WASH and NTD Manual

A multicomponent toolkit for effective integration of relevant control activities into current WASH programs

Matthew Freeman, PhD MPH
Asst. Professor of Environmental Health

Center for Global Safe Water
Rollins School of Public Health
What are NTDs?
What are NTDs?
As defined by the WHO

- Buruli Ulcer
- Chagas disease (546)
- Dengue (825)
- Guinea-worm disease
- Echinococcosis (144)
- Foodborne trematodiases (1875)
- Sleeping sickness (560)
- Leishmaniasis (3317)
- Malaria (103808)
- Leprosy (6)
- Lymphatic filariasis (2368)
- Onchocerciasis (River blindness) (495)
- Rabies (1462)
- Schistosomiasis (3309)
- Soil transmitted helminthiases (5184)
- Taeniasis/Cysticercosis (503)
- Trachoma (334)
- Yaws
WASH and NTDs have common targets at the global level

Global burden of NTDs, 2012

WASH and NTD sectors have common target groups at a global level

Global access to sanitation, 2010
And at a community level
NTD and WASH Sectoral coordination is needed

Integration of Water, Sanitation, and Hygiene for the Prevention and Control of Neglected Tropical Diseases: A Rationale for Inter-Sectoral Collaboration

- Policy
- Mapping, data collection and monitoring
- Research
- Capacity building and training
What are soil-transmitted helminths?

Parasitic infections

- A group of parasitic worms transmitted via eggs in soil that are either ingested or penetrate the skin
- Most common:
  - roundworm (*Ascaris lumbricoides*)
  - whipworm (*Trichiura trichiuris*)
  - Hookworm (*Ancylostoma duodenale and Necator americanus*)

http://www.chem.gla.ac.uk/~alanc/worms.htm; WHO, and CDC
What are soil transmitted helminths?

*Ascaris lumbricoides*

Life cycle
What are soil transmitted helminths?

Hookworm *spp.* lifecycle

Life Cycle (intestinal hookworm infection):

1. Eggs in feces
2. Rhabditiform larva hatches
3. Filariform larva penetrates skin
4. Filariform larva
5. Adults in small intestine

= Infective Stage
= Diagnostic Stage

http://www.dpd.cdc.gov/dpdx
What are soil transmitted helminths?

*Schistosomiasis mansoni*

Image credit: http://www.uni-bielefeld.de/biologie/Didaktik/Zoologie/html_eng/zyklus_eng.html
Global Burden

Soil-transmitted infection is pervasive

<table>
<thead>
<tr>
<th>Helminth infections</th>
<th>Total cases</th>
<th>Major geographic areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>STH infections</td>
<td>≥ 2 billion</td>
<td></td>
</tr>
<tr>
<td>Ascariasis</td>
<td>1.221 billion</td>
<td>Sub-Saharan Africa, India, China and East Asia</td>
</tr>
<tr>
<td>Trichuriasis</td>
<td>795 million</td>
<td>Sub-Saharan Africa, India, China and East Asia</td>
</tr>
<tr>
<td>Hookworm</td>
<td>740 million</td>
<td>Sub-Saharan Africa, Americas, China and East Asia</td>
</tr>
<tr>
<td>Schistosomiasis</td>
<td>187 million</td>
<td>Sub-Saharan Africa, China and East Asia</td>
</tr>
<tr>
<td>S. haematobium</td>
<td>119 million</td>
<td>Sub-Saharan Africa</td>
</tr>
<tr>
<td>S. mansoni</td>
<td>67 million</td>
<td>Sub-Saharan Africa, Americas</td>
</tr>
<tr>
<td>S. japonicum</td>
<td>1 million</td>
<td>China and East Asia</td>
</tr>
</tbody>
</table>

Source: de Silva and others 2003.
Global Burden of Impact of STH

The graph shows the mean number of worms over age (years) across different species:

- **A. lumbricoides** (worms × 2)
- **Hookworm** (worms × 7)
- **T. trichiura** (actual numbers)
- **S. haematobium**

*Source: Bundy 1995; reproduced and modified from Hotez, Ardra, and others 2005.*
Global Burden

Soil-transmitted infection is pervasive

- Highly associated with poverty
- Strong environmental association
- Eggs persist in the environment for a long time
- Clustering at community-level

- Results in physical and mental capacity of children including anemia, stunting, cognitive impairment
- Pregnant women are more likely to have anemia resulting from Hookworm
- Heavy infection, but also light infection impacts child growth

Effect of water, sanitation and hygiene on the prevention of trachoma infection: a systematic review and meta-analysis

Authors: Meredith Stocks, Stephanie Ogden, Danny Haddad, David Addis, Matthew Freeman
Sanitation access and WASH

Significant and substantial association

- Abdou et al, 2007
- Ayele et al, 2011
- Burton et al, 2005
- Harding-Esch et al, 2010

**Line of no effect for odds ratios**

Significant association

- Summary

Latrine access and *C. trachomatis* infection

Latrine access and Active Trachoma (TF/TI)
Hygiene: facial cleanliness

Clean face and TF/TI

Significant and substantial association
Water, Sanitation, Hygiene, and Soil-Transmitted Helminth Infection: Systematic Review and Meta-Analysis

Authors: Eric Strunz, David Addis, Stephanie Ogden, Meredith Stocks, Juerg Utzinger, Matthew Freeman
## STH and WASH

<table>
<thead>
<tr>
<th>Meta-Analysis</th>
<th>Odds Ratio</th>
<th># Studies</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe water use (any STH)</td>
<td>1.48 (0.55-4.00)</td>
<td>5</td>
<td>Very low</td>
</tr>
<tr>
<td>Pipe water use (A. lumbricoides)</td>
<td><strong>0.40 (0.31-0.41)</strong></td>
<td>4</td>
<td>Low</td>
</tr>
<tr>
<td>Pipe water use (T. trichiura)</td>
<td><strong>0.57 (0.45-0.72)</strong></td>
<td>3</td>
<td>Low</td>
</tr>
<tr>
<td>Treated water use (any STH)</td>
<td><strong>0.46 (0.37-0.58)</strong></td>
<td>4</td>
<td>Low</td>
</tr>
<tr>
<td>Wearing shoes (hookworm)</td>
<td><strong>0.29 (0.18-0.48)</strong></td>
<td>5</td>
<td>Moderate</td>
</tr>
<tr>
<td>Soap use/availability (any STH)</td>
<td>0.66 (3.9-1.10)</td>
<td>4</td>
<td>Low</td>
</tr>
<tr>
<td>Handwashing after defecation</td>
<td>0.54 (0.25-1.12)</td>
<td>4</td>
<td>Very low</td>
</tr>
<tr>
<td>Sanitation access (any STH)</td>
<td><strong>0.65 (0.60-0.75)</strong></td>
<td>9</td>
<td>Low</td>
</tr>
<tr>
<td>Sanitation access (T. trichiura)</td>
<td><strong>0.60 (0.46-0.78)</strong></td>
<td>5</td>
<td>Low</td>
</tr>
<tr>
<td>Sanitation access (A. lumbricoides)</td>
<td><strong>0.62 (0.44-0.88)</strong></td>
<td>6</td>
<td>Low</td>
</tr>
<tr>
<td>Sanitation access (hookworm)</td>
<td>0.93 (0.67-1.30)</td>
<td>3</td>
<td>Very low</td>
</tr>
</tbody>
</table>
The Manual

Background

- Funded by a grant from Sightsavers
- Written through a partnership between Children Without Worms, the International Trachoma Initiative, & Emory University’s Center for Global Safe Water
- Increased coordination and information exchange between the WASH and NTD sectors has been increasingly recognized as essential to achieving the elimination of trachoma and the control of other WASH-related NTDs
- Meant to be a toolkit for WASH practitioners to increase education on WASH/NTD intersection
The Manual
NTDs Included

• Focuses on the impact that WASH can have on 5 of the 17 NTDs:
  • Schistosomiasis
  • Soil-transmitted helminths
  • Trachoma
  • Lymphatic filariasis
  • Guinea worm

*Expected outcomes: increased awareness within WASH organizations of these NTDs, their control activities, and available resources*
The manual
Approach

• Overall objectives:
  • Help the WASH sector target/prioritize NTD endemic communities
  • Help WASH and NTD sectors engage in advocacy that elevates both issues

• Manuals
  • Customizable/country specific
  • Advocacy and M&E Tools
  • New WASH recommendations
  • Policy context

• E-course
  • Pilot facilitated by experts
  • Content generated becomes the basis for self-facilitated, open access course
The manual

Sections

• The evidence base between WASH and NTDs
• Country’s NTD landscape
• Country’s WASH landscape
• 1 section on each of the 5 diseases
• Monitoring and evaluation for WASH + NTDs
• NTD policy
• WASH and NTD advocacy and communication
Data available
thiswormyworld.org

Maps by continent
- Central America and the Caribbean
- South America
- Africa
- Middle East
- Central and South Asia
- East and Southeast Asia

Types of map
- How to use the maps
- Terms of use
- Contribute your data

Africa

The greatest burden of STH and schistosomiasis occurs in sub-Saharan Africa (SSA) and this region has the most immediate need for reliable, up-to-date distribution maps.

Until recently, only a handful of countries in SSA had conducted national surveys of worms, with information for most countries scattered across the literature and not catalogued. The developed maps collate available STH and schistosomiasis information into a single database and present the known distribution of infection and areas without suitable data.

Also presented are maps showing the current and historic coverage of national programmes to eliminate lymphatic filariasis.

Click on a country to view or download the available maps
Data available thiswormyworld.org

Distribution of soil transmitted helminth survey data and average district-level prevalence for Kenya

The predicted distribution of soil transmitted helminths in Kenya: probability that prevalence exceeds 20%

In total 1034 mapped STH surveys were available from 1974 to 2009. Where multiple surveys exist for the same location, the average prevalence is shown.

Created by the Wormy World Project (www.thiswormyworld.org) under a Creative Commons Attribution 3.0 License (http://creativecommons.org)
Data available
thiswormyworld.org
The manual

Country-specific aggregation

Enter Country or Region

Ethiopia

Endemic NTDs

STH
Schistosomiasis
Trachoma
LF
Guinea worm

Chapters

Country specific disease information for each NTD
Basic treatment aspects
WASH activities that impact each NTD + Evidence base
M&E Tools
Advocacy Tools
Policy Context
Resources

Enter Country or Region

Afghanistan

Endemic NTDs

STH
Trachoma
Available online

The manual

www.washntds.org
Landing page:

The NTDs  WASH Impact  Resources

Multiplying WASH Impact on Health

Enter your country of practice here to download country-specific WASH/NTD Manuals

Ethiopia
Country-specific information

Ethiopia – NTD Landscape

NTDs endemic to Ethiopia:
- Soil-transmitted helminths (STH)
- Schistosomiasis
- Trachoma
- Leprosy

Number of people at risk of infection with NTDs: 444

Ethiopia’s National Plan of Action for the NTDs launched in June 2013.

National Task Force for the NTDs established to oversee execution of the Plan of Action.

Ethiopia – WASH Landscape

Ethiopia Water and Sanitation Coverage Trends

<table>
<thead>
<tr>
<th>Source: JMP 2013 Report</th>
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</thead>
<tbody>
<tr>
<td><strong>Sanitation Coverage Estimates</strong></td>
</tr>
<tr>
<td><strong>Urban (%)</strong></td>
</tr>
<tr>
<td>Improved facilities</td>
</tr>
<tr>
<td>Shared facilities</td>
</tr>
<tr>
<td>Other unimproved</td>
</tr>
<tr>
<td>Open defecation</td>
</tr>
<tr>
<td><strong>Drinking Water Coverage Estimates</strong></td>
</tr>
<tr>
<td><strong>Urban (%)</strong></td>
</tr>
<tr>
<td>Piped onto premises</td>
</tr>
<tr>
<td>Other improved source</td>
</tr>
<tr>
<td>Other unimproved</td>
</tr>
<tr>
<td>Surface water</td>
</tr>
</tbody>
</table>

*Ethiopia’s annual total increase in sanitation coverage is sufficient for meeting national targets.

**Ethiopia’s annual total increase in drinking water coverage is sufficient for meeting national targets.

School WASH in Ethiopia

77% of primary schools have improved sanitation facilities; 32% of primary schools have improved drinking water facilities. Hygiene education programs are implemented in all urban primary schools, and in some rural primary schools. Little data on secondary school WASH conditions are available.

Disease-specific information

**Soil-Transmitted Helminths (STH)**

What are soil-transmitted helminths (STH)?

*Ascaris lumbricoides, Trichuris trichiura, and Enterobius vermicularis*. These parasites live in the soil in warm and humid climates, and are spread through contact with feces of infected people.

Who has STH?

Over a billion people worldwide are infected with one or more species of STH, and most people are infected as children. These infections affect the poorest and most deprived communities.

What are the health impacts?

Infection with STH leads to malnutrition, anemia and fatigue. Children infected with STH are often stunted and underweight, and experience poor cognitive as well as physical development.

**WASH for STH Control**

STH are spread through contact with feces of infected individuals. Infection happens when *dirt* contaminated soil or food is ingested, or when larvae living in soil penetrate bare skin. Infections can be treated with deworming drugs such as albendazole or mebendazole, but reinfection is common when WASH conditions are poor.

Implementation of water and sanitation improvements, as well as practicing good hygiene, is essential to stop the cycle of STH transmission. Interventions include:

- Reducing open defecation practices to prevent soil contamination with STH by increasing access to safe, clean and maintained latrines.
- Teaching communities about the importance of hygiene practices, especially handwashing and wearing shoes when walking outside.
- Providing access to water to enable good personal hygiene practices and to enable environmental cleanliness.

One in seven people worldwide are infected with one or more soil-transmitted helminth (STH). Children are especially vulnerable to the negative health and development impacts of STH infection. STH are common in areas with poor water, sanitation and hygiene conditions. Improving WASH conditions is essential to breaking the cycle of infection.

**WASH and STH Case Study: Title**

By the early 1990s, sewage discharge from the outfall drainage system in Salvador, Brazil had started to damage the fragile local ecosystem. When the discharge started to contaminate local beaches, officials drew up a plan of action to protect the leisure and tourism industry. A city-wide sanitation project, financed by the World Bank, Inter-American Development Bank, Japan Bank for International Cooperation, Brazilian development banks and the Bahia State Government, aimed to increase the level of sewer coverage from 20% to 80% of households. Over a six-year period, the prevalence of roundworm decreased from 24.4% to 12.0%, whipworm from 18.0% to 5.0% and hookworm from 14.1% to 5.3%. Most of this reduction in STH infection was attributable to the increase in sewer usage.
## Advocacy tools

### Ministry of Finance

**Tip:** Remember that the Ministry of Finance perspective is one of efficient public investments. Advocacy that demonstrates cost-effectiveness and efficiency of programs and actions may be most effective.

- For every $1 invested in water and sanitation, countries reap $4 in economic benefits.
- Trachoma alone affects ten million people globally, and accounts for an estimated $2.9 billion in lost productivity annually.
- Research demonstrates that deworming alone in childhood could increase per capita earning by 30 percent over a person’s lifetime.
- 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 percent of developing countries’ annual gross domestic product per capita.

### Ministry of Education

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

- Studies show that treating STH infections is a cost-effective way to increase school attendance, and can reduce school absenteeism up to 25 percent ([Kremer 2011](#)).
- NTDs have a negative impact on children’s cognitive and physical development. The typical side effects of NTD infection - including anemia, fever and stomach pain – can make children too sick to attend school and become unable to concentrate on lessons. STH infections have been associated with reduced cognitive ability.
- Girls are often disproportionately affected by NTDs, leading to decreased school attendance and educational outcomes among women.
E-Course launching October 2013

- Modules based off the chapters in the manual
- Taught through Emory University by WASH practitioners and researchers
- 40-50 participants from various WASH organizations around the world
- Will be a model for a self-facilitated course to launch in 2014

Contact kellytesh@gmail.com for more information