Cholera in the Caribbean

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Outline

- History of cholera in the Caribbean
- Current situation
  - Cholera epidemic
  - Water and sanitation
- Control Efforts
History of Cholera in the Caribbean

- 3 major waves documented in 1800s
  - 1833-1834 (possibly until ~1837)
    - Cuba
  - 1850-1856
    - Jamaica, Cuba, Puerto Rico, Barbados, St. Thomas, St Lucia, St Kitts/Nevis, Trinidad, Bahamas, St Vincent, Granada, Anguilla, St John, Tortola, Turks and Caicos, Grenadines, possibly Antigua
  - 1865-1872
    - Guadalupe (including Marie Galante), Cuba, St Thomas, Dominican Republic, Dominica, Martinique
History of Cholera in the Caribbean

- **Puerto Rico: preventive measures**
  - **1850-1856 (2nd wave):**
    - Puerto Rico attempted preventive measures (quarantines, spraying mail with vinegar), but cholera arrived in 1856
  - **1865-1872 (3rd wave):**
    - Ships from Dominican Republic (where cholera was epidemic) not allowed entry
History of Cholera in the Caribbean

- Caribbean islands without reported cholera in 1800s:
  - Haiti
  - Caymans
  - Netherlands Antilles: Aruba, Bonaire, Curacao
  - St Martin
  - St Barthelemy
  - Montserrat
  - Martinique?
History of Cholera in the Caribbean

- Haiti: some unique conditions among islands without cholera in 1800s
  - Large island with high population density
  - Close to DR and Cuba where major outbreaks occurred

- Possible reasons for no cholera in Haiti:
  - Lack of plantation slavery and colonial troops
  - Ships from DR quarantined in 1867
History of Cholera in the Caribbean

- Latin America cholera outbreak in 1990s
- Did not spread to the Caribbean
- Large scale investments in water and sanitation infrastructure contributed to cholera control
  - Mexico: 1990s WASH investments led to increase from 55% to > 90% of municipalities providing potable water
  - Mortality from diarrheal diseases decreased significantly in children under 5 during same time
Outline

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January 12, 2010 Earthquake in Haiti
Impact of January 12, 2010 Earthquake

- Approximately 230,000 deaths and 300,000 injuries
- Over 1 million internally displaced persons (IDPs)
- More than 1000 IDP settlements in PaP and surrounding areas
- Minimal damage to water sources but significant damage to distribution networks and kiosks
Haiti Cholera Outbreak

- Cholera first detected along Artibonite River in late October 2010
- Spread to all 10 Departments including Port au Prince by mid-November
Affected City or Village with Reported Cholera Cases

The following affected villages have not been located:
- Au Signal
- Botoquerre
- Tiboos
- Coufleur
- Dupont
- Vieux Cordes
- Maroifier

Data Sources: MSPP, DELUR, LSIDP, CCIDP-PAHO, CDC-GRASP (10-22-2010)

Creation Date: 22-Feb-2011
Timeline of Cholera-Oct 26, 2010

- Nord-Ouest: 10/26/2010
- Nord: 10/25/2010
- Artibonite: 10/21/2010
- Centre: 10/24/2010
- Ouest: 10/23/2010

Legend:
- Red: Department with lab-confirmed cholera with date of confirmation
- Light Yellow: Department without cholera

Data source: LNSP
Cholera in the Caribbean

- Haiti (as of Sept 4, 2013)
  - 674,879 cases
  - 8,258 deaths

- Dominican Republic (as of August 14, 2013)
  - 30,671 cases
  - 454 deaths

- Elsewhere:
  - Cases in Cuba, Venezuela, Italy, US (Florida)
Total (n=668,378) Cholera Cases by Week
Central America and Caribbean Countries: Percent of total population with access to improved water and sanitation (2008)

Source: WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation
## Access to Water and Sanitation in Haiti

Based on WHO/UNICEF Joint Monitoring Program 2010

### Access to Improved Drinking Water Sources

<table>
<thead>
<tr>
<th>Type</th>
<th>Percentage</th>
<th>Regional Average LAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>85%</td>
<td>98%</td>
</tr>
<tr>
<td>Rural</td>
<td>51%</td>
<td>81%</td>
</tr>
<tr>
<td>Overall</td>
<td>69%</td>
<td>94%</td>
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### Access to Improved Sanitation Facilities

<table>
<thead>
<tr>
<th>Type</th>
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<tr>
<td>Urban</td>
<td>24%</td>
<td>84%</td>
</tr>
<tr>
<td>Rural</td>
<td>10%</td>
<td>60%</td>
</tr>
<tr>
<td>Overall</td>
<td>17%</td>
<td>80%</td>
</tr>
</tbody>
</table>

1. Improved drinking water sources = piped water into dwelling or yard, public standpipe, tubewell or borehole, protected spring, rainwater
2. Improved sanitation facilities = facility that hygienically separates human excreta from human contact

Reference: WHO/UNICEF Joint Monitoring Programme (JMP) for Water and Sanitation
Comparison of Regional Infrastructure (1990-2008)

Access to Improved Drinking Water Sources

<table>
<thead>
<tr>
<th>Year</th>
<th>Haiti Urban</th>
<th>Haiti Rural</th>
<th>LAC Urban</th>
<th>LAC Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>0.2</td>
<td>0.1</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>2000</td>
<td>0.6</td>
<td>0.2</td>
<td>0.8</td>
<td>0.7</td>
</tr>
<tr>
<td>2008</td>
<td>0.8</td>
<td>0.5</td>
<td>0.9</td>
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Access to Improved Sanitation Facilities

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LAC = Latin America and Caribbean
- **Childhood mortality: Global**
  - #1 = Acute respiratory infections (ARIs)
  - # 2 = Diarrheal diseases

- **Childhood mortality: Haiti**
  - # 1 = diarrheal diseases
  - # 2 = malnutrition

- **ARIs, diarrhea and malnutrition all related**
Lessons from History

Typhoid Fever Trend (Mortality per 100,000) and Sanitary Interventions, 1900–1936
Counter examples:
- 2008 Zimbabwe cholera outbreak
- 1998 Tbilisi *E. histolytica* outbreak
- 1997 Tajikistan typhoid outbreak
Environment is a strong determinant of health impacts

2004: Hurricane Jeanne
D.R. – 19 deaths
Haiti – 3000 deaths

>90% forest cover gone in Haiti
Environmental conditions matter
Outline

- History of cholera in the Caribbean

- Current situation
  - Cholera epidemic
  - Water and sanitation

- Control Efforts
Breaking down the Haiti Water Situation

<table>
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<tr>
<th>Urban (55%)</th>
<th>Water source</th>
<th>Issues</th>
</tr>
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<tbody>
<tr>
<td>52%</td>
<td>Piped</td>
<td>• Infrastructure expansion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Chlorination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Intermittent service</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lack of monitoring</td>
</tr>
<tr>
<td>48%</td>
<td>Trucked/bottled</td>
<td>• Cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lack of Monitoring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Recontamination</td>
</tr>
<tr>
<td>Rural (45%)</td>
<td>Small systems</td>
<td>• Maintenance</td>
</tr>
<tr>
<td>~40%</td>
<td></td>
<td>• Chlorination</td>
</tr>
<tr>
<td>~60%</td>
<td>Untreated sources</td>
<td>• Lack of access to products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hygiene education</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Continued use</td>
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CDC Programs

- WQ monitoring
- Kiosk Inventory
- Water quality testing
- Inventory
- Chlorination
- Local product Support HWTS projects
- Promotion campaign
Challenges represent spectrum of needs
- Urban, Rural, Peri-urban, IDP camps
- Improved, unimproved sources
- Household, community, utility management

Requires a spectrum of interventions
- 1 size DOESN’T fit all
Spectrum of Interventions

Type of Water Supply

- **Temporary/Refugee**
- **Hauled**
- **Intermittent Piped**
- **Continuous Piped**

- Disaster Response
- Household Treatment/Storage
- Water Safety Plans
- Regulations
Different interventions needed in different settings
  - Most interventions appropriate somewhere
  - Need to define what works best for specific settings

Interventions are complementary, not competitive
  - Example: Water Safety Plan (for piped system) in Guyana lead to household treatment program
IDP Camps

Point-of-use chlorination
- Tablets
- Solution

Hygiene
- Soap
Household Water Treatment and Storage (HWTS)

- For hauled and intermittent water supplies
  - Container and chlorine solution or tablets for household use
  - Can implement and scale up rapidly (vs. infrastructure)
  - Many partners working on HWTS in Haiti

- Challenges:
  - Access to containers, chlorine products
    - Standardization
  - Continued use
    - Social marketing/health promotion
Potable Water and Sanitation Technicians for the Communes (TEPAC) Program

- 264 TEPACs: 2 per commune outside of Port-au-Prince
- Trained and Deployed Nov 2013-March 2013
- Each of DINEPA’s 11 rural departmental offices (URDs) have increased in capacity from ~7 to ~30 staff

TEPACs practice testing chlorine residuals at a public fountain during the Center departmental training in July 2012.

Fabienne Bertrand of DINEPA introduces environmental sampling methods during the North-East departmental training in June 2012. (Photo courtesy of DINEPA, 2012)
Small rural water systems: Next Steps for TEPACS

- Conduct sanitary inspections and water quality testing
- Implement chlorination in rural systems
- Implement a monitoring and evaluation system for WASH activities
- Gather data
  - % of community systems functioning
  - % of community systems chlorinating
Urban Water Vendors

- Private kiosks sell water only (not container) to consumers
- Study of kiosk water quality: fieldwork finished August 2013, data still being compiled
  - No data previously available on water quality from private kiosks
- Preliminary Results indicate that kiosk water was generally good quality
  - Recontamination after purchase potential issue
Sanitation Options

- Innovative solutions
  - Urban areas:
    - No centralized sewer collection or treatment systems
    - High density areas
    - IDP camps
  - Rural areas
    - Very low coverage (10%)
Condominial sewer systems

- Less Excavation
- Smaller diameter pipe
- Shared maintenance responsibility
Potential Innovative Sanitation Solutions
Increasing coverage for Sanitation takes time

Access to Improved Sanitation

% of population

Year

1990 2000 2008

Bolivia
Honduras
Peru
Bangladesh
Haiti
Control Efforts: Coalition to Eliminate Cholera

- **Call to Action: A Cholera-Free Hispaniola**
  - Governments of Haiti/DR, PAHO, CDC, UNICEF
    - January 2012

- **Coalition to Eliminate Cholera**
  - 2013: > 20 partners
    - International Organizations: PAHO, UNICEF, World Bank, IDB, CARICOM, Red Cross
    - Governmental: CDC, AECID, FUNASA, USAID
    - NGOs: Catholic Relief Services, Millennium Water Alliance, Partners In Health, WASH Advocates, World Vision
    - Professional Organizations: AIDIS, CWWA, Haitian Physicians Abroad
    - Private Sector: Veolia Foundation, Haitian Diaspora Foundation
Coalition to Eliminate Cholera

- **National Plan to Eliminate Cholera in Haiti**
  - 10 year plan: 2013-2022
  - Launched Feb 2013
  - Identifies US$2.2 Billion in needs

- **4 areas:**
  - Water and sanitation (88%)
    - Includes solid waste
  - Health care services/management (9%)
  - Epidemiology and surveillance (1%)
  - Health and hygiene promotion (2%)

- **Separate plan for Dominican Republic**
  - US$34 M for 2013-2015
Coalition to Eliminate Cholera

Areas of need for WASH in National Plan:

- Investment
  - Emphasis on sanitation
- Coordination of the sector
- Strengthen government capacity
  - Technical
  - Administrative/budgetary
WASH Needs

- **Investment**
  - National Plan outlines investment needs
  - 10 year plan to eliminate cholera from Hispaniola
  - >70% of funding needs are in WASH

- **Coordinating the WASH Sector**
  - DINEPA:
    - Developing Standards and guidelines
    - Framework agreement with NGOs working in sector
    - Moving toward eventually regulating the sector
WASH Needs: Strengthen Government Capacity

- **National Water and Sanitation Directorate (DINEPA)**
  - Support for key technical positions within DINEPA HQ
    - HWTS Coordinator
    - Hygiene Promotion
    - Sanitation
    - Coordinator/Deputy for Rural Technicians (TEPACs)
    - Monitoring and Evaluation

- **Ministry of Health and Population (MSPP): National Public Health Lab (LNSP)**
  - Capacity for analyzing drinking water samples
Conclusion

- History of underinvestment in WASH in Haiti
- Current situation evolved over decades
- Cost to improve will be significant
- Benefits will also be significant, for Haiti and Caribbean region
  - Health
  - Economic
  - Security
- Improving the situation will require long term effort