Understanding Haiti’s Cholera Outbreak:

How did it begin?
How can it end?

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Haiti Colonial History

- First site Columbus landed (Spanish, 1492)
- Taino population exploited for gold
- Sugar cane farming – slaves imported
- 1804 slaves revolt, 1st black republic
- 1825 France recognizes (150 million, 1922)
Haiti Republic History

- Number different leaders through 1915
  - DR, mulatto, kleptocracy, dictatorship

- 1915-1934: US Occupation
- 1934-1956: Dictators
- 1956-1986: Duvalier Regime
- 1990’s: Aristide’s Lavalas Party
- 1994: US Occupation
- 2011: Martelly
Deforestation
Erosion in Leogane Delta
<table>
<thead>
<tr>
<th></th>
<th>1990</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved drinking water</td>
<td>59%</td>
<td>69%</td>
</tr>
<tr>
<td>Improved sanitation</td>
<td>47%</td>
<td>32%</td>
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Technical support on HWTS (2000’s)
Haiti Earthquake

- January 12, 2010
  - 7.0 on the Richter Scale
  - ~300,000 fatalities
  - 3 million affected

- Immediate impact
  - Extensive shelter damage
  - Internal displacement
Supported by UNICEF and Oxfam to answer:

1. What role, if any, should PoUWT play in emergency response?

2. What are the factors associated with feasible, and potentially sustained, implementation of PoUWT in response to emergencies?
Research Plan

1. Information gathering
2. Spatial analysis
3. Household surveys
4. Water quality testing
5. Qualitative interviews
6. Costs/logistics
Coverage - Acute Emergency

- 4,618 families reached
  - 2,880 buckets with Aquatabs
  - Aquatabs in 48 settlements in PaP
  - ~350 ceramic filters in Jacmel
  - 238 biosand filters across PaP
  - 70 Klorfasil bottles one settlement

- Context
  - 0.77% of affected population
  - ~900,000 received tanker truck water
## Results

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Effective use (microbio. Improvement)</th>
</tr>
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<tbody>
<tr>
<td>Aquatabs - DSI (urban/rural)</td>
<td>57, 68%</td>
</tr>
<tr>
<td>Aquatabs - HRC</td>
<td>13%</td>
</tr>
<tr>
<td>Klorfasil</td>
<td>10%</td>
</tr>
<tr>
<td>Ceramic</td>
<td>20%</td>
</tr>
<tr>
<td>Biosand</td>
<td>8%</td>
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Effective option

Poor water quality

CONTEXT: Use, training, experience

Effective
Cholera

“Cholera is extremely unlikely to occur.” (CDC, March 2, 2010)
Cholera in Haiti

- Confirmed on October 22, 2010
- First cases in ~100 years
- Claimed over 8,000 lives
- Multiple theories of arrival
  - Arrived
  - Evolved
  - Introduced
- Widely held belief in Haiti
  - Introduced by MINUSTAH Nepal soldiers
Independent Panel

- Commissioned by the S-G

- Mandate
  - Investigate and seek to determine the source of the 2010 cholera outbreak in Haiti

- Methods
  - Epidemiology
  - Water & Sanitation
  - Molecular data
Sanitation situation at MINUSTAH facility
Black water disposal pit
Conclusions - Then and Now

**Before:** These research findings indicate that the 2010 Haiti cholera outbreak was caused by bacteria introduced into Haiti as a result of human activity; more specifically by the contamination of the Meye Tributary System of the Artibonite River with a pathogenic strain of the current South Asian type Vibrio cholerae.

- Criticism (from a number of directions!)
- Additional research - Piarroux, Nepal strain, PIH
- Call for MINUSTAH removal (by UN and Haitian)
- Vaccination campaign and Cholera Plan

**Now:** ‘Most likely source of introduction was someone associated with the Mirebalais Facility’
Role of DINEPA

- State government structure created in 2009
- Role is to execute the government guidelines in the Water and Sanitation sector
- Keys interventions:
  - Development of sector
  - Regulation of sector
  - Monitoring of stakeholders in sector
Need for regulation

- Immediate response after emergencies was massive HWTS distribution
- New programs were implemented
- No coordination, duplication
  - “Blans falling out of the sky”
  - Need for sustainable projects
  - Need for regulation
  - Need for a coherent response
Work to date on National Strategy

- **Program Launch**
  - Workshop November 2011 (DINEPA-CDC-CAWST-UNICEF)

- **Training**
  - URD/Port au Prince
  - Community leaders and NGO partners / Artibonite and Central

- **Norms and technical guidelines**
  - Chlorination, Filtration, Project evaluation
  - HWTS projects proposal/key elements

- **Evaluations:** 7 projects evaluated
- **National Strategy:** Technical document
- **Partnership:** with MOH and MOE
- **Pilot projects:** 2 DINEPA projects
How do we help?

- Difficult question with no easy answers

- Some thoughts
  - Strengthen government institutions
  - Address core issues while continuing band-aid solutions
  - Coordinate with other actors
  - Complete ethical research and projects
  - Work toward political stability and ‘resiliency’, if possible?
  - Understand complexity (where is all that money going??)

- As a Haiti watsan/cholera “expert”, what do I recommend?
  - Is it better to do nothing? No..
  - Incremental improvements, guided by evidence
Role for Tufts University

- Inter-disciplinary research & teaching
  - Engineering
  - Arts & Sciences
  - Med School
  - Vet School
  - Fletcher

- Haiti project -> DSI
What do people assume their development intervention has done?

- Often much more than it has
  - Wells in Guyana
  - Ceiling fans in Haiti
  - Missionaries in Haiti

Teach students rigorous mixed methods M&E
Teaching: Public Health Engineering
Research: Translating Efficacy to Effectiveness

Efficacy:
- RCT
- Travis (IGERT): Summarizing HIV/WASH
- Anna (PhD): BSFs in Nicaragua
  - Training in Haiti
- Travis (IGERT): Dispensers in Emergencies

Appropriateness
- Design
- Manufacturing
- Distribution
- Training
- Use
- Evaluation

Effectiveness:
- Scalable Impact in Real-World Programs
- Decision-making
- Policy
- Data Analysis

Travis (IGERT):
- Summarizing HIV/WASH

Anya (Cataldo):
- Chlorinating turbid water

Justine (PhD):
- Standards for factories
- Silver elution

Anjuliee (Pennell):
- Chlorinating turbid water

Anna (PhD):
- TA to Haitian government
- BSFs in Nicaragua
- TA to PSI

Sophia (Intern):
- TA to PSI

Natalie (MD/MPH):
- Publishing data
Currently, Haiti has:

- Post-earthquake
  - Not fully recovered
- Post-hurricane
  - Mostly recovered
- Current cholera
  - Here to stay, imported, vaccination?
- Current political violence
  - $ won’t move

None of this is changing quickly

How do we work in this ‘complex emergency’ context?
The notion that ‘being humanitarian’ and ‘doing good’ are somehow inevitably the same is a hard one to shake off. (Slim, 1997)

Thank you. I am happy to take questions.

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