Reports of a cluster of deaths from an undiagnosed disease were notified on 1 November 2020 through Event Based Surveillance in two states, Delta and Enugu, located in southern Nigeria. The Delta State health surveillance system had been informed of the outbreak on 30 October 2020, following a cluster of deaths presenting with similar symptoms.

**Figure 1. Epidemic curve of suspected cases for Delta and Bauchi states**
On 2 November 2020, the Nigeria Centre for Disease Control (NCDC) reported to WHO a cluster of deaths in Ute Okpu community in Ika North-East local government area (LGA) of Delta State. Additional cases were reported from 4 other wards of Ika North-East (Idumessah, Owa Alero, Owanta, and Umunede). A preliminary report for Delta State on 5 November 2020, notified of 48 suspected cases of yellow fever (YF) with 30 deaths (CFR 62.5%). The most frequent symptoms included 1-week history of fever, vomiting (with or without blood), bleeding, seizures, and
unconsciousness. One patient was reported to have cough, sore throat, and hiccups. Of those 48 reported cases, the main occupation was farmers, and males were predominantly affected (75%). The YF vaccination status of most of the suspected cases is unknown. The index case developed symptoms on 24 July 2020 and died on 28 July 2020. Preliminary investigation did not reveal any significant travel history. Two blood samples were collected, along with nasal and throat swabs on 31 October 2020. Laboratory investigations were carried out at the mobile laboratory of Irrua Specialist Teaching Hospital (ISTH) in Delta State. All blood samples tested by polymerase chain reaction (PCR) were negative for Lassa fever and the throat swab was negative for severe acute respiratory syndrome coronavirus 2. Six more blood samples were collected and sent to ISTH, Edo State and all were negative for Lassa fever, while three were positive for YF by PCR. As of 10 November 2020, 65 suspected cases, including 33 deaths, have been reported. Samples were collected from 27 cases and seven have tested positive for yellow fever by PCR.

On 4 November 2020, the Enugu State epidemiologist reported a cluster of deaths of unknown cause to NCDC. Investigations by the Rapid Response team for Enugu State on 4 November 2020 reported 10 deaths, with the majority being males aged 4 to 65 years old and with occupations as farmers. The most frequent symptoms included high grade fever, convulsion, and eventually coma, in addition to blood in the urine, mouth bleeding, bleeding in the respiratory tract, blood shot eyes and pain in the flank. The suggestive differential diagnosis was Lassa fever, YF, cerebrospinal meningitis and COVID-19. A total of 13 blood samples were collected and sent to the National Reference Laboratory in Abuja to be tested for viral haemorrhagic fevers. Results received on 10 November 2020 showed 6 PCR positive YF cases in Enugu State.

On 8 November 2020, Bauchi State reported 8 samples tested by PCR at the NCDC National Reference Laboratory positive for YF (7/8 from Ganjuwa LGA, 1/8 unknown LGA). Four of these samples were also IgM positive for YF. Detailed case investigations are ongoing, and the line list is currently being updated.

On 15 November 2020, 3 PCR positive samples for yellow fever were reported from Ogbadibo LGA in Benue State. These samples were also tested at the NCDC, National Reference Laboratory. Additionally, there has been a PCR positive sample for YF reported from Ohaukwu LGA in Ebonyi State. This LGA has also been the location of a cluster of probable YF cases that were IgM positive at national reference laboratory and had dates of onset July-August 2020. Security challenges in the LGA had hindered full investigation and work-up at the time of initial notification.

The outbreak encompasses 5 states in Nigeria: Delta, Enugu, Bauchi, and Benue and Ebonyi (Figure 2).

**Figure 2. Geographic distribution of affected states and local government areas in Nigeria**
Nigeria is facing concurrent outbreaks of multiple pathogens. Delta State, located in the South-South geo-political zone of the country, is one of the Lassa fever affected states, though not considered one of the YF hot spot states. In
2020, 18 Lassa fever cases have been laboratory confirmed from 140 suspected cases, including 3 fatalities. Enugu state, in the South-East geopolitical zone of the country, shares boundaries with Benue (Ogbadibo LGA) where there are 3 confirmed cases of Lassa fever, and Ebonyi state which is one of the hotspot states for the Lassa fever outbreak. To date, 10 Lassa fever cases have been reported from Enugu state since the start of the year, including 2 fatalities (20% CFR). While Lassa fever cases are reported year-round, the peak period is December to April.

The relative proximity of Delta, Enugu, Benue and Ebonyi states with Lagos is an added concern, though population movements (and hence risk of spread) may have been reduced in the COVID-19 context. However, there is a lack of data on this, and the risk of spread should be monitored.

COVID-19 response efforts demand an extraordinary amount of time and resources from the country’s health system while lockdowns, travel restrictions and other mitigations to slow the spread have severely disrupted access to core essential health services. National and state authorities are currently focused on the COVID-19 pandemic, limiting the human resources required to conduct investigations and response activities for the YF outbreaks. Recent relaxation of COVID-19 measures will increase population mobility thereby increasing the risk for amplification of yellow fever, especially if introduced into urban centres. Population mobility in urban settings can be particularly challenging in conducting mass vaccination campaigns due to the size and diagnostic challenges of the operation (SAGE 2016). As of 23 November 2020, 66,383 COVID cases, including 1,167 deaths, have been reported in Nigeria.

Public health response

The current response at central level:

- As of 7 November 2020, the National Emergency Operations Centre (EOC) for Yellow Fever was activated and led by NCDC, in close coordination with the State yellow fever EOC in the affected states
- Coordination and deployment of technical support to affected states to ensure quality detailed investigations and response
- Ensuring transport of positive samples to the regional reference laboratory, Institute Pasteur Dakar, for second stage confirmation
- The designated national reference laboratories for testing (Central Public Health Laboratories and National Reference Laboratory) are currently testing samples using serology and PCR respectively
- Reagents and consumables are available in all testing laboratories
- Pictorial aids for YF case management has been updated and is being finalized
- Development of an Incident Action Plan (IAP) for the response is ongoing
- Case definitions for active case search have been developed and shared with the affected states
- Daily monitoring and analysis of surveillance data from the affected states using the Surveillance Outbreak Response Management and Analysis System (SORMAS)
- Engaging with Rapid Response Teams and State Epidemiologists for daily updates
- Publishing press releases to update Nigerians on the YF situation in the country and provide information
- Ongoing rumour monitoring across social and traditional media platforms
- Dissemination of prevention messages across NCDC social media platforms
- Two organised interviews on Channels TV Abuja & Wazobia FM Lagos
- Conducting risk assessments in YF high risk states/ LGAs and ensuring active case searching in communities
- Provision of national guidance to states on implementing quality vaccination response aligned to COVID-19 prevention standards for campaigns
- The country is supporting entomological studies in Enugu, by the National Arbovirus Research Center (NAVRC)

The current response for Delta State:

- An accelerated preventive yellow fever mass vaccination campaign ongoing in the affected LGA (Ika North-East LGA) Line listing of cases and active case searching in health facilities and communities
- Risk communication activities and community engagement have been intensified in Ika North-East LGA on the risk of YF and steps to take to protect communities (e.g. vaccination, vector control)
• Case management of suspected cases at a designated treatment centre (Federal Medical Centre, Asaba)
• A state-wide YF preventive mass vaccination campaign is planned at the end of November 2020 that can be leveraged to accelerate the response

The current response for the cases in Enugu State:

• An expanded emergency operation center for COVID-19 response to respond to the yellow fever outbreak on the risk of yellow fever and steps to take to protect communities (e.g. vaccination, vector control)
• Community mobilization to all traditional rulers, town union presidents and other opinion leaders in Igbo-Eze North LGA
• Intensified active search for suspected YF cases in the communities and health facilities
• A case management center has been identified at the General Hospital Ogrute, Enugu-Ezike of Igbo-Eze North LGA
• Needs assessment for General Hospital Enugu – Ezike has been completed for designation as a treatment center in Enugu State
• International Coordinating Group request is under preparation for a reactive vaccination campaign in the affected LGA

The current response for the cases in Bauchi State:

• Detailed case investigation in process
• Line listing of cases
• Offsite support being given to response team pending the conclusion of the preliminary investigation
• A state-wide YF preventive mass vaccination campaign planned in Bauchi in February 2021 can be leveraged and accelerated to support the response

The current response for the cases in Benue State:

• Detailed case investigation in process
• Line-listing being updated with 27 reported cases so far on the list
• Offsite support being given to response team pending the conclusion of the preliminary investigation
• As one of the high-risk states a preventive mass vaccination campaign is scheduled for 20 November 2020

Nigeria is considered a high-risk country by the Eliminate Yellow Fever Epidemics (EYE) strategy. Routine yellow fever vaccination was introduced to Nigeria’s Expanded Programme on Immunization (EPI) in 2004 with an estimated coverage of 54% (2019), with lower figures in some sub-groups. Population immunity against yellow fever in many areas around the country remains below herd immunity thresholds: the MICS 2016/2017 indicated that YF vaccination was 39% in children aged 12 to 23 months. To address the risk of outbreaks and increase population immunity, the EYE strategy PMVC component is being implemented in phases. There are over 30 million doses of YF vaccine in the country for PMVCs – with Delta and Bauchi among the states planned for the current phase of activities. Delta state was already scheduled for a PMVC in 2020. One LGA in Delta state and 4 LGAs in Bauchi state had a vaccination campaign in 2019. This YF vaccine supply and associated preparations could serve to meet the needs of outbreak response. The supplies also include resources such as PPE and hand sanitizers for COVID-19 prevention in a mass vaccination campaign. Enugu and Ebonyi are not included in the current planned PMVCs, however there is a possibility that vaccines and associated supplies in the country might help support an immediate response. By 2024, it is anticipated that all the states in Nigeria will have undergone campaign activities to protect at-risk populations against yellow fever. This plan may be further updated or accelerated based on risk, vaccine availability, and implementation feasibility.

**WHO risk assessment**

Nigeria is a high-risk country for yellow fever. The re-emergence of yellow fever in September 2017 in Nigeria has been marked by outbreaks over a wide geographical area. The yellow fever outbreaks reported in Bauchi, Benue and Katsina states from August to November 2019, with spread to multiple other states showed an expansion of YF transmission, and an elevated risk for YF outbreaks to rapidly spread and amplify, impacting areas without prior
reported cases since 2017 and in areas with large under immunized populations. In the current year, suspected YF cases have been reported from all 36 states and the Federal Capital Territory (FCT) and confirmed YF cases across 9 states (Delta, Enugu, Bauchi, Benue, Kogi, Oyo, Edo Kwara and Katsina). These new outbreaks in Bauchi, Delta and Enugu are affecting areas without prior reported cases this year and suggest underlying sustained high viral transmission in the epizootic cycle with spillover to human populations. Due to: the risk of spread to other states with under-immunized populations, including to large urban centers; the high CFR; the potential for ongoing local transmission and amplification due to suboptimal vaccination coverage; and the occurrence of cases in peri-urban areas (e.g. in Delta State) and densely populated LGAs with proximity to Lagos, the risk is high.

There is no entomological information currently available for the affected LGAs, however previous entomological surveys conducted in 2018/2019 during outbreaks in settings of similar climate and vegetation in Ebonyi, Bauchi, Edo, Kogi and Kwara identified adult *Aedes* spp. mosquitos However, the region is entering the dry season (November to March) and vector densities are expected to be lower. The vector, *Aedes aegypti* is only moderately affected by drier conditions and remains active, and therefore sustained vector-borne transmission within human populations cannot be ruled out.

Nigeria is facing several concurrent public health emergencies, including circulating Vaccine Derived Polio Virus (cVDPV), measles, monkeypox, Lassa fever and cholera outbreaks as well as humanitarian crisis in the northeast of the country. WHO continues to monitor the epidemiological situation and review the risk assessment based on the latest available information. At present, the Yellow Fever outbreaks are considered high risk at national level, low at regional and global levels.

**WHO advice**

Yellow fever is an acute viral haemorrhagic disease transmitted by infected mosquitoes and has the potential to spread rapidly and cause serious public health impact. There is no specific treatment, although the disease is preventable using a single dose of yellow fever vaccine, which provides immunity for life. Supportive care to treat dehydration, respiratory failure and fever and antibiotic treatment for associated bacterial infections can reduce mortality and is recommended.

Yellow fever is endemic in Nigeria, a priority country for the EYE strategy. Accelerated phased YF PMVCs are planned to cover the entire country by 2024. Vaccination is the primary intervention for prevention and control of yellow fever. In urban centres, targeted vector control measures are also helpful to interrupt transmission. WHO and partners will continue to support local authorities to implement these interventions to control the current outbreak.

WHO recommends vaccination against yellow fever for all international travellers from 9 months of age going to Nigeria. Nigeria requires a yellow fever vaccination certificate for all travellers aged 9 months or over as a condition of entry.

Yellow fever vaccines recommended by WHO are safe, highly effective and provide life-long protection against infection. In accordance with the IHR (2005), the validity of the international certificate of vaccination against yellow fever extends to the life of the person vaccinated with a WHO approved vaccine. A booster dose of approved yellow fever vaccine cannot be required of international travellers as a condition of entry.

WHO encourages Member States to take all actions necessary to keep travellers well informed of risks and preventive measures, including vaccination. Travellers should also be made aware of yellow fever symptoms and signs and are instructed to seek rapid medical advice when presenting signs. Viraemic returning travellers may pose a risk for the establishment of local cycles of yellow fever transmission in areas where the competent vector is present.

The updated areas at-risk for yellow fever transmission and the related recommendations for vaccination of international travellers were updated by WHO on 1 July 2020 and are available on the WHO International Travel and Health website (see below).

WHO does not recommend any restrictions on travel or trade to Nigeria based on the information available on this outbreak.
For more information on yellow fever, please see:

- WHO Yellow Fever Factsheet
- WHO strategy for yellow fever epidemic preparedness and response
- A Global strategy to Eliminate Yellow Fever Epidemics (EYE) 2017-2026, WHO 2018
- WHO list of countries with vaccination requirements and recommendations for international travelers
- WHO list of countries with risk of yellow fever transmission and countries requiring yellow fever vaccination
- Lifetime validity of one dose of Yellow fever vaccine: Amendment to Annex 7 of IHR (2005)
- Q&A on the Extension to life for yellow fever vaccination
- WHO Database for pre-qualified vaccine
- Vaccine Position Papers
- Yellow Fever laboratory diagnostic testing in Africa
- Yellow Fever outbreak toolbox
- Yellow fever risk mapping and recommended vaccination for travellers map
- Nigeria Centre for Disease Control: An update of Yellow Fever outbreak in Nigeria

Related links

- About yellow fever
- More yellow fever disease outbreak news
- Yellow fever: Questions and answers

You are here:

- Emergencies preparedness, response
- Disease Outbreak News (DONs)