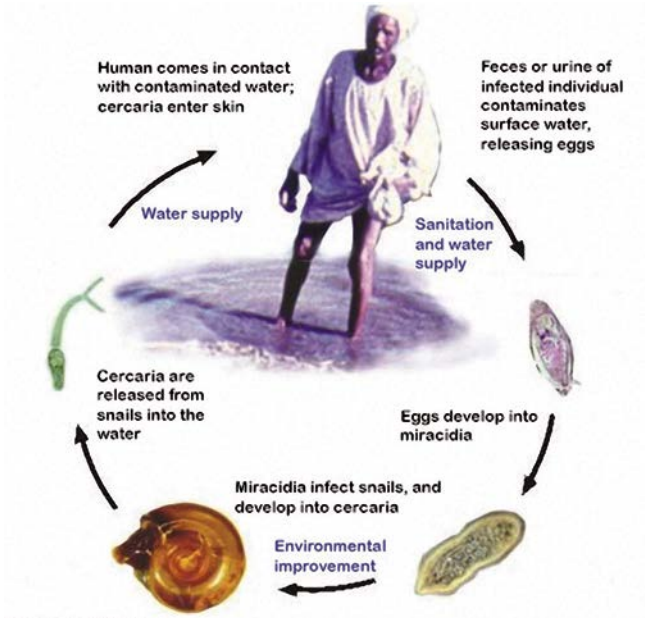


Image adapted from: http://www.uni-bielefeld.de/biologie/Didaktik/Zoologie/html_deutsch/zyklus.html

The Evidence Base for WASH Prevention of Schistosomiasis

The evidence base for WASH and schistosomiasis demonstrates the importance of preventing contact with environmental water bodies. The relationship between WASH and schistosomiasis is demonstrated by the following:

- Improving water supply infrastructure in St. Lucia was found to reduce schistosomiasis in children from 19.3% to 4.5% (Jordan, 1988).
- In Kenya, it was found that children from villages with communal as opposed to household water sources were eight times more likely to become reinfected following treatment (Muchiri, Ouma, & King, 1996).
- In Brazil, absence of piped water was found to be associated with seven-fold increased risk for infection (Lima e Cost et al., 1987).

However, providing safe water supplies does not always prevent schistosomiasis infection, and some water contact activities may continue despite the provision of these supplies. For example, another study in Brazil found no significant association between type of water supply and *S. mansoni* infection (Lima e Costa et al., 1991).

Case Study: Schistosomiasis Control In China

China has a long history of schistosomiasis control, and has succeeded in significantly reducing disease prevalence through an integrated control strategy that incorporates WASH. The disease was formerly widespread throughout the country; terms such as "Big Belly Village" were used to describe communities where the disease was common.

From the 1950s through the 1980s, efforts to combat schistosomiasis focused on snail control through applying molluscicides and environmental modification of agricultural areas. Communities were mobilized and entire areas were rid of snails. In the 1980s, use of preventive chemotherapy was emphasized. Recognizing the probability of re-infection without ongoing WASH services, the government of China adopted an integrated control strategy for schistosomiasis in 2004. The policy focused on reducing transmission of schistosomiasis to snails by preventing environmental contamination with human feces. Access to sanitation was expanded, including latrines in villages and portable toilet containers for use on boats to reduce defecation in water sources by fishermen. Health education was also emphasized along with continued preventive chemotherapy and snail control efforts.

As a result of these efforts, the prevalence of schistosomiasis infection was reduced by nearly 40%, from 843,000 people in 2003, to 325,824 in 2010. (Collins, Xu, & Tang, 2012).

Key WASH Activities to Prevent Schistosomiasis

WATER

- Increase access to safe water not only for drinking, but also for non-drinking purposes, such as clothes washing, bathing, and swimming, to decrease contact with contaminated surface water.
- Determine why people visit natural water bodies for bathing and laundry instead of using water from boreholes for these purposes (Chimbari et al., 1992); take measures to make safe water use for these purposes more appealing (e.g., ensuring areas around boreholes have proper drainage to encourage clothes washing in the area, providing private spaces near boreholes for bathing, etc.).

SANITATION

- Reduce open defecation and urination community-wide to minimize water contamination; individual household-level sanitation coverage is not sufficient to prevent transmission of schistosomiasis, as a single infected individual can contaminate a water body.
- Increase access to latrines, particularly near freshwater, and encourage use of latrines to reduce contamination of surface water.

Photo: Oliver Asselin, Sabin Vaccine Institute, 2012

HYGIENE

- Promote behavior change to discourage the use of contaminated surface water for activities such as bathing, washing clothes, and swimming, and promote the use of safe water sources for these activities.

If You Only Do ONE Thing

Discourage contact with contaminated surface water, including using it for activities such as clothes washing, bathing and swimming, in areas where community-wide coverage of improved sanitation is low.

Additional Resources

Below we have provided a selection of information that may be helpful to you as you explore opportunities for collaboration. Please note that this is not an exhaustive list; you should seek to identify many more partners, resources, and documents at both a global level and specific to your country context.

Partnerships and Programs

- The Schistosomiasis Control Initiative http://www3.imperial.ac.uk/schisto
- The Schistosomiasis Consortium for Operational Research http://score.uga.edu

Mapping

- The Global Atlas of Helminth Infections http://www.thiswormyworld.org

Information, Education, and Communication Materials

- *Bambo has Bilharzia – What Children Should Know about Bilharzia (Schistosomiasis)*. WHO 2011. http://whqlibdoc.who.int/publications/2011/9789241501903_eng.pdf

Treatment Information by Country

- WHO Preventive Chemotherapy Database http://www.who.int/neglected_diseases/preventive_chemotherapy/sch/en

Policy

- World Health Assembly 65.21 http://www.who.int/entity/neglected_diseases/mediacentre/WHA_65.21_Eng.pdf
- Schistosomiasis: WHO Progress Report 2001-2011 and Strategic Plan 2012-2020 http://www.who.int/iris/bitstream/10665/78074/1/9789241503174_eng.pdf

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Preventing Lymphatic Filariasis (LF) with WASH Interventions

What is Lymphatic Filariasis (LF)?

Lymphatic filariasis (LF) is a parasitic disease spread by mosquitoes. Larvae introduced into the body by mosquitoes enter the blood stream, and the adult worms damage the body's lymphatic system, resulting in swelling and disfigurement of the limbs and genitalia. Worldwide, nearly 1.4 billion people are at risk of infection, and approximately 40 million suffer disability as a result of the disease (WHO, 2012).

Health and Development Impacts of LF

LF affects the lymphatic system, which is responsible for removing waste products and excess fluid from the body and helping the body's immune system fight infection. Disruption of the lymphatic system causes accumulation of fluids in the tissues and extremities, leading to permanent swelling called lymphedema. In endemic communities, up to 50% men suffer swelling of the genitals, notably hydrocele (swelling of the scrotum) (WHO, 2013a). People with lymphedema are prone to painful bacterial skin infections that can cause further swelling, inflammation, and damage to the lymphatic system. Repeated episodes of these bacterial infections worsen the effects of lymphedema, and can lead to permanent disability. In turn, this results in economic loss for the community, along with physical and mental suffering for patients.

Global Burden of Lymphatic Filariasis

Approximately 40 million are disabled by lymphatic filariasis, and nearly 1.4 billion people are at risk of infection. It is one of the leading causes of permanent disability worldwide.

Lymphedema of the leg caused by lymphatic filariasis. *Photo: The Carter Center.*

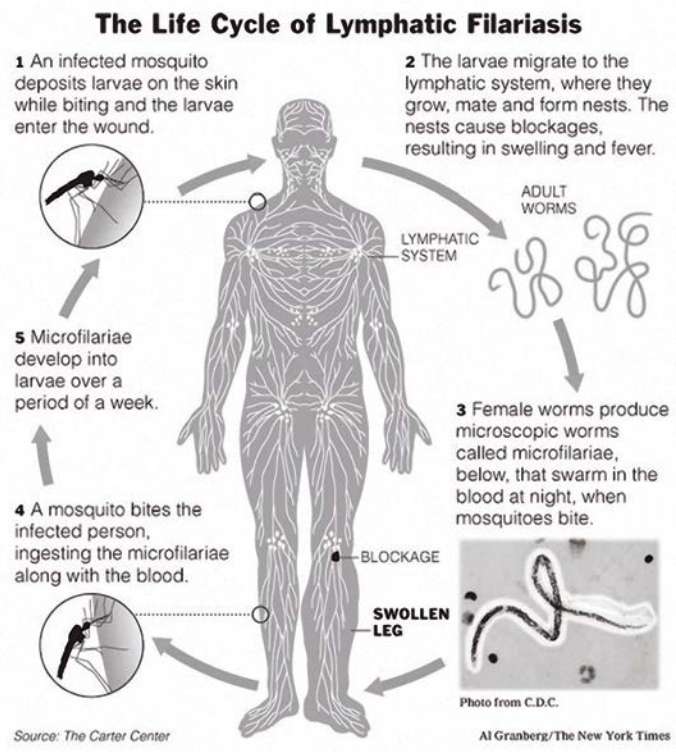
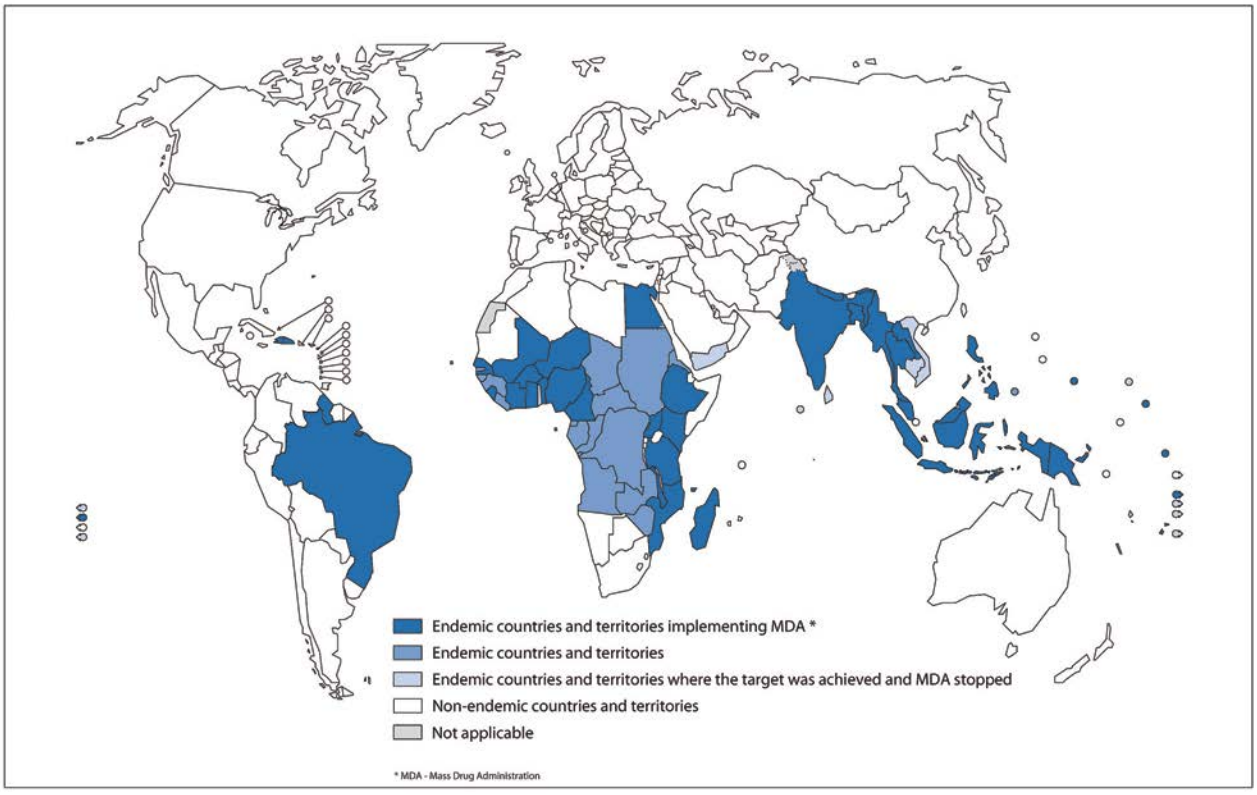


Image: Al Granberg, The New York Times.



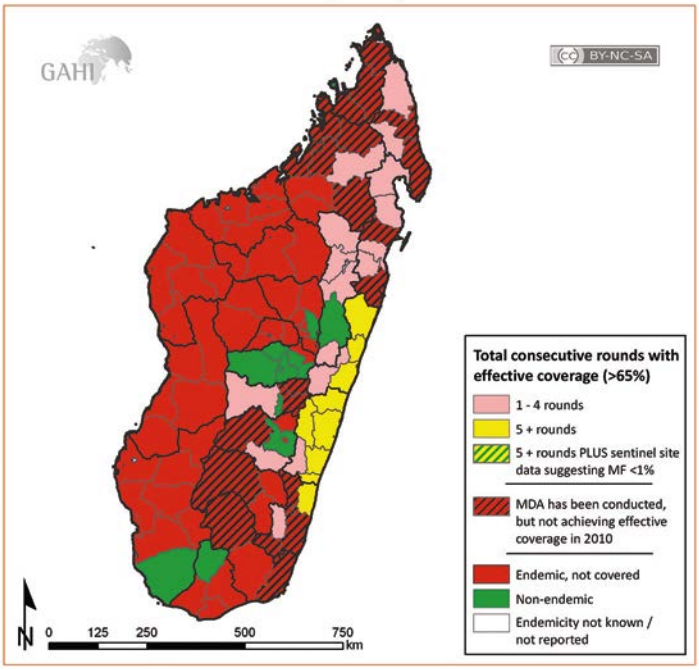
Data Source: World Health Organization
Map Production: Control of Neglected Tropical Diseases (NTD)
World Health Organization

World Health Organization

Global distribution of LF

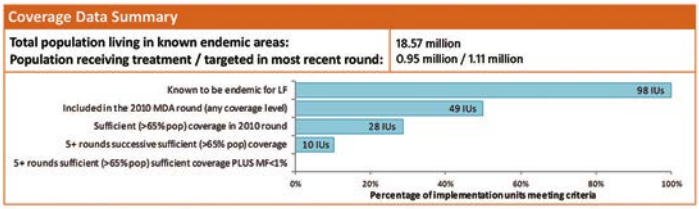
The map above shows the global distribution of LF. Countries in dark blue are endemic for the disease and have begun mass treatment. Countries in medium blue are endemic for the disease, but mass treatment has not yet begun. Countries in light blue have managed to stop transmission of the disease; however, people suffering from disabilities as a result of the infection still require care even after transmission has stopped.

Status of the LF elimination programme by health district in Madagascar, 2010



Country maps of LF burden and treatment coverage

Country-specific maps showing endemic districts as well as mass treatment coverage, as in the example at left, can be found on the Global Atlas of Helminth Infections. Visit http://www.thiswormyworld.org to access the maps.



World Health Organization Africa

Data source: World Health Organization-Regional Office for Africa (WHO-AFRO). Maps and profiles developed by WHO-AFRO in collaboration with the Global Atlas of Helminth Infection, London School of Hygiene and Tropical Medicine.

GAHI

WASH for LF Control

Hygiene plays a critical role in managing the physical morbidity resulting from LF infection, especially lymphedema. Daily washing of the legs and feet with soap, especially between the toes, is key to preventing bacterial infections. Mild exercise and elevation of the leg after washing also helps the flow of lymphatic fluid and can decrease the volume of swollen limbs, which decreases disability (Jullien, et al., 2011).

Water resource management and wastewater management can inadvertently expand breeding sites of the mosquitoes that transmit LF, depending on the species (Bockarie, Pederen, White, & Michael, 2008). Monitoring for disease transmission in areas where water resource development is being conducted is important (Erlanger, 2005) WASH implementers should use linkages with the health sector to access data on LF transmission in these areas.

Treating LF

LF can be treated using a combination of albendazole and either ivermectin or diethylcarbamazine. The pharmaceutical industry donates these drugs to Ministries of Health for the treatment of communities at risk for the disease (The Bill & Melinda Gates Foundation, 2012).

In 2012, approximately 425.1 million people were reached with mass treatment for LF. This represents about 30% of the global at-risk population (WHO, 2013b).

The Evidence Base for WASH Prevention of LF

The relationship between WASH and LF is demonstrated by the following:

- Several studies in India have observed significant decreases in acute attacks of LF-associated illness, including fever, chills, pain, and swelling of the limbs, after patients were trained in foot care, which included foot washing (Joseph et al., 2004; Shenoy, Sandhya, Suma, & Kumaraswami, 1995; Shenoy, Kumaraswami, Suma, Rajan, & Radhakuttyamma, 1999).
- In Haiti, patients reported experiencing approximately two annual episodes of acute attacks of LF-associated illness in the year prior to enrolling in a treatment program that emphasized hygiene and skin care. Over 18 months, patients reported 75% fewer annual episodes of LF-associated illness (Dahl, B.A., 2001; Addiss et al., 2010a).
- A study in Haiti found that patients who washed their swollen limbs with either antimicrobial or regular soap experienced a nearly 60% decrease in annual incidence of acute attacks of LF-associated illness, regardless of type of soap used. This suggests that hygiene itself is more important than the antimicrobial content of the soap (Addiss et al., 2010b).

A man washes his leg, afflicted by lymphedema, to prevent secondary skin infections. *Photo: Emily Staub, The Carter Center.*

Key WASH Activities to Prevent LF

HYGIENE

- Provide hygiene education that encourages daily washing of infected limbs with soap and water, especially between fingers and toes, to reduce bacteria on the skin and prevent infection. Secondary infections occur when bacteria enter the body through lesions in the skin, which are common in people with lymphedema, especially between the toes. These infections, which are painful and debilitating, further damage the skin and lead to more severe swelling.
- Promote hygiene, in conjunction with exercise and elevation of the affected limb(s), to reduce swelling, improve quality of life, and enable the individual to gain more mobility and thereby reduce disability.

Case Study: Hygiene Education for LF

Leogane, Haiti has high levels of lymphatic filariasis. Between 1995 and 1998, a study led by the US Centers for Disease Control and Prevention followed 175 people with lymphedema of the leg. In the year preceding the study, the patients reported an average of 2.1 episodes of secondary bacterial infections of the leg, resulting in fever, chills, pain, and swelling of the limb. These attacks typically lasted for two and half days.

The intervention focused primarily on hygiene and skin care. Clinic staff were trained to provide simple, clear, and assertive messages about limb hygiene and skin care. Colorful booklets were provided to each lymphedema patient with messages about the importance of washing their swollen limbs and feet. Because people with lymphedema living in the area were often stigmatized, a "soap opera" was broadcast over local radio to educate the general public about lymphedema self-care.

The study found that when proper basic limb hygiene, skin care, and other self-care measures, including limb elevation and exercise were implemented, the incidence of secondary bacterial infections decreased to 31% of earlier levels. A follow-up study two years later found that the incidence of secondary infections not only remained low, but had even decreased further (Addiss et al., 2010a).

SANITATION

- Work with health, environmental management, and agriculture sectors to ensure broad-based monitoring and surveillance of LF into large-scale water resource development and waste-water management, as these activities may impact breeding levels of mosquitoes that spread the disease.

WATER

- Increase access to clean water to encourage water use for good hygiene.
- Cover and/or treat water storage systems to limit mosquito habitat.

Additional Resources

Below we have provided a selection of information that may be helpful to you as you explore opportunities for collaboration. Please note that this is not an exhaustive list; you should seek to identify many more partners, resources, and documents at both a global level and specific to your country context.

If You Only Do ONE Thing

Encourage lymphedema patients to wash their swollen limbs and feet daily to prevent infection. Foot hygiene, in addition to gentle exercise and elevation of the swollen limb, can reduce swelling and result in decreased disability.

Partnerships and Programs Working in LF Control

- Global Alliance to Eliminate Lymphatic Filariasis http://www.filariasis.org
- Global Program to Eliminate Lymphatic Filariasis (WHO) http://www.who.int/lymphatic_filariasis/disease/en

Mapping of Geographic Distribution of LF

- The Global Atlas of Helminth Infections http://www.thiswormyworld.org

Information, Education, and Communication Materials

- Lymphatic Filariasis: Managing Morbidity and Preventing Disability (WHO) http://apps.who.int/iris/bitstream/10665/85347/1/9789241505291_eng.pdf
- Training materials on home-based care of disabilities caused by LF (WHO) http://www.who.int/lymphatic_filariasis/resources/training/en/index.html
- WHO Fact Sheet on LF: http://www.who.int/mediacentre/factsheets/fs102/en

Policy

- World Health Assembly Resolution 50.29 http://www.who.int/entity/lymphatic_filariasis/resources/WHA_50%2029.pdf

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Preventing Guinea Worm Disease (Dracunculiasis) with WASH Interventions

What is Guinea Worm Disease?

Guinea worm disease, also known as dracunculiasis, is caused by consuming water containing water fleas that carry the microscopic larvae of the parasitic worm. The disease results in the female worm emerging through a blister in the skin, usually on the foot or leg. This worm can be up to three feet in length, and takes many days to emerge.

The traditional method for removing the Guinea worm is slowly winding it around a small stick, a process that can take weeks and is very painful. The sufferer often seeks relief by submerging the blister in surface water, like a pond or river, which causes the female worm to release larvae into the water, thus continuing the cycle of infection.

Thanks to concerted eradication efforts, Guinea worm, once widespread, now only occurs in four countries. It is only the second disease of humans, after smallpox, set to be completely eradicated from the world.

Health and Development Impacts of Guinea Worm Disease

People infected with Guinea worm suffer extreme pain and debilitation while the worm emerges from their body, a process that can take weeks. During the time of the worm emergence, the sufferer experiences a burning sensation, swelling and pain, and the emergence of the worm can lead to secondary infections. The disease has a severe adverse effect on productivity of communities, especially of agricultural workers, and decreases school attendance, as sufferers are unable to work or attend school (Hopkins et al., 2000).

Removal of the Guinea worm is a long and painful process.
Photo: L. Gubb,The Carter Center.

Global Burden of Guinea Worm Disease

Guinea worm has nearly been eradicated from the world. In 2013, 144* cases worldwide were reported from four countries: Chad, Ethiopia, Nigeria and South Sudan.

The Carter Center's Guinea Worm Eradication Program webpage contains the most up-to-date information about new cases of the disease, including country reports for the four remaining endemic countries. The program webpage can be accessed at http://www.cartercenter.org/health/guinea_worm/mini_site/index.html.

*Cases reported through November 30, 2013; this number is expected to increase.

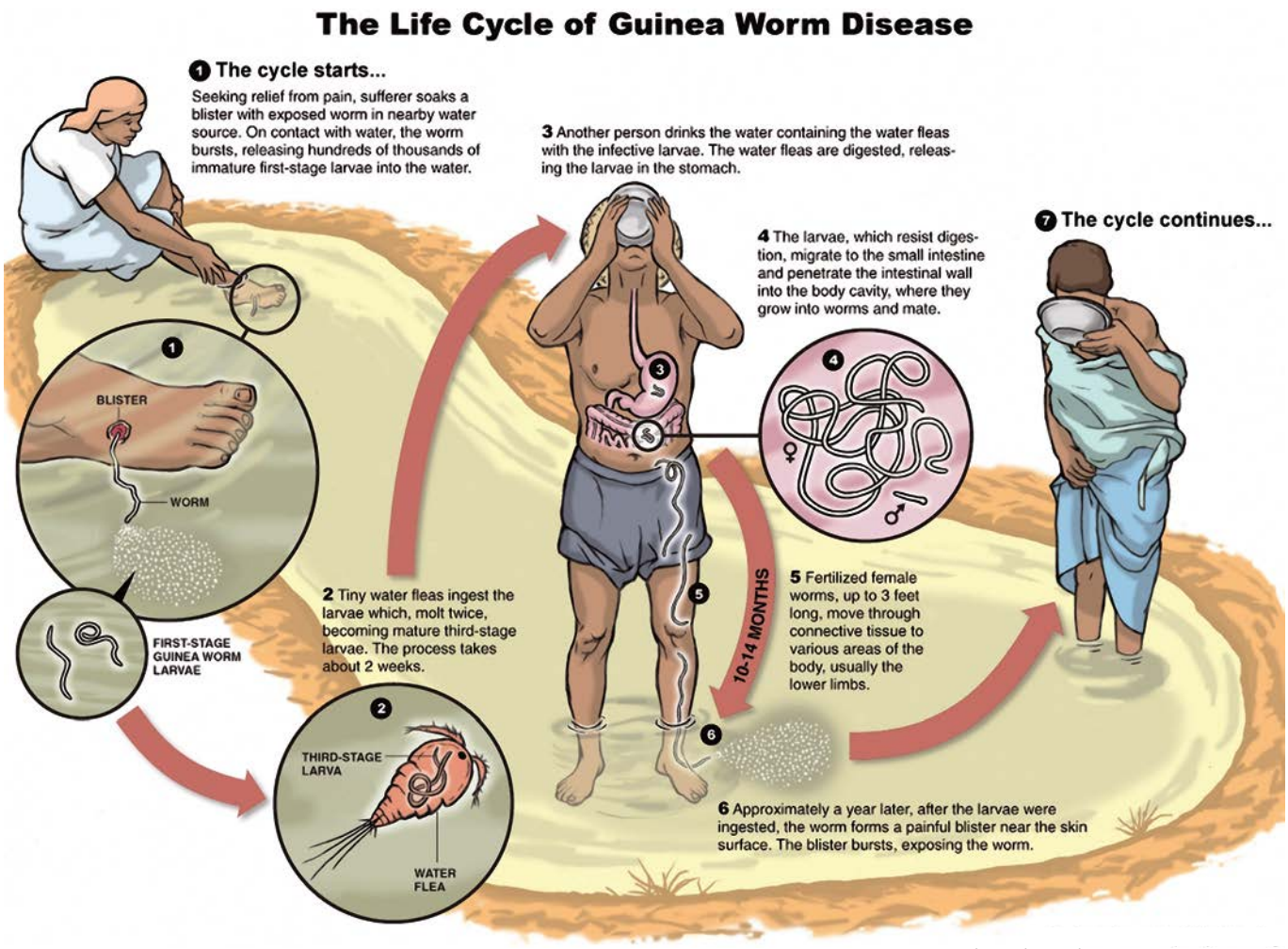

Image: Al Granberg, The Carter Center.

Case Study: WASH and Guinea Worm Disease in Nigeria

Nicknamed "ngudi," or "the impoverisher," Guinea worm disease used to have a large presence in Nigeria, reaching its peak in 1989 with 653,000 cases in 36 states. The economic loss to the disease was staggering, with one estimate putting the lost income for rice farmers alone at $20 million US.

Starting in 2009, a coalition of government and NGO partners were able to stop transmission and eradicate the disease from the country. Cloth filters were systematically distributed throughout some 94,000 villages across the country, along with health education messages about how to use the filters and other ways to ensure drinking clean water. Diligent surveillance was conducted to detect cases of the disease. Success resulted mainly from extensive cooperation and communication across several levels and organizations, including village leaders and community health volunteers, The Carter Center, UNICEF, CDC, and the Ministry of Health. Strong support from the Nigerian government played a critical role in the program's success (Miri et al., 2010; The Carter Center, 2013b).

Using a portable water filter to protect against Guinea worm infection. *Photo: L. Gubb, The Carter Center*

WASH for Guinea Worm Disease Eradication

No drug can cure or treat Guinea worm. The only effective measures for eliminating Guinea worm are preventative (WHO, 2013). People often submerge their limb in surface water like ponds or rivers to relieve the pain of the worm's emergence through the skin, which causes the worm to release thousands of Guinea worm larvae. If this is done in a pond or lake where people get drinking water, more people become infected. Therefore, provision of protected water sources such as boreholes, use of filtration cloths or pipes, and education programs have been shown to be the best prevention strategies.

The Evidence Base for WASH Prevention of Guinea Worm Disease

The relationship between WASH and Guinea worm is demonstrated by the following:

- Meta-analyses examining the impact of improved water supplies on Guinea worm disease prevalence have established a median 78% reduction (Esrey, et al., 1991).
- A UNICEF study in Nigeria found that the use of boreholes led to an 81% reduction in incidence (Esrey, Potash, Roberts, & Shiff, 1991).

However, failed boreholes can be a risk factor for transmission of Guinea worm disease (Esrey et al., 1990), and continued functionality of water system services are critical to ensure elimination of the disease. Guinea worm disease is seasonal, increasing during dry periods when water bodies shrink and the density of water fleas on which the Guinea worm parasite lives increases. Unreliable tube wells or boreholes that fail can result in increased dependence on unsafe sources contaminated with the Guinea worm parasite.

Key WASH Activities to Prevent Guinea Worm Disease

WATER

- Diligently filter drinking water derived from unprotected wells or from surface water, using fine-meshed cloth or a filter made from a 0.15 mm nylon mesh to filter out water fleas.
- Provide safe drinking water sources through drilling of wells and boreholes.
- Treat drinking water sources with a larvacide such as temephos (ABATE™).
- Construct physical barriers around drinking water sources to prevent people from entering the water.

HYGIENE

- Educate community members on safe water practices, including filtering and not entering drinking water sources when a Guinea worm is emerging.

If You Only Do ONE Thing

Coordinate with National Guinea Worm Eradication Programs, The Carter Center, and other partners to see how your organization can contribute to eradication efforts. Be aware and sensitive to the fact that poorly coordinated WASH interventions may have unintended consequences that can disrupt eradication efforts.

Additional Resources

Below we have provided a selection of information that may be helpful to you as you explore opportunities for collaboration. Please note that this is not an exhaustive list; you should seek to identify many more partners, resources, and documents at both a global level and specific to your country context.

Partnerships and Programs for Guinea Worm Eradication

- The Carter Center http://www.cartercenter.org
- Global Guinea worm eradication campaign http://www.who.int/dracunculiasis/eradication/en
- Information, Education and Communication Materials
- Public Service Announcements in multiple languages http://www.cartercenter.org/health/guinea_worm/mini_site/psa.html

Policy

- World Health Assembly Resolution 64.16 http://www.who.int/entity/neglected_diseases/mediacentre/WHA_64.16_Eng.pdf

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Post-Implementation Monitoring for WASH and the NTDs

Long-term reduction and control of disease, including the NTDs, requires lasting, sustainable, and appropriate WASH interventions. Therefore, to best serve their common target populations, WASH organizations and NTD control groups should ensure that WASH interventions meet these requirements. The only way to do that is to monitor or facilitate the monitoring of WASH services and disease over time.

Post-implementation monitoring of water services, sanitation systems, and hygiene behavior is particularly important because their long-term sustainability is a significant challenge in many developing and developed countries. Operation and maintenance of water supply infrastructure is an ongoing challenge in many contexts, as is ensuring water source quality and quantity, the hygienic use of toilets, and consistent practice of personal hygiene behaviors.

For the WASH sector, developing partnerships with organizations engaged in NTD control, as well as with local and national governments, can increase potential for connecting the impacts of WASH services to both the reduction of NTD prevalence and concrete and measurable health gains. It is possible that the WASH-preventable NTDs that are monitored regularly could serve as sentinel indicators for the functionality of WASH services.

How Can Monitoring WASH Service Delivery Help Reduce NTDs?

The WASH/NTD Roundtable Discussion hosted by the Bill & Melinda Gates Foundation in December 2012 identified mapping and monitoring as one of four important areas for collaboration (Freeman et al., 2013). Opportunities and next steps identified for mapping, data collection, and monitoring included:

- Creating a centralized resource for all available maps and data related to WASH and NTDs; for example, a web site to host mapping resources and provide links to the various sites where data already exists regarding WASH and NTDs, separately or together.
- Compiling a list of indicators currently used by the WASH and NTD control programs respectively, and determining gaps.
- Establishing common indicators for WASH and NTDs, realistic to mapping efforts (Freeman et al., 2013).

Monitoring requires asking: 1) if the interventions or activities planned for implementation are happening according to plan (project monitoring), and 2) if they continue to happen over time (post-implementation or services monitoring). Monitoring ensures that organizations are accountable to beneficiaries and donors, and is essential for tracking progress towards both project and organizational goals.

In order to account for sustainable WASH services and long-term health impact, WASH sector monitoring is shifting from a focus on coverage (counting program outputs and beneficiaries) to lasting and quality services. However, this approach is harder to do in practice, and may be more costly over time. Technological breakthroughs with mapping, cell phone data collection, and data management and sharing will make this easier in the near future (Global World Congress [GWC], 2013).

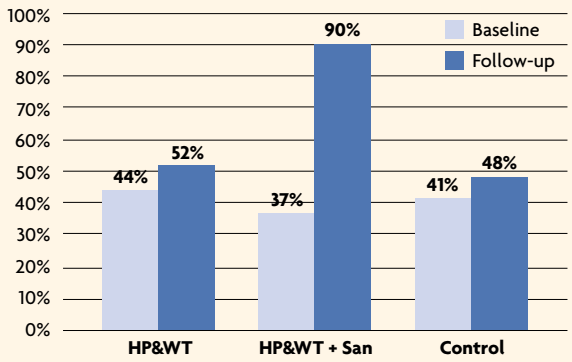
Monitoring data can also be used for advocacy, planning, and inter-agency coordination. Ideally, NGOs that conduct post-implementation monitoring of water systems, sanitation systems, and hygiene behavior in NTD-endemic areas should incorporate indicators of disease prevalence. These indicators can be obtained from entities that specialize in collecting this information (see Table 2 below). Results showing that WASH services have led to a reduction in disease prevalence can be used by both the WASH and NTD sectors to plan and adapt their future programming. These results can also be used to conduct effective advocacy to guide national NTD control efforts.

Examples of why monitoring is important: When WASH projects lead to INCREASED disease

Some WASH activities can have unintended consequences that may result in *increased* risk of infection with an NTD. For example, latrines that are poorly maintained can actually result in increased risk for STH infection by becoming "vectors" for increased contact with feces from infected individuals (see Figure 1). Monitoring may uncover such unexpected outcomes. Such information should be used to advocate for revised programming.

Figure 1

Percentage of pupils with presence of *E. coli* on their hands at schools receiving hygiene promotion and water treatment (HP&WT), additional sanitation (HP&WT + San), and control schools at baseline and follow-up (Source: SWASH+, 2011.)



In this example, monitoring of a school WASH intervention in Kenya showed that students who benefited from construction of improved school latrines as well as hygiene promotion and water treatment had significantly higher fecal contamination on their hands (Figure 1) than students who did not benefit from construction of improved school latrines. This increased exposure to fecal contamination represents a much greater risk of disease. Another example of unintended consequences of WASH interventions: poor drainage around water points can lead to increased breeding grounds for mosquitos that spread lymphatic filariasis, and for snails that harbor the parasites that cause schistosomiasis.

Current Collaborative Monitoring Context

Several documented district-level collaborations between WASH and NTD stakeholders have helped to target WASH implementation in communities where WASH-preventable NTD burden is highest. These collaborations have helped to increase the visible impact of the WASH sector. However, they have been largely ad hoc, minimally formulated, and have not yet led to more deliberate long-term collaborations or joint post-implementation monitoring (Freeman et al., 2013).

Monitoring is conducted within the WASH and NTD sectors by a vast array of stakeholders, and requires harmonization of implementers, service providers, local governments, national governments, and international organizations (like the World Health Organization and UNICEF). Some in the WASH sector have called for harmonization and standardization of the monitoring landscape at both the national and the international levels (Dietvorst, 2013).

Long-term monitoring of WASH can be challenging because of the unclear roles of these various stakeholders and funding issues. The Sustainable WASH Forum report (Global World Congress, 2013) describes ideal roles for monitoring as follows:

- National government: monitors for national targets, and accredits responsible service providers.
- Local government: audits and monitors project outcomes and service delivery. Local government should also ensure that mechanisms exist for citizens to get involved and voice their concerns, thereby promoting greater transparency and accountability.
- Multi-lateral agencies: provide support in coordination, planning, and monitoring. Support for funding is important, as there will continue to be gaps. Make sure that governments are acting with transparency and accountability.
- NGOs: harmonize monitoring with governments and share information with each other.

Donors also play a role: WASH programs are frequently designed without adequate funding to enable long-term monitoring. Much monitoring and evaluation work for WASH, especially in developing countries, is still donor-driven and designed to meet the needs of outside agencies (UNICEF, 2009). Advocacy should be conducted among donors to raise awareness and commitment to monitoring.

Furthermore, monitoring must lead to learning. Resources and skills must be dedicated to learn from the data by analyzing shortcomings and incorporating changes to improve outcomes (GWC, 2013).

Sources of Data

National NTD control programs already measure progress towards achieving national NTD targets. This is achieved through periodic mapping and surveillance of the levels of disease occurring in specific geographical areas. Because levels of disease are often highest where WASH coverage is low, existing mapping efforts present valuable opportunities for joint monitoring or data sharing.

In addition, new mapping tools are emerging that may benefit both the WASH and NTD control sectors. For example, a district-level mapping tool of water and sanitation coverage for Sub-Saharan Africa that can overlay WASH coverage with district level NTD treatment coverage data to identify districts with low WASH coverage and high disease prevalence is available at http://www.ntdmap.org. Country-level maps of disease prevalence are available at http://www.trachomaatlas.org and http://www.thiswormyworld.org, and district-level WASH coverage maps utilizing DHS data are also forthcoming to the site. These efforts can help WASH implementing NGOs more effectively target and plan WASH interventions appropriate to NTD endemic communities.

Table 1 highlights the specific roles that WASH activities play in reducing NTDs. **Table 2** shows monitoring methods for NTDs and sources of existing data. Appendix C lists disease diagnostic information for your reference, which helps WASH practitioners understand how NTDs can be monitored. However, WASH practitioners are not expected to directly collect this information.

Table 1: The Impact of WASH on the NTDs

WASH objectives for disease control	Enabling Activities	Desired behaviors	NTD-specific outcomes
Reduced amount of human feces in environment	Construction and maintenance of latrines	Elimination of open defecation practices	■ Reduced breeding sites for the *M. sorbens* fly, which spreads trachoma ■ Reduced transmission of STH and schistosome eggs
Daily practice of personal and environmental hygiene activities	■ Increase access to water in homes, schools and communities ■ Behavior change communication	Increased daily hand washing behaviors at key times	Elimination of bacteria and eggs from hands
		Increased daily face washing	Reduced reservoir of trachoma bacteria transmitted via flies, fingers, and fomites
		Decreased contact with contaminated surface water bodies	Separation of people from water infested with schistosome parasites
		Increased use of safe water for washing clothes, bathing, and swimming	Separation of people from water infested with schistosome parasites
		More frequent washing of clothes in safe water	Reduced transfer of trachoma bacteria via dirty fabric
		Cleaning and upkeep of latrines	Reduced breeding sites for the *M. sorbens* fly, which spreads trachoma
		Increased washing of lower limbs and feet affected by lymphedema	Removal of dirt and bacteria that can cause skin infections

Table 2: Monitoring the NTDs		
NTD-specific indicators	**Data sources**	**Monitoring methods**
Reduced # of people with NTDs ■ Guinea Worm ■ Trachoma ■ Schistosomiasis ■ Soil transmitted helminthiasis ■ Lymphatic filariasis	■ Carter Center[1] ■ WHO Interactive map[2], NTD Mapping Tool[3], Trachoma Atlas[4] ■ NTD Mapping Tool ■ NTD Mapping Tool ■ Local health clinic records	■ Disease diagnostics (see Reference Table in **Appendix C**) ■ Access measures ■ Knowledge, attitudes and practice measures
Reduced intensity of parasitic infections	■ District-level surveys conducted by national health system or research institutions ■ Local health clinic records	
Reduced transmission of trachoma and schistosomiasis	■ District-level surveys conducted by national health system or research institutions ■ Local health clinic records	
Decreased morbidity caused by NTDs	■ District-level surveys conducted by national health system or research institutions ■ Local health clinic records	■ Morbidity measures ■ Access measures ■ Knowledge, attitudes and practice measures

[1] *http://www.cartercenter.org/health/guinea_worm/mini_site/activities.html*
[2] *http://www.who.int/gho/neglected_diseases/en/index.html*
[3] *http://www.ntdmap.org/ntd*
[4] *http://www.trachomaatlas.org*

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Partnerships for WASH and NTD Control

Partnership Building

Effective partnerships take time and resources to build, but the benefits of cross-sector partnerships are many. Partnering with the NTD sector can increase the impact of WASH interventions on health through targeting areas at high risk for NTDs. In addition, joint monitoring can generate powerful data that provides the WASH sector with significant opportunities to conduct more effective advocacy for policy change and fundraising.

Benefits of WASH sector partnership with the NTD sector include the:

- Ability to make a measurable contribution to improved health and well-being of target populations.
- Potential inclusion of WASH in policies and plans of relevant government agencies.
- Opportunity to build and strengthen relationships with Ministries of Health and other health-sector players at various levels.
- Ability to influence and participate in key policy and planning processes related to NTDs and health.
- Successful advocacy for increased resources for WASH as a central package of interventions that accelerates attainment of improved health and related development outcomes in poor and marginalized communities.
- Contribution to the evidence base surrounding WASH approaches and impact as the basis for advocacy and a convincing "case" for increased WASH prioritization.

Assessing the Landscape for Partnerships

Once the WASH sector gains awareness of the NTDs in program areas of intervention, local partners may be able to help define the links between WASH interventions and NTDs in the communities served. WASH workers should approach relevant organizing bodies, other NGOs, and government partners to set up meetings to get acquainted. Areas of potential collaboration are many, and may extend beyond a program's current and planned activities to conferences, training, monitoring and impact evaluation methods, and funding opportunities. Some meetings may lead immediately to joint activities, while others may require further dialog to produce measurable change. Fostering pathways of communication is also a valuable result of these meetings.

Although continual engagement with local partners is often difficult, those working in the WASH sector should strive to accept invitations from potential partners and participate in stakeholder group meetings. This keeps the lines of communication open over time, which can lead to eventual partnership or collaboration (Binder-Aviles, 2012).

Developing a Framework for Collaboration

In order to ensure that partnership in mutually beneficial, it is essential that partners agree upon the following:

- A shared vision.
- Common goals and objectives, and a coordinated strategy for achieving them.
- Coordinated outreach and education efforts (to ensure that disparate messages on topics of common interest do not detract from each other).
- Clear leadership roles.
- Clear financial responsibilities.

It is important that partners define these at the outset of collaboration.

WASH/NTDs Messaging

Appendix D: Advocacy Messaging provides examples of WASH/NTDs messaging that can be used in partnership building and influencing. Messaging has been designed to appeal to specific impacts of NTD control. Information included throughout this manual can also be used to create targeted messages for a specific audience.

Policy Landscape

When engaging with partners in the NTD sector, it is helpful to have an understanding of the policy context for NTD control at both the global and national levels. Appendix E: Policy Landscape for NTD Control provides more information.

Partnership in Action

The following case studies provide examples of successful collaboration between the WASH and NTD sectors. These examples can provide lessons for WASH organizations as they begin their partnership-building process.

Case Study 1: Collaboration at the implementation level: ORBIS and WaterAid Ethiopia

ORBIS Ethiopia, an eye care organization, approached WaterAid Ethiopia in 2006 about partnering to implement the full SAFE strategy for trachoma control in Gama Gofa Zone, SNNPR. The two organizations conducted joint exploratory trips to the area to fully understand the extent of high trachoma prevalence and low WASH access. In 2007, the organizations signed a multi-year agreement to bring WASH services to targeted communities with high incidence of trachoma. ORBIS provided financial assistance for the WASH projects, which enabled the organization to implement the full SAFE strategy. The project has improved WASH coverage from 3.8% to 92.3% in the three target districts (Sisay, 2013).

Case Study 2: Collaboration at the policy level: WaterAid Tanzania's Engagement on NTDs

WaterAid and the NTD sector share a common vision of reaching the most marginalized communities. WaterAid has recognized the potential for the impact of its activities on the control and even elimination of the NTDs.

In February 2013, representatives from the Tanzania National NTD Programme, WaterAid, and the Environmental Health Division of the Ministry of Health and Social Welfare convened to plan for better integration between the WASH and NTD sectors. With the National NTD Taskforce as the collaboration platform, the partnerships developed a strategy to improve the health of poor communities through WASH. They developed an ambitious work plan through which the three parties agreed to work together on issues including the scaling up of sanitation services, joint advocacy, staff training, joint review of the National Health Strategic Plan, development of the National Environmental Health Strategy, and joint impact monitoring.

This process has given WaterAid the opportunity to build relationships with the Ministry of Health and other actors at various levels. WaterAid's participation has increased the profile and relevance of environmental health within the NTD community in Tanzania. This has all led to successful advocacy to increase resources and collaboration for WASH as a central component of NTD control (Velleman, 2013).

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Appendix A: Acronyms and Glossary of Terms

Acronyms

CI: Confidence Interval

HIV: Human immunodeficiency virus

HPV: Human papillomavirus

LF: Lymphatic filariasis

MDA: Mass drug administration

NTD/NTDs: Neglected tropical disease(s)

OR: Odds Ratio

PCT: Preventive chemotherapy

SAFE: Surgery, antibiotics, facial cleanliness, environmental improvement

STH: Soil-transmitted helminths or helminthiasis

WASH: Water, sanitation, and hygiene

DALYs: Disability-adjusted life years

JMP: Joint Monitoring Program (WHO/UNICEF)

Glossary

at-risk population: Total population in the endemic area.

association: Statistical relationship between two or more events, characteristics, or other variables.

carrier: A person or animal without apparent disease who harbors a specific infectious agent and is capable of transmitting the agent to others. The carrier state may occur in an individual with an infection that is inapparent throughout its course (known as an asymptomatic carrier), or during the incubation period, convalescence, and post-convalescence of an individual with a clinically recognizable disease. The carrier state may be of short or long duration (transient carrier or chronic carrier).

case: In epidemiology, a countable instance in the population or study group of a particular disease, health disorder, or condition under investigation. May also refer to an individual with the particular disease.

confidence interval (CI): A range of values for a variable of interest; for example, a rate, constructed so that this range has a specified probability of including the true value of the variable. The specified probability is called the confidence level, and the end points of the confidence interval are called the confidence limits.

control: The reduction of disease incidence, prevalence, morbidity or mortality to a locally acceptable level as a result of deliberate efforts; continued intervention measures are required to maintain the reduction.

distribution: In epidemiology, the frequency and pattern of health-related characteristics and events in a population. In statistics, the observed or theoretical frequency of values of a variable.

elimination of disease: Reduction to zero of the incidence of a specified disease in a defined geographical area as a result of deliberate efforts; continued intervention measures are required.

elimination of infections: Reduction to zero of the incidence of infection caused by a specific agent in a defined geographical area as a result of deliberate efforts; continued measures to prevent re-establishment of transmission are required.

endemic disease: The constant presence of a disease or infectious agent within a given geographic area or population group; may also refer to the usual prevalence of a given disease within such area or group.

environmental factor: An extrinsic factor (geology, climate, insects, sanitation, health services, etc.) that affects the agent and the opportunity for exposure.

epidemiology: The study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems.

eradication: Permanent reduction to zero of the worldwide incidence of infection caused by a specific agent as a result of deliberate efforts; intervention measures are no longer needed. Example: smallpox.

evaluation: A process that attempts to determine as systematically and objectively as possible the relevance, effectiveness, and impact of activities in the light of their objectives.

exposed (group): A group whose members have been exposed to a supposed cause of disease or health state of interest or possess a characteristic that is a determinant of the health outcome of interest.

health indicator: A measure that reflects, or indicates, the state of health of persons in a defined population. Example: the infant mortality rate.

high-risk group: A group in the community with an elevated risk of disease.

host: A person or other living organism that can be infected by an infectious agent under natural conditions.

hydrocele: swelling of the scrotum or penis as a result of Lymphatic filariasis (LF)

hyperendemic disease: A disease that is constantly present at a high incidence and/or prevalence rate.

incidence rate: A measure of the frequency with which an event, such as a new case of illness, occurs in a population over a period of time. The denominator is the population at risk; the numerator is the number of new cases occurring during a given time period.

mass drug administration: A modality of preventive chemotherapy (see definition) in which medicines are administered to the entire populations of an area (e.g., state, region, province, district, sub-district, or village) at regular intervals, irrespective of the individual infection status.

morbidity: Any departure, subjective or objective, from a state of physiological or psychological well-being.

neglected tropical diseases (NTDs): A group of primarily infectious diseases that thrive in impoverished settings, especially in tropical climates.

odds ratio (OR): A measure of association that quantifies the relationship between an exposure and health outcome from a comparative study; also known as the cross-product ratio. pooled odds ratio (OR): Aggregated odds ratios from a variety of studies.

prevalence: The number or proportion of cases or events or conditions in a given population.

preventive chemotherapy: The use of medicine, alone or in combination, as a public health tool against the neglected tropical diseases. Mass drug administration is one modality of preventive chemotherapy.

rate: An expression of the frequency with which an event occurs in a defined population.

risk: The probability that an event will occur; for example, the probability that an individual will become ill or die within a stated period of time or age.

risk reduction: The estimated percentage of reduction in risk of a given outcome. This is calculated by subtracting the odds ratio (OR) from one (1 – OR).

significance (statistical): The probability that the observed data would occur by chance. Referred to as the p-value.

transmission of infection: Any mode or mechanism by which an infectious agent is spread through the environment or to another person.

vector: An animate intermediary in the indirect transmission of a disease agent that carries that agent from a reservoir to a susceptible host.

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http://www.cs.columbia.edu/digigov/LEXING/CDCEPI/gloss.html

http://www.cdc.gov/mmwr/preview/mmwrhtml/su48a7.htm

Appendix B: Complete Results of WASH-NTD Meta-Analyses

The Evidence Base: Quantifying the Association between WASH and the NTDs

The evidence base supporting the linkages between WASH and incidence of trachoma, and soil-transmitted helminthiasis (STH) is extensive. However, there have been gaps in the evidence base examining the impact of specific WASH interventions on disease indicators. A recent meta-analysis has been undertaken to close this gap by examining the impact of WASH interventions on two of these diseases—trachoma and STH. The results of this WASH/NTD meta-analysis, which are pending publication, are included in the tables below.

Associations between WASH and STH

The WASH/NTD meta-analysis estimated the average association of WASH variables on infection with STH. The table below summarizes the results.

Control of ascaris (roundworm) and trichuris (whipworm) is closely related to improved sanitation, which reduces the amount of feces in the environment, and hand washing with soap, which reduces the amount of soil and particles of feces ingested via oral contact with contaminated hands. Access to a household latrine was associated with reduced risk of infection with ascaris and trichuris. Hand washing with soap at critical times, such as after defecation and before eating, can reduce risk of infection with all three STH species. Households that have piped water access have markedly reduced risk of infection, though this may be related to other sanitation and hygiene practices resulting from having a water source close to home. Hookworm is transmitted through the skin, as larvae penetrate the skin on the soles of bare feet; wearing shoes reduces hookworm infection.

Associations between WASH interventions and STH infection (ascaris, trichuris, hookworm)* (Strunz, E., et al., 2013)

WASH variable	Estimated % reduction in risk of infection	Odds Ratio	Confidence Interval (95%)
Use of piped water source (ascaris)	60%	0.40	(0.39, 0.41)
Use of piped water source (trichuris)	43%	0.57	(0.45, 0.72)
Household treats its own water or uses treated water (all STH species)	64%	0.46	(0.37, 0.58)
Individual wears shoes (hookworm)	71%	0.29	(0.18, 0.47)
Soap use/availability in the home (all STH species)	34%	0.66	(0.39, 1.10)
Individual washes hands after defecation	46%	0.54	(0.25, 1.16)
Household has access to improved sanitation (all STH species)	35%	0.65	(0.56, 0.74)
Household has access to improved sanitation (trichuris)	40%	0.60	(0.46, 0.78)
Household has access to improved sanitation (ascaris)	48%	0.62	(0.44, 0.88)
Household has access to improved sanitation (hookworm)	7%	0.93	(0.67, 1.3)

Associations between WASH and Trachoma

The WASH/NTD meta-analysis estimated the average association of WASH variables on signs of trachoma and trachoma infection. The tables below summarize the results.

Examining facial cleanliness has been used as a proxy indicator for the activity of face washing. An individual having a clean face with no visible ocular discharge is associated with a reduced risk of having signs of active trachoma and a reduction in risk of infection with *C. trachomatis*. Access to household latrines is also important to achieve control of trachoma. Individuals living in households with access to a latrine have an estimated 19% reduction in risk of active trachoma, and a reduction in risk of infection with the bacteria that causes trachoma.

Associations between WASH interventions and active trachoma
(characterized as trachomatous inflammation, follicular or intense) (Stocks, M., et al., 2013)

WASH variable	Estimated % reduction in risk of active trachoma	Number of studies	Pooled OR (95% CI)	Confidence Interval (95%)
Distance of water source from household within 1km	not significant	10	0.93	(0.80, 1.08)
Household has access to sanitation	19%	25	0.81	(0.72, 0.92
Individual has clean face	65%	21	0.35	(0.26, 0.46)
Individual has no visible ocular discharge	65%	10	0.35	(0.23, 0.54)
Individual has no visible nasal discharge	41%	9	0.59	(0.50, 0.70)
Individual washes face at least once daily	36%	6	0.64	(0.52, 0.79)
Individual washes face at least twice daily	15%	8	0.85	(0.79, 0.92)
Individual bathes or is bathed at least once daily	29%	4	0.71	(0.51, 1.00)
Individual uses towel	not significant	5	0.80	(0.56, 1.15)
Individual uses soap during face washing	27%	5	0.73	(0.58, 0.92)

Associations between WASH interventions and trachoma infection
(characterized as infection with *C. trachomatis* bacteria) (Stocks, M., et al., 2013)

WASH variable	Estimated % reduction in risk of infection	Number of studies	Pooled OR (95% CI)	Confidence Interval (95%)
Distance of water source from household within 1km	Not significant	4	1.00	(0.87, 1.16)
Household has access to sanitation	57%	7	0.43	(0.27, 0.70)
Individual has no visible ocular discharge	68%	4	0. 32	(0.21, 0.50)
Individual has no visible nasal discharge	40%	4	0.60	(0.42, 0.85)

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Appendix C: Diagnostics for the NTDs

This table summarizes the most commonly used diagnostics for detecting NTD infection, and the resources needed to conduct these diagnostics. This table is for informational purposes only; WASH practitioners are not expected to undertake diagnostic activities.

Diagnostic methods for detecting NTD infection

Disease	Diagnostic	Indicator	Personnel needed to conduct diagnostic	Sampling frame	Data collected at…
Trachoma	1. Flipping of eyelids for signs of disease (WHO simplified grading system*), or 2. Bacterial swab (polymerase chain reaction)	1. WHO simplified grading system: ■ Inflammation, scarring of eyelids ■ Scarring of cornea 2. Presence of ‹i›Chlamydia trachomatis‹/i› bacterium	Trained trachoma grader	Communities	National level agency or department District level – Health promoters, local clinics, baseline and impact evaluations
Soil-transmitted helminths	Stool sample (Kato-Katz method)	Presence and number of eggs in feces	Laboratory technician	Schools	District level
Lymphatic Filariasis	Blood test	Level of microfilaria (baby worms) in blood	Laboratory technician	Communities	National level
Guinea worm	Observation of symptoms: community health surveillance	Emerging worm from ulcer on the body, usually the foot or leg	Specialized knowledge not needed	Communities	Village or community level
Schistosomiasis ■ *Mansoni* ■ *Japonicum* ■ *Mekongi* ■ *Intercalatum*	Stool sample (Kato-Katz method)	Presence and number of eggs	Laboratory technician	Schools	District level
Schistosomiasis ■ *Haematobium*	1. Urine dipstick 2. Urine observation	1. Presence and number of eggs 2. Presence of blood			District level

Appendix D: Advocacy Messaging

Disease-specific Messages

The following messages relate to specific WASH-impacted NTDs, and can be used for targeted advocacy to increase commitment to WASH for NTD control.

Soil-transmitted Helminthiasis (STH)

The Problem

- Over a billion people are infected with one or more species of STH, and over 900 million children worldwide are at risk of infection (WHO, 2012).
- Infection with STH causes up to 39 million disability-adjusted life-years (DALYs) annually (WHO, 2012).
- 40 million women of child-bearing age are infected with hookworm in the developing world; the infection can cause serious complications during pregnancy and childbirth (Hotez, 2001).

How WASH Services Address the Problem

- Improved water supplies and/or sanitation have been shown to reduce illness from one of the STH worms, roundworm, by a median of 29% (Esrey et al., 1991).
- Recent comprehensive, systematic review and meta-analyses (Ziegelbauer et al., 2013; Strunz, et al., 2013) found that:
  - **Wearing shoes** reduces hookworm infection by an average of 71%.
  - **Combined sanitation availability and use** were associated with a reduction of infection of 46% for roundworm, 42% for whipworm, and 40% for hookworm; overall, combined sanitation availability and use were associated with a 49% reduction of infection with three species of STH.
  - **Access to a household latrine** was associated with a greater than 40% reduced risk of infection with roundworm and whipworm.
  - **Hand washing with soap at critical times,** such as after defecation and before eating, can reduce risk of infection with all three STH species by greater than 30%.
  - **Households that have piped water access** have a markedly reduced risk of infection (43% – 60%), though this may be related to other sanitation and hygiene practices as a result of having a water source close to home.

Trachoma

The Problem

- Trachoma is the world's leading cause of preventable blindness (WHO, 2013d).
- Nearly 1.2 million people are irreversibly blind as a result of trachoma (WHO, 2013b).
- Infection with trachoma results from poor hygiene and sanitation (WHO, 2013d).

How WASH Services Address the Problem

- Trachoma infection can be prevented through increased facial cleanliness with soap and clean water and improved sanitation (Esrey et al., 1991). A recent systematic review and meta-analysis (Stocks, et al., 2013) shows:
  - Hygiene promotion encouraging people to wash their faces. Facial cleanliness* is associated with a 65% reduction in risk of active trachoma and a 68% reduction in risk of infection with the bacteria that causes trachoma.
  - People with latrines have an estimated 19% reduction in risk of active trachoma and a 57% reduction in risk of infection with the bacteria that causes trachoma.
  - Improved water supplies and/or sanitation reduce illness from trachoma by 27%.

* Facial cleanliness means that an individual having a clean face and no visible ocular discharge. Facial cleanliness has been used as a proxy indicator for the activity of face washing.

Schistosomiasis

The Problem

- More than 700 million people are at risk of contracting schistosomiasis, especially in Africa and Asia (WHO, 2012b).
- Infection with schistosomiasis causes fatigue, and can cause blood in urine, liver and spleen enlargement, and other complications that can result in disability and even death (WHO, 2013c).
- Urogenital schistosomiasis can significantly increase the probability of a woman to contract HIV, HPV, syphilis, herpes, and other sexually-transmitted infections (Kjetland et al, 2006).

How WASH Services Address the Problem

- Improved water supplies and/or sanitation have been shown to reduce illness from schistosomiasis by a median of 77% (Esrey et al., 1991).
- Improving water supply infrastructure was found to reduce annual schistosomiasis incidence in children from 19.3% to 4.5% (Jordan, 1988) .
- Children from villages with communal water sources as opposed to household water sources were eight times more likely to become reinfected following treatment (Muchiri et al., 1996).
- Absence of piped water was found to be associated with a seven-fold increased risk for *S. mansoni* infection (Lima e Costa et al, 1987).

Lymphatic Filariasis (LF)

The Problem

- LF is the second leading cause of chronic disability worldwide (Wynd, Melrose, Durrheim, Carron, & Gyapong, 2007).
- Disabilities resulting from infection with LF result in stigmatization and isolation for sufferers (Wynd et al., 2007).
- Disabilities caused by LF result in significant economic loss; in India, it is estimated that $842 million US are lost to patients and households every year from treatment costs and reduced working time (Ramaiah, Das, Michael, & Guyatt, 2000).

How WASH Services Address the Problem

- Hygiene plays a critical role in decreasing disability caused by advanced stages of LF. Foot washing with soap helps to manage the debilitating swelling of the limbs (lymphedema) by reducing the frequency of painful secondary bacterial infections in affected limbs (WHO, 2013a).
- Management of wastewater, cesspits and septic tanks, as well as covering water containers, treating water bodies, and other interventions can help prevent breeding of mosquitoes that spread the disease (Bockarie, Pederen, White, & Michael, 2008)

Guinea Worm Disease

The Problem

- Before recent improvements made by the Guinea Worm Eradication Program, the disease caused millions of dollars in economic losses per year (Hopkins et al, 2000).
- Guinea worm is set to be the first NTD to be eradicated from the world, and only the second disease in humans, after smallpox, to be eradicated (WHO, 2013e).
- Guinea worm disease is one of the few infectious diseases spread only by contaminated water; improving water sources will have a direct impact on the efficacy of the global eradication program (WHO, 2013f).

How WASH Services Address the Problem

- Improved water supplies reduce Guinea worm prevalence by 78% (Esrey et al., 1991).
- The use of boreholes led to an 81% reduction in Guinea worm incidence in a UNICEF study in Nigeria (Esrey et al., 1991).

Sector-Specific Messages

The following messages are helpful to incorporate into messaging targeting the finance, health, and education sectors. These messages provide key information and context about the issues in a way that appeals to sector-specific missions.

Economic Benefits of WASH for NTD Control

Tip: *Remember that potential partner organizations are intent on efficient investment. Messaging that demonstrates cost-effectiveness and efficiency of programs and actions may be most effective.*

Problem

- The symptoms of NTD infection diminish or eliminate an individual's chance to contribute to their local economy, as illness makes work difficult or impossible (Norris, Adelman, Spantchak, & Marano, 2012).
- NTDs prevent children from attending and performing well in school, limiting opportunities to find employment later in life, and decreasing their contribution to the local and national economy (Norris et al., 2012).
- Trachoma alone could potentially account for the loss of billions of US dollars' worth of potential productivity each year (Frick, Hanson, & Jacobson, 2003).

Solution

- Combined treatment and prevention has shown clear gains in the US and other developed countries. Improving sanitation and hygiene, and providing treatment to prevent hookworm led to an increase of more than 40% in future wage earnings in the early 20th century in the US (Bleakley, 2007).
- The WHO estimates that meeting the water and sanitation Millennium Development Goals using low cost interventions would achieve an estimated rate of return between $5 US and $36 US on a $1 US investment (WHO, 2007).
- Full household coverage with water and sanitation infrastructure substantially reduces child deaths. The average cost per life-year saved if households have complete water and sanitation coverage ranges between 65% and 80% of the annual gross domestic product per capita of developing countries (Gunther & Fink, 2011).

Health Benefits of WASH for NTD Control

Tip: Remember that the health sector's perspective is one of improving and maximizing overall health outcomes. Messaging that demonstrates the total improved health outcomes as a result of WASH, NTD control, or combined programs may be most effective. Remember that NTDs and WASH are interrelated with other priority health topics, including maternal and child health, HIV infection, malaria, and tuberculosis.

Problem

- 40 million women of child-bearing age are infected with hookworm in developing countries. The infection can cause serious complications during pregnancy and childbirth, such as maternal anemia and low birthweight in infants (Hotez, 2001).

Solution

- Evidence suggests that while NTD treatment and hygiene education reduced intestinal worm infections when implemented individually, the rate of reduction in infection is significantly better when these two methods for disease control are combined (Global Network, 2013).
- Data suggest that controlling soil-transmitted helminths could substantially reduce the infection rates and reduce health impacts of and improve treatment success for HIV/AIDS, tuberculosis, and malaria (Wolday et al., 2002; Harms & Feldmeier, 2002).

Educational Benefits of WASH for NTD Control

Tip: *Remember that the Ministry of Education perspective is one of improving school attendance and performance, and maximizing overall educational attainment. Messaging that demonstrates how WASH programs and NTD control contribute to increased school attendance and performance may be most effective.*

Problem

- Girls are often disproportionately affected by NTDs, leading to decreased school attendance and educational outcomes among women (Courtright & West, 2004).
- STH infections have a negative impact on children's cognitive development. The typical side effects of NTD infections can make children too sick to attend school and unable to concentrate on lessons (WHO, 2012).

Solution

- Studies show that treating STH infections is a cost-effective way to increase school attendance and can reduce school absenteeism up to 25% (Baird, 2012).
- Girls are more likely to stay in schools where WASH facilities are available, especially when they reach menarche. WASH has been shown to have an even greater impact on the health and well-being of girls (UNICEF, 2013).

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Appendix E: Policy Landscape for NTD Control

Global Policy for NTD Control

The vast global impact of the NTDS has been recognized, and support for NTD control at the national level is increasing rapidly. Since 1948, the World Health Assembly has adopted 68 resolutions to reduce the global burden of NTDs. A 2007 meeting of WHO's global partners for NTD control in Geneva, Switzerland strengthened commitment from Member States and pharmaceutical companies to increase collaboration. In October 2010, the first WHO report on NTDs was released. The report demonstrated that control and elimination efforts are producing tangible results and included provision of WASH services as a part of the five-pronged strategy.

In January 2012, WHO published a roadmap for prevention, control, elimination and eradication of NTDs (WHO, 2012a). This roadmap was the inspiration for the London Declaration on Neglected Tropical Diseases, which was endorsed on January 30, 2012 by a group of donors, politicians, heads of global health organizations, and pharmaceutical industry leaders who formally committed their organizations to support the control or elimination of ten NTDs through providing drug donations, supporting research and development, and technical assistance (London Declaration, 2012). These organizations agreed to enhance control efforts through collaboration with other public, private, non-governmental and multilateral organizations in the NTD community and other sectors, such as water and sanitation (WHO, 2013).

In May 2013, formative policy for the control of the NTDs was adopted. The 66th World Health Assembly adopted Resolution 66.12, which, among other measures, urges Member States to:

- Ensure country ownership of prevention, control, elimination, and eradication programs for the NTDs;
- Expand and implement interventions and advocate for predictable, long-term international financing for activities related to control and capacity strengthening;
- Integrate control programs into primary health-care services and existing programs;
- Ensure optimal program management and implementation; and
- Achieve and maintain universal access to interventions and reach the targets of the roadmap (WHO, 2013).

NTD Policy at the Regional and National Levels

With the support of WHO, Regional Plans of Action for the NTDs have been developed to support the global goals for controlling, eliminating and eradicating targeted NTDs. These regional plans can be found on the WHO Regional Office websites (see Additional Resources).

Many countries have developed National Plans of Action for the NTDs, which contain useful information about the burden of NTDs in country and national strategies for control, elimination and eradication. These documents can usually be found on Ministry of Health websites or by contacting WHO Country Offices (see Additional Resources).

Global Policies for the NTDs	
Disease	**Relevant Global Policies – World Health Assembly (WHA) Resolutions and Global Programs**
Soil-transmitted helminths (STH)	WHA 54.19[5] (2001): Goal of a minimum of 75% of school-aged children receiving regular chemotherapy by 2010; encouraging member states to promote access to safe water, sanitation, and health education through inter-sectoral collaboration.
Schistosomiasis	WHA 54.19[6] (2001): Goal of a minimum of 75% of school-aged children receiving regular chemotherapy by 2010; encouraging member states to promote access to safe water, sanitation, and health education through inter-sectoral collaboration. WHA 65.21[7] (2012): Encouraged member states to provide the necessary and sufficient means and resources for water, sanitation, and hygiene interventions in order to achieve elimination.
Trachoma	WHA 51.11[8]: established goal of eliminating blinding trachoma. Includes call for implementation of facial cleanliness and environmental improvements as part of SAFE strategy.
Lymphatic filariasis (LF)	WHA 50.29[9] (1997): Elimination of LF as a public health problem. Includes a call for increased access to safe water, sanitation and health education through intersectoral collaboration Global Programme to Eliminate LF (GPELF)[10] (2000): launched to eliminate LF by 2020. Strategy based on interrupting transmission through MDA and alleviating suffering through morbidity management and disability prevention.
Guinea worm	WHA 64.16[11]: Calls on all Member States to expedite the interruption of transmission and enforce nation-wide surveillance to ensure eradication of Guinea worm disease.

[5] *http://www.who.int/neglected_diseases/mediacentre/WHA_54.19_Eng.pdf*
[6] ***Ibid***
[7] *http://www.who.int/neglected_diseases/mediacentre/WHA_65.21_Eng.pdf*
[8] *http://www.who.int/neglected_diseases/mediacentre/WHA_51.11_Eng.pdf*
[9] *http://www.who.int/neglected_diseases/mediacentre/WHA_50.29_Eng.pdf*
[10] *http://www.who.int/lymphatic_filariasis/disease/en*
[11] *http://www.who.int/entity/neglected_diseases/mediacentre/WHA_64.16_Eng.pdf*

Additional Resources

Africa Regional Plan for the NTDs – Available at http://www.afro.who.int/en/media-centre/pressreleases/item/5819-towards-an-african-region-free-from-neglected-tropical-diseases.html.

Latin America and the Caribbean Regional Plan for the NTDs – Available at http://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=13885&Itemid

South East Asia Regional Plan for the NTDs – Available at http://www.searo.who.int/entity/leprosy/documents/SEA_CD_250/en/index.html.

Western Pacific Regional Plan for the NTDs – Available at http://www.wpro.who.int/entity/mvp/topics/ntd/NTD_Regional_Action_Plan_for_uploading.pdf.

WHO Country Offices – Contact information available at http://www.who.int/countries/en

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International Trachoma Initiative


Partnership for Treating and Preventing Intestinal Worms
ChildrenWithoutWorms


WaterAid


WASH
ADVOCATES
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sanitation
hygiene
for everyone


EMORY
UNIVERSITY
Center for
Global Safe Water


care