Cholera Outbreak Caused by Drinking Contaminated River Water, Bulambuli, Uganda, March 2016

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Cholera outbreak – Eastern Uganda
Late Mar.: Bulambuli District reported sharp increase in cholera cases in Bwikhonge Subcounty

- Persistent, low-level transmission in community (1st case reported 24 Feb.)
- Cholera outbreaks reported in some nearby districts; across the border in Kenya
Objectives

- Assess scope of outbreak
- Determine mode of transmission
- Inform control measures
Case definition

- Suspected case: acute onset of watery diarrhoea from 1 Mar 2016 onwards in a resident of Bwikhonge subcounty, age ≥5 years
- Confirmed case: a suspected case with positive stool culture for *V.cholerae*
Case finding

- Reviewed medical records in Cholera Treatment Centre
- Located cases in villages assisted by Village Health Team members
Case finding in Bwikhonge sub-county

- Suspected cases = 118
- Confirmed cases (V.cholerae culture) = 7/13
- RDT (Africhol®) +ve for V.cholerae 0139 = 1/3
- Case fatality rate = 1.6%
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Attack rate in Bwikhonge subcounty

Overall A.R. = 9/1000
All age groups affected (N=118)

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Both sexes affected approximately equally (N=118)

<table>
<thead>
<tr>
<th>Sex</th>
<th>Cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>61</td>
<td>52</td>
</tr>
<tr>
<td>Male</td>
<td>57</td>
<td>48</td>
</tr>
</tbody>
</table>
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Continuous common source transmission

Date of onset

Cases

Potential exposure period = 8 days

Low level community transmission

3 days (mean incubation)

5 days (longest incubation)
### Hypothesis generating interview (N=40)

<table>
<thead>
<tr>
<th>Potential exposure factors during outbreak</th>
<th>% Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheptui river as primary source of drinking water</td>
<td>76</td>
</tr>
<tr>
<td>Use Cheptui river water for domestic utilities</td>
<td>67</td>
</tr>
<tr>
<td>Drank unboiled water</td>
<td>95</td>
</tr>
<tr>
<td>Ate cold food</td>
<td>0</td>
</tr>
</tbody>
</table>

NB: No community gathering or feast during potential exposure period
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Hypothesis

Consumption of contaminated water from River Cheptui caused the cholera outbreak
Case-control study

- To verify hypothesis
- Involved
  - 100 suspected cases
  - 100 controls
- Cases and controls individually matched by age & village of residence
Drinking untreated river water highly associated with cholera

<table>
<thead>
<tr>
<th>Variable</th>
<th>% Cases n = 100</th>
<th>% Controls n = 100</th>
<th>OR$_{MH}$</th>
<th>95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drank untreated water from River Cheptui</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>22</td>
<td>49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>78</td>
<td>51</td>
<td>7.8</td>
<td>2.7-22</td>
</tr>
<tr>
<td>Drank borehole water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>65</td>
<td>46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>35</td>
<td>54</td>
<td>0.31</td>
<td>0.13-0.65</td>
</tr>
</tbody>
</table>
Environmental assessment

- 2/7 water collection points yielded *V. cholerae* (01 Ogawa) by culture
  - Water from main collection point on River Cheptui, *V. cholerae* (01 Ogawa)
  - Water from another collection point yielded *V. cholerae* (01 Ogawa)
- No molecular typing for cholera toxin gene
Collection of dirty river water

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Contamination of river water

Bathing/swimming

Defeacation near river

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Washing soiled clothes at water collection point

River segment

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**Conclusion**

- Cholera outbreak caused by drinking water from Cheptui river contaminated with *V.cholerae*
Public Health Actions Taken

- Boiling or treating drinking water
- Restriction on washing clothes near drinking water collection points
- Sanitation improvement
Recommendation for long-term public health intervention

- Provide safe water to residents
- Construct pit-latrines
Acknowledgements

- Uganda Min. of Health
- US-CDC
- Makerere University School of Public Health
- Bulambuli District Health Team
- PHFP