
Robert K. Majwala, MD, MA Health Policy Fellow, Cohort 2016
Outbreak Reported

- 14\textsuperscript{th} Oct. 2016, PHEOC notified of a measles outbreak in Mayuge District
- 3/10 samples tested measles IgM+
- DHT reported increased numbers of children with fever and rash in the district since Aug. 2016
Objectives

- Determine extent of the outbreak
- Estimate vaccination coverage
- Calculate vaccine effectiveness
- Recommend control measures
Case Definitions

- Probable case: Fever $\geq 3$ days and generalized rash with $\geq 1$, conjunctivitis, cough or running nose
- Confirmed case: Probable case with measles IgM(+) in absence of vaccination in last two weeks
Case Finding

- Reviewed health facility records
- Community case finding with the help of village health teams, community leaders and health assistants
## Cases found

<table>
<thead>
<tr>
<th>Cases</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probable</td>
<td>59</td>
</tr>
<tr>
<td>Confirmed</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
</tr>
</tbody>
</table>
Epidemic Curve

17-Oct. 16 Start of Investigation
14-Oct. 16 Outbreak Declared

Date of Rash Onset

Measles cases

Kityerera & Malongo Sub-counties Had Similar Attack Rates

<table>
<thead>
<tr>
<th>Sub-county</th>
<th>Kityerera</th>
<th>Malongo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>49,330</td>
<td>105,831</td>
</tr>
<tr>
<td>Cases</td>
<td>20</td>
<td>42</td>
</tr>
<tr>
<td>AR/10,000</td>
<td>4.1</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Central Busoga Forest Reserve
Males and Females Had Similar Attack Rates

<table>
<thead>
<tr>
<th>Sub-county</th>
<th>AR/10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Kityerera</td>
<td>4.6</td>
</tr>
<tr>
<td>Malongo</td>
<td>3.9</td>
</tr>
</tbody>
</table>
# Bumwena Parish Had Highest Attack Rate

<table>
<thead>
<tr>
<th>Sub-county</th>
<th>Parish</th>
<th>Cases</th>
<th>Population</th>
<th>AR/10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malongo</td>
<td>Bumwena</td>
<td>21</td>
<td>2,649</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>Bukatabira</td>
<td>4</td>
<td>5,167</td>
<td>7.7</td>
</tr>
<tr>
<td>Malongo</td>
<td></td>
<td>10</td>
<td>17,971</td>
<td>5.6</td>
</tr>
<tr>
<td>Namoni</td>
<td></td>
<td>3</td>
<td>5,790</td>
<td>5.2</td>
</tr>
<tr>
<td>Buluuta</td>
<td></td>
<td>2</td>
<td>11,852</td>
<td>1.7</td>
</tr>
<tr>
<td>Namadhi</td>
<td></td>
<td>1</td>
<td>6,373</td>
<td>1.6</td>
</tr>
<tr>
<td>Bukalenzi</td>
<td></td>
<td>1</td>
<td>11,500</td>
<td>0.9</td>
</tr>
<tr>
<td>Kityerera</td>
<td>Kityerera</td>
<td>18</td>
<td>13,449</td>
<td>13</td>
</tr>
<tr>
<td>Maumu</td>
<td></td>
<td>1</td>
<td>4,392</td>
<td>2.3</td>
</tr>
</tbody>
</table>
## Age Group 0 – 59 Months Most Affected

<table>
<thead>
<tr>
<th>Age (Months)</th>
<th>Count</th>
<th>Population</th>
<th>AR/10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 11</td>
<td>9</td>
<td>6,672</td>
<td>13</td>
</tr>
<tr>
<td>12 - 59</td>
<td>38</td>
<td>24,671</td>
<td>15</td>
</tr>
<tr>
<td>60+</td>
<td>15</td>
<td>123,818</td>
<td>1.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>62</strong></td>
<td><strong>155,161</strong></td>
<td><strong>4.0</strong></td>
</tr>
</tbody>
</table>
Estimation of Vaccine Effectiveness & Vaccination Coverage

- Case-Control Study
- Ratio 1:4
- 41 cases:164 controls
- Matched by age and residence
- Collected information vaccination status during exposure period i.e. 7 – 21 days before onset of rash
### Measles Vaccination is Protective

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Cases n=31</th>
<th>Controls n=121</th>
<th>OR$_{MH}$ (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measles vaccination (9 – 59 months)</td>
<td>39%</td>
<td>68%</td>
<td>0.31 (0.12 – 0.75)</td>
</tr>
</tbody>
</table>
Estimation of Vaccine Effectiveness

- $\text{VE} = 1 - RR$
- $\approx \text{OR}$ for rare diseases
- $\text{VE} = 1 - 0.31$

$$= 0.69 \times 100 = 69\% \ (95\% \ CI: 25 - 88)$$
Measles Vaccination Coverage

- 68% (95% CI: 61 – 76)
- Below the recommended at least 80% target for a district
Two children travel from Malongo to Kityerera
Propagated Outbreak Bumwena Parish
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Measles Cases

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Measles Cases


Kityerera Sub-county Propagated Outbreak

9th Aug. mother of two travels from Nakigo to Kityerera
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9th Aug. mother of two travels from Nakigo to Kityerera


9.8.16 Mother travelled with 2 babies from Nakigo
Propagated Measles Outbreak

Date of Rash Onset

14-Oct. 16 Outbreak Declared
17-Oct. 16 Start of Investigation

PIRI

Measles cases


Conclusions

- Malongo & Kityerera sub-counties most affected with 0 – 59 months as most affected age group
- Vaccine effectiveness low, 69%
- Vaccination coverage low at 68%
- Propagated outbreak, community transmission
Recommendations

- Strengthen surveillance
- Identify under-five children, have them vaccinated
- Given low vaccine effectiveness, introduce 2nd dose of measles
- Intensify vaccination services provision in the affected sub-counties
Public Health Actions

- Surveillance has been intensified in the district
- Intensification of measles vaccination in the district, among those aged 0 – 59 months
Acknowledgment

- DHT Mayuge District
- US CDC
- MakSPH
- PHEOC – MOH
- UVRI
- PHFP Secretariat
Epidemic Curve Propagated Measles Outbreak

59

Propagated Outbreak in Malongo Sub-County

Epidemic Curve Malongo Sub-county

Date of Rash Onset

Measles cases

Epidemic Curve Malongo Sub-county