Spreading Like a Wild Fire: A Tale of Three Cholera Outbreaks, Namayingo District, March 2016

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Location of Namayingo district in Uganda
Namayingo prone to cholera outbreaks

- Second cholera outbreak in two years
- Reasons why Namayingo is prone to cholera outbreaks is unknown
Sequence of events leading to investigation

Alert to MoH

Negative test results

March

CPHL confirmation, 65 suspected cases, 2 sub-counties affected

Field investigation Started

April

15 17 19 21 23 25 27 29 31 2 4
Initial response by local response team

- Activation of District Cholera Task Force
- Treatment: 2 Cholera Treatment Wards
- Samples tested using
  - Culture and sensitivity - CPHL
- Social mobilization: Community meetings; Radio talk shows
- Water purification tablets distributed
Objectives

- To determine the scope of the outbreak
- To ascertain the source of infection
- To establish the mode of transmission
- To recommend control measures based on findings of the investigation
Case definition

- Suspected case: Sudden onset of watery diarrhoea in a resident (aged ≥2 years) of Namayingo District from 1 March 2016 onwards

- Confirmed case: Suspected case with *V. Cholerae* isolated from stool sample by culture
Active case finding

- Reviewed hospital records and searched the community to find cases

- Identified cases with the help of Village Health Teams (VHTs)

- Interviewed cases using case investigation forms
### Case count: 161 suspected cases identified

<table>
<thead>
<tr>
<th>Level of case definition</th>
<th>Case count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspected</td>
<td>157</td>
</tr>
<tr>
<td>Confirmed (culture)</td>
<td>4</td>
</tr>
</tbody>
</table>
## Symptoms consistent with cholera

<table>
<thead>
<tr>
<th>Symptom</th>
<th>% of case-persons, by symptoms</th>
<th>Bumeru A and Bulundira (n=73)</th>
<th>Yebbe Island (n=27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute watery diarrhoea</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Vomiting</td>
<td>74</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>53</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>
Mutumba and Sigulu Island sub-counties the highest attack rates
Both males and females affected
Epicurve showing spread of cholera
Outbreak spread from Bumeru A to Bulundira village

Cholera Outbreak, Namayingo District, March 2016
Potential risk factors amongst cases

Drunk locally packaged (Kaveera) water

Ate cold food prior to outbreak

Ate food in a restaurant prior to the outbreak

Drunk unboiled water before outbreak

Latrine ownership

Attended social event

Lake or swamp primary drinking water source

Yebbe Island  Bumeru A and Bulundira

Cholera Outbreak, Namayingo District, March 2016
Hypotheses

- Drinking un-boiled water from lake or swamp caused outbreak in Bulundira and Bumeru A villages

- Drinking locally packaged drinking water (Kaveera water) caused outbreak on Yebbe Island
Case control studies

- Bulundira and Bumeru A villages: 77 suspected cases; 238 controls
- Yebbe Island: 21 suspected cases; 84 controls
- Controls: Asymptomatic, Age ≥ 5, residents of no diarrhoea in household since 1 March 2016
- Matched by village and age-group
- Info on drinking water, food, hygiene practices
Drinking water from the lake was strongly associated with cholera in Bumeru A and Bulundira.

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Percentage exposed</th>
<th>Adj. OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cases (N=77)</td>
<td>Controls (N=238)</td>
</tr>
<tr>
<td>Drinking water from</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kasokoso</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>64</td>
<td>92</td>
</tr>
<tr>
<td>Yes</td>
<td>36</td>
<td>8.0</td>
</tr>
<tr>
<td>Drinking water from Karim</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>86</td>
<td>99</td>
</tr>
<tr>
<td>Yes</td>
<td>14</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Ref 9.0 (5.0-18)

Ref 32 (7.0-148)
Drinking locally packaged water from a Vendor strongly associated with cholera on Yebbe Island

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<tr>
<td></td>
<td>Cases (N=21)</td>
<td>Controls (N=84)</td>
</tr>
<tr>
<td>Drunk Kaveera water from a Vendor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>57</td>
<td>87</td>
</tr>
<tr>
<td>Yes</td>
<td>43</td>
<td>13</td>
</tr>
</tbody>
</table>

Cholera Outbreak, Namayingo District, March 2016
Water sources contaminated

- Open defecation observed in all 3 outbreak villages;
  - Yebbe Island has only one pit latrine
  - Pigs were natural sanitizers on Yebbe Island
- Washing of soiled clothes of cholera patients at water collection points
- On Yebbe Island, boiled water was mixed with un-boiled lake water
Water contamination at Kasokoso and Yebbe

Cholera Outbreak, Namayingo District, March 2016
Residents preferred lake water to borehole water

- Only one functional borehole in each of the 3 villages, salty water generally unpalatable
- Broken boreholes not repaired for >2 years
Conclusions

- The outbreak affected three sub-counties
  - Spread from one village to another like a wild fire
- Drinking contaminated lake water was the source of the infection and mode of transmission
  - Contamination was sustained by washing soiled cholera patient’s clothes at water collection points
Recommendations

- **Immediate interventions:**
  - Public health education: Treating or boiling drinking water
  - Designate specific areas for washing clothes

- **Ultimate solution:**
  - Provide community acceptable treated (safe) water to all residents
  - Construct environmentally sustainable pit latrines
Acknowledgment

- US CDC
- MoH
- Namayingo DHT
- PHFP mentors
- VHTs in affected villages
- PHFP fellows (Cohort 2016, 2015)