Cholera Outbreak Caused by Drinking Contaminated Lakeshore Water: Hoima District, Oct 2015

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Events leading to investigation

- 2 suspected cholera deaths in Kaiso
- Outbreak reported, District response
- Investigation

1 – 10 Oct | 12 Oct | 1 Nov
Located on shoreline of Lake Albert
Objectives

- Identify source of infection
- Identify mode of transmission
- Recommend evidence-based measures to prevent future outbreaks
Case definition

- **Suspected case:** Onset of acute watery diarrhoea in a resident of Kaiso village from 1st October onward.

- **Confirmed case:** A suspected case with *vibrio cholerae* identified in fecal sample by Lab culture.
Systematic case finding and investigation

- 123 cases line listed from cholera treatment center and community
- Rainfall data from Kabwoya Wildlife Reserve weather station
A point source epidemic after heavy rainfall

Tx ctr opened

H2O chlorination

Investigation

Rainfall (mm)

# cases

Rainfall

Oct

Nov
Symptoms were consistent with Cholera

- Diarrhoea: 100% cases
- Vomiting: 94% cases
- Abdominal pain: 34% cases
### Cases by age and gender

<table>
<thead>
<tr>
<th>Sex</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>70</td>
</tr>
<tr>
<td>Female</td>
<td>52</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>8mon – 65y</td>
</tr>
<tr>
<td>Median</td>
<td>20y</td>
</tr>
</tbody>
</table>
Attack rates varied by zone within village

<table>
<thead>
<tr>
<th>Zone</th>
<th>Cases</th>
<th>Popn (Estim.)</th>
<th>Attack rate (/1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaiso Village</td>
<td>123</td>
<td>9000</td>
<td>14</td>
</tr>
<tr>
<td>Songa-Babobya</td>
<td>35</td>
<td>2000</td>
<td>17</td>
</tr>
<tr>
<td>Songa-Lendu</td>
<td>83</td>
<td>6500</td>
<td>13</td>
</tr>
<tr>
<td>Fichama</td>
<td>2</td>
<td>500</td>
<td>4</td>
</tr>
</tbody>
</table>
Hypothesis:
Water likely source of transmission

- Lake primary source of water for all cases
- 100% cases no water treatment
- Piped water system non-functional
- Heavy rainfall prior to outbreak
- No large community festival prior to outbreak
- >90% cases ate hot food from their homes
Case - control study

- 61 cases
- 126 randomly selected village controls from village register
- Obtained info on sources of drinking water and boiling water
## Water collection points associated with cholera

<table>
<thead>
<tr>
<th>Exposure</th>
<th>% cases exposed (n=61)</th>
<th>% controls exposed (n=126)</th>
<th>OR_{M-H} (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Songa-Lendu (Site C)</td>
<td>69</td>
<td>33</td>
<td>6.7 (2.5 – 17)</td>
</tr>
<tr>
<td>Bakobya (Site B)</td>
<td>21</td>
<td>37</td>
<td>1.8 (0.64 – 5.3)</td>
</tr>
<tr>
<td>Rescue (Site A)</td>
<td>10</td>
<td>30</td>
<td>ref</td>
</tr>
</tbody>
</table>
**Drinking unboiled water associated with disease**

<table>
<thead>
<tr>
<th>Exposure</th>
<th>% cases exposed (n=61)</th>
<th>% controls exposed (n=126)</th>
<th>OR&lt;sub&gt;M-H&lt;/sub&gt; (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking unboiled water</td>
<td>100</td>
<td>93</td>
<td>∞ (1.0-∞)*</td>
</tr>
<tr>
<td>Drinking boiled H2O</td>
<td>0</td>
<td>7</td>
<td>Ref.</td>
</tr>
</tbody>
</table>

*Fisher’s exact CI*
3 water collection sites: A, B & C

Songa-Lendu

Songa-Bakobya

Ficama

Attack rate 13/1000

Attack rate 17/1000

Attack rate 4/1000
Environmental investigation: three water collection sites on shoreline

Site A: Rescue
Site B: Bakobya
Site C: Lendu

sewage
Gully channel washed sewage into lake shore at site C
Open defecation along the channel
Piped water system vandalized
Conclusion

- Drinking lakeshore water contaminated with feces washed down a gully channel from hill side residential area caused this outbreak
Recommendations

- **Immediate interventions:**
  - Boiling & treatment of drinking water
  - Construction of public latrines

- **Ultimate solution:** Fix the broken piped water system or provide alternative safe water to the community
Acknowledgements

- Hoima DHO and DHT Members
- MoH
- WHO
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- PHFP mentors Dr. Bao Ping Zhu and Dr. Ario Alex
- Mentors: Dr. David Okumu, Dr. Kizingi, Dr. Victoria Nankabirwa
- Kabwoya Wild Life Reserve
- Chairman LC1 Kaiso and