**1. HIGHLIGHTS**

- On 18th Feb 2018, the Ministry of Health in Juba received a report from Jonglei state of a suspect foodborne disease outbreak in Bor Town.
- The cluster involved individuals that attended the Chol Riak Building Complex Inaugural ceremony at one of the hotels in Bor Town on 17 Feb 2018.
- The cases presented with fever, vomiting, abdominal pain, and acute watery diarrhoea from 17th to 20th Feb 2018 with 65% of the case presenting on 18th Feb 2018.
- A total of 434 cases including one community death (CFR 0.23%) were reported among individuals that attended the inauguration ceremony in Bor Town. No new cases were reported after 20th Feb 2018. There are no cases admitted in Bor state hospital or any of the private clinics where cases were treated.
- A total of 19 stool and two number of water samples were obtained for laboratory testing.
- A multi-agency response that entailed activation of Jonglei state taskforce, deployment of rapid response teams and surge clinical staff, and case investigation and clinical management kits facilitated rapid containment of the event.
- There are no major response challenges

**2. BACKGROUND**

- The initial cases presented with vomiting, diarrhoea, and abdominal upsets to Bor state hospital and several private clinics in Bor town from the evening of 17 Feb 2018.
- Cases involved individuals that attended the Chol Riak Building Complex Inaugural ceremony at one of the hotels in Bor Town on 17 Feb 2018.
- At the ceremony, guests were served with food and tap water. The food served was mainly beef and ‘Kudra’ a (green leafy vegetable common in South Sudan usually cooked with meat), which were prepared a day before the event (on 16 Feb 2018). Other consumers of the food carried uncooked meat and/or ‘Kudra’ and cooked at home. The guests at the ceremony were estimated at one thousand.
- Response to the event was led by the national and state Ministry of Health supported by WHO, UNICEF, ICRC, Doctors of the world, Red Cross South Sudan, Health Link, IMA, UNMISS, and other partners.
- Coordination meetings were conducted at national and state level and these resulted in the deployment of rapid response teams with surge clinical staff and delivery of case investigation and clinical management kits to optimise clinical care and health promotion at community level.
- As of 24th Feb 2018, all the cases had been discharged after improving on treatment. Data analysis and sample (stool and water) testing are underway.
3. EPIDEMIOLOGY & SURVEILLANCE

Descriptive epidemiology
As part of the outbreak investigation and response activities, rapid response teams were deployed to identify all suspect cases in Bor town. Following the verification of the initial cases on 17 Feb 2018, a working case definition was developed to facilitate active case finding in the communities and health facilities in Bor town.

A suspect case was defined as any person:
1. With a gastrointestinal illness characterised by abdominal pain and either fever, vomiting, or diarrhoea;
   AND
2. Who ate food and/or drunk water from the Chol Riak Building Complex inauguration ceremony in Bor Town on 17th Feb 2018.

- Following the inauguration ceremony on 17 Feb 2018, all new cases epidemiologically linked to this event developed disease symptoms during the period 17th to 20th Feb 2018 with most of the new cases reported on 18 Feb 2018. No new incident cases were reported after 20th Feb 2018.
- As of 24 Feb 2017, a total of 434 cases including one community death (CFR 0.23%) were reported among individuals that attended the inauguration ceremony in Bor Town.
- The cases presented with acute watery diarrhoea, vomiting, abdominal cramps, fever, headache, with general body weakness, and dehydration (Table 1).

<table>
<thead>
<tr>
<th>Signs and symptoms</th>
<th>No. cases</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diarrhoea</td>
<td>434</td>
<td>100%</td>
</tr>
<tr>
<td>Vomiting</td>
<td>425</td>
<td>98%</td>
</tr>
<tr>
<td>Abdominal cramps</td>
<td>362</td>
<td>83%</td>
</tr>
<tr>
<td>Severe dehydration</td>
<td>359</td>
<td>83%</td>
</tr>
<tr>
<td>Fever</td>
<td>332</td>
<td>76%</td>
</tr>
<tr>
<td>General body weakness</td>
<td>232</td>
<td>53%</td>
</tr>
<tr>
<td>Headache</td>
<td>165</td>
<td>38%</td>
</tr>
<tr>
<td>Some dehydration</td>
<td>10</td>
<td>2%</td>
</tr>
</tbody>
</table>

- Given the approximate time between exposure to development of symptoms (incubation period) of a few hours to three (3) days and in light of the symptom distribution in table 1, these are suggestive of a severe enteric infection due to the following organisms:
  - *Salmonella species*
  - *Shigella*
  - *Aeromonas*
  - *Enteropathogenic E. coli*
  - *Vibrio cholerae (01 or 0139)*

- Laboratory analysis of 19 stool samples and water samples is underway at the National Public Health Laboratory in Juba.
- Figure 1 shows the date of onset of illness among cases linked to the foodborne event in Bor town from 17th to 20th Feb 2018. The shape shows a steep rise and a gradual decline.
in cases, thus suggesting a point source outbreak. The approximate incubation period was a few hours to three (days) with a median of one (1) day (Figure 1).

**Figure 1: Epidemic curve for the susp. foodborne outbreak, Bor town Feb 17-20, 2018**

- As seen in table 2, the frequency of being a case increased with age from 9 (2%) in cases under five years of age to 342 (80%) in cases older than 14 years. Females constituted 251 (58%) of the cases reported.

<table>
<thead>
<tr>
<th>Age</th>
<th>Female</th>
<th>Male</th>
<th>No. cases</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5 years</td>
<td>7</td>
<td>2</td>
<td>9</td>
<td>2%</td>
</tr>
<tr>
<td>5-14 years</td>
<td>25</td>
<td>57</td>
<td>82</td>
<td>19%</td>
</tr>
<tr>
<td>15+ years</td>
<td>219</td>
<td>123</td>
<td>342</td>
<td>79%</td>
</tr>
<tr>
<td>Total</td>
<td>251</td>
<td>182</td>
<td>433</td>
<td>100%</td>
</tr>
</tbody>
</table>

- Table 3 shows the classification of cases by the level of dehydration the treatment they received. Severe dehydration was reported in 359 (83%) of the cases. Most of the severely dehydrated cases 184 (51%) were managed with oral rehydration salt solution, intravenous fluids, and antibiotics. Only 10 (2%) of the cases presented with some dehydration with the majority 6 (60%) receiving oral rehydration salt solution and intravenous fluids. These findings suggest a severe gastrointestinal infection caused by ingestion of significantly contaminated food and/or water laden with a virulent enteropathogen.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Some dehydration</th>
<th>Severe dehydration</th>
<th>Missing</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORS, IV Fluids</td>
<td>6 (60)</td>
<td>175 (49)</td>
<td>181 (42)</td>
<td></td>
</tr>
<tr>
<td>ORS, IV Fluids, ABXs</td>
<td>4 (40)</td>
<td>184 (51)</td>
<td>188 (43)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td></td>
<td></td>
<td>64</td>
<td>64 (15)</td>
</tr>
<tr>
<td>Total</td>
<td>10 (100)</td>
<td>359 (100)</td>
<td>64</td>
<td>433 (100)</td>
</tr>
</tbody>
</table>
• All the suspect cases reported were linked to the Chol Riak Building Complex Inaugural ceremony at one of the hotels in Bor Town on 17 Feb 2018. Figure 2 shows the location of Bor town in Bor South county, Jonglei state, South Sudan.

• The working hypothesis of the investigation stated that the occurrence of a gastrointestinal illness was associated with the consumption of contaminated water and/or food at the Chol Riak Building Complex Inaugural ceremony at one of the hotels in Bor Town on 17 Feb 2018. A cohort analysis of food and/or water specific exposures is underway to identify the source foods.

Figure 2: Map of South Sudan Showing Bor town, Bor county, Jonglei state
3. LABORATORY INVESTIGATIONS

- A total of 19 stool samples and environmental samples were collected. The samples arrived in Juba on 22 Feb 2018.
- Microbiological analysis of these samples is currently underway at the National Public Health Laboratory.

4. ENVIRONMENTAL ASSESSMENT

- WHO and SMoH inspected the venue of the event and collected two samples of the main water source, that is exposed to unhygienic environment. Tap water was served during the ceremony. The water was supplied by a water tanker truck and emptied into a reservoir tank at the venue of the ceremony.
- Interviews revealed a wide variety of foods served (9 different types), the main food are Meat and ‘Kudra’, cooking began in the evening before the day of the event (on the 16 Feb 2018) and was served 3 times on the day of the event. Breakfast was served and lunch was served twice (the high table first and later for everyone else). No one from the high table presented as a case.
- A sample of dried meat from the event was brought to the SMoH, which according to the SMoH veterinary or animal experts may not be viable for any testing.

5. PUBLIC HEALTH ACTION / RESPONSE INTERVENTIONS

1. COORDINATION

- Daily emergency coordination meetings were convened in Bor by the state Ministry of Health and attended by partners WHO, UNICEF, ICRC, Doctors of the world, Red Cross South Sudan, Health Link, IMA, and UNMISS. These meetings were convened from 19 Feb 2018 and were intended to brief partners on the situation and to mobilise resources to support the response.
- The National Ministry of Health convened corresponding coordination meetings involving WHO, and health cluster partners at Juba level. The meetings were intended to review the situation and support the emerging response needs at local level.

2. SURVEILLANCE

- WHO provided overall technical support to MoH and partners to streamline surveillance, case investigation, and sample collection from suspect cases.
- National and state rapid response teams were deployed to conduct epidemiological and laboratory investigations and laboratory assessments in Bor hospital, private health clinics in Bor town, and one of the hotels in Bor.
- Following the investigation of the initial cases, a working case definition was developed to facilitate identification and line listing of suspect cases as part of active case search in all the health facilities and communities in Bor town.
• All cases the met the working case definition were line listed including the community deaths.
• A separate questionnaire assessing food and water specific exposures in a sample of cases was also administered and is being analysed.
• WHO supported the deployment of a seven-man rapid response team to support the investigations and response in Bor town.
• WHO in addition donated four cholera investigation kits to facilitate sample collection and shipment to Juba for confirmatory testing

3. LABORATORY
• With support from WHO and ICRC, a total of 19 stool samples were collected in Carry Blair and shipped to Juba on 22 Feb 2018 for microbiological testing in the National Public Health Laboratory. Testing of stool samples is currently underway.
• Environmental and food samples were also collected for laboratory testing.

4. CASE MANAGEMENT
• Most of the cases (369 cases) were managed in Bor state hospital while the others were managed in private clinics in Bor.
• The initial treatment of cases provided by local health works but eventually surge support for case management came in from Juba on 19 Feb 2018 with support from WHO.
• Partners – WHO, UNICEF, IMA, Health Link and other partners donated an assortment of case management kits (oral rehydration salts, intravenous fluids, and antibiotics, tents) that were used to stabilise the cases.

5. HAZARD CONTAINMENT
• The rapid response team conducted an environmental assessment at one of the hotels in Bor town where they obtained food samples and water samples. These assessments are intended to identify the source of contamination during the party. These visits were also intended to stop the consumption of any food remnants and hence prevent additional cases.
• The rapid response team conducted active case search to ensure all suspect cases were identified and started on treatment to reduce the clinical duration of illness and hence the shedding of pathogens in stools.

6. WASH & IPC
• The minimum infection prevention and control standards were observed in Bor hospital where most of the cases were managed.
• WHO donated a chlorination kit to Bor state hospital to ensure that safe water was available to support preparation of oral rehydration solution, preparation of drinking water, and for handwashing.
7. **RISK COMMUNICATION, COMMUNITY ENGAGEMENT & SOCIAL MOBILISATION**
   - As part of the active case search, communities were educated on the presentation of the illness and to seek care promptly to improve clinical outcomes.
   - The messages were targeted to patients and at-risk communities in Bor town with the focus enhancing adherence to personal and food hygiene standards, drinking safe water, and appropriate disposal of solid, liquid, and human waste.
   - Food hygiene counseling sessions were extended to catering staff at the source hotel in Bor town.

8. **LOGISTICS**
   - WHO air lifted an assortment of supplies including 4 case management kits; 4 investigation kits; and two tents.
   - Health Link South Sudan donated the initial kits that were used to treat the first cases.
   - IMA World Health also donated an assortment of medicines for case management.

9. **UNICEF SUPPORT TOWARDS THE FOODBORNE EVENT IN BOR TOWN**

   To support the cases management
   - UNICEF released immediately 200 liters of Ringer Lactate, 4000 ORS sachets, 20 Cartoons of Gloves to support the MOH and other partners on ground.
   - To accommodate of the large number of cases three tents erected by UNICEF during the Cholera outbreak in 2017 are being used as additional treatment facilities.
   - Two DDKits and 4 tents were also prepositioned to prevent stock out of supplies and provide additional accommodation for patients.

   For Infection Prevention and Control:
   - Two hand washing facilities were installed at the hospital entrance and commenced chlorination of water as part of infection prevention control.
   - Disinfection exercise for feet and hand washing using chlorine for both patients and visitors
   - Each patient being discharged is given one bar of soap and three chlorine tabs stripes to enhance sanitation and hygiene at household level.
   - Garbage are being collected where patients have been admitted using garbage collection bags provided by UNICEF to improve sanitation status in Bor Hospital.
   - 30 buckets without taps have been delivered to enhance ORS solutions for patients and dehydrated visitors.

   Social Mobilization:
   - Trained and deployed community mobilizers for community sensitization, hygiene promotion and community surveillances have been initiated in the communities.
6. CHALLENGES/GAPS

- There are no major response gaps. However, there is need to finalise the epidemiological, laboratory, and environmental investigations.

7. RECOMMENDATIONS & PRIORITY FOLLOW UP ACTIONS

- **COORDINATION AND LEADERSHIP**
  a. Further updates and follow up on the event to continue during the routine state and national level emergency preparedness and response coordination meetings
  b. Enhanced mass casualty planning to improve response to similar events in future through preparedness, training, and stockpiling of emergency supplies including surge support for emergency response teams

- **SURVEILLANCE**
  a. Complete the food specific exposure assessments and share the findings in subsequent updates
  b. Continue with routine surveillance to be sure that all transmission has stopped.

- **LABORATORY**
  a. Finalise laboratory testing of the stool, water, and food samples and share the results in subsequent updates on this event.

- **CASE MANAGEMENT**
  a. Strengthen state and facility based capacities for mass casualty response to similar events in future through training and ensuring adequate stockpiles of emergency supplies
  b. Ample infection prevention and control supplies to ensure adherence to standard precautions during patient care.

- **HAZARD CONTAINMENT**
  a. Food hygiene training for food handlers in hotels, restaurants, and other designated food eating stalls.
  b. Improving access to safe drinking water
  c. Community education to the public on drinking safe water, observing good personal and food hygiene and adhering to recommended sanitation standards.

- **LOGISTICS**
  a. Replenish stockpiles for emergency and outbreak investigation and response supplies to ensure prompt response to similar events in future.
8. CONCLUSIONS

- This was a suspect foodborne disease outbreak caused by a severe enteric infection that is most likely caused by *Salmonella species, Shigella, Aeromonas, Enteropathogenic, E. coli, or Vibrio cholerae (01 or 0139)*. The source of the infection is likely to have been contaminated food and/or water that was served and eaten in one of the hotels in Bor Town.
- The event highlights the need to improve hygiene and sanitation standards in hotels, restaurants, and other public places to minimise the risk of foodborne disease outbreaks.
- The capacities for mass casualty preparedness and response should be enhanced to prevent adverse outcomes.
- Adequate stock piles of emergency supplies are critical for prompt initiation of response to acute events like these.