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**TIMELINE OF OUTBREAKS**

### 2016

- **Uganda**
  - Yellow fever
  - 14 Feb. 2016
  - Page 10

- **South Sudan**
  - Cholera
  - Page 14

- **Niger**
  - Rift Valley fever
  - 14 Jul. 2016
  - Page 18

- **Nigeria**
  - Meningitis
  - Page 22

### 2017

- **South Africa**
  - Listeriosis
  - 01 Jan. 2017
  - Page 28

- **Cabo Verde**
  - Malaria
  - 19 Jan. 2017
  - Page 33

- **Namibia**
  - Crimean-Congo haemorrhagic
  - 15 Feb. 2017
  - Page 37

- **Malawi**
  - Cholera
  - Page 41

- **Democratic Republic of the Congo**
  - Ebola virus disease
  - 22 Apr. 2017
  - Page 45

- **Liberia**
  - Meningococcal septicaemia
  - 23 Apr. 2016
  - Page 49
2017

- **Borno State, Nigeria**
  - Cholera
  - 14 Aug. 2017
  - Page 57

- **Madagascar**
  - Pneumonic plague
  - 23 Aug. 2017
  - Page 63

- **Uganda**
  - Marburg fever
  - 16 Sep. 2017
  - Page 71

- **Senegal**
  - Dengue fever
  - 28 Sep. 2017
  - Page 79

- **Mauritania**
  - Crimean-Congo haemorrhagic
  - 11 Nov. 2017
  - Page 85

- **Nigeria**
  - Lassa fever
  - 28 Dec. 2017
  - Page 90

2018

- **Democratic Republic of the Congo**
  - Ebola virus disease
  - 05 Apr. 2018
  - Page 100

- **Kenya**
  - Rift Valley fever
  - 02 Jun. 2018
  - Page 107
Sub-Saharan Africa experiences over 100 acute public health emergencies each year. Most of the events are outbreaks of infectious diseases. However, the region continuously faces ongoing humanitarian crises and frequent natural disasters. All 47 member states are at risk.

WHO is committed to saving lives and reducing suffering during times of crisis – whether caused by conflict, disease outbreak or a disaster. The WHO Health Emergencies Programme is mandated to undertake WHO's functions and responsibilities during health emergencies. The vision of this programme is to protect health and save lives during outbreaks and emergencies. Our mission is to help countries and to coordinate international actions, to prevent, prepare for, detect, rapidly respond to, and recover from outbreaks and other emergencies. The priorities of this programme include:

- Supporting the assessment of country health emergency preparedness and development of national plans to address critical capacity gaps
- Developing strategies and capacities to prevent and control high-threat infectious hazards
- Monitoring of new and ongoing public health events to assess, communicate and recommend actions for public health risks
- Ensuring readiness to diminish public health risks in countries with high vulnerability
- Providing life-saving health services to affected populations in countries with ongoing emergencies.

Specific programme areas that fall under this global programme include:

- Country Health Emergency Preparedness and the International Health Regulations (CPI)
- Emergency Operations (EMO)
- Health Emergency Information and Risk Assessments (HIM)
- Infectious Hazards Management (IHM)
- Management and Administration (MGA).

In March 2017, the WHO Health Emergencies Programme in the Regional Office for Africa started the Weekly Bulletin on Outbreaks and Other Emergencies, which is a summary of new and ongoing events, put together using reports from country offices. This is sent out to about 2,500 recipients each week and has been extremely well received.

The *Compendium of Short Reports on Selected Outbreaks in the African Region*, “The Compendium”, complements the Weekly Bulletin and aims to document outbreaks that have occurred in the WHO African Region, responded to and successfully controlled by the respective Member States, WHO Health Emergencies Programme and other stakeholders. The Compendium illustrates how short reports can contribute to sharing information and approaches to different public health events, emergencies and outbreaks.

Each report has a similar structure, with a summary of the event, which highlights key features, the evolution of the event with a brief epidemiological description, public health actions, any gaps in action and a discussion of the situation.

The reports are presented in a way that makes them accessible to a wide audience – epidemiologists, policy makers, strategists and anyone working in the area of emergency responses.
THE REPORTS
YELLOW FEVER
UGANDA
Uganda

Yellow fever

SUMMARY

- Suspected viral haemorrhagic fever (VHF) was reported to the Ministry of Health, Uganda, on 24 March 2016.
- On 7 April 2016, yellow fever was confirmed in three samples by the Uganda Virus Research Institute (UVRI); it was re-confirmed on 21 April by CDC, Fort Collins (WHO collaborating centre for yellow fever).
- Between 24 March and 4 May 2016, there were 65 suspected cases of yellow fever reported, seven of which were confirmed; there were three deaths among the confirmed cases (case fatality rate: 4.6%).
- A reactive vaccination campaign was carried out in all the three affected districts from 19 May to 7 June 2016.
- The outbreak was declared over by the Ministry of Health by 30 June 2016.

EVENT DESCRIPTION

Three cases from one family presented to the Masaka Regional Referral Hospital with high-grade fever, convulsions and loss of consciousness; they were unresponsive to anti-malarial treatment. Since the patients presented with both haemorrhagic and neurological signs, the Ministry of Health deployed a rapid response team (RRT) on 28 March 2016 to work with the Masaka District Health Office to further investigate and respond to a suspected outbreak of VHF. As a result, a treatment centre was set up at the Masaka Regional Referral Hospital. Active community case finding followed, and more samples were collected and sent to the UVRI for testing. Most cases were male, with an average age of 23 years, and no history of travel outside Uganda.

After intensification of surveillance activities, yellow fever was also confirmed in Rukungiri and Kalangala districts on 13 April 2016 and 4 May 2016 respectively. Between 24 March 2016 and 4 May 2016, 65 suspected cases of yellow fever were reported, with seven confirmed (five from Masaka, and one each from Rukungiri and Kalangala). Three of the confirmed cases died.

A reactive vaccination campaign was carried out in all the three districts from 19 May to 7 June 2016, achieving overall coverage of 94%. Following this successful campaign, no new cases were confirmed. Between 1 and 30 June 2016, there was no further evidence of yellow fever transmission. The outbreak was, therefore, declared over by the Ministry of Health.

Yellow fever was confirmed in three samples by UVRI on 7 April 2016. This diagnosis was re-confirmed on 21 April 2016 by CDC, Fort Collins (WHO collaborating centre for yellow fever).
The Ministry of Health deployed a RRT on 28 March 2016 to work with the Masaka District Health Team to further investigate and respond to this suspected outbreak of VHF.

Once yellow fever was confirmed, WHO and its partners (CDC, ICG, GAVI and UNICEF) supported the Ministry of Health in conducting reactive yellow fever vaccination in the three districts in which yellow fever had been confirmed.

This vaccination campaign targeted all residents of Masaka, Rukungiri and Kalangala, and was implemented from 19 to 22 May 2016 in Masaka and Rukungiri and from 4 to 7 June 2016 in Kalangala District.

A total of 627,706 people aged 6 months and above were vaccinated – 273,447 in Masaka, 304,605 in Rukungiri and 49,654 in Kalangala districts.

Overall vaccination coverage of 94% (above the WHO recommendation of 90%) was achieved in the three districts – 91% in Masaka, 97% in Rukungiri and 95% in Kalangala.

The PHEOC coordinated one month of enhanced yellow fever surveillance in the 17 districts that surround the districts in which there had been confirmed cases (Bukomansimbi, Kalungu, Lwengo, Rakai, Lyantonde, Sembabule, Kiuhura, Mbarara, Mitooma, Sheema, Bushenyi, Rubirizi, Nyungamo, Buhweju, Isingiro, Kabale and Kanungu).

DISCUSSION

Uganda is situated in the ‘yellow fever belt’ of Africa, and is considered a country at risk of yellow fever virus transmission. The present outbreak occurred in the context of international export of yellow fever cases from Angola to China, the Democratic Republic of the Congo, and Kenya. The affected districts were in southwestern Uganda, close to the borders of the Democratic Republic of the Congo, Rwanda and Tanzania. There is substantial movement of people across these borders, facilitating transmission of the virus.

Successful containment of the outbreak can be attributed to prompt action by national and local health authorities. This involved early deployment of an RRT, speedy laboratory confirmation of yellow fever, active case finding and surveillance, and the early initiation of a mass reactive vaccination campaign.

Disease surveillance is ongoing, and there are continuing efforts to ensure that the risk of re-introduction of yellow fever by international travellers is minimized, with the recommendation of mandatory vaccination of people travelling from high-risk countries into Uganda.
Geographic distribution of the yellow fever cases in Uganda, 24 March 2016 to 4 May 2016
CHOLERA
SOUTH SUDAN

WHO Emergency Mobile Medical team coordinator, administering oral cholera vaccine in Kapoeta town. Source: WHO/South Sudan.
The cholera outbreak in South Sudan declared on 18 June 2016 affected 27 counties and the capital, Juba. The most affected counties were Ayod, Tonj East, Yirol East, Fashoda, Kapoeta East and Kapoeta South. Populations most affected were those living along the banks of the River Nile, those in cattle camps, those living on poorly serviced islands and IDPs in camps with inadequate access to WASH facilities, who also had the highest case fatality ratios. Children and males were disproportionately affected. The response to the outbreak was coordinated by a national task force led by the Ministry of Health with the participation of WHO, UNICEF and Health and WASH cluster partners. On 7 February 2018 South Sudan declared the end of its longest and largest cholera outbreak, in the context of a complex humanitarian crisis. As of the declaration of the end of the outbreak, a total of 20,438 cases, including 512 confirmed, and 436 deaths (case fatality ratio 2.1%) were reported.

By 17 November 2016, communities along the River Nile were known to be the worst affected and accounted for 91% of reported cholera cases. By this time a total of 2,874 cases and 44 deaths (case fatality ratio 1.5%) from the outbreak had been reported from eight counties on either side of the River Nile: Awerial, Duk, Fangak, Juba, Leer, Pageri, Pigi and Terekeka. The only affected county not along the Nile was Runkona. Juba had the highest number of cases (1,990, 63% of the total), while Terekeka had the highest case fatality ratio. By 5 May 2017, cholera outbreaks had been confirmed in 19 counties. By this time the cumulative total number of cases was 7,735 with 246 deaths (case fatality ratio 3.23%). Nine out of 19 counties affected since June 2016 were considered to have active transmission – reporting cholera cases in the previous four weeks.
By October 2017, cholera transmission had started to decline countrywide. Between weeks 37 to 40 of 2017, cholera cases dropped from at least 40 cases per week to 15 cases per week. The three counties that continued to report cases were Juba, Budi and Fangak, with most cases reported from Juba.

On 7 February 2018 South Sudan declared the end of its longest and largest cholera outbreak, in the context of a complex humanitarian crisis. No new cases had been reported in the previous seven weeks. The last confirmed case was discharged from hospital on 18 December 2017. As of the declaration of the end of the outbreak, a total of 20 438 cases, including 512 confirmed, and 436 deaths (case fatality ratio 2.1%) were reported.

**PUBLIC HEALTH RESPONSE**

- Overall coordination of the cholera response at national level was coordinated by the National Cholera Taskforce to review outbreak trends and progress of implementation activities.

- Cholera case management took place in designated treatment facilities. WHO provided technical support to the taskforce committees by providing updated situation reports; supervising the investigation and testing of suspected cases; support towards case management activities through training on cholera case management protocols; recommending tailored strategies in response to emerging trends; and support for the outbreak evaluation process. WHO technical officers were deployed in the field to support ongoing response activities.

- UNICEF, with partners, actively supported cholera response in the community across all levels of health, WASH and communication through active partnerships.

- Cholera treatment centres were run by Médicines sans Frontières. Community interventions including establishment of oral rehydration centres, community health education, hygiene promotion and support for person hygiene and water chlorination at water collection sites.

- Cholera vaccines were deployed to complement cholera response in several high-risk populations, including Leer, Bor PoC, Malakal town, Bentiu PoC, Mingkaman IDP settlement, Aburoc IDPs, Bentiu/ Rubkona Town, Ayod (Pagil, Tar, Jiech, Karmun, Padek, and Kandak), Juba (Don Bosco IDPs and additional high-risk locations), Tonj East and Marial Lou payam, Kajo-Kei North, Kajo-Kei South, and Kajo-Kei East. Out of the 2.17 million doses secured by WHO in 2017, a total of 1.38 million doses were deployed, with 885 302 used during the first round and 496 534 in the second round in 16 cholera-affected and high risk populations.

**DISCUSSION**

This was the longest and most complex cholera outbreak South Sudan had experienced. Central to the challenges of controlling this outbreak was the ongoing security problems in the region, which frequently led to problems with humanitarian access. The most affected regions were those around the River Nile and IDP camps. The highest case fatality ratios were, unsurprisingly, in areas where people had poor access to healthcare, on islands and in cattle camps.

All these challenges also led to problems with surveillance and accurate reporting of case numbers, making it difficult to coordinate responses and plan medical and public health intervention. A reactive vaccination campaign that reached millions was probably central to the final control of the outbreak, along with targeted WASH interventions. However, the security situation in South Sudan is showing no signs of improving, people are still living in IDP camps and the usual movement of people along the Nile River and its islands will continue. Constant vigilance will be required to prevent further major outbreaks of this disease.
Geographical distribution of cholera cases and deaths in South Sudan, week 23, 2016 - week 51, 2017

Epidemic curve for cholera outbreak in South Sudan, week 23, 2016 - week 51, 2017
RIFT VALLEY FEVER
NIGER
**Niger**

**Rift Valley fever**

**SUMMARY**

- On 30 August 2016, the Ministry of Health of the Republic of Niger notified WHO of an outbreak of Rift Valley fever (RVF) in the country; the outbreak was declared on 21 September 2016.
- WHO classified the outbreak as a Grade 2 health emergency, establishing a multi-sectoral rapid response team in the country.
- During the epidemic, there were 399 cases (suspected, probable and confirmed), with 33 deaths, for a case fatality ratio of 8.3%.
- The last confirmed positive case was reported on 22 November 2016; the outbreak was declared over by the Government of Niger on 14 February 2017.

**EVENT DESCRIPTION**

On 30 August 2016, the Ministry of Health of the Republic of Niger notified WHO of an outbreak of Rift Valley fever (RVF) among stockbreeders in the Tchintabaraden Health District in Tahoua Region. At the same time, abortion events were reported among livestock in the same areas. The first cases of fever and hemorrhagic jaundice were noted on 2 August 2016. Cases were later reported in the Tassara, Abalak and Banibangou health districts in Tahoua Region. Most of the cases (66%) were male, and mainly farmers and animal breeders. There were 66 confirmed and probable cases, and 27 deaths (case fatality rate: 41%) from 2 August 2016 to 5 December 2016. Prompt classification of the outbreak as a Grade 2 health emergency by WHO allowed effective response by a multi-sectoral rapid response team that brought the outbreak to a close within 3 months. The last confirmed positive case of RVF was reported on 22 November 2016. The outbreak was declared over on 14 February 2017. During the epidemic, there were 399 cases (suspected, probable and confirmed), with 33 deaths (case fatality ratio 8.3%).

Samples were collected and sent to the Pasteur Institute in Dakar; they tested positive for RVF. Six out of 13 human samples, and three out of six animal samples, tested positive.

**PUBLIC HEALTH RESPONSE**

- The cases were notified to WHO on 30 August 2016.
- WHO promptly classified the outbreak as a Grade 2 health emergency, and established a multi-sectoral rapid response team at country level.
- WHO deployed more than 20 experts with specialties in surveillance, entomology, laboratory investigation, communication and logistics.
Capacity was strengthened with the training of 60 health workers and 428 community workers.

All partners collaborated with the animal health system and veterinarians.

DISCUSSION

During the last week of September every year, nomadic stockbreeders from neighbouring countries gather with their herds in the In-gall area of Niger to celebrate Cure Salée, which is an annual festival to mark the end of the rainy season. Approximately 2 million cattle and many more small ruminants are in the area during that time. Following the end of the rainy season, nomads move their livestock to other southern sub-Saharan countries and irrigation systems along the Niger River, where pastures are still available. Infected animals are usually in close proximity to their herders, providing fertile ground for transmission of disease by carriers.

Most humans infected with RVF are asymptomatic, or show relatively mild symptoms. The overall case fatality ratio is usually below 1%, although about 3% to 4% of patients develop more severe forms of the disease. In this outbreak, the case fatality rate was high, probably because of poor access to health services within the area of the outbreak, and possibly because the strain of the virus was particularly virulent.

RVF has the potential to impact public health seriously, to lead to major economic losses, and to cause social disruption. It is on the list of diseases to which Annex 2 of the International Health Regulations (2005) should be systematically applied.

Control of this outbreak within 3 months was a good example of the efficacy of a collaborative One Health approach to a zoonotic disease.
Geographic distribution of the Rift Valley fever cases in Niger, 2 August to 22 November 2016

Epidemic curve for the Rift Valley fever outbreak in Niger, weeks 30 - 44, 2016
MENINGITIS
NIGERIA

Meningitis vaccination campaign. WHO/Nigeria credit: P. Ajello.
Nigeria
Meningitis

SUMMARY

- Suspected meningitis cases reached epidemic proportions in week 50 of 2016 (the week ending on 18 December 2016) in Zamfara State, Nigeria, and subsequently spread to other states.
- From the onset of the outbreak, 14,518 suspected or confirmed cases of meningitis were reported from 25 states, with 1,166 deaths (case fatality ratio 8%).
- After multi-sectoral response efforts, the situation started improving in the week 15 of 2017.
- The outbreak was declared over by the Federal Ministry of Health on 23 June 2017.

EVENT DESCRIPTION

Zamfara State in Nigeria experienced a gradual increase in the number of suspected meningitis cases, reaching epidemic proportions in week 50 of 2016 (the week ending on 18 December 2016). The situation quickly evolved in subsequent weeks, with the number of new cases and deaths increasing exponentially, and the disease spreading to other states. The Federal Ministry of Health notified WHO of the outbreak on 22 February 2017. Following concerted multi-sectoral response efforts, the meningitis outbreak started to improve gradually by week 15 of 2017. On 23 June 2017, the Federal Ministry of Health of Nigeria officially declared the end of the 2016/2017 meningitis outbreak in the country. This declaration came 4 weeks after the number of new meningitis cases reported each week fell below the epidemic and alert thresholds in all local government areas (LGAs).

From the onset of the outbreak in December 2016, a total of 14,518 suspected or confirmed cases of meningitis were reported in 25 states, with 1,166 deaths, giving a case fatality ratio of 8%. Of the reported cases, 901 cerebrospinal fluid samples were collected and analysed at the National Reference Laboratory. Forty-seven percent (421/901) isolated *Neisseria meningitidis* as the causative pathogen, with *N. meningitidis* serogroup C the predominant strain, accounting for 72.7% of the bacterial meningitis pathogens identified. The age group 5-14 years was the most affected, accounting for 46.8% of the total caseload. While 25 states reported meningitis cases during the outbreak, 97% of the reported cases came from six states, namely, Zamfara, Sokoto, Katsina, Yobe, Kebbi, and Kano. A total of 34 LGAs reached epidemic levels at any one point during the course of the outbreak.
The overall outbreak response was conducted within the framework of the national Emergency Operations Centre (EOC), coordinated by the Nigeria Centre for Disease Control (NCDC). WHO and partners such as UNICEF, CDC, University of Maryland, Nigeria Field Epidemiology and Laboratory Training Programme (NFELTP), eHealth Africa, Médecins sans Frontières (MSF), and Rotary International provided technical, logistical and financial support. The following activities were undertaken by the various response components:

- Enhanced active surveillance in the affected states; mobilization and training by the Ministry of Health and WHO of 400 community informants to support surveillance activities at the community level in Sokoto and Zamfara states; deployment of experts at state level to strengthen surveillance and support the response; strengthening and daily collation, cleaning and harmonization of outbreak data to enable monitoring of trends and the impact of response activities.

- Deployment by WHO of 50 health workers in 10 teams to Sokoto and Zamfara States; printing of case management protocols and distribution of the same to health facilities in the most affected states; procurement of 20 000 doses of ceftriaxone and distribution of the same to the affected states; distribution of lumbar puncture kits, Pastorex and other laboratory reagents and supplies in order to strengthen diagnostic capacity. The rate of lumbar puncture among new cases increased to 81% in Zamfara.

- Successful conduct of reactive vaccination campaigns, led by the NPHCDA, in Zamfara, Sokoto, Yobe and Katsina states; state governments were fully engaged in conducting these campaigns to ensure that the vaccines reached the most at-risk populations. About 2 million people were eventually vaccinated during the outbreak.

- Deployment of a technical mission from the Medical Research Council (MRC) of Gambia, with the support of WHO, to strengthen laboratory diagnostic capacity; the team conducted training in methods of cerebrospinal fluid (CSF) sample collection, and immediate processing of these samples, including performance of the Pastorex test on site; the team also supported the reference laboratory in Zamfara State.

**DISCUSSION**

Nigeria lies in the meningitis belt, where the risk of meningitis outbreaks remains high. Recurrent outbreaks are common. There was a meningitis outbreak in 2015 in the same areas that were affected in 2016/2017. The 2015 outbreak (as well as the current ones) was mainly caused by *N. meningitidis* serogroup C. Since implementation of the large-scale mass immunization campaign with meningitis A vaccine in the African Region, subsequent outbreaks reported have been caused mainly by new serotypes, including *N. meningitidis* serotypes C and W135. This phenomenon has also been reported in other countries, including Togo (in 2016 and 2017) and Niger (in 2015 and 2017).

While large-scale interventions show the efficacy of mass immunization campaigns in the prevention and control of meningitis, paradoxically, this intervention has resulted in the dominance of serotypes that are unaffected by the current vaccines. The recurrence of meningitis outbreaks in Nigeria is probably due to the low immunity of the population to the new dominant serotypes. The age group most affected (5-14 years) has not experienced infections due to these new serotypes in the last decades, which makes them particularly susceptible to meningitis serotypes C and W135.

The most common strain of the bacteria in this outbreak was *N. meningitidis* serotype C, for which there is a serious vaccine deficit. In addition, the vaccine against *N. meningitidis* serotype C is expensive at US$ 50 per dose. This, and lack of availability of vaccine stocks, hampered the initial responses to the outbreak.

The meningitis outbreak situation in Nigeria improved as control measures were scaled up considerably. The epidemic peaked in weeks 14 and 15, and started a steady decline from week 16.

The outbreak rapidly deteriorated in spite of the country's past experience in managing meningitis outbreaks. The factors postulated for the rapid spread of the outbreak include the high number of vulnerable persons unprotected from *N. meningitidis* C, delays in conducting reactive vaccinations, and inadequate supply of medicines and laboratory commodities. The quantity of vaccines initially received in the country from the International Coordinating Group (ICG) was insufficient to control this outbreak pending arrival in the country of approved vaccines and supplies. In addition, the healthcare workforce available to manage the outbreak was inadequate, especially in the worst affected states.

The other critical challenges experienced in the response include (a) the low rate of sample collection, and the limited threshold of laboratory confirmations required for vaccines approval; (b) weak coordination of response activities at the state level and below; and (c) limited funding to support the activities of the national Emergency Operations Centre.
Geographic distribution of the meningitis outbreaks in Nigeria, week 50, 2016 - week 23, 2017

Epidemic curve for the meningitis outbreaks in Nigeria, week 50, 2016 - week 23, 2017
Map of the outbreaks and other emergencies reported to WHO AFRO in 2017
LISTERIOSIS
SOUTH AFRICA

3D illustration of Listeria monocytogenes. Source: biocote.com
South Africa
Listeriosis

SUMMARY

- An outbreak of listeriosis was declared on 5 December 2017, detected after an increasing incidence of cases noted since October 2017, retrospectively established to have started in early 2017.
- *Listeria monocytogenes* was identified by the National Institute for Infectious Diseases (NICD) in blood culture and cerebrospinal fluid specimens. Whole genome sequencing identified 15 sequence types (ST), with 71% belonging to ST6.
- Isolates of ST6 were closely related, suggesting that most cases had exposure to a widely available, common food type/source.
- Most infected people interviewed by NICD reported eating ready-to-eat processed meats, commonly polony, followed by viennas/sausages and other ‘cold meats’.
- The source of the outbreak was initially traced to an Enterprise food production facility in Polokwane, Limpopo Province and then to the Rainbow Chicken (RCL Wolwehoek production facility).
- Public health measures were rapidly instituted including making listeriosis a notifiable condition. A national multisectoral response team was put in place to investigate and respond to the outbreak, focusing on identifying the source. WHO deployed a food safety expert, an epidemiologist with expertise on listeriosis outbreak investigation and a risk communication expert to South Africa.
- Major changes to standard operating procedures around food safety and food inspection, along with a full review of food safety legislation around processed meat products took place as a result of this outbreak.
- The outbreak was declared over on 3 September 2018.

**EVENT DESCRIPTION**

On 5 December 2017, the South African National Department of Health notified WHO of an outbreak of listeriosis in the country, which was detected in October 2017 when an increasing incidence of cases was noted. Retrospective epidemiological investigations established a gradually increasing incidence of listeriosis from the start of 2017.

At the start of the outbreak there were a total of 557 confirmed cases, with 36 deaths (case fatality ratio 6.5%).

Cases were reported from all nine provinces in South Africa. Most were from Gauteng Province (345, 62%), followed by Western Cape (71, 13%) and KwaZulu-Natal (37, 7%). In the 540 initial cases with known age, the age range was from birth to 93 years, with a median age of 26 years. Neonates, aged 28 days and younger, accounted for 37% of cases. Among neonates, 96% had early-onset disease (from birth to less than 6 days). Females accounted for 53% of cases (286/538). These provincial and demographic patterns remained through the course of the outbreak.
Of the initial 557 confirmed cases, *Listeria monocytogenes* was isolated from 386 (69%) by blood culture and 146 (26%) in cerebrospinal fluid specimens. Whole genome sequencing was performed on 189 *L. monocytogenes* isolates early in the outbreak, which identified 15 sequence types (STs), with 71% (134/189) belonging to ST6. Isolates in this ST6 cluster were very closely related, showing fewer than 20 single nucleotide polymorphism differences, suggesting that most cases had exposure to a widely available, common food type/source. Initially, the limited food consumption data that were available indicated that a wide variety of food items that had been documented to cause previous outbreaks/clusters of listeriosis (including dairy, meat, vegetables, fruit and ready-to-eat products) were commonly consumed, so no specific food item/s or food consumption patterns were identified that could guide targeted environmental investigations.

Most infected people (85.3%; 93/109) who were interviewed by an NICD team from the start of the outbreak until early March 2018, reported eating ready-to-eat processed meats, most commonly polony, followed by viennas/sausages and other ‘cold meats’. On 12 January 2018, nine children under five years of age from the same crèche presented to Chris Hani Baragwanath Hospital in Johannesburg with febrile gastroenteritis. A food-borne illness was suspected, with listeriosis as a possible cause. Environmental Health Practitioners visited the crèche and obtained samples from two unrelated brands of polony (Enterprise and Rainbow Chicken Ltd), which were submitted for testing. *L. monocytogenes* was isolated from the stool of one ill child and from both polony specimens. Whole genome sequencing and genomic analysis by the NICD Centre for Enteric Diseases confirmed ST6 sequence type on all three isolates on 27 January 2018. Whole genome sequencing analysis performed on environmental samples from the Enterprise factory, showed outbreak strain ST6, showing the source of the outbreak to be the Enterprise food production facility in Polokwane, Limpopo Province. The National Consumer Commission immediately requested the recall of Enterprise’s entire domestic and international distribution networks and issued a compliance notice in terms of the National Health Act. On 4 March 2018 the national Minister of Health announced the source of the outbreak. The export registration of the food processing plants involved was temporarily suspended and the Rainbow Chicken (RCL Wolwehoek production facility) was investigated.

Because of the long incubation period of *L. monocytogenes*, ranging from a few to up to 90 days, both the NDOH and the NICD warned of continuing vigilance for new cases as people eating contaminated products could continue to present with listeriosis. In the weeks following the recall, a few new cases continued to be reported weekly and by the time the outbreak was declared over on 3 September 2018, a total of 1 060 cases and 216 deaths (case fatality ratio 20%) had been recorded between 1 January 2017 and 17 July 2018.

### PUBLIC HEALTH RESPONSE

- A national multisectoral response team was put in place to investigate and respond to the outbreak, focusing on identifying the source.
- Listeriosis was made a notifiable medical condition.
- The National Health Laboratory Service (NHLS) established a line list database of listeriosis cases, which was updated daily with data from Central Data Warehouse (CDW) downloads as well as direct reports of listeriosis cases from private sector laboratories.
- WHO deployed a food safety expert, an epidemiologist with expertise on listeriosis outbreak investigation and a risk communication expert to South Africa.
- Two call centres were established, one for the public and another for clinicians.
- Case investigation forms were completed by healthcare workers in the public and private sectors, including surveillance officers at enhanced surveillance sites (public sector), clinical microbiologists (public sector), infection prevention and control (IPC) practitioners at private sector hospitals, and National Department of Health (NDOH) officials. Data from these forms were entered into the database.
Clinical listeriosis management guidelines were

A team of epidemiologists from the National Institute for Communicable Diseases (NICD) compiled a comprehensive food item checklist and conducted in-depth interviews of case-patients in Gauteng Province to obtain detailed food consumption histories.

The NICD conducted numerous radio and television interviews about listeriosis, stressing the importance of food safety.

Private and public sector laboratories submitted clinical and selected food/environmental isolates to the NICD Centre for Enteric Diseases (CED) for whole genome sequencing.

Clinical listeriosis management guidelines were drafted and distributed to all health practitioners.

The Director General of the NDOH requested food industry stakeholders to submit *Listeria* isolates to the NICD, along with details of *Listeria* positive food/food processing environmental samples. Environmental health practitioners visited the homes of those diagnosed with listeriosis to take samples from their refrigerators.

The NICD provided information about listeriosis, including Frequently Asked Questions, clinical management guidance, and laboratory testing methods on their web site and the Food Control Division with the NDOH distributed information about the outbreak to food industry stakeholders.

The NICD established a 24-hour hotline for clinicians.

In early February 2018, municipal Environmental Health Practitioners in all provinces started systematic inspection and sampling of diverse food production, processing and packaging facilities.

The source of the outbreak was announced on 4 March 2018 and on 15 March 2018, the Southern African Development Community (SADC) health ministers held an extraordinary strategic meeting in Johannesburg to share information and enhance preparedness and response capacities for listeriosis in the region.

Safety recall notices were issued, along with compliance notices, and measures related to export of implicated products and risk communication for vulnerable groups. Potential cross-contamination of other ready-to-eat processed meats led the NDOH to advise the public to avoid all ready-to-eat processed meat products.

Recalled products were warehoused and destroyed at a rate of 80 tons a day. Destruction was finalized by the end of June 2018.

WHO deployed a second team of experts through the GOARN and INFOSAN mechanisms to support outbreak investigations and response and worked with 16 other African nations that imported the implicated meat products to enhance capacities for preparedness and readiness to potential listeriosis outbreaks.

**DISCUSSION**

Listeriosis is a potentially serious bacterial infection that contaminates food and is particularly dangerous to pregnant women, causing premature labour and stillbirth, and neonatal meningitis. Milder forms result in gastroenteritis, which can be severe in at-risk groups, which include pregnant women, the elderly and immunocompromised people. The first documented reports of outbreaks in South Africa were in 1977 (14 cases) and 2015 (seven cases), and since then sporadic cases have occurred throughout the country. However, since October 2017, the Department of Health saw a marked increase in the number of cases. This increase and the associated deaths were of concern, particularly in the face of South Africa’s high prevalence of HIV infection. Street food vendors are common across South Africa and poorly regulated and many people lack access to electricity and thus refrigeration. Before this event, listeriosis was not a notifiable condition in South Africa, so there is limited epidemiological data available.

However, as a result of this outbreak, there are now major changes to standard operating procedures around food safety and food inspection, along with a full review of food safety legislation around processed meat products that are currently being gazetted. Hazard analysis and critical control system (HACCP) is being made mandatory in high risk meat processing facilities through an amendment of the regulations pertaining to the application of HACCP. Overall, there have been legislative reforms regarding food safety, food safety regulation and standards around processed meat products, food monitoring and inspection of food processing, storage and transport facilities. Other countries in the region have been urged to draw lessons from this outbreak in order to improve their capacities for preparedness, prevention, early detection and rapid control of any outbreak of food-borne diseases.

Sporadic cases of listeriosis will continue to occur as the disease is endemic in South Africa. For the past five years, the NICD has reported between 60-80 cases of listeriosis annually in the country. It remains a notifiable disease condition. There should be continued emphasis on good food safety practices, including good hand hygiene, separation of raw and cooked food, thoroughly cooking food, proper food storage at safe temperatures and using safe water and raw materials.
Geographical distribution of confirmed listeriosis cases and deaths in South Africa, 5 December 2017 - 22 July 2018

Weekly trend of confirmed cases of listeriosis in South Africa, 5 December 2017 - 22 July 2018
MALARIA

CABO VERDE

An Anopheles gambiae mosquito, one vector of the malaria parasite. Source: Wikimedia Commons.
Cabo Verde
Malaria

SUMMARY

A sudden upsurge in malaria cases in this low malaria risk island occurred during July 2017, with 45 indigenous cases and one imported case reported from 20 June-30 July 2017, compared to an average of one locally acquired case reported each year from 2012-2016.

The outbreak was confined to the capital city, Praia, with the neighbourhoods of Achada, Santo Antonio and Varzea most affected.

Between 1 January 2017 and 9 January 2018, a total of 450 cases were reported, including 419 indigenous cases, 13 imported cases and 18 reinfections/recurrences. Two deaths were reported, one in an indigenous case and one in an imported case.

About two-thirds of the cases were adult males, with 77% aged 20 years or older, most (82%) between 21 and 44 years. Two pregnant women were infected.

The causative agent was confirmed as *Plasmodium falciparum* using both microscopy and rapid diagnostic tests (RDTs).

The sudden increase in local transmission was intensively investigated and attributed to several possible factors, including suboptimal vector control strategies, coupled with inappropriate use (incorrect dilution) and a new insecticide introduced in November 2016.

The last case in Praia was reported in December 2017 and as of 4 January 2018, no further cases were reported. As of week 7, 2018 (week ending 16 February 2018) there was no evidence of indigenous transmission outside Praia.

Key milestones for the malaria outbreak in Cabo Verde, 2017

EVENT DESCRIPTION

In July 2017, the Ministry of Health in Cabo Verde reported a sudden and unprecedented increase in the incidence of malaria. The island country is a low malaria risk area, typically with limited local transmission from September to November each year, which coincides with the rainy season. From January to June 2017, sporadic cases were reported, many of which had recent travel history from either Angola or Nigeria. However, between 30 June 2017 and 30 July 2017, 45 indigenous cases and one imported case were notified, compared to an average of one locally acquired case reported each year during the previous five years (2012-2016). All these locally acquired cases lived in the capital city of Praia, Santiago Island. The most affected neighbourhoods were Achada, Santo Antonio and Varzea.

Between 1 January 2017 and 9 January 2018, a total of 450 cases were reported, including 419 indigenous cases, 13 imported cases and 18 reinfections/recurrences.
A local youth group conducted a door-to-door campaign to educate the community on malaria prevention and control.

WHO supported the development of a comprehensive response plan, which included strengthening coordination, case-based surveillance within communities and at entry points, vector control activities, communication and resource mobilization. Long-term response activities were addressed with the support of the Global Malaria Programme.

DISCUSSION

Cabo Verde is a low malaria transmission country, eligible for elimination of the disease. However, this means that people resident in the area have limited underlying immunity, so all people, irrespective of age, are at risk of infection and of developing severe disease. In this upsurge, cases did not extend outside Praia, although the vector (Anopheles gambiae) is present throughout Santiago and neighbouring islands.

In this outbreak, the coordinated implementation of care, prevention and awareness activities helped both to limit the disease to Praia and to end the outbreak by early January 2018. Key interventions included intense case finding in affected household, and early and effective case management, with systematic hospitalization of all positive cases. Vector control interventions included household insecticide spraying, larva control in vector breeding sites. Mobilization of partners in a limited area, Praia, also helped, since there was intense concentrated effort to improve drainage canals and reduce vector breeding sites.

However, this outbreak serves as a reminder that even in low transmission areas, changing environmental conditions can lead to conditions favourable for transmission, so epidemiological surveillance of all vector borne diseases needs to continue and be strengthened.

PUBLIC HEALTH RESPONSE

The WHO Country Office and the WHO Malaria Control Programme immediately provided technical support to the Ministry of Health to conduct outbreak investigations and establish the key response pillars.

A task force was established in Praia to coordinate and monitor technical outbreak interventions and an entomologist and two epidemiologists were deployed to the area and an incident manager appointed.

Surveillance and treatment was provided in local clinics and investigation teams initiated active case finding in affected households.

A total of 14,972 houses were treated with insecticide, protecting an estimated 54,524 people.

Mass media messages were broadcast on radio and television to encourage preventive behaviour and vector control measures.
Geographical distribution of malaria cases in Cabo Verde, weeks 4 - 53, 2017

Weekly trend of malaria cases in Cabo Verde, weeks 4 - 53, 2017
CRIMEAN-CONGO HAEMORRHAGIC FEVER
NAMIBIA
**Namibia**

**Crimean-Congo haemorrhagic fever**

**SUMMARY**

- Crimean-Congo haemorrhagic fever (CCHF) was confirmed on 23 February 2017 in a patient from the Gobabis City area in eastern Namibia.
- A second, unrelated case was confirmed on 9 March 2017.
- The cases were not linked as they were geographically separate.
- No further cases arose from contacts of the two patients.

**Key milestones for the Crimean-Congo haemorrhagic fever outbreak in Namibia, 2017**

<table>
<thead>
<tr>
<th>Event</th>
<th>Time (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptom onset - primary case</td>
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<tr>
<td>Detection of outbreak</td>
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</tr>
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<td>Confirmation of outbreak</td>
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</tr>
<tr>
<td>Declaration of end of outbreak</td>
<td>33</td>
</tr>
</tbody>
</table>

**EVENT DESCRIPTION**

The index patient was a 20-year-old man from a commercial cattle farm 40 km from Gobabis City, eastern Namibia, who presented with flu-like symptoms and headache on 18 February 2017, after a tick bite on 15 February 2017. He was treated as an outpatient and discharged. He returned on 20 February 2017 vomiting blood, and with bloody stools and jaundice. He was immediately admitted and isolated. A blood sample was sent to the National Institute for Communicable Diseases (NICD) in South Africa for identification and confirmation of CCHF; CCHF was confirmed on 23 February 2017. He died and was buried on 23 February 2017, with full precautions, under the supervision of environmental health officers. The 48 contacts linked to this case were identified and monitored for 14 days and released.

He died and was buried on 23 February 2017, with full precautions, under the supervision of environmental health officers. The 48 contacts linked to this case were identified and monitored for 14 days and released.

The second case was a 19-year-old male from Okongous Village, 250 km from Gobabis, who reported a tick bite on 1 March 2017, and presented on 3 March 2017 with fever, headache, and backache, along with vomiting and diarrhoea. He was transferred to Gobabis on 6 March 2017. Laboratory results showed severe thrombocytopenia, deranged liver enzymes, and a deranged clotting profile. He was transferred to Windhoek Central Hospital on 8 March 2017. On 9 March 2017, the laboratory test (also sent to the NICD, South Africa) came back CCHF-positive. This case was not linked to the index case because there was no history of travel outside the farm in the 3 weeks before onset of illness. This patient also had no contact with animal blood or body fluids in the weeks before the onset of illness. Contacts (16) were traced, monitored, followed up for 14 days, and released. The patient survived the illness.

**PUBLIC HEALTH RESPONSE**

The potential outbreak was contained quickly and effectively through a combination of good communication and transparency, in the presence of efficient health services in Namibia. This rapid containment was achieved because:

- The case-patients were isolated early.
There was a high index of suspicion for CCHF and a sample was sent early to NICD in South Africa for diagnosis.

There was immediate action – the event was reported to the Ministry of Health and Social Services within 24 hours of first diagnosis.

There was a coordinated response.

Rapid response teams (RRTs) and health workers were available.

The outbreak was immediately investigated.

The animal sector team – FAO and the Ministry of Agriculture – were involved in the field response, and animal samples were taken from three farms.

AREAS THAT NEED IMPROVEMENT

Samples are always sent to South Africa for testing, thereby causing a potential delay in receiving results. It would be worthwhile providing the local laboratory with the capacity to detect the virus and other dangerous pathogens.

There is a lack of capacity to determine the extent and distribution of infected animals in known areas of endemicity.

The main hospital in Gobabis and the surrounding area lacks an isolation room that meets infection prevention and control (IPC) standards. Again, considering that this particular haemorrhagic fever is endemic to the area, it would be worthwhile scaling up capacity in the main hospital.

DISCUSSION

CCHF is endemic in certain areas of Namibia. There is free movement of both livestock and wild animals, which cannot be controlled. From published records on CCHF and in Namibia, the first CCHF case was reported in 1986. The infections mainly occur in five regions in the eastern part of the country: Grootfontein (Otjozondjupa Region); Windhoek (Khomas Region); Gobabis (Omaheke Region); Karasburg (Karas Region); and the Mangetti area (Kavango Region). So far, there were three cases in 1986, one in 1998, two in 2001, one in 2002 and three in 2010. Gobabis (Omaheke Region), the epicentre of the current outbreak, recorded the last case in 2001 – that of a well-known farmer from a game farm that rehabilitates wild cats. He died of CCHF following a tick bite while transporting cattle to his guest lodge.

Gobabis is the chief town of Omaheke Region, the fifth largest region in the country, and covers an area of 84,612 km². Its estimated total population is 72,306. The main economic activity in the area is cattle farming. The Region has one district and seven constituencies, with one hospital, 13 clinics, and one health centre. The estimated population of the affected farm and the neighbouring area is about 40 people. The catchment population (Okongoua Village) of the Corridor Clinic is 2,080 people.

The two isolated events were quickly controlled because of good communication, prompt action by healthcare staff (isolating the patient and sending samples for definitive diagnosis), rapid response of the WHO Health Emergencies team, and the response of local health and agriculture agencies.

Long-term control strategies in such settings hinge on raising community awareness about the disease, and changing behaviours to prevent transmission. Such behaviours include wearing protective clothing, using repellents when working in the fields to prevent tick bites, and avoiding direct contact with infected animal tissues and body fluids. In addition, reducing the population of the Hyalomma tick, through various vector control strategies, is critical.

More effective would be a much higher index of suspicion among local health workers. Any case presenting with a history of tick bites and flu-like symptoms should immediately be tested for CCHF. This would depend on education and budget.
Geographic distribution of Crimean-Congo haemorrhagic fever cases in Namibia, 15 February - 21 March 2017

Epidemic curve for Crimean-Congo haemorrhagic fever outbreak in Namibia, 15 February - 21 March 2017
CHOLERA
MALAWI

A cholera patient is recovering at a treatment center in Lilongwe District, Malawi. Credit: Chisomo Mdalla, ONSE Health communications officer.
## Malawi

### Cholera

#### SUMMARY

- On 12 March 2017, two suspected cholera cases were reported to the district health authorities in Ndamara, Malawi.
- The District Rapid Response Team was mobilized the same day; rapid diagnostic testing confirmed the cases as cholera.
- From 11 to 19 March 2017, 14 cases were registered, with no deaths.
- No new cases were reported after 19 March 2017.

### EVENT DESCRIPTION

On 12 March 2017, a case of suspected cholera was reported to district health authorities by Ndamara Health Centre, which is on the Mozambican border. The District Rapid Response Team (DRRT) was mobilized immediately; the outbreak was investigated the same day, and the case was confirmed as cholera. The index case, a 31-year-old woman from Bitilinyu Village, Ndamara, presented with vomiting, diarrhoea, weakness, dehydration and leg pain, which had started on 11 March 2017. She was admitted to the cholera tent.

On the same day, a 50-year-old man was admitted to the holding room at Ndamara Health Centre, with symptoms suggestive of cholera. The DRRT established that this patient frequently visited and provided care for his sister, who was also admitted to the holding room of the clinic with diarrhoea.

The DRRT also visited Bitilinyu Village, which is where all the cases had originated. All households in the village have pit latrines and drink water from the same borehole; the borehole is close to the households.

Nsanje District shares borders with Mozambique. The initial cluster of cases was found to have epidemiological linkage with Villa Nova, Tete Province, in Mozambique; Villa Nova had an ongoing cholera outbreak.

From 11 to 19 March 2017, 14 cases were registered, with no deaths. Specimens were collected from these patients; rapid diagnostic testing of the specimen for cholera was positive. Samples were sent to the national laboratory for confirmation. The outbreak was eventually confirmed by the Community Health Sciences Unit (CHSU) Reference Laboratory on 15 March 2017, after *Vibrio cholerae* O1 Ogawa was isolated from cultures. No new cases were reported after 19 March 2017.

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#### Key milestones for the cholera outbreak in Malawi, 2017

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Time (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection of outbreak</td>
<td>5</td>
</tr>
<tr>
<td>Confimation of outbreak</td>
<td>3</td>
</tr>
<tr>
<td>Notification to WHO</td>
<td>9</td>
</tr>
<tr>
<td>Grading of event</td>
<td>21</td>
</tr>
<tr>
<td>Overall outbreak time</td>
<td>26</td>
</tr>
</tbody>
</table>

Time is measured and recorded in days.
PUBLIC HEALTH RESPONSE

The small outbreak of cholera was quickly contained thanks to the following:

- The DRRT was mobilized early; a rapid assessment of the situation, including a site visit to the patient’s village, was made to determine risk factors and priorities.
- The transmission pathway was established early.
- Rapid diagnostic testing established the pathogen before definitive laboratory testing, making appropriate response measures possible.
- Immediate cholera awareness campaigns were conducted; village health committees were called in and briefed on cholera prevention and control, including emphasis on food hygiene.
- A water treatment chemical (1% stock chlorine solution) was distributed to village households.
- Médecins sans Frontières (MSF) provided infection prevention and control (IPC) materials to the Cholera Treatment Centre; MSF also supported case management.
- The Malawi Red Cross Society constructed a pit latrine and bath shelter for the Cholera Treatment Centre, as patients were using health centre facilities.

DISCUSSION

Malawi has been experiencing recurrent outbreaks of cholera, especially in the Southern Region. This Region is prone either to floods or drought (both conditions favour the spread of cholera infection).

The poor sanitation and hygiene practices in these communities are some of the factors contributing to cholera transmission. In addition, continuous cross-border movements of people between Malawi and Mozambique (reported to have ongoing cholera outbreaks) has the potential to lead to subsequent trans-border transmission of cholera, escalating the public health risks associated with these events.

The response to the cholera outbreak in Malawi brought together several partners, including UNICEF, the Red Cross, Malawi College of Medicine, MSF, DFID, and WHO. This coordinated, multi-partner and multi-sector response contained the outbreak. Rapid and effective action by the DRRT prevented a potentially far larger outbreak, and showed that emergency response systems in place in Malawi are working well.
Geographic distribution of cholera cases in Malawi, 11 - 19 March 2017

Epidemic curve for cholera outbreak in Malawi, 11 - 19 March 2017
EBOLA VIRUS DISEASE
DEMOCRATIC REPUBLIC OF THE CONGO
Democratic Republic of the Congo
Ebola virus disease

SUMMARY

- An outbreak of Ebola virus disease was notified to WHO on 11 May 2017 by the Ministry of Health of the Democratic Republic of the Congo in the remote Likati Health Zone in Bas-Uele Province.
- The notification followed a cluster of illnesses and deaths in late April 2017.
- The outbreak evolved during May 2017 with further transmission and deaths.
- There was an immediate coordinated response by WHO and partners, including deployment of interagency rapid response teams, who investigated the outbreak and established key pillars of the response at the epicentre.
- Two samples, out of five collected from the original cases, were analysed at the Institut National de Recherche Biomédicale (INRB) laboratory in Kinshasa and tested positive for typical Zaire ebolavirus.
- Between 22 April 2017 and 8 June 2017, there were eight cases (three probable and five confirmed) and four deaths (case fatality rate 50%).
- The outbreak was effectively controlled and declared over on 2 July 2017.

Key milestones for the Ebola virus disease outbreak in Democratic Republic of the Congo, 2017

EVENT DESCRIPTION

The index case was a man, aged 39, who reported to the local health facility on 22 April 2017 with fever, weakness, vomiting, bloody diarrhoea, bloody urine, nose bleeds, and extreme fatigue. He was immediately referred to the Likati health facility, but died in transit. On 24 April 2017, a motorcycle rider and another person who assisted in the transportation of the first patient, developed an acute febrile illness. The motorcycle rider died on 26 April 2017.

Samples were collected from these individuals and sent to the Institut national de Recherche Biomédicale (National Institute of Biomedical Research) (INRB) laboratory in Kinshasa; two out of the five samples collected from the original cases tested positive for typical Zaire ebolavirus.

The confirmed and probable cases were reported from the Nambwa (four confirmed and two probable), Ngay (one probable) and Mabongo (one confirmed) health areas in the Likati Health Zone. The last confirmed case was isolated on 17 May 2017, and tested negative for Ebola virus disease (EVD) by polymerase chain reaction (PCR) for the second time on 21 May 2017. By the end of the outbreak, 375 contacts had completed 21 days of follow-up.
WHO held weekly 3-level teleconferences during the outbreak, with the active participation of senior managers of the Organization. The first national coordination meeting was held on 11 May 2017, with the participation of WHO and partners. Together with partners, WHO coordinated international technical support for the outbreak with the help of the Global Outbreak Alert and Response Network (GOARN) and the Dangerous Pathogens Laboratory Network. Other key partners who supported the Government of the Democratic Republic of the Congo in their response included the Africa Centres for Disease Control and Prevention, the Alliance for International Medical Action (ALIMA), the European Union (EU), the Government of the People’s Republic of China, the International Federation of Red Cross and Red Crescent Societies (IFRC), the International Organization for Migration (IOM), the Japan International Cooperation Agency (JICA), Médecins sans Frontières (MSF), the Red Cross of the Democratic Republic of the Congo, UNICEF, the United States Agency for International Development (USAID), the United States Centers for Disease Control and Prevention (CDC), the United Kingdom Department for International Development (DFID), the University of Québec, and the World Food Programme (WFP). Coordination at regional level was strengthened, and daily meetings were held during the outbreak.

Dr M R Moeti, the WHO Regional Director for Africa, travelled to the Democratic Republic of the Congo on 13 May 2017 and met with national authorities. She reiterated the availability and commitment of the Organization to work with the Ministry of Health and other sectors to rapidly contain the outbreak and avoid unnecessary interference with travel and trade. She also held a meeting with in-country partners to enhance partnership and strengthen coordination of the response to this dangerous disease; early technical guidance was given to the Democratic Republic of the Congo; it included the involvement of anthropologists and risk communication experts; a global expert roster was also activated.

The regional and global laboratories network was activated for confirmation of suspected cases. The first field investigation was conducted by the local health team on 5 May 2017; the team collected the five blood samples that were used to confirm the outbreak.

A national multidisciplinary investigation team of 10 experts was deployed on 13 May 2017; it undertook active case searches, reviewed health facility records, and initiated community-based surveillance.

Contact identification and follow-up started immediately, and communities were briefed and trained in safe burial practices; the homes of those affected were disinfected; and personal protective equipment (PPE) was issued to health workers.

Social mobilization and community engagement activities were conducted throughout the outbreak;

they included awareness-raising events early in the outbreak; these were held in four schools, with 592 attendees; broadcasts of awareness and prevention messages were made through mobile phone providers.

The WFP/Logistics Cluster and UNICEF supported warehousing capacity in Buta and Likati; the United Nations Humanitarian Air Service (UNHAS) set up a base for air operations from Buta, while the United Nations Organization Stabilization Mission in the Democratic Republic of the Congo (MONUSCO) helped to transport response teams and urgently-needed supplies to the affected zone.

The Democratic Republic of the Congo provincial government mobilized the initial funds for immediate operational field activities, and the WHO Country Office finalized a country response plan, along with a budget of US$ 1 449 338.

DISCUSSION

This was the eighth outbreak of EVD in the Democratic Republic of the Congo since the discovery of the virus in the country in 1976. The last outbreak in 2014 involved 66 people, with 49 deaths (case fatality ratio 74.2%). Several healthcare workers were exposed to EVD as a result of local customs and rituals associated with death. Consequently, the virus rapidly spread to many other people. However, after the extensive outbreak in west Africa starting in 2014 that quickly spread across national borders, with excessive morbidity and mortality, the speed of the international response to this small outbreak was commendable. This was also understandable since the response was comprehensive and involved all available partners, thereby limiting the geographical and epidemiological extent of the outbreak.

At the same time, the 2017 outbreak highlighted the challenges of providing health services and disease surveillance in remote areas. During the present event, WHO and partners were vigilant; they increased surveillance, investigated alerts, and tested suspected cases – all of which were critical actions that prevented EVD flare-ups.

Interventions to strengthen not only infection prevention and control (IPC) but also WASH (water, sanitation and hygiene) also need to be continued and maintained beyond the end of the outbreak, as does the strengthening of the Likati health system. As a result of the outbreak, there has been a general increase in use of the health facility. Additional healthcare workers have also been trained, and need to continue to be employed. The regular supply of medicines and other commodities remains a challenge in this remote area. WHO has asked that, in the immediate aftermath of the outbreak, partners should consider maintaining technical and financial support to the Ministry of Health of the Democratic Republic of the Congo. This should ensure continued control of the outbreak, and should upgrade healthcare facilities, not only in Likati Health Zone but also in the rest of the country.
Geographic distribution of Ebola virus disease cases in the Democratic Republic of the Congo, 22 April - 21 May 2017

Weekly trend of Ebola virus disease cases in the Democratic Republic of the Congo, 22 April - 21 May 2017
MENINGOCOCCAL SEPTICAEMIA
LIBERIA

Source: WHO AFRO
Liberia
Meningococcal septicaemia

**SUMMARY**

- On 25 April 2017, the Ministry of Health of Liberia notified WHO of a cluster of 14 cases of acute illness, involving eight sudden deaths; the illness, in Greenville District, Sinoe County, Southern Region, was of unknown etiology.
- Of the 14 cases, 95% were linked to the funeral of a religious leader who had died of known causes.
- Rapid, effective response from the Government of Liberia, the Ministry of Health, and strong collaboration between WHO, Centers for Disease Control (CDC), Atlanta, USA, and other partners, confirmed the pathogen to be *Neisseria meningitidis* serogroup C.
- Between 23 April 2017 and 7 May 2017, a total of 31 cases and 13 deaths (case fatality ratio 41.9%) were reported.
- The last case was reported on 7 May 2017.

**EVENT DESCRIPTION**

The event, linked to a funeral celebration, started on 23 April 2017 when the index case – an 11-year-old girl from Teah Town, Greenville District – presented to F J Grante Hospital with acute onset of diarrhoea, vomiting, and mental confusion. The girl died within one hour of admission. On 24 April 2017 (the second day), the second case – a 51-year-old woman from Teah Town, Greenville – developed sudden onset of vomiting, abdominal pain and confusion. She was admitted to F J Grante Hospital on 25 April 2017, and died the same day. On 25 April 2017 (the third day), a cluster of 13 case-patients from five communities in Greenville, developed similar acute illness. Seven died the same day. The last case was reported on 7 May 2017, and the last death occurred on 2 May 2017.

Between 23 April and 7 May 2017, a total of 31 cases involving 13 deaths (case fatality ratio 41.9%) were reported. Most (95%) of the cases participated in the funeral rites of a religious leader who had died of known causes, and whose funeral took place from 21 to 22 April 2017 in Greenville, Sinoe County. This locality was the epicenter of the outbreak, with 87% (27/31) of the cases and 78% (10/13) of the deaths. Montserrado County had two cases and two deaths, while Grand Bassa County had two cases and one death. The ages of the affected persons ranged from 10 to 62 years, and 55% of the cases were female.

Analyses of biological samples conducted at the National Reference Laboratory (NRL) in Liberia and in CDC-Atlanta confirmed *Neisseria meningitidis* serogroup C as the etiological agent by polymerase chain reaction (PCR) in 13 out of 24 samples analysed. Among the five cases that manifested the typical clinical features of meningococcal septicaemia, [purpura fulminans (seen in four cases), ecchymosis (two cases), petechial rashes (four cases), and abdominal pain (four cases)], *N. meningitidis* was confirmed in four of these cases.

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**Key milestones for the meningococcal septicaemia outbreak in Liberia, 2017**

<table>
<thead>
<tr>
<th>Detection time</th>
<th>Laboratory confirmation time</th>
<th>Notification time</th>
<th>Response time</th>
<th>Overall outbreak time</th>
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Time is measured and recorded in days.
PUBLIC HEALTH RESPONSE

The Government of Liberia and the Ministry of Health, with strong support and collaboration from WHO, CDC-Atlanta and other partners (National Public Health Institute of Liberia (NPHIL), Liberia Field Epidemiology Training Programme, the African Field Epidemiology Network (AFENET), etc.), mounted a rapid and effective response that led to the containment of the event.

National and county epidemic preparedness and response committees (NEPRC/CEPRC) were activated to coordinate response to the event.

A multidisciplinary national rapid response team was deployed to Sinoe to conduct a detailed outbreak investigation and to support lower-level outbreak response.

Surveillance was heightened at the health facility and community levels in all counties; active case searches were conducted among those who attended the funeral celebrations and their contacts in the affected and surrounding communities; contacts were systematically identified, line-listed and followed up; at least 214 close contacts were identified and followed up from the three counties; of these, 110 people had attended the funeral function.

Infection prevention and control interventions, including hand hygiene practices, testing of water points, and safe burial procedures were enhanced in the other affected counties.

Social mobilization, public health education and community engagement were undertaken using various approaches and channels; this was aimed at encouraging early healthcare-seeking behaviour and promoting disease prevention practices.

DISCUSSION

The occurrence of an outbreak of a disease with a high case fatality rate and haemorrhagic symptoms in a region that had just been seriously affected by the Ebola virus disease outbreaks of 2014-2016 led to a rapid and effective response by the Government of Liberia, and to strong collaboration between WHO, CDC-Atlanta and other partners. This response included relatively early identification of the causal pathogen as Neisseria meningitidis serogroup C (as the origin of meningococcal septicaemia). This is distinct from meningococcal meningitis (common in west, central and east Africa). Meningococcal septicaemia is less frequently seen.

The rapid response to this outbreak demonstrated clearly that the measures put in place during and after the Ebola outbreak in west Africa have strengthened the country’s ability to respond effectively to the threat of infectious diseases. The close collaboration between WHO and other partners was also possible because of these measures.

However, the occurrence of this uncommon form of meningococcal disease in the Region, and the initial difficulties encountered in making the diagnosis, emphasizes the need to strengthen laboratory diagnostic capacity and available technology in Liberia in particular, and the African Region generally. In the meantime, intensified surveillance should continue in all counties in order to ensure that any emerging cases – or indeed other diseases – are promptly detected and managed.
Geographic distribution of the meningococcal septicaemia cases in Liberia, 23 April - 17 May 2017

Epidemic curve for meningococcal septicaemia outbreak in Liberia, 21 - 30 April 2017
BORNO STATE, NIGERIA
CHOLERA
Borno State, Nigeria
Cholera

SUMMARY

The first suspected case of cholera presented on 14 August 2017 in Maiduguri city, Borno State, north-east Nigeria and by the 20 August 2017 there was an increasing number of cases from the same area.

Confirmation of cholera was made on 23 August 2017.

Most cases detected early in the outbreak were from Muna garage camp. By September 2017, the outbreak had spread rapidly through several IDP camps and host communities.

A total of six local government areas (LGAs) were affected – Jere, Maiduguri Metropolitan Council, Dikwa, Munguno, Mafa and Guzamala.

Most (50%) of cases occurred in the Muna corridor with 33% in Monguno and 14% in Dikwa.

*Vibrio cholerae* 01 Ogawa was identified as the pathological agent.

A rapid public health response was mounted in all areas, along with a reactive vaccination campaign.

By the end of the outbreak there had been 5,365 cases, with 61 deaths (case fatality ratio 1.1%).

The end of the outbreak was declared on 21 December 2017 by the Borno State government. The last case was reported on 5 December 2017.

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**EVENT DESCRIPTION**

The first suspected case of cholera in Borno State, north-east Nigeria, presented on 14 August 2017 in Maiduguri city and by 20 August 2017, the WHO country office reported an increasing number of suspected cases from the same area. Two cases were confirmed positive by culture and additional cases tested positive on rapid diagnostic testing (RDT). Five suspected cholera cases were reported on 20 August 2017 by staff deployed in Borno State. The cases were reported from the Muna Garage IDP camp, northeast of Maiduguri. The cholera outbreak in Borno State was declared on 16 August 2017.

Efforts to contain further transmission were scaled up by Borno State Ministry of Health, together with WHO and partners, but in spite of this, the outbreak spread to other areas. Cases were clustered in three areas: Muna (689), Dikwa (406) and Monguno (70). In the Muna area most cases were from the internally displaced persons (IDP) camp, but sporadic cases were reported from four other sites around Maiduguri city.

The first cases in Dikwa presented on 2 September 2017 and rapidly spread to affect three other camps: Agric, Sangya and Bulabulin. In Monguno, cases were coming from two camps: GGSS and Kuya.
During the course of the outbreak, a peak of 1,200 cases a week were reported in week 36. By week 43, the situation had started to improve, with only 101 new cases reported weekly. The remaining hotspots were Muna corridor in Jere local government area (LGA) and Gwaran settlement in Guzamala LGA. These hot spot areas were specifically targeted by the state rapid response teams and the WHO hard-to-reach team.

A total of 431 samples were tested using rapid diagnostic tests (RDT). Of these, 354 (82%) were positive by RDT and 175 (46%), were positive on culture. Serotyping isolates from Zamfara and Lagos States identified Vibrio cholerae 01 Ogawa as the causative agent.

The end of the outbreak was declared on 21 December 2017 by the Borno State government. The last case was reported on 5 December 2017. By the end of the outbreak there had been 5,365 cases, with 61 deaths (case fatality ratio 1.1%).

PUBLIC HEALTH RESPONSE

The Public Health Emergency Operations Centre (PHEOC) was immediately activated to coordinate the response to the outbreak.

Active surveillance was enhanced in affected areas, with case searches undertaken in hot spots and at-risk communities. A central hotline was set up at the Emergency Operations Centre (EOC) for reporting alerts.

Detailed case investigation was undertaken along with active case search. Surveillance systems were established at treatment sites, with daily collation, analysis and reporting conducted by Borno State Ministry of Health. Case management was provided at identified treatment or isolation facilities in affected states. There were five cholera treatment centres (CTCs) and 12 oral rehydration points (ORP) working fully in Borno State in hot spot areas.

Water, sanitation and hygiene (WASH) interventions were intensified across Borno State, reaching 6,600 households through hygiene promotion messages and hygiene kit distribution. A total of 1,700 latrines were cleaned and disinfected, and 6,166 shelters disinfected. Aqua tabs were distributed, boreholes repaired and batch chlorinated, water points and water-logged areas disinfected, and water trucking increased to improve access to safe drinking water, providing an average of 112 m$^3$ daily.

From 18-22 September 2017, an oral cholera vaccine (OCV) campaign was conducted in five LGAs, targeting 915,005 people, with 844,305 people vaccinated (96% coverage). Further vaccination campaigns in Mafa LGA reached 24,625 of the 54,254 people targeted on the first day of the campaign. Towards the end of the outbreak a further vaccination campaign was held between 9-13 December 2017, during which 560,267 people were vaccinated. Phase two of this campaign was carried out in Dikwa and Monguno LGAs.

Risk communication was intensified in affected states, with cholera prevention messages aired on local radios, and hygiene promotion activities in schools and camps carried out through radio, community groups, posters and other methods. Health education and community sensitization was provided in all affected states.

DISCUSSION

This large cholera outbreak in Borno State was rapidly brought under control as a result of a concerted and coordinated response by the Borno State government and Ministry of Health, WHO and other partners. The combination of active surveillance, detailed case investigation and active case search and the mechanism for daily reporting, allowed the authorities to monitor the outbreak closely and respond rapidly. Rapid deployment of WASH partners led to effective hygiene interventions, along with provision of safe drinking water. At the same time, risk communication and community education, helped to prevent further transmission of the disease. Reactive and planned vaccination campaigns contributed.

WHO continues to support an early warning and surveillance system with dot mapping to pinpoint new cases, which will facilitate targeted cholera prevention and control interventions.
Geographical distribution of cholera cases in Borno State, Nigeria, 14 August - 21 December 2017

Epidemic curve for the cholera outbreak in Borno State, Nigeria, 14 August - 21 December 2017
MADAGASCAR
PNEUMONIC PLAGUE
**Summary**

- An outbreak of pneumonic plague was notified to WHO by the Madagascar Ministry of Public Health on 13 September 2017.
- The case patient was a 47-year-old woman who died on 11 September 2017 of a respiratory illness, confirmed as plague by rapid diagnostic tests on samples sent to Institut Pasteur de Madagascar.
- A field investigation by the Directorate of Health Surveillance and Epidemiological Surveillance (DVSSE) established that the current outbreak started on 23 August 2017, when the index patient, a 31-year-old male from Tamatave, who developed a malaria-like illness, travelled by bush taxi from Ankazobe District to Tamatave (via Antananarivo) and died on the way.
- A large cluster of secondary cases later occurred among his contacts, with onward transmission to tertiary cases.
- There was an immediate, concerted, large-scale response by the Ministry of Public Health Madagascar, WHO and many other international partners covering coordination of the response, surveillance, contact identification and follow-up, laboratory services, case management, infection prevention and control, social mobilization, community engagement and risk communication, logistics, resource mobilization, partnership, preparedness/operations readiness and travel measures as per the International Health Regulations.
- The outbreak affected 58 districts and 17 regions of the country, with the most cases seen in Analamanga region, where the county’s capital is located.
- As of 22 April 2018, the total number of cases of plague of all types (pneumonic, bubonic and septicaemic) was 2,676, with 238 deaths (case fatality ratio 8.9%). The outbreak of pneumonic plague was declared over in urban areas on 27 November 2017. The last confirmed case of pneumonic plague was notified in the district of Miarinarivo (Itasy region) on 21 December 2017.

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**Event Description**

The Madagascar Ministry of Public Health notified WHO of an outbreak of pneumonic plague on 13 September 2017. The case patient was a 47-year-old woman who died of a respiratory illness on 11 September 2017. Blood samples from this patient were sent to Institut Pasteur de Madagascar where rapid diagnostic tests (RDTs) confirmed plague. This finding triggered a field investigation by the Directorate of Health Surveillance and Epidemiological Surveillance (DVSSE), which established that the current outbreak started on 23 August 2017 when the index case, a 31-year-old male from Tamatave, developed a malaria-like illness. On 27 August 2017, he travelled by bush taxi from Ankazobe District to Tamatave (via Antananarivo) while symptomatic and died on the way. A large cluster of secondary cases later occurred among his contacts, with onward transmission to tertiary cases.
From 1 August 2017 to 22 April 2018, a total of 2,676 cases of plague were notified, including 558 confirmed, 829 probable and 1,289 suspected. Out of these, 2,032 cases were pneumonic plague, 437 were bubonic, one case was septicaemic and 206 cases were unspecified. There was an exponential increase in the number of cases from 29 September 2017 to a peak on 10 October 2017. From 11 October 2017, the number of cases started to drop.

As of 22 April 2018, the total number of cases of plague of all types (pneumonic, bubonic and septicaemic) was 2,676, with 238 deaths (case fatality ratio 8.8%). Since the beginning of the outbreak, 71 healthcare workers were affected, with no deaths. Fourteen strains of Yersinia pestis were isolated and were sensitive to antibiotics recommended by the National Program for the Control of Plague.

The outbreak affected 58 districts and 17 regions of the country. The region of Analamanga, where the capital is located, was the most affected with 64% of cases.

The 21 to 30 age group (28%, n=303), was the most affected by pneumonic plague, followed by children under 10 years (23%, n=253).

Between 5 and 11 February 2018, one new case was notified in the district of Ambalavao (Haute Matsiatra region). Of the 58 districts reporting at least one suspected, probable or confirmed case, six reported eight cases in the two weeks up to 11 February 2018. The Fandriana district in Amoron’I mania region reported a probable case of pneumonic plague in the two weeks up to 11 February 2018.

As of 11 February 2018, a total of 7,530 contacts had been registered and provided with antibiotic prophylaxis, since contact follow-up was established on 12 October 2017. All completed their follow-up on 1 February 2018.

The outbreak of pneumonic plague was declared over in urban areas on 27 November 2017. The last confirmed case of pneumonic plague was notified in the district of Mirinarivo (Itasy region) on 21 December 2017.

> The health response was coordinated by the Ministry of Public Health, co-led by WHO and supported by agencies and partners directly involved in the health response, organized into four major committees – surveillance, community engagement and education, case management and communication. The logistics committee crosscut all committees.

> Cross-sectoral non-health actors (media, transport, defence, education etc.) were coordinated by the National Risk and Disaster Management Office (BNGRC).

> WHO Country Office and the Regional Office for Africa (AFRO) and Headquarters (HQ) provided direct technical and operational support to the country, collaborated closely with partners, including those in the Global Outbreak Alert and Response Network (GOARN) to ensure rapid and effective international assistance to the outbreak response.

> WHO classified the event as a Grade 2 emergency, and accordingly established its Incident Management System (IMS) and repurposed internal resources and mobilized external resources.

> Regional emergency operations centres (EOCs) were set up in five hotspot areas including Antananarivo, Tamatave, Mahajunga, Fianarantsoa and Fenerive.

Surveillance, contact identification and follow-up and laboratory support

> Institut Pasteur de Madagascar (IPM) played a critical role from the beginning of the outbreak, when blood samples collected from a case-patient were confirmed as plague at IPM using rapid diagnostic test (RDT) on 13 September 2017. This initial case triggered a field investigation, which led to the identification of the index case and established that the current outbreak began on 23 August 2017. Since confirming the outbreak, IPM continued to provide diagnostic capacity for plague, analysing collected samples and sharing results with the sending facility and others. WHO supported this response.

> A total of 1,800 community health workers from Antananarivo and 2,632 from other affected regions carried out contact tracing activities, supervised by 340 medical doctors and students.

Case management

> Nine plague treatment centres were established, six of which were in Antananarivo. The treatment centres were supported by IFRC, MSF, MdM, UNICEF and WHO.

Infection prevention and control

> A total of 198 staff made up of hygienists, guards, launderers, coordinators and logisticians were hired for the six treatment centres in Antananarivo and 70 additional staff were hired for treatment centres in Tamatave and Fenerive East.

PUBLIC HEALTH RESPONSE

Coordination of the response

> From August to November 2017, there was an effective multisectoral response by the Ministry of Public Health and partners. A high level inter-Ministerial coordination forum, chaired by the Prime Minister, was established to provide strategic and policy direction to the plague outbreak response. The Country Humanitarian Team of the United Nations System established a strategic coordination platform for partners, chaired by the Resident Coordinator.

> The logistics committee crosscut all committees.

> Regional emergency operations centres (EOCs) were coordinated by the National Risk and Disaster Management Office (BNGRC).

> WHO Country Office and the Regional Office for Africa (AFRO) and Headquarters (HQ) provided direct technical and operational support to the country, collaborated closely with partners, including those in the Global Outbreak Alert and Response Network (GOARN) to ensure rapid and effective international assistance to the outbreak response.

> WHO classified the event as a Grade 2 emergency, and accordingly established its Incident Management System (IMS) and repurposed internal resources and mobilized external resources.

> Regional emergency operations centres (EOCs) were set up in five hotspot areas including Antananarivo, Tamatave, Mahajunga, Fianarantsoa and Fenerive.
WHO engaged the Malagasy Red Cross to take responsibility for dignified and safe burial, based on a protocol that was developed. Burial teams were trained and 2,660 volunteers for the 22 regions were targeted.

Social mobilization, community engagement and risk communications
UNICEF supported production of field-tested public awareness/education materials (posters, brochures). A total of 69,000 posters and brochures were produced and distributed, including to partners in the Ministries of Transport and Tourism, church groups and other key influencers.
UNICEF supported three special sensitization meetings with the private sector and private sector platforms to ensure that the private sector was aware and supported relevant measures for their staff, and to mobilize private sector support for the response.

Logistics
UNICEF donated 23 tents, 50 beds, 150 adult body bags, 64 children’s mortuary bags, 300 boxes of 100 pairs of gloves, 12,000 surgical masks, 400 masks, and three inter-agency emergency health kits.
A total of 1,2 million doses of antibiotics donated by WHO were delivered to the national authorities in the country.
USAID donated 18,000 respirator masks, 100,000 simple masks and 10 vehicles to support operations of the Department of Public Health.

Resource mobilization
The joint response plan between the Government of Madagascar and its partners was adjusted to US$ 9.5 million, in view of the multisectoral response to the urban plague outbreak.
WHO provided US$ 1.5 million, UNICEF US$ 500,000, the International Federation of the Red Cross US$ 250,000, UNDP US$ 300,000, and UNFPA US$ 331,000. In addition, other organizations provided assistance in kind: China provided medicines worth US$ 200,000.
Contributions from the private sector included: the Oilers Group donated US$ 16,000, Canal+ offered free message broadcasting, DHL offered storage facilities, and Ambatovy, the Orange Solidarity of Madagascar Foundation and the BFV Bank – Société Générale donated personal protective equipment (PPE).

Partnership
In support of the Ministry of Public Health and the other national authorities, WHO and the GOARN partners deployed emergency response teams. By 24 October 2017, 115 experts (74 from the WHO Country Office in Madagascar, 26 through the WHO Headquarters and 15 from WHO Regional Office for Africa) were deployed to support the response in various fields.
WHO and GOARN continued to mobilize partners to provide technical, personnel and logistical support to the country, and worked closely with the United Nations Clusters, stakeholders and donors to ensure appropriate support to the outbreak response.

Preparedness/operational readiness
Nine countries and overseas territories were identified as priority countries in the African region for plague preparedness and readiness by virtue of having trade and travel links to Madagascar. These countries and overseas territories included Comoros, Ethiopia, Kenya, Mauritius, Mozambique, La Réunion (France), Seychelles, South Africa, and Tanzania.
The key readiness actions that were implemented in each priority country, in coordination and collaboration with major partners (UNICEF, CDC, ECDC, Red Cross/Red Crescent Societies etc.), included:
• Increasing public awareness of plague and enhancing surveillance for the disease, particularly at points of entry, such as air and sea ports;
• Conducting specific contingency planning with all health sector partners;
• Prepositioning of equipment and supplies, including PPE, antibiotics, and other equipment required to safely identify and manage potential plague cases.
• Providing in-country technical assistance in a range of areas, including surveillance, contact tracing, social mobilisation and risk communication.
After reporting suspected cases of plague, WHO deployed two epidemiologists, and a risk communication officer to support Seychelles to strengthen in-country preparedness and response.
WHO prepositioned equipment and supplies, including PPE, antibiotics and other equipment required to safely identify plague cases, in Comoros, Mauritius, Mozambique, Seychelles, and Tanzania.

DISCUSSION
The response to the plague outbreak in Madagascar benefited from the success of a number of effective strategies for the prevention and control of plague, notably partner engagement and coordination of response, rapid training of community health workers and others to implement enhanced surveillance, contact tracing, and follow up, rapid training of healthcare workers in case management and IPC, alongside rapid deployment of commodities needed for these activities.
Coordination of the health response by the Ministry of Public Health and WHO with support by agencies and partners directly involved in the health response facilitated access to much needed human and material resources critical to effective response. Rapid training of community health workers to conduct surveillance and contact tracing activities contributed greatly to knowledge of the evolution of the outbreak, while training of healthcare workers in case management and IPC facilitated the provision of appropriate medical care for suspected cases while protecting providers from infection. The IPM played a critical role in facilitating diagnosis of suspected cases and sharing information to inform response and treatment efforts. The Ministry of Health, WHO, and other partners’ efforts to mobilize and engage affected communities and communicate with the public regarding the risk of plague were effective.

Why is plague still a problem in these areas of Africa? There are a number of drivers of the disease. Poor rural communities live in close proximity to rodents, which are widely hunted and eaten in many plague-endemic areas. Superstition, poverty and distance from health facilities (and lack of money to pay for healthcare) can lead to delays in seeking treatment. Inadequate public health systems, humanitarian crises and lack of infrastructure also contribute. Changes to the landscape through climate change, and human mobility patterns are also increasingly favouring contact between plague-reservoir and peridomestic rodents and between people from plague-endemic and previously unaffected regions.

The 2015 outbreak of pneumonic plague in a non-endemic region was contained relatively fast, in spite of high transmission of the disease. The low population density in the geographical location of the outbreak and the rapid response are almost certainly the main reasons for this. However, during that outbreak, a new genotype was isolated, which had not been seen in previous outbreaks. In January 2017, multiple genotypes were isolated and found to be persistent in this region, including that isolated in the 2015 outbreak. The occurrence of pneumonic plague was assumed to be because of bloodstream spread of bacteria in untreated bubonic plague, allowing a pneumonic form of the disease that was easily transmitted from human to human.

In the 2017 outbreak, not only were the numbers of cases of pneumonic plague high and occurring in non-endemic areas, but endemic areas were seeing higher numbers of cases of bubonic plague than usual. This suggests a biological reason for persistence and spread of vectors, both fleas and rodents, which could be related to the recent climate effects of El-Niño in the Indian Ocean.

However, it is noteworthy that the case fatality ratio of pneumonic plague in this outbreak (7%) was lower than is usual for this form of the disease. The reasons for this need to be explored further, but may be because of the strains of Y. pestis present, the fact that most of the pneumonic plague cases are in large centres where they were detected and treated fast and because Madagascar does have an effective surveillance system. However, the fact that this outbreak occurred at all, shows that plague control in the country remains a challenge, with poor healthcare systems and traditional burial practices, which promote the disease.

The rapid response by government agencies, WHO and partners, almost certainly prevented a much larger outbreak. A key pillar in this response was the early establishment of the Incident Management System and rapid deployment of personnel on the ground to support the response. Social mobilization, community engagement and risk communication are crucial response pillars given the nature of the disease and particularly the risks associated with traditions around the dead, which need to be addressed particularly sensitively.
Geographical distribution of confirmed cases of plague in Madagascar, 1 August – 26 November 2017

Epidemic curve for plague outbreak in Madagascar, 1 August – 26 November 2017
UGANDA
MARBURG FEVER

**Uganda Marburg fever**

**SUMMARY**

- An outbreak of Marburg virus disease in Kween District, eastern Uganda, was notified on 17 October 2017.
- The index case was a 50-year-old woman who became ill on 3 October 2017, and died on 11 October 2017. Post-mortem blood samples returned positive for Marburg virus disease on 17 October 2017.
- The primary case in the outbreak was the index case’s brother, who had nursed her and participated in burial rituals. He died on 25 September 2017.
- The brother of the first two cases had transported his sister to hospital on 10 September 2017 and subsequently became ill. He died on 27 October 2017 and blood samples taken were positive for Marburg virus disease.
- A total of 316 close contacts of the patients were listed and followed up in Uganda and Kenya (one of the confirmed cases had travelled to Kenya before his death). In Kenya the close contacts completed 21-day follow up on 13 November 2017.
- By 8 November 2017 the number of reported cases remained at three (two confirmed and one probable), all of whom died (case fatality ratio 100%).
- The outbreak was declared over on 8 December 2017, 42 days after the last confirmed case died on 26 October 2017.

**EVENT DESCRIPTION**

The Uganda Ministry of Health notified WHO of an outbreak of Marburg virus disease in Kween District, eastern Uganda on 17 October 2017. The index case, a 50-year-old woman, became ill on 3 October 2017 and was initially admitted to the Kaproron Health Centre IV on 5 October 2017 with fever and a bleeding diathesis. She was referred to Kapchorwa Hospital on 10 October 2017 and was initially admitted to the Kaproron Health Centre IV on 5 October 2017 with fever and a bleeding diathesis. She was referred to Kapchorwa Hospital on 10 October 2017, where she died on 11 October 2017. Post-mortem blood specimens were collected and sent to the Uganda Virus Research Institute (UVRI) in Entebbe the same day. The woman was buried according to local custom on 13 October 2017. On 17 October 2017, UVRI reported that the specimens tested positive for Marburg virus disease by reverse transcription polymerase chain reaction (RT-PCR), after which the Ministry of health officially declared the outbreak on 19 October 2017.

Further investigations established that the primary case in the outbreak was the brother of the index case and that she had nursed and participated in her brother’s burial rituals. The primary case was a 42-year-old hunter who lived in a village on the slopes of Mount Elgon, near a game park. He was admitted to the Kaproron Health Centre IV on 20 September 2017 with a high fever, vomiting and diarrhoea and was initially unsuccessfully treated for malaria. His condition deteriorated and he was transferred to Kapchorwa Hospital on 25 September 2017 and died the same day. No laboratory specimens were collected. He was buried according to local custom on 27 September, an event that was attended by an estimated 200 people.
A third case patient was the brother of the first two cases, who transported his sister to hospital on 10 September 2017 and subsequently became ill. After initially refusing admission and returning to the community, he was admitted to the treatment centre in Kween District, where he died on 27 October 2017. Specimens collected from this case were confirmed as Marburg virus disease by RT-PCR.

There were no further confirmed cases and by 8 November 2017 the number of reported cases remained at four (three confirmed and one probable), all of whom died (case fatality ratio 100%). During the course of the outbreak a further four suspected cases were reported, all contacts of the first confirmed case and all tested negative for the virus.

A total of 316 close contacts of the patients were listed and followed up in Uganda and Kenya (one of the confirmed cases had travelled to Kenya before his death). In Kenya the close contacts completed 21-day follow up on 13 November 2017.

The outbreak was declared over on 8 December 2017, 42 days after the last confirmed case died on 26 October 2017.

PUBLIC HEALTH RESPONSE

As the outbreak was notified the National Task Team was reactivated and an Incident Management System (IMS) established and an Incident Manager appointed. The District Task Force was established and an emergency response plan developed.

WHO deployed additional staff, six viral haemorrhagic fever kits and additional funding to support and scale up the response, including case management and facilitating specimen transport.

A rapid response team was deployed to Kween and Kaopchorwa Districts on 18 October 2017 to conduct outbreak investigations and support local response activities.

The Minister of Health held a press conference on 19 October 2017 to inform the public of the outbreak, allay anxiety and disseminate preventive messages.

Active surveillance was immediately initiated within the affected communities and healthcare centres, including active case search, and contact tracing and monitoring. Cross-border surveillance activities were initiated with the Kenyan authorities and alert desks were set up in Kween and Kapchorwa Districts.

Healthcare workers were put on high alert and training sessions planned and carried out, including a thorough review of infection prevention and control (IPC) protocols.

An isolation centre was set up at the Kaproron Health Centre IV with logistical support from UNICEF, and burial teams were trained in affected districts.

Community engagement and awareness campaigns were planned and carried out to reduce stigma and to encourage reporting and early health-seeking behaviour. Psychosocial support specialists were deployed to Kween and counselling sessions were conducted for discharged suspected cases.

Information, education and communication (IEC) materials and messages were updated and readied for mass production. Guided tours of the Marburg treatment units in Kapchorwa and Kween were organized to allay fears of incorrect practice among the local population.

Various international partners were engaged to support the response. WHO deployed additional staff, six viral haemorrhagic fever (VHF) kits and additional funding to scale up the response and support local authorities with case management and facilitate specimen transportation. UNICEF assisted with communication activities and MSF was deployed to treatment centres.

A joint meeting between Uganda and Kenya health authorities was held on 30 October 2017 and cross-border surveillance initiated. A temporary treatment facility was identified in Kaisangat Health Centre and the Kenya Red Cross Society recruited and re-oriented nurses to manage the centre. A further meeting was held on 7 November 2017 to coordinate surveillance and response activities in both countries.

WHO despatched 2,000 sets of personal protective equipment to Tans Nzi County, Kenya.

WHO Headquarters, in collaboration with the US Centers for Disease Control and the European Mobile Consortium, coordinated the deployment of a mobile laboratory to Kapchorwa to follow-up a clinical trial on compassionate use of antivirals (favipiravir and Gilead GS5734) for treatment and post-exposure prophylaxis, with the agreement of the Uganda Ministry of Health.

DISCUSSION

Marburg virus disease outbreaks have been documented in Uganda since 2007. The last was an isolated case in 2014. In 2012, a large outbreak occurred in which there were 28 cases and 15 deaths reported (case fatality ratio 53.5%). Historically, cases have been reported among miners and travellers who visited caves inhabited by bat colonies, particularly in the western part of Uganda.

Uganda is experienced in the management of recurring viral haemorrhagic disease outbreaks, including Marburg virus disease. This outbreak involved few cases and remained localized, in spite of concerns about the potential for spread into neighbouring Kenya. National authorities responded rapidly and implemented control measures promptly. The main concerns during the outbreak were the potential number of contacts in the community, particularly as the last confirmed case had consulted traditional healers days before being re-admitted. Contact tracing was also hampered by the remoteness of affected areas, with poor road conditions. There were also reports of field teams finding that local communities were unwilling to share information. However, this was overcome by dialogue with the local community by national authorities and political leaders.

Kenya, on the other hand, has not experienced an outbreak of viral haemorrhagic fever since the 1980s and operational assessments identified gaps that required urgent attention. In particular, healthcare workers needed training in recognising viral haemorrhagic disease and in infection prevention and control measures, as well as surveillance.
Geographic distribution of Marburg cases in Uganda, 16 September - 18 October 2017

Epidemic curve for the Marburg outbreak in Uganda, 16 September - 18 October 2017
Laboratory blood samples. Source: shutterstock.

SENEGAL
DENGUE FEVER
An outbreak of dengue fever was notified to WHO on 24 October 2017 by the Ministry of Health and Social Action. However, retrospective investigation showed that the outbreak in fact started on 28 September 2017, when the initial suspected cases reported to the health facility. The outbreak was initially confined to the Louga Region, in the north-west of the country and was detected through arboviruses and haemorrhagic fever sentinel surveillance. Between 6-12 October 2017, the Institut Pasteur Dakar (IPD) received 24 specimens from the Santhiaba Health Post sentinel surveillance site in the Louga Region. On 20 October 2017, IPD released results showing that of the 24 specimens tested, nine were positive for dengue virus serotype 1 (DENV-1) by polymerase chain reaction (PCR). A multidisciplinary rapid response team was deployed to Louga Region to conduct further outbreak investigation. They confirmed 21 additional cases among symptomatic patients. By 9 December 2017, the outbreak had spread to three other regions, although the overall disease trend was declining. At the start of the outbreak the Emergency Operations Centre of the Ministry of Health was activated to coordinate outbreak response. At the same time a comprehensive response plan was developed to guide response operations and aid resource mobilization. Vector control interventions were immediately started in affected communities and active surveillance strengthened. By the 15 January 2018 no further cases were reported, with no deaths and no severe disease and the outbreak was declared closed. There were a total of 806 cases, with 138 confirmed.
and a total of 132 samples tested positive by PCR. All confirmed cases were DENV-1. There were no severe cases and no deaths.

Most (97%) of cases were reported from the Louga Region. All except the Dakar case were detected through surveillance at health facilities. The Dakar case was detected through diagnostic testing at a private hospital.

Environmental investigation in the Louga Region identified multiple mosquito breeding sites, including uncovered water drums, flower pots, backyard orchards and banana plantations. In Dakar, mosquito breeding sites included uncovered water buckets used to collect drainage from air conditioning units.

By the 15 January 2018 no further cases were reported, with no deaths and no severe disease and the outbreak was declared closed. There were a total of 806 cases, with 138 confirmed.

**DISCUSSION**

This outbreak of dengue fever was against a backdrop of the emergence of the disease in West Africa. Outbreaks were reported in Burkina Faso, Cabo Verde, Côte d’Ivoire and Mali. This outbreak was detected through sentinel surveillance, which may indicate that the disease has been spreading in the community for some time without being noticed, making the true burden of disease difficult to measure. Preliminary environmental investigations in affected communities identified multiple suitable mosquito breeding sites, such as uncovered water drums, flower pots, backyard orchards and banana plantations.

The disease vector is *Aedes* species and environmental and entomological studies are needed to determine disease burden and potential risk, including vector density, spatial distribution and infectivity.
Geographic distribution of dengue fever cases in Senegal, 28 September - 21 November 2017

Epidemic curve for the dengue fever outbreak in Senegal, 28 September - 21 November 2017
MAURITANIA
CRIMEAN-CONGO HAEMORRHAGIC FEVER

Mauritania
Crimean-Congo haemorrhagic fever

SUMMARY

A confirmed case of Crimean-Congo haemorrhagic fever (CCHF) was notified to WHO from the outskirts of Nouakchott on 20 November 2017.

The index case was a 48 year-old cattle trader from Haye Sakin who fell ill on 11 November 2017, developed symptoms of haemorrhagic fever on 15 November 2017, was immediately isolated, and was confirmed by laboratory testing to have CCHF on 17 November 2017. He improved on treatment and was discharged on 22 November 2017.

A total of 25 contacts were identified and followed up for 21 days.

An immediate public health response followed, including the formation of sub-committees for coordination, case identification and surveillance, and medical and veterinary services. Staff were sensitized to CCHF and a daily situation report was organized to inform response to the outbreak.

At the end of the 42-day follow up period after the index case was notified (15 November 2017), no clinical signs and symptoms were identified in contacts and the outbreak was declared over on 27 December 2017.

EVENT DESCRIPTION

On 20 November 2017, the Ministry of Health Mauritania notified WHO Regional Office for Africa of a confirmed case of Crimean-Congo haemorrhagic fever (CCHF) in Dar Naim, on the outskirts of the capital city, Nouakchott.

The index case was a 48 year-old cattle salesman, from Haye Sakin. He fell ill on 11 November 2017, presenting to the Teyarett Health Centre with fever, fatigue and headache. No definitive diagnosis was made and he was treated as an outpatient. However, his symptoms persisted and he developed a bleeding diathesis and returned to the health facility on 15 November 2017, from where he was referred to the Cheikh Zayed Hospital in Nouakchott. Because of the suspicion of a haemorrhagic fever, he was immediately isolated and blood samples collected. A thick blood slide was positive for malaria. An additional blood sample was sent to the National Institute for Public Health Research (INSP), Nouakchott, which was positive for CCHF by polymerase chain reaction (PCR) on 17 November 2017. He improved on treatment and was discharged on 22 November 2017.

A total of 25 contacts were identified, ten in the family of the index case, nine at Cheikh Zayed Hospital, and six at the Teyarett Health Centre. All were line listed and followed up for 21 days until 6 December 2017.

At the end of the 42-day follow up period after the index case was notified (15 November 2017), no clinical signs and symptoms were identified in contacts and the outbreak was declared over on 27 December 2017.
DISCUSSION

This outbreak was detected and responded to promptly and effectively, suggesting an enhanced ability to respond to CCHF and therefore other health emergencies. The country had just finished a simulation exercise on 16 November 2017, which may have contributed to this. The NIPHR has the capacity to diagnose CCHF, which facilitated rapid confirmation of the pathology in this case.

However, there were three previous outbreaks of CCHF in Mauritania in 2017, the first two in May and June and the third in August of that year. These comparatively regular outbreaks suggest that the virus and its reservoir and vector, *Hyalomma* tick species, are prevalent in the country. Elimination requires a One Health response from both medical and veterinary authorities.

PUBLIC HEALTH RESPONSE

- Immediately following the notification, an emergency meeting was held on 21 November 2017, which included the Directorate for Combating Disease (DLM), the Regional Directorate of Sanitary Action North Naouakchott (DRAS-Nktt-n), the Directorate of Veterinary Services (DSV) and WHO.
- Three sub-committees were set up as a result of this meeting: a coordination committee, investigation, follow-up and case management and a response subcommittee composed of medical and veterinary services and a WHO representative.
- Staff at the Tayarett Health Centre and the Cheikh Zayed Hospital were provided with education on viral haemorrhagic fevers and appropriate hygiene measures. At Cheikh Zayed Hospital the emergency department and isolation ward were disinfected.
- A daily situation report was organized with the technical and financial assistance of WHO, which was used to inform responses for the duration of the outbreak.
Geographic distribution of Crimean-Congo haemorrhagic fever cases in Mauritania, 27 November 2017

Ticks of the genus Hyalomma are the principal vector of Crimean-Congo haemorrhagic fever. Female (right), male (left).
Credit: Robert Swanepoel/NICD South Africa
GHANA

INFLUENZA A H1N1
Ghana
Influenza A H1N1

SUMMARY

- On 6 December 2017, the Ghana Ministry of Health notified WHO of a focal outbreak of influenza A H1N1 in Kumasi Academy High School.
- The case-patients presented with fever, cough, headache, and joint and body pains and respiratory symptoms.
- Laboratory specimens, including blood, cerebrospinal fluid and throat swabs were sent to Noguchi Memorial Institute for Medical Research (NMIMR), which is a national influenza centre, Kumasi Centre for Collaborative Research (KCCR) and other public health laboratories. Test results on 6 December 2017 from NMIMR showed that 12 out of 19 throat swabs were positive for influenza A H1N1 pmd09 2009 pandemic strain.
- By 31 December 2017, there had been 95 cases, with 4 deaths (case fatality ratio 4.3%).
- By 8 January 2018 there had been no new reported case linked to the outbreak, which was over two maximum incubation periods, and the outbreak was declared over.
- Public health responses involved the Ghana Ministry of Health and WHO Director General and Regional Office for Africa, and included improved case management, enhanced surveillance, public education and influenza H1N1 vaccination.

EVENT DESCRIPTION

An outbreak of a febrile illness, suspected to be meningitis, was reported from Kumasi Academy High School (KAHS), on 29 November 2017. A cluster of 13 cases of severe acute upper respiratory illnesses was reported from the school, the initial cases developing on 29 November 2017. By 1 December 2017, three deaths had been reported. On 6 December 2017, the Ghana Ministry of Health notified WHO of a focal outbreak of influenza A H1N1 in the school. By 9 December 2017, 88 cases and four deaths (case fatality ratio 4.5%) had been reported.

The case-patients presented with fever, cough, headache, joint and body pains and abnormalities on auscultation of the chest. Most, 66%, of cases were males and over 95% of the cases were in teenagers. The disease remained localized to the school. Kumasi Academy High School is a mixed sex school, with 2 814 students, including 541 day students, 127 teaching staff and 73 non-teaching staff. Most (95%) of the reported cases were students, with three health staff and one member of the teaching staff affected.

Laboratory specimens, including blood, cerebrospinal fluid and throat swabs were sent to Noguchi Memorial Institute for Medical Research (NMIMR), which is a national influenza centre, Kumasi Centre for Collaborative Research (KCCR) and other public health laboratories. Test results on 6 December 2017 from NMIMR showed that 12 out of 19 throat swabs were positive for influenza A H1N1 pmd09 2009 pandemic strain.
Research (KCCR) and other public health laboratories. Test results on 6 December 2017 from NMIMR showed that 12 out of 19 throat swabs were positive for influenza A H1N1pdm09 2009 pandemic strain. These findings were corroborated by results released by KCCR on 7 December 2017, which showed that seven out of 25 nasal swabs were positive for influenza type A by quantitative real time polymerase chain reaction (rt-PCR). Twenty-six blood specimens tested negative for Ebola and Marburg virus diseases, Lassa fever, yellow fever, dengue, chikungunya and Zika virus. Specimens analyzed in other public health and research laboratories were negative for meningitis and encephalitis.

By 31 December 2017, there had been 95 cases, with four deaths (case fatality ratio 4.3%). However, no new cases had been reported since 12 December 2017 and no new deaths after 5 December 2017. By 8 January 2018 there had been no new reported case linked to the outbreak, which was over two maximum incubation periods, and the outbreak was declared over.

**DISCUSSION**

The influenza H1N1 virus that caused the 2009 pandemic is now a regular human influenza virus that circulates worldwide. Any seasonal influenza spreads easily, with rapid transmission in crowded areas, including schools, which is what happened in this instance.

Ghana has a good influenza preparedness system. The National Influenza Centre at NMIMR is part of the Global Influenza Surveillance Network (GISN), coordinated by WHO since 1996. Furthermore, the country benefits from the Pandemic Influenza Preparedness (PIP) Framework for determination of influenza burden of disease. The PIP Framework facilitates sharing of influenza viruses and access to vaccines and other benefits to improve global pandemic influenza preparedness and response. These capabilities enhanced the ability to detect the current outbreak in real time and initiate containment measures, which meant that the outbreak remained localized.

A consequence of the outbreak is setting up of and strengthening of systems to prevent, detect cases early and respond rapidly to any future occurrences, to mitigate negative impact. The lessons learnt from this outbreak have been used to enhance school health and surveillance systems for H1N1, other influenza-like illnesses and all priority diseases, not only in the school but nationwide.
Geographic distribution of influenza A H1N1 cases and deaths in Ghana, 29 November - 19 December 2017

Epidemic curve for influenza A H1N1 in Kumasi, Ashanti Region, Ghana, 29 November - 19 December 2017
Taking blood from a multimammate mouse, the animal host of the Lassa virus. Source: REUTERS

LASSA FEVER
NIGERIA
Nigeria
Lassa fever

SUMMARY

A new cluster of five Lassa fever cases was notified to WHO on 15 January 2018, part of ongoing Lassa fever outbreak in Nigeria.

From 1 January 2018 to 27 May 2018, a total of 1,968 suspected Lassa fever cases were reported from 21 states.

Of these, 431 were confirmed and 10 classified as probable, and 1,523 tested negative (non-cases). A total of 118 deaths occurred among confirmed (108 deaths) and probable cases (10 deaths), giving a case fatality ratio of 26.8% in this group.

The greatest number of cases were reported between week 2 (week ending 13 January 2018) and week 9 (week ending 10 March 2018).

Full public health actions were initiated by Nigeria Centre for Disease Control Lassa Fever Response working group, with the support of WHO, Médecines sans Frontières (MSF), US CDC and other partners. This included the activation of a National Lassa fever Emergency Operations Centre (EOC) on 22 January 2018 to coordinate the response.

Several challenges were observed across all pillars of the outbreak response, which should be addressed in the after-action review and acted on by the national authorities.

By early May 2018 the emergency phase of the outbreak was declared over.

EVENT DESCRIPTION

On 15 January 2018, WHO was notified of a new cluster of five Lassa fever cases reported from Ebonyi State. The index case was a 15-year-old boy from Abakaliki local government area, who was admitted to hospital on 28 December 2017 with fever and haemorrhagic signs. He died a few days later. Four healthcare workers who treated the index case fell ill, of whom three died. Samples taken from the healthcare workers tested positive for Lassa fever by polymerase chain reaction (PCR).

This initial Lassa fever cluster was part of an ongoing outbreak. As of 24 December 2017, there were 1,022 suspected cases and 127 deaths (case fatality ratio 12%). Nineteen out of 36 states had, by this date, reported at least one confirmed case of Lassa fever (Ogun, Bauchi, Plateau, Ebonyi, Ondo, Edo, Edo, Taraba, Nasarawa, Rivers, Kaduna, Gombe, Cross-River, Borno, Kano, Kogi, Enugu, Anambra, Lagos, and Kwara). More than 80% of all confirmed cases came from Edo (42%), Ondo (24%) and Ebonyi (51%). The greatest number of cases were reported between week 2 (week ending 13 January 2018) and week 9 (week ending 10 March 2018). By week 8 (week ending 23 February 2018), the number...
A team of NCDC staff and Nigeria Field Epidemiology and Laboratory Training Programme (NFELTP) residents were deployed to respond to the Ebonyi, Ondo and Edo outbreaks.

A 24-hour Lassa fever case management help desk was set up.

A seroprevalence survey and research into development of a rapid diagnostic test kit for Lassa fever was set up with support from WHO.

A national Lassa fever After Action Review meeting was scheduled for 5-7 June 2018.

DISCUSSION

Lassa fever is endemic in Nigeria. However, this initial cluster of cases and the subsequent outbreak, which had wide geographical spread, suggests that current preparedness and response activities were insufficient to prevent significant morbidity and mortality. In addition, available treatment facilities were overstretched and there was lack of funding, which prevented contact tracing in Edo State, problems with logistics, delays in samples reaching diagnostic centres and gaps in surveillance and contact tracing. The numbers of healthcare workers affected suggested that there was poor understanding of infection prevention and control practices. The potential for cross-border spread also meant that cross-border surveillance and collaboration with neighbouring countries was essential.

Several challenges were observed across all pillars of the outbreak response, which need to be addressed, because of the nature of the disease and its endemic status in Nigeria. These should be addressed in the after-action review and acted on by the national authorities.

PUBLIC HEALTH RESPONSE

The Nigeria Centre for Disease Control (NCDC) Lassa Fever Response working group coordinated weekly Lassa fever review meetings with the participation of WHO, Médicines sans Frontièrs (MSF), US CDC and other partners.

A National Lassa fever Emergency Operations Centre (EOC) was activated on 22 January 2018 to coordinate the response, in conjunction with partners (WHO, CDC, UMB, AFENET, MSF and ALIMA) and a letter of notification of Lassa fever EOC activation has been sent to 36 states and the Federal Capital Territory (FCT).

The Ebonyi State Emergency Outbreak Committee was activated by the State Governor and met daily to coordinate response activities.

Funds were released by the Ebonyi State Government to initiate the response, with a particular focus on case management.

On 12 February 2018, WHO deployed a team of six international experts in viral haemorrhagic fevers (VHF) to join 14 other WHO staff to support the NCDC response.

Active case finding and contact monitoring took place in Ebonyi State and a standard Lassa fever case definition was shared with health facilities, along with clinician sensitization.

Enhanced surveillance took place in affected states through the State Surveillance Team and the viral haemorrhagic fever (VHF) management system was updated. The Surveillance, Outbreak Response, Management and Analysis System (SORMAS) was deployed in affected states.
Geographical distribution of confirmed Lassa fever cases in Nigeria weeks 1-21, 2018

Weekly trend of confirmed Lassa fever cases and deaths in Nigeria, weeks 1-21, 2018
Map of the outbreaks and other emergencies reported to WHO AFRO in 2018

EBOLA VIRUS DISEASE
DEMOCRATIC REPUBLIC OF THE CONGO
An outbreak of Ebola virus disease in Bikoro Health Zone, Equateur Province was declared by the Ministry of Health, Democratic Republic of the Congo on 8 May 2018.

Of five blood samples collected between 5-6 May 2018 from patients with fever and haemorrhagic signs, two were found to be positive for *Zaire Ebolavirus* at the Institut National de Recherch Biomédical, Kinshasa by reverse transcriptase PCR.

Full public health measures were immediately initiated by the Ministry of Health, WHO and partners, with coordination structures in place from the previous Ebola virus disease outbreak in May 2017 reactivated.

The outbreak initially evolved relatively rapidly, but by 26 May 2018, the number of new cases showed a declining trend.

The outbreak remained confined to three health zones: Bikoro, Iboko and Wangata.

The last confirmed case was on 2 June 2018 and the end of the outbreak was declared on 24 July 2018, 42 days after blood samples from the last confirmed case twice tested negative for the virus.

By the end of the outbreak there had been a total of 54 cases, with 33 deaths (case fatality ratio 61%).

**EVENT DESCRIPTION**

On 8 May 2018, the Ministry of Health of the Democratic Republic of the Congo notified WHO of an outbreak of Ebola virus disease (EVD) in Bikoro Health Zone, in the north-western Equateur Province. The event was initially reported by the provincial health authority on 3 May 2018 when a cluster of 21 cases of fever with haemorrhagic signs, including 17 community deaths, occurred in Ikoko Impenge Health Area, Bikoro Health Zone, approximately 125 km south of the provincial capital of Mbandaka.

A national rapid response team (RRT), composed of members of the Ministry of Health, Médecines sans Frontières (MSF) and WHO, travelled to Bikoro from 5-6 May 2018 and collected blood samples from five hospitalized patients. The samples were transported to the Institut National de Recherch Biomédicale (INRB) in Kinshasa on 6 May 2018. Reverse transcriptase polymerase chain reaction (RT-PCR) results released on 7 May 2018 showed that two were positive for *Zaire Ebolavirus* and the outbreak was declared. Further investigation identified additional cases in neighbouring Wangata and Iboko health zones.

The outbreak initially evolved relatively rapidly, with a total of 39 suspected cases including 19 deaths by the 13 May 2018, rising to 46 cases and 26 deaths by 18 May 2019. However, by 26 May 2018, the number of new cases declined significantly and this trend continued.
The last confirmed case was on 2 June 2018 and the last surviving confirmed EVD case was discharged from an Ebola treatment centre, following two negative tests on serial laboratory specimens, on 12 June 2018. The end of the outbreak was declared on 24 July 2018, 42 days (two maximum incubation periods) after blood samples from the last confirmed case twice tested negative for the virus. By the end of the outbreak there had been a total of 54 EVD cases (38 confirmed and 16 probable), with illness onset between 5 April and 2 June 2018. Of these cases, 33 died (overall case fatality ratio 61%), including 17 deaths among confirmed cases. Cases were reported from three health zones: Bikoro (n=21; 10 confirmed, 11 probable), Iboko (n=29; 24 confirmed, 5 probable) and Wangata (n=4; all confirmed). Seven cases were in healthcare workers, two of whom died.

PUBLIC HEALTH RESPONSE

- On 8 May 2018, the Minister of Health of the Democratic Republic of the Congo held a press conference to formally declare the outbreak of EVD, in collaboration with the WHO representative.

- On the same date, the three levels of WHO (Headquarters (HQ), Regional Office for Africa (AFRO), and the Country Office in the Democratic Republic of the Congo) issued a joint News Release to announce the outbreak globally.

- The WHO Director General, Deputy Director General for Emergencies and the Regional Director for the WHO African Region, accompanied by senior staff, visited the Democratic Republic of the Congo from 12-13 May 2018 to assess the situation and direct the continuing response, in support of national health authorities.

- Coordination structures were reactivated by the Ministry of Health at national, provincial and local levels, with involvement of all partners. At national level, daily coordination meetings took place, chaired by the Minister of Health and attended by all humanitarian partners. A health cluster meeting was held on 10 May 2018 to mobilize partners. Regular meetings took place throughout the course of the outbreak.

- WHO was in full response mode in support of national authorities, working with key partners, including Médecines sans Frontières (MSF), World Food Programme (WFP), UNICEF, International Federation of Red Cross and Red Crescent Societies (IFRC) and the Congolese Red Cross, UNOCHA and MONUSCO, US Centers for Disease Control and Prevention (US-CDC), the International Organization for Migration (IOM) and others.

- WHO established its Incident Management System of fully dedicated staff and resources across the three levels of the organization to support response. Arrangements were finalised for immediate deployment of technical experts, including epidemiologists, clinicians, infection prevention and control (IPC) experts, risk communications specialists, logisticians, and vaccination support teams. An advance team, including the Incident Manager, arrived in the country on 9 May 2018.

- On 9 May 2018, the Ministry of Health, in conjunction with WHO and MSF, deployed additional teams of technical experts to the affected health zones to support outbreak investigations and local response.

- Surveillance, case management, risk communication and psychosocial support were all immediately initiated. IPC and water, sanitation and hygiene (WASH) activities immediately started with a safe water supply installed at Bikoro General Hospital and supervision of waste management activities at the local market.

- WHO, GOARN partners (MSF, UNICEF and IFRC) and other partners supported the Ministry of Health and other national authorities through provision of technical, financial and logistical resources. WHO also worked closely with the UN agencies and other development partners to ensure appropriate support for the response.

- A total of 7 560 doses of recombinant vesicular stomatitis virus-Zaire Ebola virus (rVSV-ZEBOV) vaccines arrived in Kinshasa by 19 May 2018 and targeted vaccination started on 21 May 2018. Between 21 May 2018 and 26 June 2018, a total of 3 481 people were vaccinated.

- A mobile laboratory deployed at Bikoro Referral Hospital became fully operational on 16 May 2018, while a second mobile laboratory was deployed to Mbandaka. The National Laboratory strategy focused on GeneXpert for confirmatory testing in key sites such as Ebola Treatment Centres.

- MSF set up isolation facilities in Mbandaka’s main hospital (20 beds) and Bikoro hospital (15 beds) and two Ebola treatment centres were set up in Iboko and Itipo.

- A clinic for EVD survivors was established in Bikoro, operated by the Ministry of Health INRB and MSF. WHO supported the Ministry of Health to establish a one-year programme of care for survivors focusing on clinical follow-up, counselling, semen testing and psychosocial support.

- By 21 May 2018, WHO had deployed 110 technical experts in various disciplines – Who AFRO (74, including 34 vaccination technical staff from Guinea), WHO HQ (20) and WHO Country Office (16).

- WHO deployed 164 technical experts in various critical functions of the Incident Management Support System to support response in the three hotspots of Bikoro, Iboko and Wangata (Mbandaka city).

- The Ministry of Health, with support from CDC, WHO, Epicentre and other partners maintained an up-to-date outbreak database, including line lists, contact
A point of entry (POE) surveillance strategy was developed by the Ministry of Health, WHO, IOM, Africa CDC, UNICEF and WFP.

The WFP established an air-bridge between Kinshasa, Mbandaka and the affected areas, with flights six days a week, to deliver supplies and personnel.

WHO supported preparedness and readiness activities in nine neighbouring countries, Angola, Burundi, Central African Republic, Congo, Rwanda, South Sudan, Tanzania, Uganda and Zambia. Preparedness support teams were deployed to eight out of the nine countries to assess EVD readiness, support development of contingency plans (with partners) sensitize key stakeholders on EVD preparedness and strengthen cross border surveillance at POEs. Personal protective equipment, infrared digital thermometers and other essential supplies were prepositioned in these countries.

A workshop was held from 20-21 July 2018 in Kinshasa during which surveillance, coordination, case management, laboratory testing and vaccination teams, along with heads of the affected zones from Equateur Province (Mbandaka, Bikoro, Itipo and Iboko) met, with the support of WHO, to harmonize and validate data from the EVD response in the light of the declaration of the end of the outbreak.

Meetings were held with all partners to discuss effective implementation of stabilization and consolidation activities and a security meeting was held with the provincial ministers of the Interior and Justice on strengthening security in Bikoro because of increasing insecurity in the region, along with a coordination meeting with all the health zone Commissions in the Bikoro Region.

Under the Consolidation and Stabilization Plan enhanced surveillance capacity will be maintained and further strengthened to rapidly detect and respond to potential new cases of Ebola virus disease, including for points of entry and the locations of areas where travellers congregate and interact with the local population, and in neighbouring provinces and countries. As of 21 July 2018, 850 alert cases were investigated across the country, and 11 278 households have been visited (79% of the total) in the 10 zones of the Bikoro Health Zone.

DISCUSSION

This new outbreak of Ebola virus disease came almost a year after the last outbreak was declared in 11 May 2017. This was the ninth outbreak of the disease in the country since the virus was discovered in Democratic Republic of the Congo (formerly Zaire) in 1976.

A full response was rapidly mounted to this outbreak by the Ministry of Health and other national authorities, WHO and partners. This effective and coordinated response rapidly contained the outbreak to the localized affected areas. This was achieved by rapid scaling up of proven containment measures, effective surveillance, including maintenance of a full data base, contact tracing and follow up, active case searching, ring vaccination, and risk communication, social mobilization and community engagement. This was in spite of confirmation of a case in Mbandaka city, with a population of more than one million and connections to other major cities in the country, such as Kinshasa through road, air and water

The team Prevention and Infection Control travelling to health area. WHO/DRC credit: J. Naissem.
Geographical distribution of Ebola virus disease cases in Equateur Province, Democratic Republic of Congo, 8 May - 24 July 2018

Weekly trend of Ebola virus disease cases in Equateur Province, Democratic Republic of Congo, weeks 14 - 22, 2018
Rift Valley fever is a disease passed from mosquitoes to animals then to people. Source: Shutterstock.
Kenya

Rift Valley fever

- An outbreak of Rift Valley fever (RVF) was reported to WHO by the Kenya Ministry of Health in Wajir County on 8 June 2018.
- At the same time, the Kenya Ministry of Livestock had reported a high number of deaths and abortions among camels and goats in the previous two months in four counties and on 8 June 2018, a suspected epizootic was reported to the World Organization for Animal Health.
- Risk assessment for RVF in humans and animals identified eight counties (Tana River, Tharaka Nithi, Garissa, Lamu, Kajiado, Baringo, Mombasa, and Nairobi) as being at high risk of an RVF outbreak.
- Following the initial confirmation of RVF a total of 95 cases, including 11 deaths (case fatality ratio 11%) were reported from three counties.
- The Eldas sub-county, Wajir reported the highest number of cases (79).
- Full public health response measures were initiated in the affected areas by the Ministries of Health and Livestock.
- The Ministry of Agriculture and Livestock issued a ban on slaughtering animals for human consumption. A ban on movement of livestock from all affected and at-risk counties was also imposed.
- The last case was reported on 20 July 2018.

EVENT DESCRIPTION

On 8 June 2018, the Kenya Ministry of Health reported an outbreak of Rift Valley fever (RVF) in Wajir County in the north-east of the country. The index case, an 18-year-old male, presented to a local health facility with fever, weakness, a bleeding diathesis, and other systemic symptoms. He died on the day of admission, having been ill for five days, with bleeding for the previous three days. He had a history of eating meat from a camel that had died of illness around 22-23 May 2018. On 4 June 2018, two relatives of the index case presented to the local referral hospital with high fever and bleeding from the mouth. One of the case-patients, a 25-year-old male, died on the day of admission. Blood specimens collected from these two case-patients were sent to the Kenya Medical Research Institute (KEMRI), one of which tested positive for RVF by polymerase chain reaction (PCR).

At the same time, the Kenya Ministry of Livestock had reported a high number of deaths and abortions among animals, particularly camels and goats, occurring in the last two months in four counties – Kajiado (bordering Tanzania), Kitui (east of Nairobi), Marsabit (bordering Ethiopia) and Wajir (bordering Ethiopia and Tanzania), all known to be RVF endemic areas. A number of animal blood samples had tested positive for RVF. On 8 June 2018, the Kenya Ministry of Livestock reported a high number of deaths and abortions among camels and goats in the previous two months in four counties. A suspected epizootic was subsequently reported to the World Organization for Animal Health.
In 2018, the Kenya Directorate of Veterinary Services notified the World Organization for Animal Health of a suspected RVF epizootic in the country. All human cases are primarily herders who were epidemiologically linked to suspected RVF cases. Risk assessment for RVF in humans and animals identified eight counties (Tana River, Tharaka Nithi, Garissa, Lamu, Kajiado, Baringo, Mombasa and Nairobi) as being at high risk of an RVF outbreak.

By 8 June 2018 a total of 10 suspected cases of RVF, including five deaths (case fatality ratio 50%) had been reported in Wajir County. Eight additional blood samples were sent to KEMRI. Following the initial confirmation of RVF a total of 95 cases, including 11 deaths (case fatality ratio 11%) were reported from three counties. Twenty-one samples submitted to KEMRI tested positive by PCR. Wajir reported 82 cases and six deaths, Marsabit reported 11 cases and three deaths and Siaya County reported one case and one death. The Eldas sub-county, Wajir reported the highest number of cases (79). The last case was reported on 20 July 2018.

On 29 June 2018, the Ugandan Ministry of Health notified WHO of an outbreak of RVF in Isingiro and Kasese districts, both in the western region of the country. This outbreak came at a time when Kenya was still reporting RVF cases and Rwanda was reporting a suspected epizootic, with possible human cases.

PUBLIC HEALTH RESPONSE

- On 8 June 2018, the Ministries of Health and Agriculture and Livestock held an emergency meeting, attended by WHO and partners, to review the outbreak situation and plan responses. A subnational task force was activated in Wajir County, which held meetings three times a week.

- A joint multidisciplinary national rapid response team from the Ministries of Health and Agriculture and Livestock was deployed to the affected counties to conduct outbreak investigations and support local response.

- Both the Director of Medical Services and the Ministry of Livestock issued an alert focusing on the eight counties where both human and animal cases had been reported and affected counties were directed to send blood samples directly to KEMRI and the National Public Health Laboratory Service for confirmation.

- A national RVF technical committee, chaired by the Director of Veterinary Services, was constituted, and met weekly.

- An Emergency Operations Centre was established, with an Incident Manager and supporting technical team.

- A team from the Field Epidemiology and Laboratory Training Programme was dispatched to Wajir to support the county health teams and active surveillance was ongoing in these counties as well as contact tracing in Wajir and Marsabit.

- Four treatment centres were established in Wajir County.

- The Ministry of Agriculture and Livestock issued a ban on slaughtering animals for human consumption.

- A total of 500,000 doses of RVF vaccine was provided to high risk counties and personal protective equipment and sample protection protocols were shared with Wajir veterinary officers.

DISCUSSION

Rift Valley fever is an emerging mosquito-borne zoonotic disease that primarily affects domesticated ruminants, but can also cause severe illness in humans. Most human infections are asymptomatic or relatively mild and the overall case fatality ratio is below 1%. However, a small percentage of people develop the more severe forms of the disease. Most human infections result from direct or indirect contact with the blood or organs of infected animals, but can also result from ingesting unpasteurized or uncooked milk of infected animals. Less commonly, people can be infected by exposures to infected mosquitoes. No human-to-human transmission of RVF has been documented, and no transmission of RVF to healthcare workers has been reported when standard infection control precautions have been put in place.

Aedes mosquito species are considered the main reservoir, as well as a vector for the disease. Virus replication in domestic ruminants results in high rates of mortality and abortion. Rift Valley fever has the potential to cause serious public health impact as well major economic losses and social disruption.

This outbreak had ecological and subregional geographical connotations. This was the first Rift Valley fever outbreak in Kenya since a 2006-2007 outbreak killed 234 people. Part of the population in Wajir County is semi-nomadic, with close connections to populations in other parts of Kenya, Ethiopia and Somalia, as well as other cattle keepers in eastern Uganda and South Sudan. Livestock population movements are high in the subregion, including cattle raiding activity between Uganda-Kenya-South Sudan. The small outbreak in Uganda took place in regions that were part of the cattle corridor, stretching the length of the country. The ongoing heavy rains and flooding in Kenya (and parts of East Africa) had caused increased vector density at the time of the outbreak. This was in line with modelling carried out by the Food and Agriculture Organization in May 2018, which showed suitability for vector amplification in several countries in East Africa. Response and preparedness needs to be strengthened across this region, with a One Health approach, focusing on both human and animal health interventions.
Geographical distribution of Rift Valley fever cases in Kenya, weeks 19 - 25, 2018

Weekly trend of Rift Valley fever cases and deaths in Kenya, weeks 19 - 25, 2018
This compendium of reports highlights outbreaks that were successfully managed and declared over between 2016 and 2018. There are many common transmissible diseases with a variety of etiologies, all of which are endemic in the countries in which the outbreaks were reported. Ebola virus disease, for example, is linked to consumption of game (not discussed in these reports), and we know that the virus itself originates in fruit bats across west and central Africa. This zoonosis is easily transmitted from human to human and can consequently cause large and potentially deadly outbreaks and significant morbidity and mortality. Other zoonoses, such as Rift Valley fever (RVF) and Crimean-Congo haemorrhagic fever (CCHF), are far less readily transmitted between humans, relying more on intermediate vectors. This means that their spread is less rapid but can still cause major morbidity and mortality.

The recent outbreak of RVF had a high case fatality ratio of 8.3%. However, morbidity and mortality are rarely of the scale that was seen in Ebola virus disease in 2014, for example. Control of zoonoses relies on the One Health approach that involves both human and veterinary medical surveillance. In the case of RVF, control requires the collaboration of agricultural authorities as well. However, controlling the consumption of game and the movement of nomadic herders and their livestock will remain a major challenge across the African Region.

What each outbreak has shown is the generally suboptimal health infrastructure available throughout the Region. This is also often compounded by security concerns caused by conflicts and large-scale movements of people escaping them. The poor infrastructure ranges from lack of healthcare facilities and personnel, to inadequate laboratory facilities within countries, and the absence of routine vaccination coverage. Indeed, the fact that there are no articles covering diseases such as measles, shows that these outbreaks are widespread and ongoing across the Region. And, while they may be controlled at a very local level, they are a constant threat, as malaria outbreaks have shown. Poor sanitation, poor hygiene, and lack of potable water go hand-in-hand with these inadequate facilities. Consequently, cholera outbreaks are seldom controlled as quickly as was the recent case in Malawi.

Plague in Madagascar is endemic to the plateau regions of the island nation, where slash and burn farming techniques are common, driving rodent vector hosts towards areas of human habitation. What was unusual about this outbreak was the high incidence of highly transmissible pneumonic plague occurring in non-endemic areas. The reason for this unusual presentation is as yet unknown, but highlights the importance of vigilance with endemic diseases.

There were two Ebola virus disease outbreaks in Democratic Republic of the Congo, within a year. A full response was rapidly mounted to both outbreaks by the Ministry of Health and other national authorities, WHO and partners. This effective and coordinated response rapidly contained the outbreaks to the localized affected areas. This was achieved by rapid scaling up of proven containment measures, effective surveillance, including maintenance of a full data base, contact tracing and follow up, active case searching, ring vaccination in the 2017 outbreak, and risk communication, social mobilization and community engagement.

Four viral haemorrhagic fevers (VHF) are discussed in this compendium, Marburg disease, Crimean-Congo haemorrhagic fever (CCHF), Rift Valley fever (RVF) and Lassa fever. VHF’s are relatively common in the African region, with regular outbreaks. CCHF is a zoonosis with poor transmissibility between people, although this can occur. Control lies in understanding the relationship between livestock, their parasites (ticks) and humans, relying on a One Health approach. Sporadic outbreaks occur annually, but are rarely large, although the disease carries high morbidity and mortality.

Marburg virus disease is a severe haemorrhagic fever, caused by a virus carried by fruit bats and spreads by human-to-human transmission. The disease has a high case fatality rate, varying from 24% to 88% depending on virus strain and case management. Community engagement and social mobilization are key to successfully controlling outbreaks, with a package of interventions such as case management, surveillance and contact tracing, good laboratory services and safe burial procedures. These measures were successfully implemented in the latest outbreak in Uganda.

Rift Valley fever is an emerging mosquito-borne zoonotic disease that primarily affects domesticated ruminants, but can also cause severe illness in humans. Most human infections are asymptomatic or relatively mild and the overall case fatality ratio is below 1%. However, a small percentage of people develop the more severe forms of the disease. Most human infections result from direct or indirect contact with the blood or organs of infected animals, but can also result from ingesting unpasteurized or uncooked milk of infected animals. Less commonly, people can be infected by exposures to infected mosquitoes. No human-to-human transmission of RVF has been documented, and no transmission of RVF to healthcare workers has been reported when standard infection control precautions have been put in place. Aedes mosquito species are considered the main reservoir, as well as a vector for the disease. Virus replication in domestic ruminants results in
high rates of mortality and abortion. Rift Valley fever has the potential to cause serious public health impact as well major economic losses and social disruption. The outbreak reported in this compendium had ecological and subregional geographical connotations and was the first RVF outbreak reported in Kenya since that of 2006-2007. The outbreak occurred in a semi-nomadic population in Wajir County, which has close connections to populations in other parts of Kenya, Ethiopia and Somalia, as well as other cattle keepers in eastern Uganda and South Sudan. A concomitant small outbreak in Uganda took place along the cattle corridor that stretches the length of the country and has close ties to cattle keepers in neighbouring countries. Although the Kenyan outbreak was relatively small, the case fatality was high at 11%, suggesting a severe form of the disease. The potential for spread of this virus in the region is high, particularly with a changing climate, and a One Health approach, focusing on human and animal health interventions is vital.

Lassa fever is endemic in West Africa, including Nigeria. The disease usually affects humans after exposure to urine or faeces of infected Mastomys rats, but can also spread between humans through direct contact with body fluids and sexual transmission has been reported. Those at greatest risk live in rural areas where Mastomys is usually found, particularly in communities with poor sanitation or crowded living conditions. Proper barrier nursing is required to prevent transmission to healthcare workers. Although the disease is endemic to Nigeria, the wide geographic spread of this outbreak suggests that currently preparedness and response activities were insufficient to prevent significant morbidity and mortality. Several challenges were observed across all pillars of the outbreak response, which need to be addressed.

Dengue fever virus is a mosquito-borne viral infection and control lies in control of the vector, female Aedes species mosquitoes. The incidence of the disease is spreading globally, and in the period covered by this compendium, the disease was emerging in West Africa with outbreaks reported in Burkina Faso, Cabo Verde, Côte d’Ivoire and Mali. Since infected symptomatic or asymptomatic humans are the main carriers and multipliers of the virus, serving as a source of virus for uninfected mosquitoes, it is important that cases are detected rapidly. Aedes species mosquitoes are also daytime biters, making bite prevention more difficult than for the evening biting characteristic of the mosquitoes that carry malaria, although bite prevention is still important. This means that vector control is particularly important in terms of preventing breeding sites such as standing bodies of water around human dwellings and spraying outdoor water storage sites.

The outbreak of listeriosis in South Africa was a particularly large and widely spread outbreak of a food-borne bacterial disease. Listeriosis is a potentially serious bacterial infection that contaminates food and is particularly dangerous to pregnant women, causing premature labour and stillbirth, and neonatal meningitis. Milder forms result in gastroenteritis, which can be severe in at-risk groups, which include pregnant women, the elderly and immunocompromised people. The first documented reports of outbreaks in South Africa were in 1977 (14 cases) and 2015 (seven cases), and since then sporadic cases have occurred throughout the country, but because the disease was previously not notifiable, there are few reliable records of previous cases. The size and severity of this outbreak was unprecedented, resulting in major morbidity and mortality. However, authorities acted rapidly, with support from WHO and other partners, and there are now major changes to standard operating procedures around food safety and food inspection, along with a full review of food safety legislation around processed meat products that are currently being gazetted. Other countries in the region have been urged to draw lessons from this outbreak in order to improve their capacities for preparedness, prevention, early detection and rapid control of any outbreak of food-borne diseases.

Influenza H1N1 is a regular human influenza virus that circulates worldwide. Any seasonal influenza spreads easily, with rapid transmission in crowded areas, including schools, which is what happened in this instance. Ghana has a good influenza preparedness system. The National Influenza Centre at NMIMR is part of the Global Influenza Surveillance Network (GISN), coordinated by WHO since 1996. Furthermore, the country benefits from the Pandemic Influenza Preparedness (PIP) Framework for determination of influenza burden of disease. In this instance, the school outbreak was also used to strengthen preparedness and responses to other potential infectious disease outbreaks.

Cholera is an ancient disease that is causing regular outbreaks across the African Region. In the two outbreaks highlighted, the Borno region of Nigeria and South Sudan, the disease occurred against a background of complex, long-standing humanitarian crises, with all the concomitant knock on effects on humanitarian and health assistance. In spite of this, both outbreaks were controlled within a reasonable period, with relatively low case fatality rates. This can be attributed to prompt action by authorities as soon as an outbreak was declared, as well as targeted assistance from humanitarian and health cluster partners such as WHO.

Although climate change is not specifically mentioned in any of the reports, it is impossible to look at patterns of disease, at movements of people, and indeed, at conflicts in general, without some mention of this major global factor, which is affecting Africa particularly severely. With drought, unseasonal rainfall patterns, and temperature anomalies come famine as a result of crop failure, changes in movement of livestock, and increased conflict over ever-more-difficult-to-access resources, leading to mass movements of people. Changes in the distribution of vectors, such as mosquitoes that transmit yellow fever and other disease, will also result from climate change.

In all instances, the various humanitarian partners, guided by WHO, mounted effective and rapid responses to these disease outbreaks, reducing their spread and containing morbidity and mortality in affected areas.