1. HIGHLIGHTS

- During week 11, a total of three (3) new suspect meningitis cases including one (1) death were reported from Torit county. All the new cases are from Imurok payam, the most recent locus of transmission.
- Hence, as of 17 March 2018, a total of 171 suspect meningitis cases including 31 deaths (CFR 18.13%) have been reported from Iyire and Imurok payams, Torit county.
- Imurok payam has the highest cumulative attack rate (cases per 100,000) of 987.
- The weekly attack rate (cases per 100,000) for Torit county in week 11 is 1.86, which is below the alert and action threshold for meningitis.
- The age-specific attack rates (cases per 100,000) showed that the risk of disease increased with age with persons aged 30 years and above being the most affected (182).
- While most deaths occurred in Imurok payam (22 deaths), the case fatality rates were highest in Iyire payam (39.1%). The CFR was highest in persons 5-14 years.
- At least 14 CSF samples have been collected from Torit with the preliminary analysis showing the CSF was clear, cell counts not done, evidence of contamination, 9 (69%) showed Gram positive diplococci, rapid pastorex was negative for all the seven samples tested, and microbiological culturing either showed no growth or evidence of contamination.
- On 14 Mar 2018, the 14 CSF samples were shipped to Institute Pasteur, Paris, France for further testing.
- Coordination meetings, case surveillance at facility and active cases search at community level, case management, and social mobilisation are ongoing.

2. BACKGROUND

- The County Health department (CHD) in Magwi was notified by community leaders of a cluster of deaths in Iyire Payam (Nyara East and West Villages) on 15th February 2018. Nyara is a village under Iyire payam, Torit county, former Eastern Equatoria, with estimated population of 2120 people.
- From 15th to 21st Feb 2018, at least three verification missions were undertaken by the county rapid response team with support from WHO and Magwi County Implementing partner (American Rescue Committee (ARC)). The team initially documented nine (9) community deaths (evidenced by fresh graves) after short illness manifesting with fever, headache neck pain/stiffness and general body weakness. The team also identified fifteen sick persons in the community, among whom one was severe and was referred to Obbo Primary Health care Unit. Follow up mission by ARC/CHD team on 21st Feb 2018 treated six cases in Polotoka PHCC (with one of the cases being admitted). No samples were collected as the county team did not have a lumbar puncture kit and transport media.
• On the 24th Feb 2018, the state ministry of health in collaboration with WHO dispatched the State Surveillance Officer, the Vaccine Preventable Disease (VPD) surveillance officer and one other technical officer along with the required sample collection materials. On arriving in Iyire the team conducted review of facility records as well as active case search in the community. The team line listed 42 suspect meningitis cases including 9 deaths, and collected one sample from a suspect case.

• On 27th February reports of a second cluster of cases was reported from Imurok Payam, Torit county. The state rapid response teams promptly investigated the cluster and by 1 March 2018, they had line listed 11 suspect cases (6 deaths).

• Given the scale and evolving nature of the outbreak the National Rapid Response team comprising MOH and WHO was dispatched to Torit from 1st to 13th Mar 2018 to support the state strengthen coordination, surveillance and laboratory, case management and risk communication.

• The threat of meningitis outbreaks in South Sudan is premised on its location in the African Meningitis belt in addition to the historical, climatic, and the complex public health situation in the entire country. The dry spell in South Sudan lasts for 5-6 months (from September to March), with outside temperatures reaching as high as 40°C. To pre-empt the risk, a countrywide preventive MenAfrivac campaign was undertaken in April 2016 with Torit county registering sub-optimal administrative coverage of 83% in persons aged 1-29 years.

3. EPIDEMIOLOGY & SURVEILLANCE

Descriptive Epidemiology.
A total of 171 suspected meningitis cases have been listed in the two locations (Iyire and Imurok), with 31 deaths giving a case fatality rate of 18.13% (WHO standard for optimal control is CFR <10%). This is a high CFR, mostly driven by the fact the facilities were not functional due to insecurity in the affected area. There are also reports of poor health seeking behaviour in the affected communities.

![Fig. 1|Suspect meningitis cases Iyire and Imurok payams, Torit, week 1-11, 2018 (n=171)](image)

CFR= 31/171 (18.13%)

<table>
<thead>
<tr>
<th>No. cases/deaths</th>
<th>Epidemiological week of onset</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>0</td>
<td>11</td>
</tr>
</tbody>
</table>

Alive Died

MoH SOUTH SUDAN SITREP 2
Retrospective investigations reveal that in Iyire Payam the index case was in the third epidemiological, no cases were reported in week 4 and 5. From week 6 to 9, there was exponential increase in the number of case that is more accentuated in week 9 (Figure 1). The cases have been declining since week 10. The decline is attributed to the active community case search and the drizzles of rain reported in the area.

In Imurok Payam investigations revealed that the index case developed symptoms on the 25 Feb 2018. Other cases identified in the community were managed at the Khurmush PHCU. Most suspect cases from week 9 to week 11 originated from Imurok payam (Figure 2).

As seen from Figure 3, the risk of disease as seen from the age-specific attack rates (cases per 100,000) increased with age from 26 in children 1-4 years; 73 in children 5-14 years; 105 in persons 15-29 years; to 182 in persons aged 30 years and above.

Additionally, the CFR is highest 13/32 (41%) in the 5-14-year age group (Figure 3).
Figure 4 shows the weekly attack rates (cases per 100,000) and CFR% for suspect meningitis cases in Torit county. Torit county had population of 161,584, projected from the 2008 census. Based on this population, Torit county surpassed the suspect meningitis alert threshold of 3 cases per 100,000 in week 7, when the attack rate for suspect meningitis was 6.2 cases per 100,000 (Figure 4).

In week 9, there was an exponential rise in cases in Torit county, due to transmission in Imurok payam. Consequently, the attack rate for Torit county in week 9 was 70.6 cases per 100,000, thus surpassing the meningococcal meningitis outbreak threshold of 10 cases per 100,000 (Figure 4).

From week 10, the suspect meningitis cases attack rate declined to 18.6 cases per 100,000 and eventually to 1.86 cases per 100,000 in week 11, which is below the alert and action thresholds for epidemic meningitis (Figure 4).

All the rumours and alerts so far have been confined to the Torit County. Both Iyire and Imurok Payam are in Torit County and the communities in the two Payams are related and have the same language and cultural heritage. While Imurok is accessible direct from Torit Town, Iyire Payam is only accessible through Magwi which is the neighbouring county. The location of the two Payams is shown in the spot map.
1. LABORATORY INVESTIGATIONS

- At least 14 CSF samples have been collected from Torit with the preliminary analysis showing the CSF was clear, cell counts not done, evidence of contamination, 9 (69%) showed Gram positive diplococci, rapid pastorex was negative for all the seven samples tested, and microbiological culturing either showed no growth or evidence of contamination.
- On 14 Mar 2018, the 14 CSF samples were shipped to Institute Pasteur, Paris, France for further testing.

2. ENVIRONMENTAL ASSESSMENT

- Torit county has been experiencing a dry and hot spell however over the past two weeks drizzles of rain have been reported. This change in weather is responsible in part for the declining transmission.
- Otherwise, the dry hot conditions at this time of the year favour the transmission of epidemic meningitis especially in areas located in the African meningitis belt where Torit
county lies. The former Eastern Equatoria state, where Torit county is located has experienced meningitis outbreaks before (confirmed outbreak in 2007 and suspected outbreak in 2016).

- A preventive MenAfriVac Conjugate A vaccine was conducted in Eastern Equatoria state in April 2016. Torit county scored a suboptimal administrative coverage of 83%, which was below the desired coverage of 95%. The other counties with low administrative coverage included Ikotos (55%), Kapoeta East (79%), Kapoeta North (77%) and Magwi (73%). The implication is that there is sufficient pool of susceptible individuals in Torit and neighbouring counties (especially Magwi and Ikotos) and this can lead to further transmission of the disease.

3. PUBLIC HEALTH ACTION / RESPONSE INTERVENTIONS

1. COORDINATION

   - The state EPR committee has been activated and is meeting daily to coordinate investigation and response activities in Torit county with the most recent conducted on 15 March 2018. Corresponding meetings are ongoing at Juba level to ensure that the situation is reviewed regularly to ensure that the response is optimised.

   - The ongoing Interagency response is led by the National MoH, sMoH, CHDs, and supported by partners SCI, ARC, OCHA, WHO, Unicef, CARE, SSRC, and HLSS.

2. SURVEILLANCE

   - The state Ministry of Health is leading surveillance, dissemination of case definitions and tools, alert investigations, sample collections, and case line listing. The state MoH is supported by WHO.

   - The National rapid response team departed from Torit on 13 March 2018 after a two-week long mission to support local investigation and response activities.

   - Active case surveillance in the communities is led by SSRC volunteers using the community case definition to identify and refer suspect meningitis cases to the designated treatment center.

3. LABORATORY

   - As part of case investigations for new suspect meningitis cases, samples are being collected to facilitate confirmatory laboratory testing. However, there are reports of cases refusing to consent to sample collection due to a rumour in the community alleging that the samples are being collected and shipped to Juba for sale.

   - Part of the consignment of laboratory supplies from Ouagadougou arrived during the week to facilitate in country rapid and confirmatory testing of suspect meningitis cases.
• At least 14 CSF samples have been collected from Torit with the preliminary analysis showing the CSF was clear, cell counts not done, evidence of contamination, 9 (69%) showed Gram positive diplococci, rapid pastorex was negative for all the seven samples tested, and microbiological culturing either showed no growth or evidence of contamination.
• On 14 Mar 2018, the 14 CSF samples were shipped to Institute Pasteur, Paris, France for further testing.

4. CASE MANAGEMENT

• Save the Children International (SCI) is the lead health partner supporting case management at Khurmush PHCU, the designated treatment center. Save the children is supported by CARE International. The contracts of relocated health staff at Khurmush PHCU have been extended for another week as the declining suspect meningitis case trend continues to be monitored.
• There are four SCI ambulances on standby at Khurmush PHCU to support patient referral.
• The health team has been briefed on the meningitis treatment protocol with copies of the protocol availed to the clinical team. In addition, there are ample supplies of the recommended medicines for meningitis treatment.
• Currently, there are no suspect meningitis cases admitted in Khurmush PHCC. The last suspect meningitis case was admitted on 13 March 2018.
• To optimise access to routine healthcare, PHC kits have been secured, and plans are underway to open all clinics and conduct mobile clinics to improve physical access to medical care.

5. RISK COMMUNICATION, COMMUNITY ENGAGEMENT & SOCIAL MOBILISATION

• SSRC has deployed a team of at least 33 volunteers in Imurok payam and 20 volunteers in Iyire payam. The volunteers are supporting with house-to-house sensitizations on meningitis case presentation and early care seeking. The volunteers are also conducting active community case search and case referral to designated treatment centers.
• Messages on meningitis prevention and control as well as messages tailored to address and counter emerging myths, misconceptions, and harmful practices have been developed and disseminated by the Ministry of Health with support from UNICEF.

6. LOGISTICS

• During the week, the routine PHC kits were shipped to Torit to facilitate the opening of health facilities in Iyire and Imurok payams.
• WHO chartered a flight and delivered the following supplies to augment routine primary health care in the two payams: basic unit kits (2); supplemental IEHK kits (1), basic malaria module (4), and malaria supplementary module (1).
• During the week, the state emergency coordination team (state MoH, SCI, and WHO) conducted a monitoring visit to Iyire on 13 March 2018 to assess the current state of
meningitis response as well the progress being made to revive routine healthcare in the payam.

4. CHALLENGES/GAPS

- Part of the laboratory supplies dispatched from Ouagadougou by DHL have not arrived
- Confirmatory laboratory sample testing is still pending
- There is need to enhance in country capacities for meningitis laboratory confirmation
- Access to routine primary healthcare is still limited but efforts are underway to open existing facilities.

5. RECOMMENDATIONS & PRIORITY FOLLOW UP ACTIONS

- COORDINATION AND LEADERSHIP
  a) Continue with weekly meetings of the state outbreak coordination committee to monitor the outbreak situation and support the meningitis prevention and response activities.
  b) Conduct regular monitoring visits to the affected and at-risk areas to ensure preventive and response interventions are optimised for mitigate the risk of new infections in addition to preventing adverse outcomes.

- SURVEILLANCE
  c) Facility and community based surveillance should continue and epidemiological investigation should be undertaken for all new suspect cases
  d) Compile regular situation reports to inform tailored response activities in affected and at-risk areas.

- LABORATORY
  e) Collect laboratory samples from new suspect cases to facilitate confirmatory testing in the laboratory
  f) Disseminate, share, and ensure adherence to laboratory sample collection SoPs to minimize the risk of sample contamination.
  g) Obtain the results for the samples shipped for confirmatory testing in Institute Pasteur, Paris, France.
  h) Secure the remaining consignment of meningitis rapid and confirmatory test kits that were dispatched from Ouagadougou.
  i) Strengthen sample management by enforcing adherence to SoPs for sample collection, processing, and transportation.
  j) Review and strengthen diagnostic capacity at NPHL and at Nimule state hospital
k) Provide rapid pastorex kits to facilitate field testing of suspect meningitis cases.

- **CASE MANAGEMENT**

l) Treat all new cases with appropriate antibiotics as recommended by the national protocols
m) Support facilities in the catchment area of the two Payams to manage cases.
n) Improve access to routine primary health care by opening close health facilities and conducting outreach clinics to access hard to reach populations.

- **RISK COMMUNICATION, COMMUNITY ENGAGEMENT & SOCIAL MOBILISATION**

o) Engage local leaders to ensure they support the implementation of meningitis prevention activities.
p) Engage communities to understand the risks associated with poor health seeking behaviour
q) Risk communication and community engagement to address community perception and Health seeking behaviour

- **LOGISTICS**

r) Ensure equity in the distribution of the routine and emergency health kits that have been secured to support health care in the affected areas.
s) Support the regular shipment of samples from Torit to Juba to facilitate confirmatory testing.

### 6. CONCLUSIONS

The current findings are consistent with a suspect meningitis outbreak in Torit county. The suspect cases have been rising since week 6 and the alert threshold for suspect meningitis was surpassed in week 7. The exponential rise in cases in Torit county resulted in a weekly attack rate that surpassed the meningitis epidemic threshold in week 9. However, the cases declined after week 9 with the weekly attack rate falling below that alert and action threshold in week 11. The risk of disease was highest in individuals aged 30 years and above while the CFR was highest in the 5-14 year olds. Definitive laboratory testing is underway since all sample testing performed to date has not been conclusive.

While the temperature and environmental conditions have been favourable, the sporadic drizzles of rain in the last two weeks appear to have dampened the transmission in Iyire and Imurok.
Annex 1: Case definition

Suspected meningitis case:
- Any person with sudden onset of fever (>38.5 °C rectal or 38.0 °C axillary) and neck stiffness or another meningeal sign including bulging fontanels in toddlers.

Probable meningitis case:
- Any suspected case with macroscopic aspect of CSF turbid, cloudy or purulent; or with a CSF leukocyte count >10 cells/mm³; or with bacteria identified by Gram stain in CSF.
- In infants: CSF leucocyte count >100 cells/mm³; or CSF leucocyte count 10–100 cells/mm³ AND either an elevated protein (>100 mg/dl) or decreased glucose (<40 mg/dl) level.

Confirmed meningitis case:
- Any suspected or probable case that is laboratory confirmed by culturing or identifying (i.e. by polymerase chain reaction, immunochromatographic dipstick or latex agglutination) of Neisseria meningitidis, Streptococcus pneumoniae or Haemophilus influenzae type b in the CSF or blood.