

Strategies for Combating Waterborne Diarrheal Diseases (WDD):

Investigating Current Appropriate Technologies and their Effectiveness in Environmental Public Health

Katie Peterson (Dr. Jean Lavigne and Dr. Ernie Diedrich) Environmental Studies Department

College of St. Benedict and St. John's University (MN)



WDD and Environmental Public Health

- 5,000 people worldwide die daily from waterborne diarrheal disease complications due to unsafe drinking water and inadequate basic sanitation.
- Nearly 2.6 billion people lack access to basic sanitation, and 1.2 billion people lack access to safe drinking water.
- Unlike other public health epidemics, WDD can be tackled with local, inexpensive resources, and small changes.
- Through the application of appropriate technologies, worldwide access to clean and safe water and basic sanitation are realistic goals.

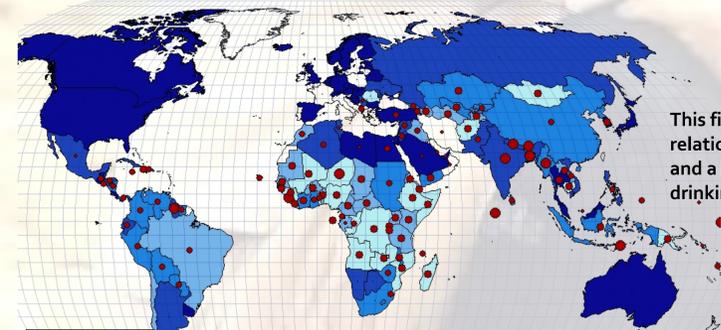


Children are often given the responsibility of collecting water for their family, a grueling task which detracts from schoolwork. (Photo courtesy of www.watersecretsblog.com)

The Underlying Dilemma

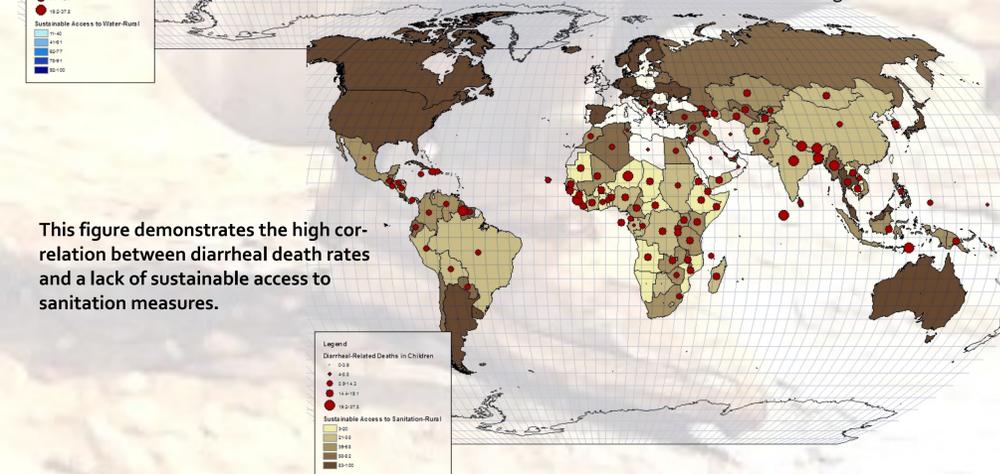
"It's hard to tell how many people actually understand the connection between WDD and basic lifestyle choices. However, even with the knowledge, there is a large gap between people who do something about it and those who don't. Most people understand that they should make changes, but not all have the means or motivation to make them." -Megan Peterson, a current Peace Corps Volunteer in Uganda

Child Diarrheal Death Rates Correlated with Sustainable Access to Water in Rural Regions



This figure demonstrates the high correlation between diarrheal death rates and a lack of sustainable access to drinking water sources.

Child Diarrheal Death Rates Correlated with Sustainable Access to Sanitation in Rural Regions



This figure demonstrates the high correlation between diarrheal death rates and a lack of sustainable access to sanitation measures.

Existing AT Strategies

Personal Cleanliness

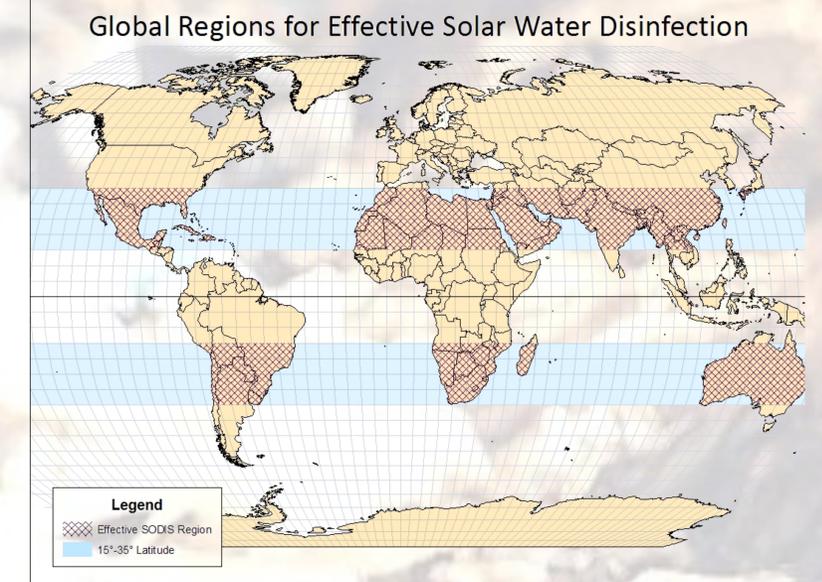
- Known as *hygiene*— it's *the* most effective way to combat WDD, but difficult to promote due to cultural norms
- Handwashing may reduce WDD infection rates by up to 50 percent.

Household Cleanliness

- Defined as maintenance of human waste through use of clean toilets and latrines.
- Necessary to:
 - keep feces away from water and food supplies
 - provide safe and convenient location to relieve oneself

Public Cleanliness

- Provide water that is affordable and safe is possible through unique ATs in different regions and cultures
- Livestock fences need to be built to avoid fecal contamination of community water source
- Therefore, point-of-use water treatment is most effective:
 - boiling water** using firewood or other fuel source
 - solar cookers** utilize solar energy to boil and disinfect water
 - personal chlorination** is inexpensive and very common
 - slow sand filtration** is effective and requires little work
 - ceramic filters** can be made locally
 - solar water disinfection (SODIS)** is simple and almost labor-free



Solar water disinfection is an extremely simple AT that effectively inactivates bacteria and viruses between 15 and 35 degrees latitude north and south of the equator.

Appropriate Technologies (AT)

- Environmentally conscious
- Cost-effective
- Emphasize the use of local resources
- Produced locally by community members
- Requires minimal amount of capital
- Offer economic opportunities within a community
- Maintained by villagers
- Adaptable to different regions and environmental conditions
- Culturally sensitive

Multifaceted Solutions

- There is **NO** silver bullet for the issue of waterborne diarrheal disease transmission
- A **multifaceted approach** involving every scale of cleanliness will be most effective solution
- **Community awareness** and **monetary support** by national governments and non-governmental organizations are essential