Disease outbreak news

Annual compendium 2022

World Health Organization

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Abbreviations

AFP	acute flaccid paralysis
AFRO	WHO African Region
AMR	WHO Region of the Americas
AWD	acute watery diarrhoea
CCHF	Crimean-Congo haemorrhagic fever
CFR	case fatality ratio
COVID-19	coronavirus disease 2019
CTCs	cholera treatment centres
CTUs	cholera treatment units
cVDPV2	circulating vaccine-derived poliovirus type 2
cVDPV3	circulating vaccine-derived poliovirus type 3
DON	Disease Outbreak News
EIS	event information site
EMRO	WHO Eastern Mediterranean Region
EOCs	emergency operation centres
ETC	Ebola treatment centre
EURO	WHO European Region
EVD	Ebola virus disease
EWAR	early warning alert and response
FAO	Food and Agriculture Organization
GPEI	Global Polio Eradication Initiative
GPLN	Global Polio Laboratory Network
ICG	International Coordinating Group on Vaccine Provision
ICRC	International Committee of the Red Cross
IDPs	internally displaced persons
iGAS	invasive Group A *Streptococcus*
IHR	International Health Regulations
IMS	incident management system

IPC	infection prevention and control
IPV	inactivated polio vaccine
IVM	integrated vector management
MERS	Middle East respiratory syndrome
MoH	Ministry of Health
MSF	Médecins sans Frontières
MVD	Marburg virus disease
NFP	national focal point for IHR
OCV	oral cholera vaccine
ORS	oral rehydration salts
OPV	oral polio vaccine
ORPs	oral rehydration points
OSL	operations, support and logistics
PHEIC	public health emergency of international concern
PMCV	preventive mass campaign vaccination
RCCE	risk communication and community engagement
RDT	rapid diagnostic tests
RT-PCR	reverse transcription polymerase chain reaction
SEAR	WHO South-East Asia Region
SOP	standard operating procedures
SIAs	supplementary immunization activities
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
VHF	viral haemorrhagic fever
WASH	water, sanitation and hygiene
WHO	World Health Organization
WPR	WHO Western Pacific Region
WPV1	wild poliovirus type 1
YF	yellow fever

1. Introduction

The Disease Outbreak News (DON) *(1)* report is a comprehensive and external WHO information product that, since 1996, has represented a key mode through which WHO communicates on acute public health emergencies with the public, providing verified epidemiological facts, updates and information about the Member States response actions and WHO's support to these during public health events.

According to Article 11.4 of the International Health Regulations (2005) [IHR (2005)], WHO may make information on acute public health events available, if other information about the same event has already become publicly available and there is a need for the dissemination of authoritative and independent information. The DON reports fulfil this requirement.

WHO makes a decision to publish a DON report on an event-by-event basis. The decision to produce a DON considers the assessment of different criteria including, whether there is a need for support from the international community, potential public interest, whether information on the event has already been reported publicly, and the need to disseminate authoritative and independent information as per Article 11 of the IHR (2005).

Once the decision is taken to produce a DON report, a draft is produced by a team of epidemiologists at WHO. The draft is then shared with epidemiologists, public health specialists, subject matter experts and communications experts within WHO for feedback and editing, as well as with experts at the WHO regional(s) and country(ies) office(s) where the event covered by the DON report is occurring. After incorporating the comments and feedback, a revised version is shared with those who provided prior input for final review and addressing any pending clarifications. This consolidated version is then sent for clearance by a senior epidemiologist. The DON report is disseminated by publishing on the WHO website after clearance as the final step. The DON report is also circulated by email, including to all WHO Members States as well as various partners, and added to the WHO health emergency dashboard ***(2)*** for public access.

In addition to the DON reports, WHO uses other information products for different scenarios, for example for protracted events, such as COVID-19, mpox and cholera. Situation reports are published on the dedicated WHO emergency situation reports ***(3)*** webpage.

In this inaugural edition of the *Annual Compendium of WHO Disease Outbreak News,* we aim to highlight selected public health events described in DON reports published in 2022.

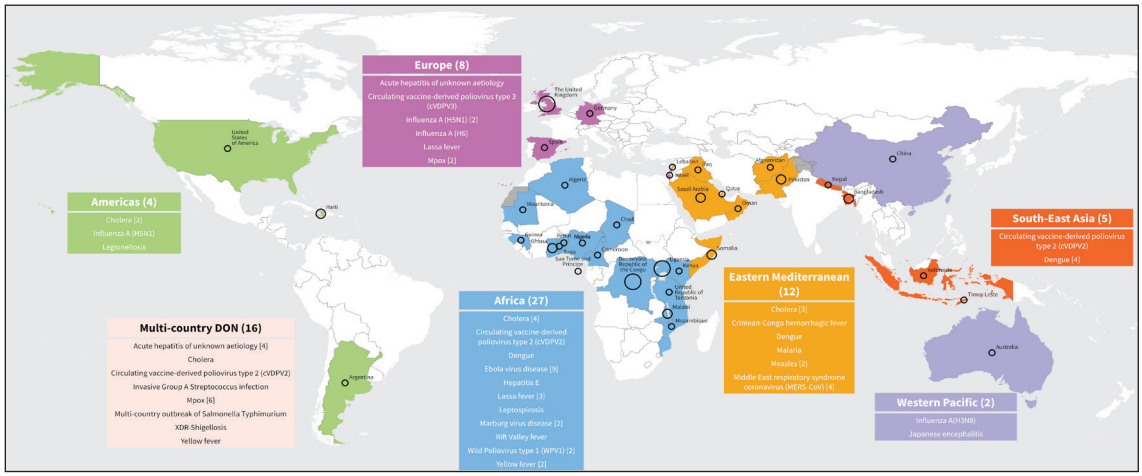
Each report summarizes the public health event, the implemented and/or ongoing response, the WHO risk assessment and advice, and provides an update on the epidemiological situation where available.

2. Overview of published disease outbreak news

In 2022, a total of 74 DON reports were published. The highest proportion of DON reports (*n* = 27; 36%) were acute public health events reported from the WHO Africa Region, followed by events that involved multiple WHO regions (*n* = 13; 18%).

A total of 23 diseases were covered by DON reports published in 2022, with the majority related to cholera events (*n* = 10; 14%), followed by Ebola virus disease (*n* = 9; 12%) and mpox (*n* = 8; 11%) events.

FIG. 1 Number of disease outbreak news (DON) reports by WHO Region, 2022 (*n* = 74)



Note: *numbers in brackets indicate the number of DONs (when multiple) published for each disease.*

Source: World Health Organization
Production: WHO Health Emergencies Programme
Date: 17/01/2023
Not applicable

3. Review of selected events with **DON** reports

This section summarizes selected DON reports published in 2022, highlighting the public health response implemented and WHO advice. When available, the most recent update on the status of the outbreak, using the latest official information, is provided.

The DON reports in this section have been selected based on the following criteria: (1) public health impact of the event in terms of number of cases and deaths, geographical spread and (2) number of event-related DON reports published.

3.1 Acute hepatitis of unknown aetiology in children

Summary

A total of 1010 cases of severe acute hepatitis of unknown aetiology in children were reported from 35 countries in five WHO regions between 1 October 2021 and 8 July 2022. The first DON report *(4)* on this event was published on 15 April 2022 following a notification from the National IHR Focal Point for the United Kingdom of Great Britain and Northern Ireland (the United Kingdom) of ten cases of severe acute hepatitis of unknown aetiology in children. A total of five DONs *(5)* reports were published between 15 April and 12 July 2022, with the last DON report *(6)* reporting data and situation update as of 8 July. Adenovirus type 2 was indicated as one of the main aetiological hypotheses, although a causal relationship has not been proven and additional co-factors may have played a role in the pathogenesis.

Description of the situation

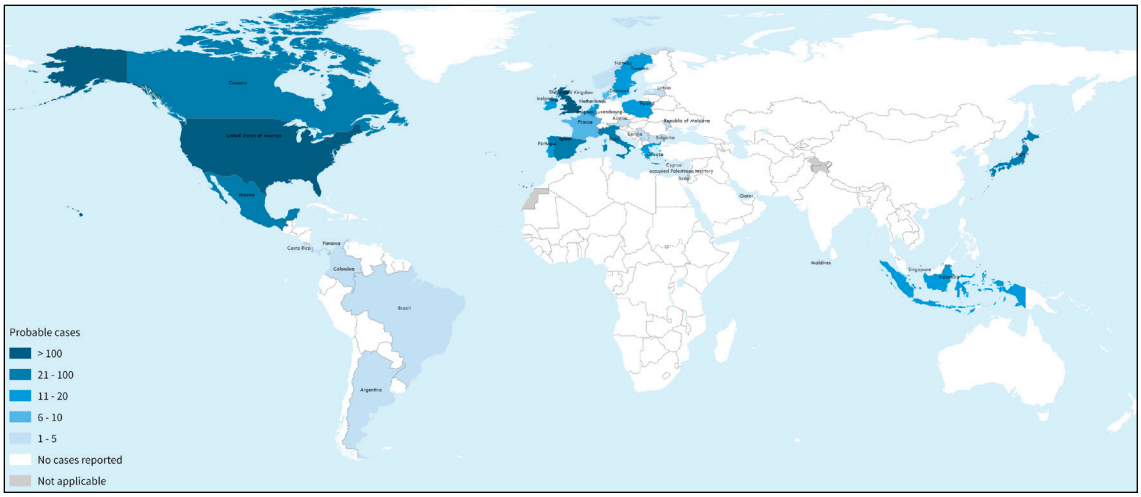
On 5 April 2022, the United Kingdom notified WHO of 10 cases of severe acute hepatitis of unknown aetiology in previously healthy children aged under 10 years in the central belt of Scotland. Following this notification, Member States were requested to identify, investigate and report potential cases to WHO.

Following this request, as of 8 July 2022, 35 countries in five WHO regions reported 1010 probable cases, with almost half of the probable cases (*n* = 484; 48%) reported in the European Region.

TABLE 1 **Distribution of probable cases of severe acute hepatitis of unknown aetiology in children, by WHO Region, 1 October 2021–8 July 2022 (*n* = 1010)**

WHO Region	Number of cases
African Region	0
Region of the Americas	435
South-East Asia Region	19
European Region	484
Eastern Mediterranean Region	2
Western Pacific Region	70

FIG. 2 **Geographical distribution of probable cases of severe acute hepatitis of unknown aetiology in children, 1 October 2021–8 July 2022 (*n* = 1010)**

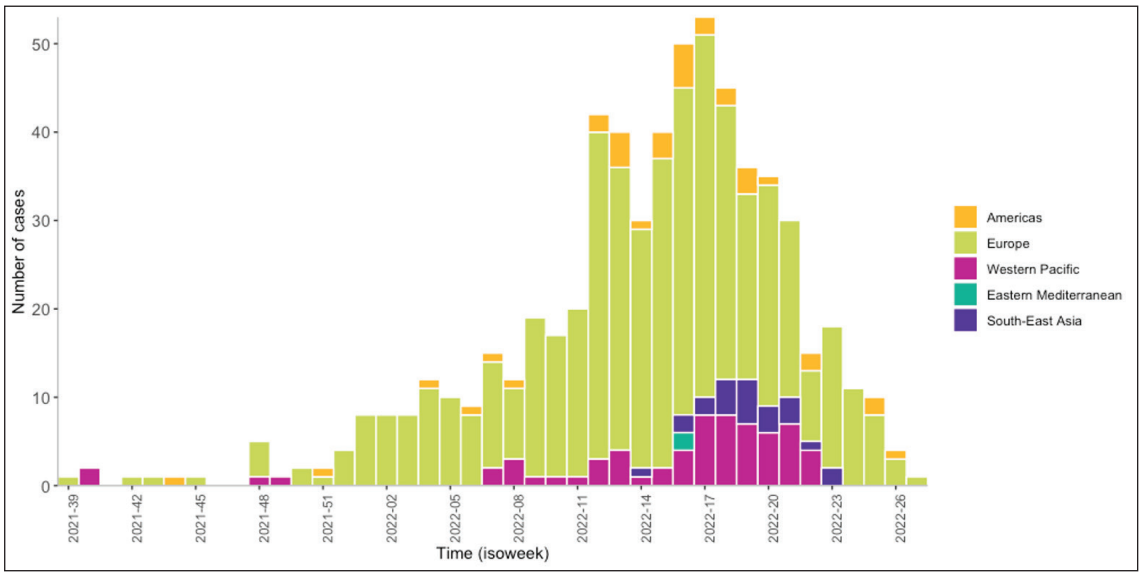


Forty-six (5%) children required liver transplants and 22 deaths (CFR 2%) were reported. Out of 100 probable cases with available clinical data, the most commonly reported symptoms were nausea or vomiting (60%), jaundice (53%), general weakness (52%) and abdominal pain (50%). Of 479 cases with information on gender and age as of 8 July, 48% were males (*n* = 232), while the majority of cases (76%, *n* = 365) were under 6 years of age.

Laboratory testing excluded hepatitis A–E viruses. Other pathogens were detected in a number of cases, with adenovirus being the most frequently detected pathogen among cases with available data: 52% (193/368) among cases reported in the European Region. SARS-CoV-2 virus was detected in 16% of cases (54/335) with available results in the European Region, and in 8% of cases (15/197) with available results from the United States of America.

Starting from June 2022, a decreasing trend was observed and the outbreak was no longer considered an acute public health event or potential event of concern. Therefore, Member States were no longer requested to report cases under IHR (2005), unless significant epidemiological changes were observed.

FIG. 3 Epidemiological curve of probable cases of severe acute hepatitis of unknown aetiology, by week and by WHO Region, 1 October 2021–8 July 2022 (*n* = 1010)



Public health response

Epidemiological, clinical, laboratory, histopathological and toxicological investigations of the possible aetiology(ies) of the cases were conducted by several national authorities, and research networks, across different working groups in WHO and with partners. These included detailed epidemiological investigations to identify common exposures, risk factors or links between cases.

For additional information, see: United Kingdom Health Security Agency (UKHSA)'s *Technical briefing on Acute hepatitis* ***(7)***; Joint ECDC–WHO Regional Office for Europe *Hepatitis of Unknown Origin Surveillance Report* ***(8)***; US CDC *Children with Acute Hepatitis of Unknown Cause* ***(9)***.

WHO risk assessment

At the time of the last DON report (8 July 2022), WHO assessed the risk at the global level as moderate, considering:

» The aetiology and mode of transmission of this severe acute hepatitis remained unknown.

» The limited epidemiological, laboratory, histopathological and clinical information.

WHO advice

WHO developed several documents to guide Member States across the different response components, including but not limited to:

» *Interim guidance on Laboratory testing for severe acute hepatitis of unknown aetiology in children* ***(10)***.

» *Suggested minimum variables for reporting cases of severe acute hepatitis of unknown aetiology in children* ***(11)***.

» *WHO Global Clinical Platform for severe acute hepatitis of unknown aetiology in children – Case Report Form (CRF)* ***(12)***.

» *WHO Minimum reporting variables line list template* ***(13)***.

» *WHO Global survey of severe acute hepatitis of unknown aetiology among children from 2017 to 2022* ***(14)***.

3.2 Cholera

Summary

In 2022, a total of nine DON reports were published on cholera outbreaks that occurred in seven countries: Benin ***(15)***, Cameroon ***(16)***, Haiti ***(17)*** (two DONs), Lebanon ***(18)***, Malawi ***(19)*** (two DONs), Pakistan ***(20)*** and Somalia ***(21)***.

In addition, considering the global surge of cholera, a DON report on the *Cholera – Global situation* ***(22)*** was also published on 16 December 2022.

Due to the protracting and expanding of cholera events, from 28 March 2023, a monthly *Global Cholera situation* report ***(23)*** was released.

As of 1 June 2023 ***(24)***, WHO assessed the risk of cholera at the global level as very high, and it remains a global threat to public health, and an indicator of inequity and lack of social development. There are several concomitant drivers and challenges for controlling and containing the different cholera outbreaks that are occurring worldwide and are mainly represented by:

» Climate change — widespread floods and drought;

» Humanitarian crises, political instability, and conflict;

» Multiple ongoing emergencies;

» Limited availability of healthcare resources; and

» Limited availability of the oral cholera vaccine.

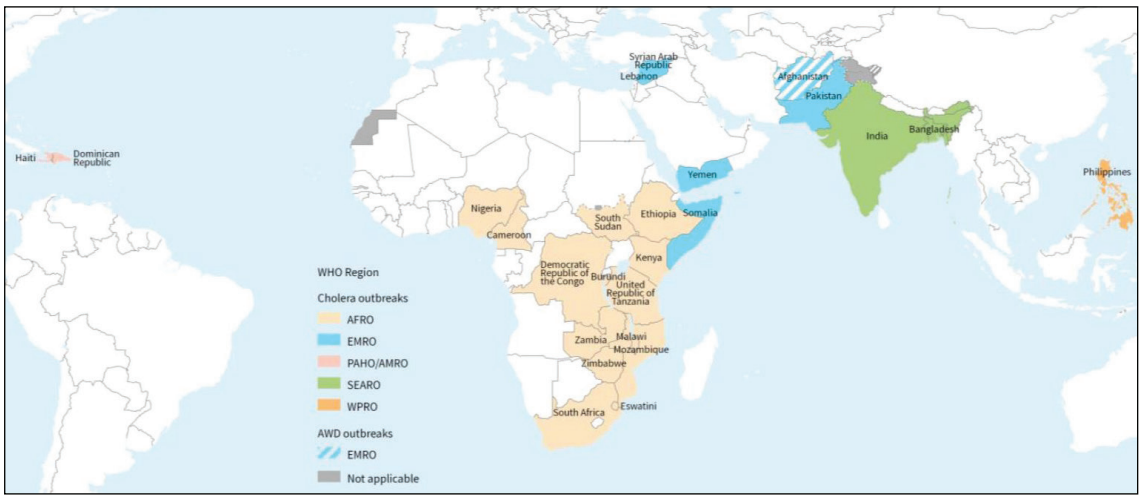
GLOBAL SITUATION

Description of the situation

Since 2021, an increase in cholera cases and their geographical distribution globally was observed. In 2021, 23 countries reported cholera outbreaks, mainly in the WHO African and Eastern Mediterranean Regions. This trend continued into 2022 with over 29 countries reporting cholera cases or outbreaks. Many of those countries reported higher case numbers and CFR than in previous years (global CFR 2%). As of 15 May 2023, at least 24 countries have reported cholera cases since the beginning of the year. During the same period in 2022, 15 countries had reported cholera cases.

The current situation represents a resurgence of the ongoing seventh pandemic of cholera that began in 1961.

FIG. 4 Global situation of epidemics of cholera and acute watery diarrhoea reported in 2023, as of 15 May 2023



Public health response

WHO is working with partners at global, regional and country levels to support Member States in different areas of the response, including, but not limited to:

» **Coordination:** collaborating with key partners to coordinate supply delivery and optimal access to supplies, as well as expert deployment.

» **Surveillance:** strengthening surveillance including strengthening diagnostic algorithms, use of rapid diagnostic tests, collecting and transporting of samples, and strengthening laboratory capacity to culture *Vibrio cholerae*.

- **Vaccine:** providing guidance to identify target populations for vaccination and requesting vaccine through the International Coordination Group (ICG) mechanism, in the context of acutely limited supply.
- **Case management:** strengthening case management and improving access to treatment for patients by setting-up dedicated health facilities (CTCs and CTUs) and training health workers and provisioning of technical guidance.
- **Infection prevention and control (IPC):** conducting advocacy and resource mobilization activities to support cholera prevention and control at national, regional and global levels.
- **Risk communication and community engagement:** working closely with Member States and partners to strengthen risk communication and community engagement plans and strategies.
- **Water, sanitation and hygiene (WASH):** working closely with Member States and partners to strengthen water, hygiene, and sanitation systems through multi-sectoral mechanisms, including IPC and guidance on water quality monitoring.
- **Operations, support and logistics (OSL):** working closely with suppliers to secure cholera kits, sourcing other WASH supplies and establishing a pipeline for bulk items.

WHO risk assessment

As of 1 June 2023, WHO assessed the risk of cholera at the global level as very high *(24)*.

The number of outbreaks occurring simultaneously across all WHO regions is straining the overall epidemic response capacity. Protracted outbreaks of cholera are draining public health response personnel and depleting resources.

Several countries are in the midst of complex humanitarian crises with fragile health systems, inadequate access to clean water and sanitation, and insufficient capacity to respond to these outbreaks. Climate change and lack of development also contribute to outbreaks together with cross-border population movements. The latter, along with increased global travel following the COVID-19 pandemic, further increases the risk of international spread.

WHO advice

WHO recommends improving access to proper and timely case management of cholera cases, improving access to safe drinking water and sanitation infrastructure, as well as improving infection prevention and control in health facilities.

Effective risk communication and community engagement strategies are needed to encourage behavioural change and the adoption of appropriate preventive measures.

Oral cholera vaccine (OCV) should be used in conjunction with improvements in water and sanitation to control cholera outbreaks and for prevention in targeted areas known to be at high risk for cholera.

WHO recommends Member States to strengthen and maintain surveillance for cholera, especially at the community level, for the early detection of suspected cases and to provide adequate treatment and prevent its spread.

BENIN

From 1 September 2021 to 16 January 2022, a total of 1430 cholera cases and 20 deaths (CFR 1%) were reported in Benin from nine departments: Alibori, Atacora, Atlantique, Borgou, Collines, Donga, Littoral, Mono and Oueme.

The majority of cases (*n* = 887; 62%) were aged between 16 and 45 years, and there was no significant difference in gender distribution with 53% (*n* = 758) of cases among females.

At the last update, according to the *WHO AFRO Bulletin* of 12 June 2022 ***(25)***, the event was considered closed.

Public health response

WHO supported the Ministry of Health of Benin in the activation of a national incident management system, the development of a response plan, strengthening community-based surveillance, active case finding and case investigations. Case management was also strengthened through the establishment of treatment facilities and the provision of supplies. WASH activities were implemented together with risk communication and community engagement. Cholera and laboratory kits were also delivered to support the affected departments.

WHO risk assessment

Cholera is endemic in Benin, and since 2016 cases continue to be reported every year in various departments across the country. Additionally, Benin shares international borders with Nigeria and Togo, and there is frequent and substantial cross-border population movements. Given the porous borders with countries responding to cholera outbreaks and inadequate WASH conditions, at the time of the DON report (25 January 2022) WHO assessed the risk posed by this outbreak as high at the national and regional level, and low at the global level.

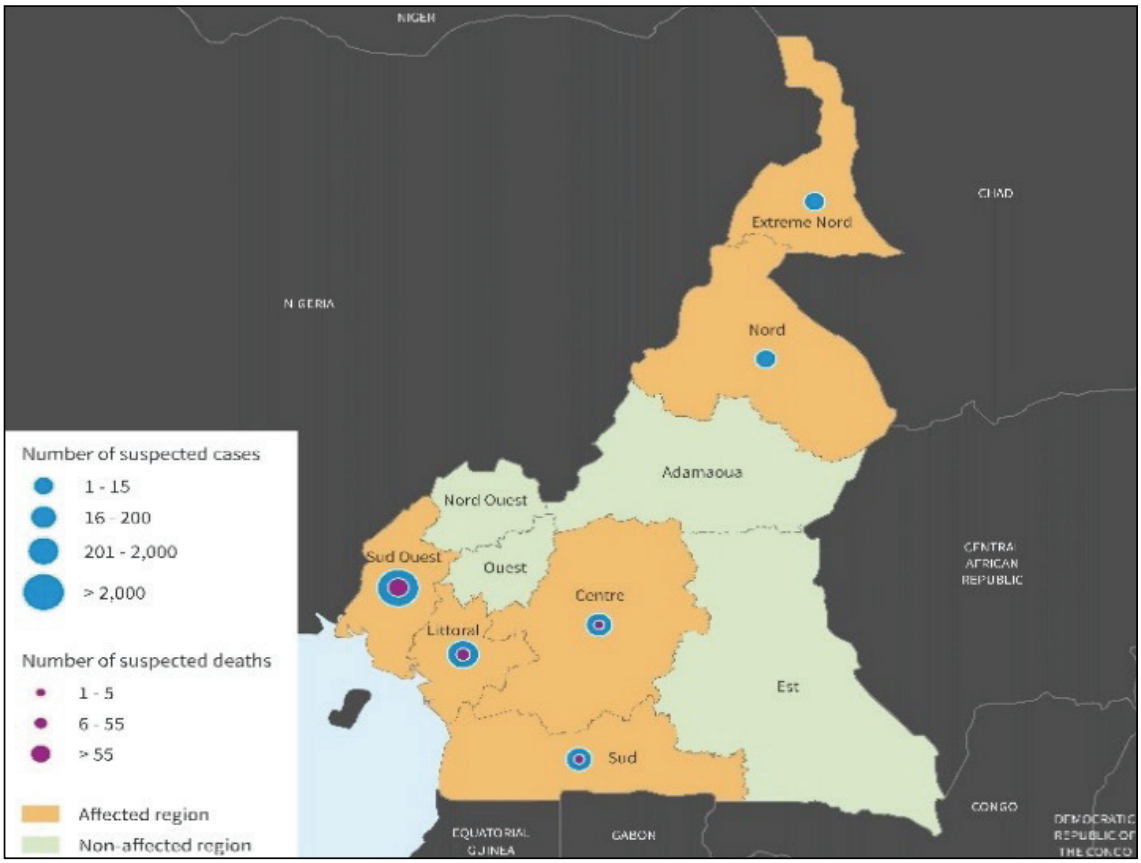
WHO advice

At the time of the DON report (25 January 2022), WHO recommended strengthening surveillance, particularly at the community level, including improved access to care in areas affected by the outbreak to reduce mortality.

CAMEROON

The cholera outbreak was declared by the Cameroonian health authorities on 29 October 2021. As of 30 April 2022, 6652 suspected cases of cholera including 134 deaths (CFR 2%) were reported from six regions: South-West (4617 cases, 77 deaths), Littoral (1704 cases, 51 deaths), South (183 cases, two deaths), Central (125 cases, four deaths), North (15 cases, no death) and Far North (eight cases, no death). Patients' median age was 27 years, with males more affected. Although the cholera outbreak started in late October 2021, the number of weekly suspected cases increased from less than 200 in week 9 of 2022 (ending 6 March) to 1262 in week 12 of 2022 (ending 27 March).

FIG. 5 Distribution of reported cholera cases, Cameroon, 29 October 2021–30 April 2022 (*n* = 6552)



As of 15 May 2023 ***(24)*** the outbreak is ongoing. Following a period of low transmission from December 2022 to the end of March 2023, a strong increase in cases has been noted in the weeks since late March 2023. From 25 March to 14 May 2023, 1508 cases and 64 deaths with CFR 4% have been reported from five regions, with the focus of the outbreak being Yaoundé in the Centre region, the capital of the country, where 1449 cases (96% of total cases) are reported.

FIG. 6 **Number of cholera cases reported per week, Cameroon, 1 December 2022–14 May 2023 (*n* = 16 859)**

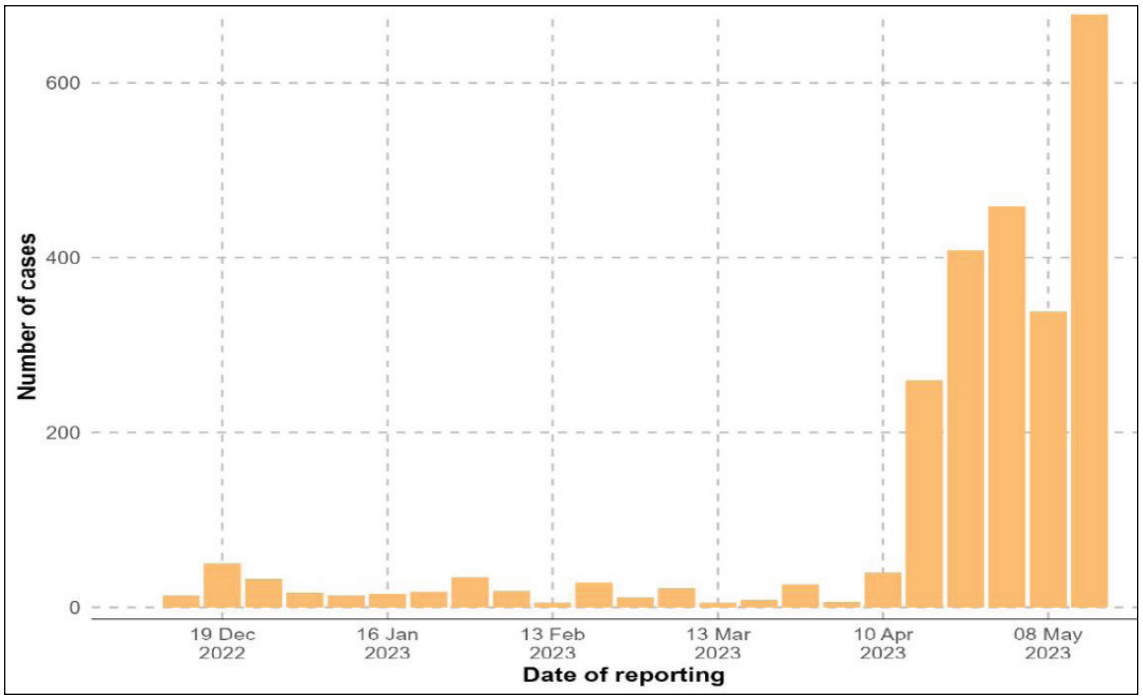
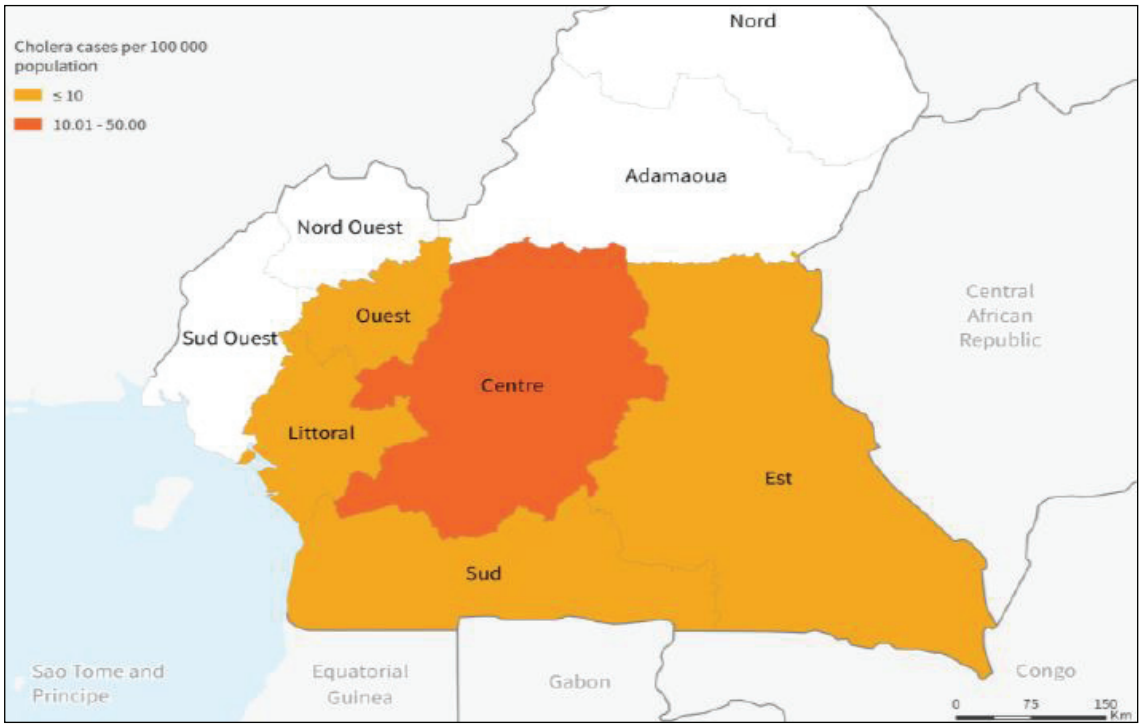


FIG. 7 **Number of cholera cases per 100 000 population per region, Cameroon, 1 December 2022–14 May 2023 (*n* = 16 859)**



Public health response

WHO deployed teams of experts to support the response and provided technical, logistical and financial support to the government. The Ministry of Health established a national task force and developed a response plan, providing cholera kits, deploying response teams, and implementing risk communication activities and WASH interventions. Surveillance activities continue to be strengthened for active case finding; outbreak sites and households of confirmed cases were decontaminated. A reactive OCV campaign was organized in the affected districts and targeted almost one million people, reaching an administrative coverage of 89%.

WHO risk assessment

Cameroon is among several countries in West and Central Africa experiencing recurrent cholera outbreaks. Several risk factors contribute to *V. cholerae* circulation, especially in the North, Littoral, Central, and South-West regions, such as limited access to safe drinking water, as well as cultural practices that contribute to unsafe WASH conditions.

Furthermore, in the northern areas, Cameroon is bordered by Adamawa, Borno and Taraba states of Nigeria and there is frequent and substantial cross-border movements posing a risk of international transmission. There is also a risk of further international spread, especially to the Republic of Chad that borders both Nigeria and Cameroon. Additionally, the high population movement of internally displaced persons (IDPs), weak health system, insufficient human resources, poor knowledge of treatment protocols and low-risk communication for cholera continue to pose challenges

WHO advice

WHO recommends strengthening surveillance, especially at the community level; improving access to clean water and sanitation, good waste management, food safety practices and hygienic practices to prevent the transmission of cholera.

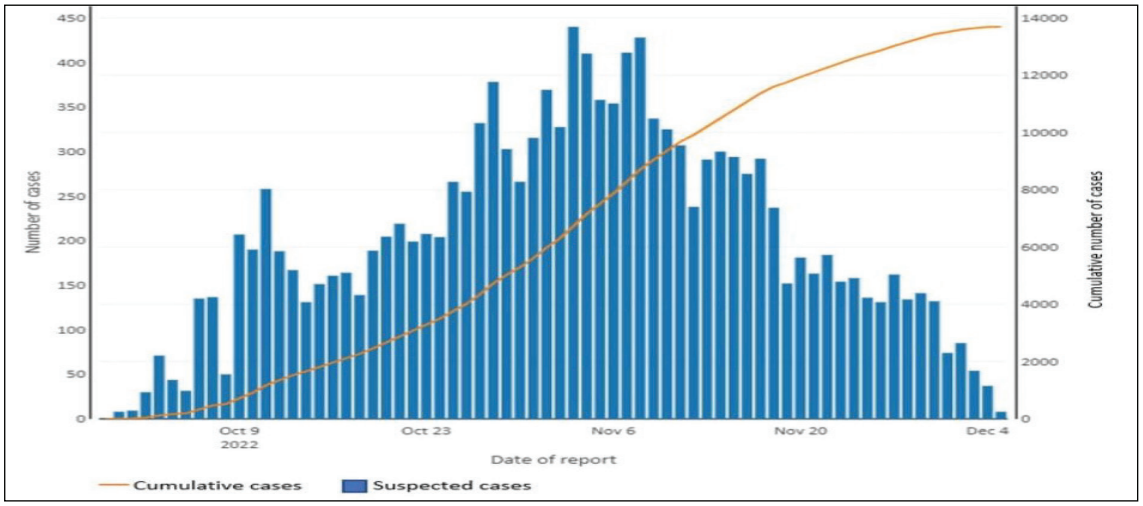
As the outbreak is occurring in international border areas where there is significant cross-border movements, WHO encourages the respective countries to ensure cooperation and regular information sharing.

HAITI

After more than three years with no reported cases of cholera in Haiti, on 2 October 2022, the national authorities reported two confirmed cases of *V. cholerae* O1 in the greater Port-au-Prince area.

Between 2 October through 6 December 2022, a cumulative total of 13 672 suspected and 1193 laboratory-confirmed cholera cases, including 283 deaths (CFR 2%) were reported by the Haiti Ministry of Public Health (MSPP) from all ten departments in the country.

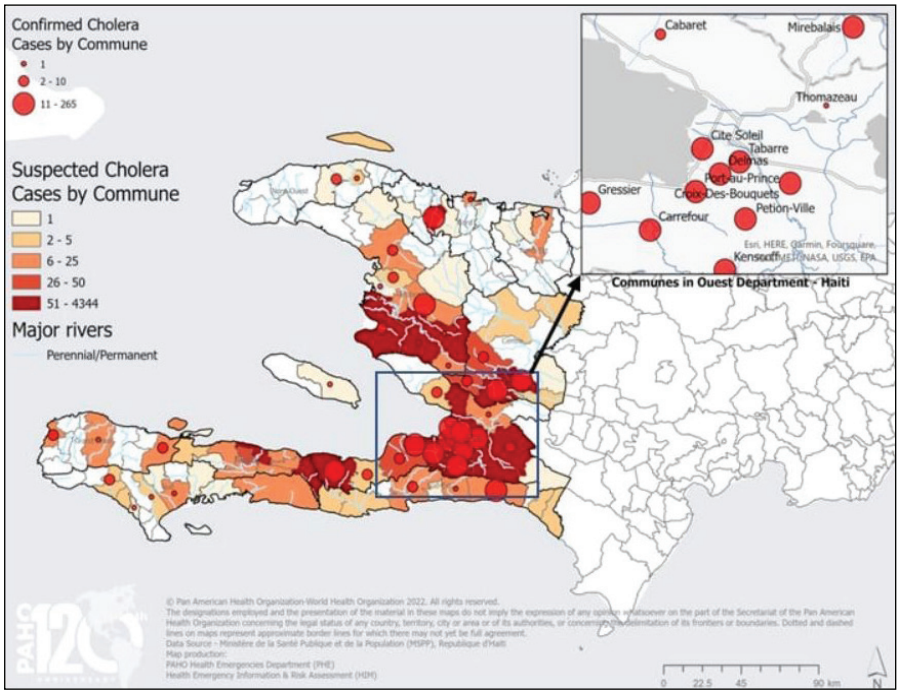
FIG. 8 Number of suspected cholera cases, Haiti, 2 October–6 December 2022 (*n* = 13 672)



Eighty-six per cent (11 751 cases) of all reported cases were hospitalized. Of the confirmed cholera cases with available information, 57% (680 cases) were male and the most affected age groups were those aged 1–4 years (19%), followed by 30–9 years (15%) and 5–9 years (14%).

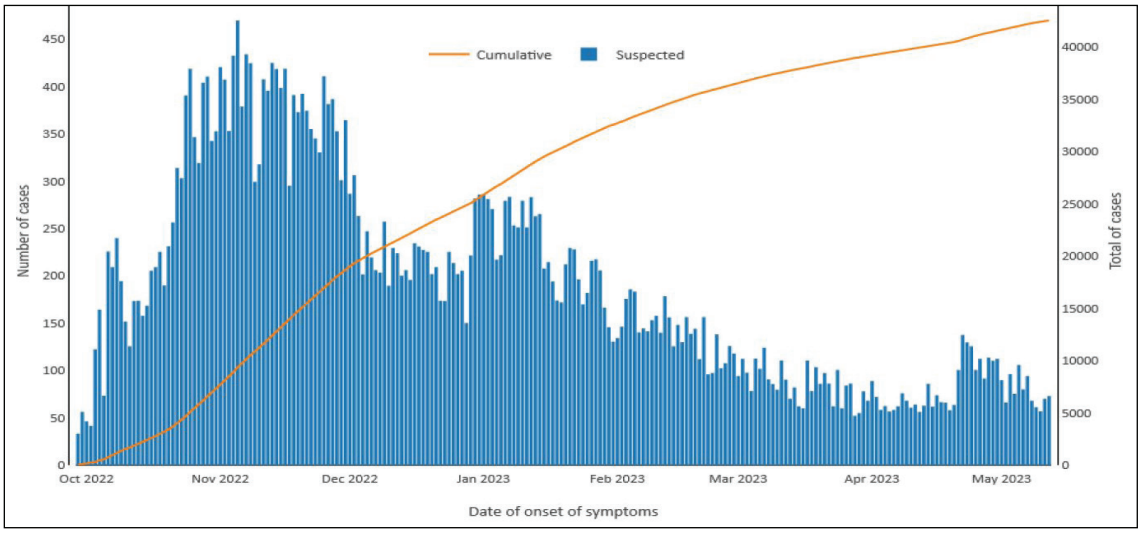
Three departments accounted for 94% of the reported confirmed cases: Ouest (79%; 943 cases), Centre (13%; 156 cases) and Artibonite (2%; 28 cases).

FIG. 9 Geographical distribution of suspected cholera cases, Haiti, 2 October–6 December 2022 (*n* = 13 672)



As of 15 May 2023 *(24),* the outbreak is considered ongoing with 42 351 suspected cases and 2678 confirmed cases reported in all ten departments of the country since 29 September 2022. While a downward trend in the number of cases has been observed since January 2023, an upsurge in cases was noted at the beginning of May 2023, especially in the Ouest and Centre departments.

FIG. 10 Daily distribution of suspected cases of cholera, Haiti, 29 September 2022–15 May 2023 (*n* = 42 315)



Public health response

Emergency response activities are being conducted by the Haiti MSPP, WHO and other partners across different response pillars, including but not limited to:

- **Laboratory and surveillance:** WHO supported the Haiti MSPP in strengthening epidemiological surveillance and laboratory capacity. Training of nurses and sampling teams was conducted to perform rapid diagnostic tests in the Centre and Ouest departments.
- **Clinical management:** WHO provided essential medicines and medical supplies to the Health Directorates in all 10 departments by land and air. In addition, WHO supported the MSPP in the coordination and quality assessment of Cholera Treatment Centres.
- **WASH:** WHO conducted training of the departmental health officials on cholera outbreak response at the community level.
- **Risk communication and community engagement (RCCE):** WHO, in coordination with UNICEF and the Communications Unit of the MSPP, developed a communication strategy to support the cholera vaccination campaign.
- **Reactive vaccination campaigns:** as a part of the outbreak response, an emergency reactive vaccination campaign of oral cholera vaccination was implemented by MSPP with WHO support.

WHO risk assessment

The cholera outbreak in Haiti, combined with the ongoing crisis related to gang violence, social unrest and insecurity, has strained the health system's response capacity. There is also limited access by the general population to safe drinking water and sanitation facilities. Thus, the overall risk for this outbreak, at the time the DON report was published (13 December 2022), was assessed as very high at the national level and low at the regional and global levels.

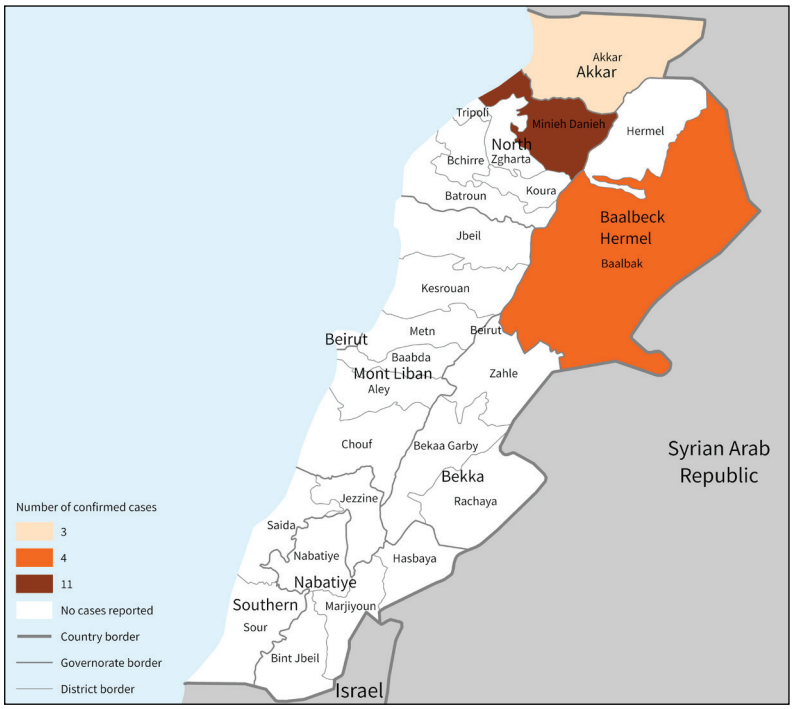
WHO advice

Given the re-emergence of cholera in Haiti and the imported cases reported in the Dominican Republic, WHO recommends that Member States strengthen and maintain cholera surveillance to prevent and respond promptly to possible imported cases or outbreaks.

LEBANON

Lebanon notified WHO of two laboratory-confirmed cholera cases, confirmed by bacteria culture test, reported from North and Akkar governorates, northern Lebanon. This represented the first cholera outbreak in Lebanon since 1993.

FIG. 11 Geographical distribution of confirmed cholera cases by district, Lebanon, 6–13 October 2022 (*n* = 18)



As of 13 October, a total of 18 confirmed cases were reported. The most affected age group were children under 5 years (44%; *n* = 8), followed by persons aged 45–64 years (22%; *n* = 4), 25–44 years (17%; *n* = 3) and 5–15 years (17%; *n* = 3). Females were disproportionally affected in the outbreak (72%; *n* = 13). Of the total cases, 11 (61%) were reported from the district of Minieh–Danniyeh, four cases (22%) from Baalbek district and three cases (17%) from Akkar district. As of 15 May 2023 ***(24)***, the outbreak is considered ongoing with a total of 1931 suspected and confirmed cholera cases reported from 1 January 2023.

Public health response

The Ministry of Public Health has established a coordination mechanism with multi-sector partners including the Ministry of Energy and Water, WHO, UNICEF and the International Committee of the Red Cross (ICRC). Response measures implemented, include but are not limited to:

» Intensification of active surveillance and case finding; updating of surveillance protocols; training on surveillance.

» Establishment of nine cholera treatment centres.

» Development of a cholera preparedness and response plan.

» Distribution of 1000 Bioline rapid diagnostic tests.

WHO risk assessment

Lebanon's health system has been hard hit by a three-year financial crisis and an explosion at the port of Beirut in August 2020 that destroyed essential medical infrastructure in the capital. In this context, responding to a cholera outbreak may overwhelm the already fragile health system in the country.

Due to porous borders allowing free movement between Lebanon and neighbouring countries, the exportation of cholera cases was considered highly likely at the time of DON report (19 October 2022).

WHO advice

WHO recommends improving access to proper and timely case management of cholera cases, improving infection, prevention, and control in healthcare facilities, improving access to safe drinking water and sanitation infrastructure, as well as, improving hygiene practices and food safety in affected communities as the most effective means of controlling cholera.

Surveillance for early case detection, confirmation and response in other provinces and regions of Lebanon should be reinforced especially in internally displaced persons (IDP) camps and at the district level while expanding community-based surveillance.

MALAWI

On 3 March 2022, the Ministry of Public Health of Malawi notified WHO of a cholera outbreak after laboratory confirmation of a cholera case in Machinga district hospital on 2 March 2022.

Between 3 March and 31 October 2022, a cumulative total of 6056 cases including 183 deaths were reported from 27 of 29 districts in Malawi (CFR 3%) with active transmission ongoing in 23 districts as of 31 October.

Five districts accounted for 79% of the reported cases and 68% of the deaths: Blantyre (650 and 26 deaths), Karonga (683 cases and 14 deaths), Nkhata Bay (1128 cases and 31 deaths), Nkhotakota (811 cases and 40 deaths) and Rumphi (783 cases and 13 deaths).

From 28 February 2022 to 15 May 2023 ***(24)***, 58 690 suspected and confirmed cholera cases and 1759 deaths with cumulative CFR 3% have been reported from all 29 districts of the country, making it the biggest active cholera outbreak in Africa. Since the middle of April, both the numbers of weekly cases and deaths continue to decline.

FIG. 12 Geographical distribution of confirmed and suspected cholera cases, Malawi, 1 January–31 October 2022 (*n* = 6056)

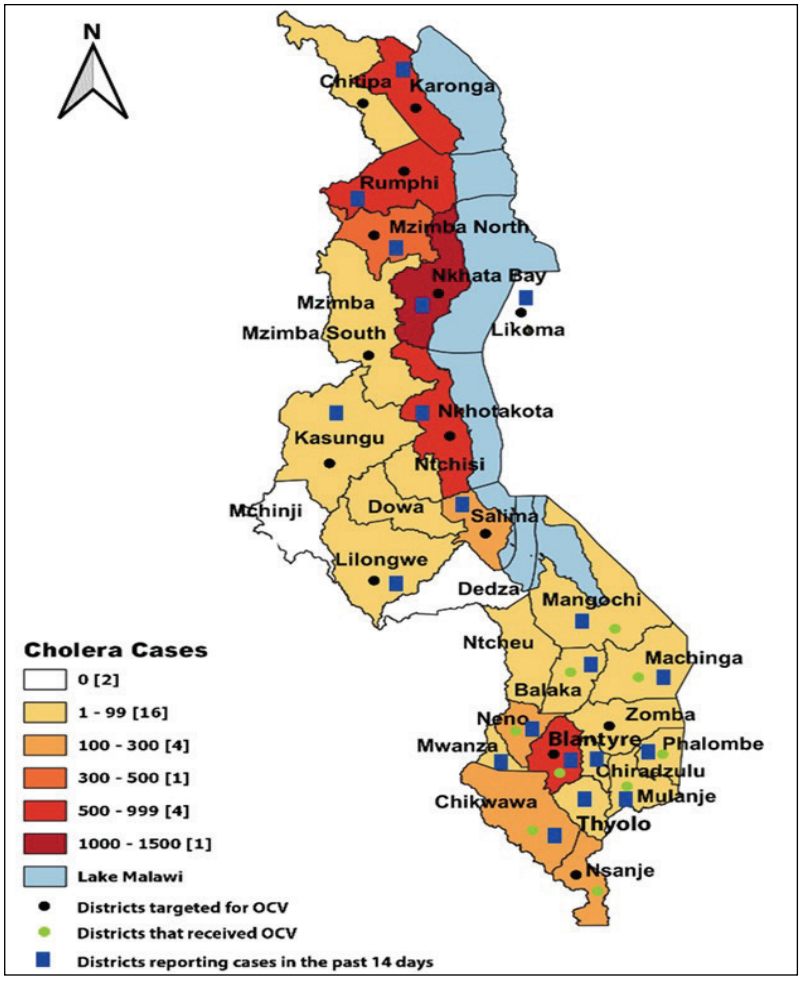


FIG. 13 Number of suspected and confirmed cholera cases (*n* = 6056) and deaths (*n* = 183), by month, Malawi, 1 January–31 October 2022

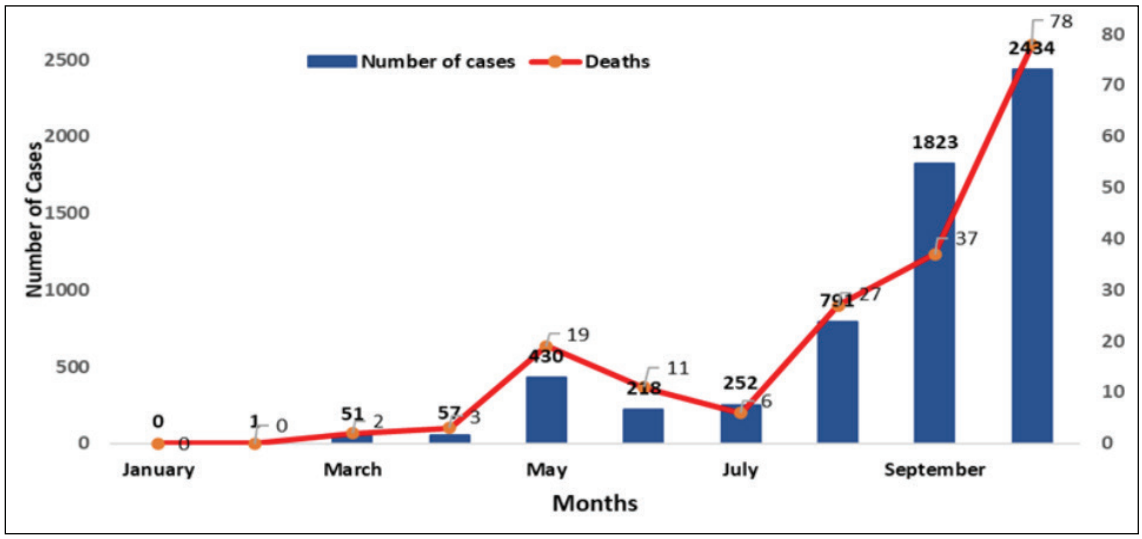
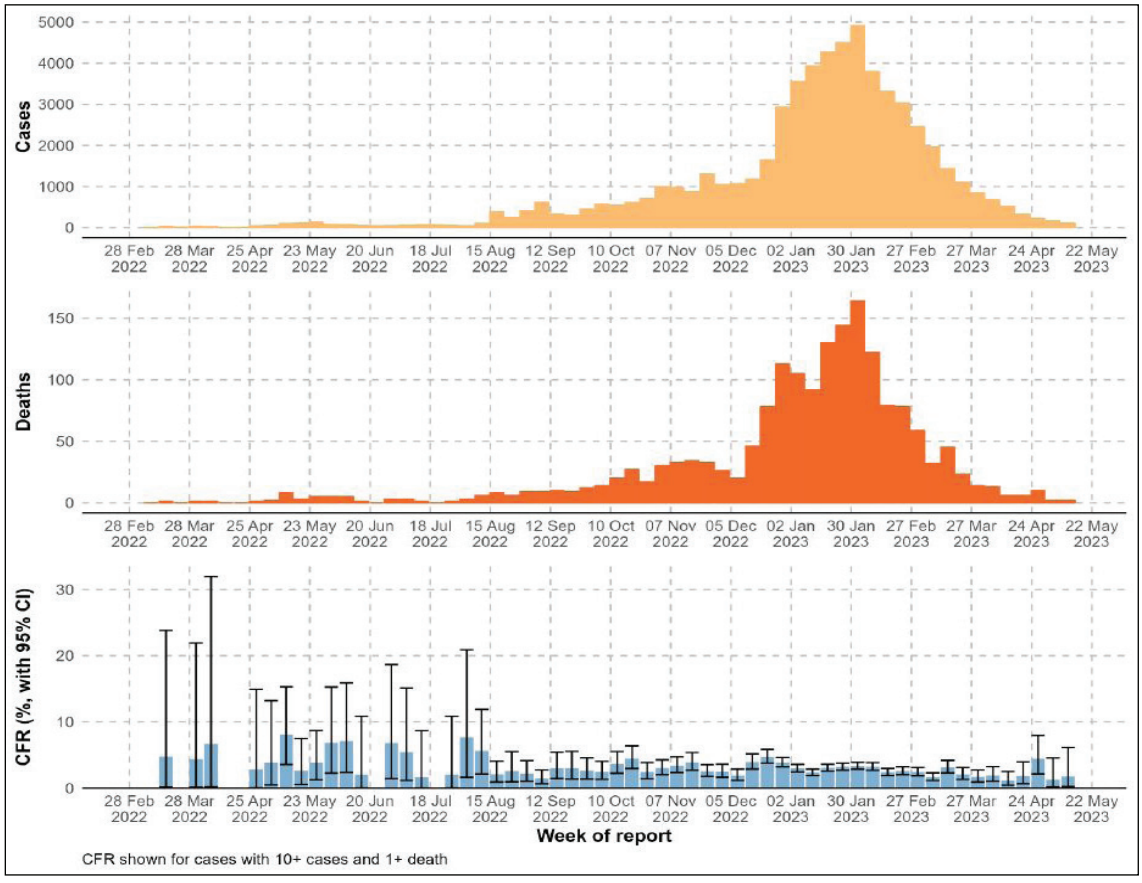


FIG. 14 Number of suspected and confirmed cholera cases, deaths and CFR (%), by week of reporting, Malawi, 28 February 2022–15 May 2023 (*n* = 58 690)



Public health response

Emergency response activities were conducted by the Ministry of Health, WHO and other partners since the declaration of the outbreak in March 2022, and include, but are not limited to:

» **Coordination and response:** national and district-level emergency operation centres (EOCs) were operationalized to coordinate the response.
» **Surveillance:** strengthen surveillance and case management in affected districts, including active case search for suspected cholera cases.
» **Health system strengthening:** supplies for case management and laboratory confirmation of cholera cases were distributed. Case management has been strengthened through the establishment of treatment structures and the provision of equipment.
» **Reactive vaccination campaigns** of oral cholera vaccination were implemented.

WHO risk assessment

Since the beginning of 2022, 29 districts of Malawi have reported cholera cases. The outbreak was largely confined to the south of the country until July 2022, when the outbreak spread to the north of the country resulting in a surge in cases. This upsurge in the number of cases was reported during the country's dry season when normally there is low or no transmission of cholera in Malawi.

There is a continued risk for further increases in the number of cases and international spread. Confirmed cases were reported across the border in Mozambique during the initial period of the current outbreak.

There is significant cross-border movements in the region with bordering countries and beyond. Given the history of the cross-border spread of cholera during this outbreak, at the time of the DON report (7 November 2022), WHO considered the risk as very high at the national and regional levels.

WHO advice

WHO recommends Member States to strengthen and maintain surveillance for cholera, especially at the community level, for the early detection of suspected cases and to provide adequate treatment and prevent its spread.

WHO encourages Malawi and its neighbouring countries to ensure cooperation and regular information sharing so that any spread across the border is quickly contained.

PAKISTAN

The first laboratory-confirmed case of this outbreak was reported on 15 January 2022 in Sindh province.

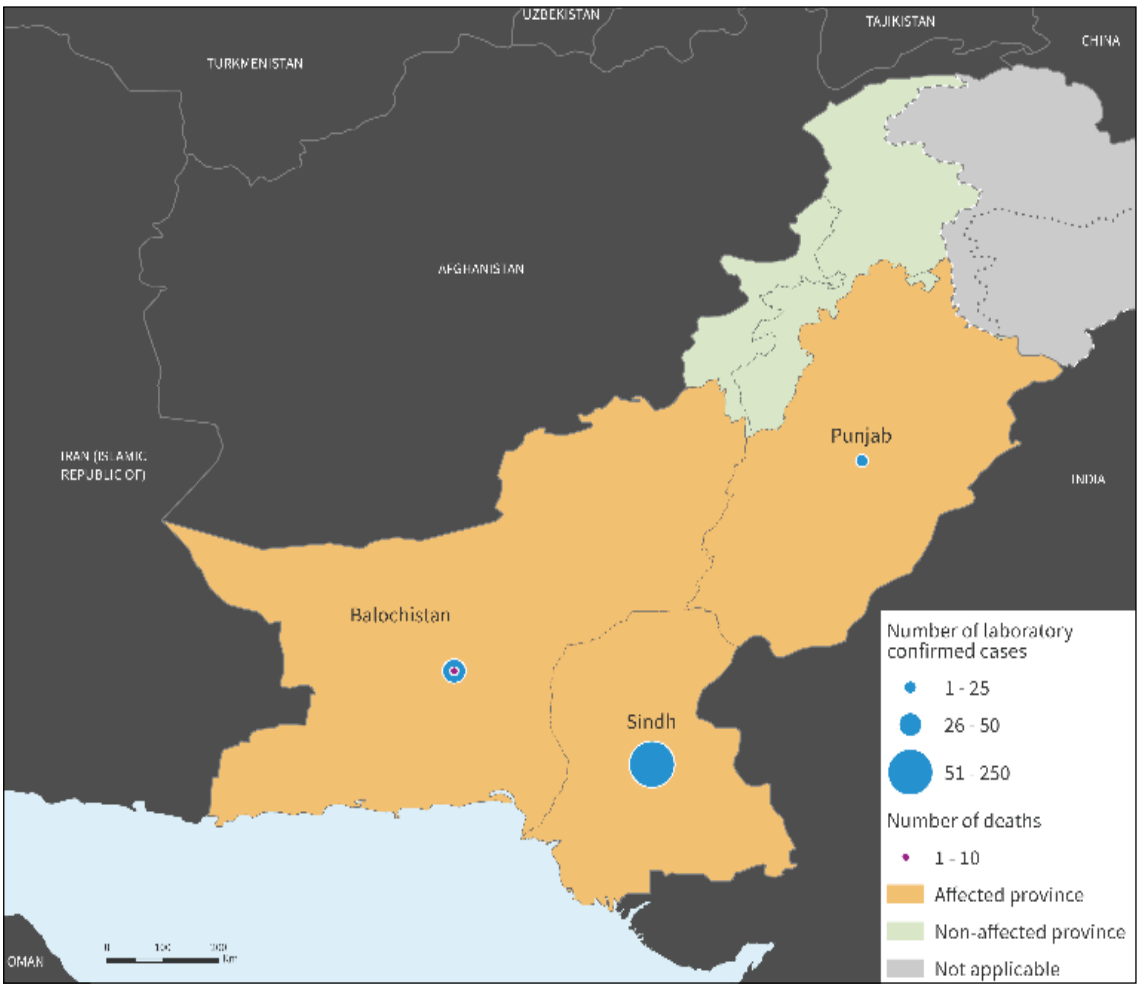
As of 27 May 2022, three provinces (Balochistan, Punjab and Sindh), reported a total of 290 confirmed cases of cholera with no deaths.

There was no significant difference in gender distribution with 126 (54%) cases that occurred among females.

Children younger than nine years old were the most affected age group with 114 (49%) cases reported.

As of 15 May 2023 ***(24)***, the outbreak is considered ongoing with a total of 7314 suspected and confirmed cholera cases reported from 1 January 2023.

FIG. 15 Geographical distribution of cholera cases, Pakistan, 15 January–27 May 2022 (*n* = 290)



Public health response

The Ministry of Health of Pakistan established and implemented a response plan including the activation of sentinel surveillance sites, the deployment of rapid response teams, and engaging private sector hospitals to enhance reporting.

Material support was also provided to the affected districts, including oral rehydratation salts (ORS), zinc, selected antibiotics and intravenous fluids for case management.

WHO supported advocacy and coordination, strengthening surveillance, case management, infection, prevention and control, data management and social mobilization activities.

Distribution of sample collection kits, water purification tablets, ORS, as well as information on cholera, education, and communication materials, was also continuously led by WHO.

WHO risk assessment

At the time of the DON report (13 October 2022), WHO highlighted the risk of potential international spread from Sindh province given that the most affected districts were located in Karachi city, which is an industrial centre as well as a transport hub with airport and seaport. In Balochistan province, there were suboptimal surveillance, limited access to safe drinking water and to health care, and affected areas were in proximity to areas with active cross-border movements with Afghanistan and Iran.

WHO advice

» WHO recommended strengthening the disease surveillance system. Surveillance for early case detection, confirmation and response in other provinces and regions of Pakistan should be reinforced.
» Proper and timely case management of cholera cases should be ensured.
» Oral cholera vaccines should be used in conjunction with improvements in WASH activities to control cholera outbreaks and for prevention in areas known to be at high risk for cholera.
» Improving access to safe drinking water and sanitation infrastructure, as well as improving IPC measures in healthcare facilities, with hygiene practices and food safety in affected communities are the most effective means of controlling cholera.
» Risk communication and community engagement on cholera prevention and early care seeking and treatment should be provided to the population.

SOMALIA

From 1 January to 10 July 2022, according to the Ministry of Health Somalia, a cumulative number of 7796 cases of cholera, including 37 associated deaths (CFR 1%) were reported from 25 drought-affected districts in Banadir region, South-West state and Hirshabelle state.

The number of cases reported in the first six months of 2022 exceeded the number of cases reported in 2021 in the same drought-affected districts, when a total of 6205 acute watery diarrhoea (AWD)/suspected cholera cases including 39 deaths (CFR 1%) were reported.

Over half of the cases (54%) were among children below 2 years of age, with males and females equally affected.

From 1 January to 14 May 2023 ***(24)***, a total of 7973 cases and 26 deaths with CFR < 1% have been reported in Somalia. Jubaland and south-west regions near the borders with Kenya and Ethiopia remain the major focus of the current outbreak.

FIG. 16 Geographical distribution of cholera cases (%), Somalia, 1 January–10 July 2022 (*n* = 7796)

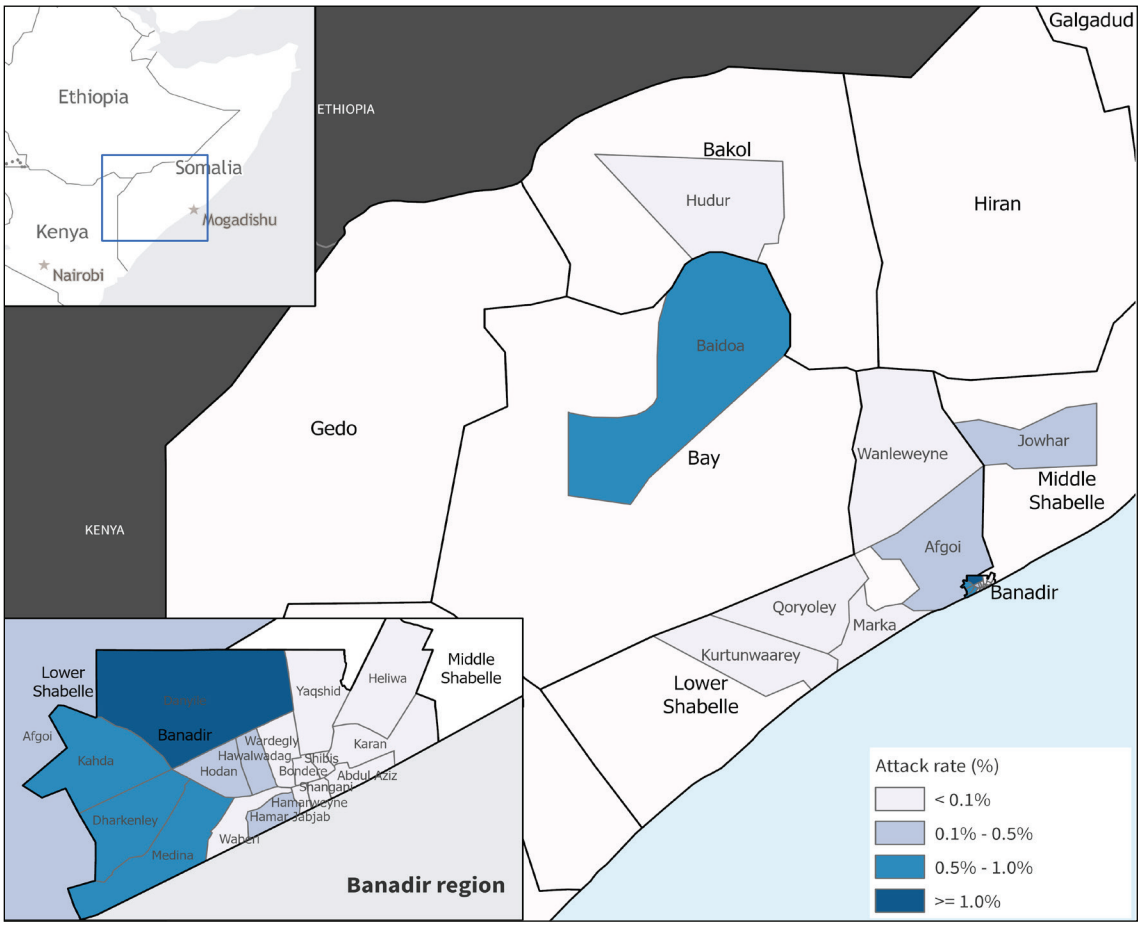
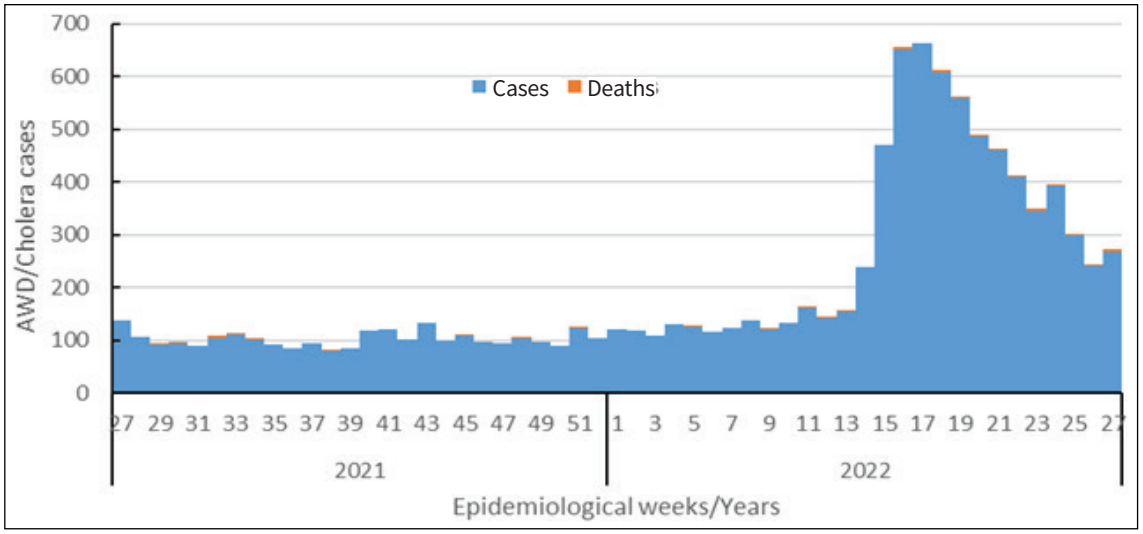


FIG. 17 Number of suspected cholera cases, Somalia, 1 January 2021–10 July 2022 (*n* = 7796)



Public health response

Emergency response activities were conducted by the MoH, WHO and other partners, including but not limited to:

» Activation of an incident management system (IMS) at the national level to coordinate drought response including cholera response activities.

» A Cholera Task Force was established to coordinate the implementation of cholera response activities including the implementation of reactive OCV campaigns.

» Activation of an early warning alert and response (EWAR) network in drought affected districts including community health workers who detect and investigate community alerts.

» Provision of state-based laboratories with reagents and other relevant supplies for the confirmation of cholera cases.

» Establishment of cholera treatment centres.

» Health sensitization sessions targeting people living in IDP camps conducted by health cluster partners along with the MoH.

» Implementation of water, sanitation and hygiene interventions including the distribution of hygienic kits to displaced communities are ongoing.

» The first round of the reactive oral cholera vaccination campaign was conducted (14–26 June 2022) in the nine high-risk districts and 897 086 (96%) of the people aged 1 year and above, including pregnant women, were vaccinated against cholera.

WHO risk assessment

The cholera outbreak in Somalia took place in the context of other ongoing outbreaks (including COVID-19 and measles), as well as the escalating drought that has affected seven million people and displaced 805 000 people to camps according to the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), putting pressure on an already overstretched health-care system with limited primary health-care services.

At the time of DON report (20 July 2022), the international spread could not be ruled out given the escalating drought conditions across the Horn of Africa, which has led to repeated displacement and extensive cross-border population movements between Somalia and nearby countries, especially Djibouti, Ethiopia, Kenya and Yemen.

WHO advice

WHO recommends to:

» Deploy additional district rapid response teams and community health workers to detect and report alerts and conduct risk communication.

» Build the capacity of frontline health workers in the clinical management of cholera cases.

» Establish oral rehydration points (ORPs) in the affected communities, supporting linkages of ORPs to CTCs.

» Scale-up of community awareness and sensitization campaigns.

» Strengthening the implementation of WASH interventions in drought affected districts.

» Develop an updated cholera response plan to streamline coordination for cholera response.

3.3 Invasive Group A *Streptococcus* infection

Summary

During 2022, and particularly in the second half of the year, France, Ireland, Netherlands (Kingdom of the), Sweden and the United Kingdom observed an increase in cases of invasive Group A *Streptococcus* (iGAS) infection and scarlet fever, mostly affecting children under 10 years of age. WHO published a DON ***(26)*** report on 15 December 2022, reporting this increased incidence across some European countries. WHO supported countries in evaluating the epidemiological situation, assessing the risk for the general population to be low.

Description of the situation

As of 8 December 2022, at least five Member States in the European Region (France, Ireland, Netherlands (Kingdom of the), Sweden and the United Kingdom) reported to WHO an increase in cases of iGAS and in some cases also scarlet fever. An increase in iGAS-related deaths was also reported in some of these countries.

Public Health France reported ***(27)*** an increase in iGAS cases in France since the beginning of 2022 in different regions, mainly in children under 10 years of age, and also detected an increase in cases of scarlet fever reported in outpatient clinics since September 2022.

The Irish Health Protection Surveillance Centre (HPSC) reported ***(28)*** an increase in iGAS cases in Ireland since the beginning of October 2022. Out of the 57 iGAS cases reported in 2022, 23 (40%) occurred between October and December 2022, compared to 11 cases reported for the same period in 2019 (pre-COVID-19 pandemic).

The Public Health Agency of the Netherlands (Kingdom of the) (RIVM) observed an increase in iGAS infections among children from March 2022 onward. Coinfections with varicella-zoster and respiratory viruses were also noted.

According to the Public Health Agency of Sweden ***(29)***, during the period from 1 July 2021 through 30 June 2022, 220 cases of iGAS were reported, compared to 173 cases reported in the previous year 2022–2021.

According to the United Kingdom Health Security Agency ***(30)***, a total of 4622 notifications of scarlet fever were reported from weeks 37 (ending on 18 September 2022) to 46 (ending on 20 November) of the 2022–2023 season, compared with an average of 1294 (range 258 to 2008) for the same period in the previous five years. Likewise, also the level of iGAS notifications was higher than what has been recorded over the last five years in all age groups (average 248, range 142 to 357 notifications). As of 8 December, 509 notifications of iGAS disease were reported through laboratory surveillance in England, with a weekly high of 73 notifications in week 46.

So far in the 2022–2023 season and as of 8 December 2022, the United Kingdom reported 13 deaths within seven days of an iGAS diagnosis in children under 15 years. This compares with four deaths in the same period in 2017 to 2018 (pre-COVID-19 pandemic) season. Antimicrobial susceptibility results from routine laboratory surveillance in the United Kingdom indicated no increased antibiotic resistance. Additionally, laboratory surveillance has not detected newly emerging *emm* gene sequence types (the gene encoding the M virulence protein responsible for many *Streptococcus* pyogenes serotypes).

Public health response

Enhanced surveillance activities were implemented in the countries reporting an increase in iGAS cases, together with public health messages addressing the general population and clinicians, in order to enhance early recognition, reporting and prompt treatment initiation of iGAS cases.

WHO supported the assessment of the epidemiological situation across the region providing recommendations to the public. WHO also issued an alert to other countries to be vigilant for a similar increase in cases and to report any unexpected increased national or increased national or regional incidence of iGAS infections to WHO.

WHO risk assessment

At the time of the DON report (15 December 2022), WHO assessed the risk for the general population posed by the reported increase in iGAS infections in some European countries as low, considering the moderate rise in iGAS cases, GAS endemicity, no newly emerging *emm* gene sequence types identified, and no observed increase in antibiotic resistance.

WHO advice

WHO recommended continuing close analysis of the epidemiological situation in countries throughout the European region. Countries should continue to report any unexpected increased national or regional incidence of iGAS infections to WHO through IHR (2005) or equivalent mechanisms either as notifications or consultations, as applicable and driven by the decision-making instrument in Annex 2 of the IHR (2005) ***(31)***.

3.4 Mpox (monkeypox)

Summary

On 13 May 2022, WHO was notified of two laboratory confirmed cases and one probable case of mpox (monkeypox), from the same household, in the United Kingdom. On 15 May, four additional laboratory confirmed cases were reported among Sexual Health Services attendees presenting with a vesicular rash illness in men who have sex with men (MSM). The first DON ***(32)*** report related to this event was published on 18 May 2022, following the notification, and until 27 June, a total of eight DON ***(33)*** reports were published. On 6 July 2022, updates on the multi-country outbreak of mpox transitioned from the Disease Outbreak News to mpox situation reports ***(34)*** due to the protracting situation. WHO also launched a dedicated web page ***(35)*** providing updated information on the outbreak.

On 23 July 2022, the WHO Director-General declared the escalating global mpox outbreak a Public Health Emergency of International Concern (PHEIC) ***(36)*** and, nearly a year later, on 11 May 2023, the WHO Director-General concurred that the event no longer continues to constitute a PHEIC ***(37)***.

Description of the situation

From 1 January 2022 to 31 December 2022, a cumulative total of 83 943 laboratory-confirmed cases of mpox and 75 deaths were reported to WHO from 110 countries/territories/areas in all six WHO regions.

TABLE 2 **Number of cumulative confirmed mpox cases and deaths reported to WHO, by WHO Region, 1 January–31 December 2022 (*n* = 83 943)**

WHO Region	Confirmed mpox cases	Deaths
African Region	1 200	15
Region of the Americas	56 694	53
South-East Asia Region	35	1
European Region	25 705	5
Eastern Mediterranean Region	80	1
Western Pacific Region	229	0
TOTAL	**83 943**	**75**

The majority of cases were reported from the Region of the Americas (80%), and from the European Region (19%).

From August 2022, the number of reported confirmed cases shows a constant decline, in particular in the European and the Americas Regions.

FIG. 18 **Geographical distribution of confirmed cases of mpox reported to, or identified by, WHO from official public sources, 1 January–31 December 2022 (*n* = 83 943)**

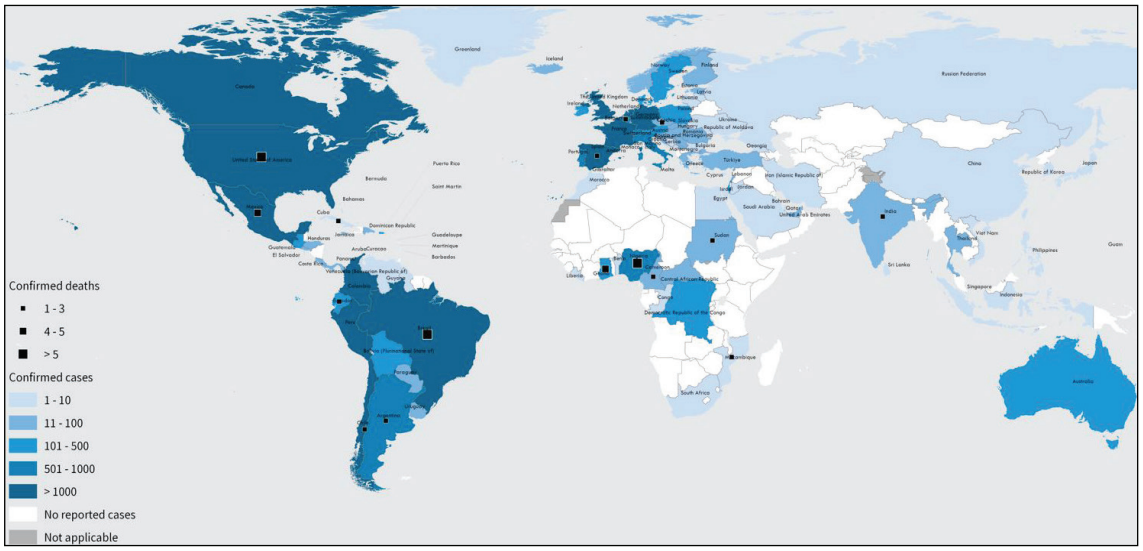
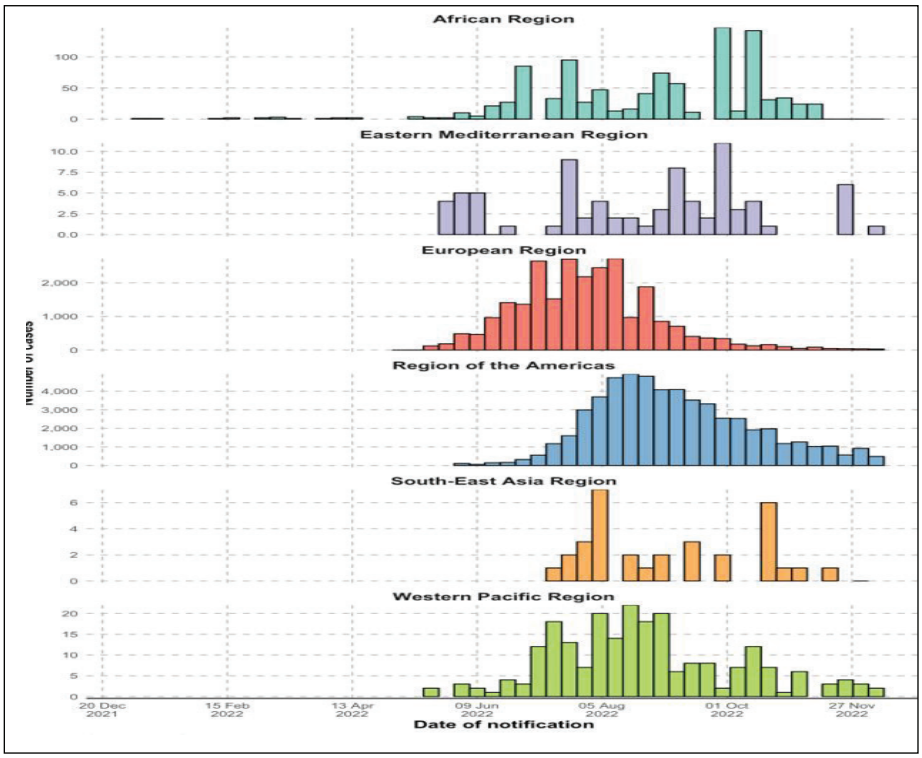


FIG. 19 **Epidemiological curves of weekly aggregated confirmed cases of mpox, by WHO Region, 1 January–31 December 2022 (*n* = 83 943)**



The outbreak affected primarily young men, with 97% (71 946/74 479) of cases with available data being men, with a median age of 34 years (interquartile range: 29–41 years). Among cases with sexual orientation reported, 84% (25 946/30 733) identified as gay, bisexual and other men who have sex with men. Of all reported modes of transmission, transmission through skin and mucosal contact during sexual activities was most reported, in 14 629 of 21 164 (69%) of all reported transmission events. The most reported exposure setting was a party setting with sexual contact, comprising 3367 of 5034 (67%) reported exposure settings.

As of 19 June 2023 *(38)*, a total of 87 972 laboratory confirmed cases with 147 deaths have been reported from 112 countries. Nineteen of the 112 affected countries have reported new cases within the last 21 days, the maximum disease incubation period. Two of these countries are in the African Region, six in the Region of the Americas, three in the South-East Asia Region, five in the European Region and three in the Western Pacific Region. Some of these countries continue to have sustained community transmission of mpox, while others report sporadic cases.

Public health response

WHO continues to closely monitor the situation, and support international coordination and information sharing with Member States and partners. Clinical and public health incident response was activated by Member States to coordinate comprehensive case findings, contact

tracing, laboratory investigation, isolation, clinical management and implementation of infection and prevention and control measures. Genomic sequencing of viral deoxyribonucleic acid (DNA) of the mpox virus found in the current outbreak indicates that the virus genes detected belong to the West African clade.

WHO developed several documents to guide Member States across the different response components. Please visit WHO mpox outbreak website for further information *(39)*.

WHO risk assessment

As of 16 March 2023 *(40)*, WHO assessed the risk posed by the mpox outbreak as moderate in the African, Eastern Mediterranean, European regions and in the Region of the Americas; and low in South-East Asia and the Western Pacific regions.

On 11 May 2023, during the Fifth Meeting of the IHR (2005) Emergency Committee on the Multi-Country Outbreak of mpox (monkeypox) *(37)* the Emergency Committee (EC) acknowledged the progress made in the global response to the multi-country outbreak of mpox and noted a significant decline in the number of reported cases. The EC acknowledged remaining uncertainties about the disease, regarding modes of transmission in some countries, poor quality of some reported data, and continued lack of effective countermeasures in the African countries, where mpox occurs regularly. The EC considered, however, that these are long-term challenges that would be better addressed through sustained efforts in a transition towards a long-term strategy to manage the public health risks posed by mpox, rather than the emergency measures inherent to a public health emergency of international concern (PHEIC). The WHO Director-General concurred with EC indications and declared the end of the PHEIC, issuing Temporary Recommendations *(37)* to support the goal of the WHO Strategic Preparedness, Readiness and Response Plan for Monkeypox 2022–2023 *(41)* and WHO operational guidelines *(42)* to stop the outbreak and meet the objectives to interrupt human-to-human transmission, protect the vulnerable, and minimize zoonotic transmission of the virus.

WHO advice

WHO continuously updates several advice *(38)*, based on emerging evidence, including but not limited to:

- Surveillance, case investigation and contact tracing for mpox: interim guidance, 22 December 2022 *(43)*.
- Vaccines and immunization for mpox: interim guidance, 16 November 2022 *(44)*.
- Mpox strategic preparedness, readiness, and response: operational planning guidelines *(42)*.
- Clinical management and infection prevention and control for mpox: interim rapid response guidance *(45)*.
- Risk communication and community engagement public health advice on understanding, preventing and addressing stigma and discrimination related to mpox *(46)*.
- Mpox vaccination specific documentation *(47)*.

3.5 Polio

Summary

Outbreaks of poliovirus were reported in Algeria, Indonesia, Israel, Malawi and Mozambique in 2022. In addition, unusual detection of circulating vaccine-derived poliovirus type 2 (cVDPV2) were reported in environmental samples in the United Kingdom and the United States of America. The detection of these cases and the emergence of cVDPV2 in the United Kingdom and the United States of America is a reminder that until polio is eradicated, polio-free countries will remain at risk of polio re-infection or re-emergence.

A total of six DON reports on polio events were published in 2022. Two DON reports covered wild poliovirus type 1 (WPV1) outbreaks that occurred in Malawi *(48)* and Mozambique *(49)*, one DON report covered outbreaks of circulating vaccine-derived poliovirus type 3 (cVDPV3) in Israel *(50)*, and two reported outbreaks of circulating vaccine-derived poliovirus type 2 (cVDPV2) in Algeria *(51)* and Indonesia *(52)*. A multicountry DON *(53)* report was published on the cVDPV2 detected in environmental samples in the United Kingdom and the United States of America.

The thirty-third meeting *(54)* of the Emergency Committee under the IHR (2005) on the international spread of poliovirus, convened by the WHO Director-General on 12 October 2022, unanimously agreed that the risk of international spread of poliovirus remains a Public Health Emergency of International Concern.

WHO considers there to be a continued high risk of the international spread of WPV1 and cVDPV, due to persisting suboptimal immunity, surveillance gaps and large-scale population movements. The risk is magnified by decreased immunization rates related to the COVID-19 pandemic.

ALGERIA

On 8 July 2022, a case of cVDPV2 in Algeria was notified to WHO through the Global Polio Laboratory Network (GPLN). The case was a child under 2 years old from Tamanrasset province, southern Algeria, with the onset of acute flaccid paralysis (AFP) on 11 April 2022. Stool specimens tested positive for cVDPV2 by the Pasteur Institute of Algeria and were confirmed by the Pasteur Institute of Paris. Genomic sequencing analysis indicates that the isolated virus was genetically linked to a virus previously isolated in Kano, Nigeria. The child had not received any polio vaccine doses and has no history of travel outside Tamanrasset province.

This represents the first cVDPV2 case identified in Algeria, where, according to the 2021 WHO-UNICEF immunization coverage estimates, Pol3 (3rd dose of polio-containing vaccine) coverage was 91% and IPV1 (one dose of the inactivated polio vaccine) coverage was 94%.

According to GPEI *(55)*, at the time of DON report (13 September 2022), Algeria was affected by circulating cVDPV2. From 1 January to 26 June 2023, no cVDPV2 were reported from the country. There were three cVDPV2 cases reported in 2022.

Public health response

» Surveillance was strengthened for active search for additional AFP cases in and around the immediate area of the detected case.
» A detailed field investigation was initiated in coordination with the GPLN to identify the extent of the virus circulation (including potentially in neighbouring countries).
» A response plan was prepared in accordance with the revised international polio outbreak response SOPs.
» A reactive immunization campaign was implemented.

WHO risk assessment

The polio isolate in Algeria was linked to a virus originating in Kano, Nigeria, demonstrating the potential for the international spread of cVDPVs. WHO considers there to be a continued high risk of international spread of cVDPV2, due to persisting suboptimal immunity, surveillance gaps, and large-scale population movements.

WHO advice

It is important that all countries, in particular those with frequent travels and contacts with polio-affected countries and areas, strengthen surveillance for AFP cases and commence planned expansion of environmental surveillance in order to rapidly detect any new virus importation and to facilitate a rapid response. Countries, territories and areas should also maintain uniformly high routine immunization coverage at the district level to minimize the consequences of any new virus introduction.

INDONESIA

On 12 November 2022, Indonesia's Ministry of Health notified WHO of a confirmed case of cVDPV2. The case was a 7-year-old boy from Pidie district in Aceh province, who developed AFP on 9 October 2022. The case had not received the oral polio vaccine (OPV), or IPV, and had no travel history or contact with people who had travelled to endemic areas. On 25 November 2022, three more genetically related isolates of cVDPV2 were reported based on the laboratory results of stool samples taken from three healthy children who were in the same community but not close contacts of the index case.

Sequencing results showed 25 nucleotide changes for the AFP case and 25 to 26 nucleotide changes for the three asymptomatic children. These results were evidence of transmission of the virus and met the criteria to be classified as cVDPV2.

According to GPEI *(56)*, at the time of DON report (19 December 2022), Indonesia was affected by cVDPV2. As of 26 June 2023, the country reported three cases in 2023 and one case in 2022. This includes three cases with AFP in Aceh province and one in West Java province.

Public health response

The Ministry of Health, with support from WHO, UNICEF and other partners, undertook strong measures to stop the transmission. Measures included enhanced surveillance and active search for AFP cases at health facilities and communities, assessment of OPV/IPV coverage through a rapid community survey in a sample of 200 households, and training on the surveillance guidelines for the use of novel oral polio vaccine type 2 (nOPV2).

The WHO Director-General approved the release of the nOPV2 for rapid response on 25 November 2022 and a rapid vaccination response was initiated on 28 November in Pidie district (the affected district) with approximately 95 603 children aged under 13 years reached by the vaccination campaign.

A rapid response vaccination campaign was also launched in Aceh province for those aged from 0 to 12 years on 5 December 2022.

WHO risk assessment

At the time of the DON report (19 December 2022), WHO assessed the risk to be high at the national level due to low polio vaccination coverage; susceptibility of the population to poliovirus type 2 after switching from trivalent oral polio vaccine (tOVP) to bivalent oral polio vaccine (bOPV) in April 2016 combined with low uptake of inactivated polio vaccine; sub-optimal surveillance capacity; and vaccine hesitancy among the at-risk population.

WHO advice

The detection of cVDPVs highlights the importance of maintaining high levels of routine vaccination coverage everywhere to minimize the risk and consequences of the circulation of any poliovirus, as well as the need to ensure quality surveillance for early detection of any poliovirus.

To comply with the Temporary Recommendations issued under the PHEIC, any country that has had an importation of cVDPV2 with local transmission should: (1) declare the outbreak as a national public health emergency; (2) encourage residents and long-term visitors to receive a dose of IPV four weeks to 12 months before international travel; (3) ensure that travellers who receive such vaccination have access to an appropriate document to record their polio vaccination status; (4) further intensify efforts to increase IPV immunization coverage, including sharing coverage data; and (5) intensify regional cooperation and cross-border coordination to enhance surveillance for prompt detection of poliovirus, and vaccinate refugees, travellers and cross-border populations, according to the advice of the Advisory Group.

ISRAEL

On 7 March 2022, the IHR National Focal Point for Israel notified WHO of the detection of cVDPV3 in the country. According to the notification, cVDPV3 virus was isolated from an acute flaccid paralysis case, in an unvaccinated child aged 3 years and 9 months, from the city of Jerusalem. The case had onset of paralysis on 17 February 2022. The isolated virus has 17 nucleotide changes from Sabin 3 (vaccine strain) and is genetically linked to a cluster of VDPV3 previously detected from environmental samples from Jerusalem and Bethlehem city, collected between September 2021 to January 2022.

According to GPEI ***(57)***, at the time of DON report (15 April 2022), Israel was affected by both circulating vaccine-derived poliovirus type 2 (cVDPV2) and type 3 (cVDPV3). In addition to the cVDPV3 case reported in 2022, in 2023 (as of 26 June 2023), the country reported one cVDPV2 case.

Public health response

Local health authorities conducted environmental, epidemiological and virological investigations, to determine the source and origin of the isolated virus, and the potential risk of further spread associated with it. Similar investigations were undertaken in the occupied Palestinian territory.

An IPV and OPV polio catch-up vaccination was implemented for children aged from 6 weeks to 17 years (inclusive). On 4 April, a bOPV campaign was launched, focusing on Jerusalem district. As of 13 April, the bOPV campaign was extended to the entire country.

WHO risk assessment

Given the high level of vaccination coverage and robust surveillance system in Israel, the risk of further spread in the country, as well as in the occupied Palestinian territory, was assessed to be moderate at the time of the DON report (15 April 2022), as immunization gaps persisted in certain high-risk areas/population groups.

WHO assessed the risk of further international spread associated with this cVDPV3 detection as low due to high population immunity, robust AFP surveillance and existing response capacity.

WHO advice

Despite the high level of vaccination coverage and robust surveillance system in Israel, immunization gaps persist in certain high-risk areas/population groups.

WHO advises that every country should seek to achieve and maintain high levels of coverage with polio vaccine in support of the global commitment to eradicate polio.

Countries, territories, and areas should also maintain uniformly high routine immunization coverage at the district level to minimize the consequences of any new virus introduction.

MALAWI

On 17 February 2022, WHO received an IHR notification regarding the detection of wild poliovirus type 1 in Malawi.

The case, a child under 5 years old, from Central constituency, Lilongwe district, Central Region, developed acute flaccid paralysis on 19 November 2021. Two stool specimens were collected for testing on 26 and 27 November and were received at the Regional Reference Laboratory, the National Institute of Communicable Disease (NICD) in South Africa, on 14 January 2022, and then forwarded to the United States Centers for Disease Control and Prevention (US CDC).

Sequencing of the virus is conducted by the NICD on 2 February, and on 12 February the US CDC confirmed this case as WPV1. Analysis showed that the current WPV1 isolate in Malawi was genetically linked to a Pakistan sequence detected in 2020 in Sindh province.

According to GPEI *(58)*, at the time of DON report (3 March 2022), Malawi was affected by wild poliovirus type 1 and vaccine-derived poliovirus type 1. In addition to the WPV1 case reported, the country also reported in 2022 four cases of vaccine-derived poliovirus type 1. No wild and vaccine-derived poliovirus cases have been reported in 2023 (as of 26 June).

Public health response

Global Polio Eradication Initiative partners, including WHO, supported the Malawi health authorities to carry out a risk assessment and outbreak response, including supplemental immunization. Surveillance measures were activated and expanded in Malawi and neighbouring countries to detect potential cases.

GPEI Rapid Response Team was sent to Malawi to support coordination, surveillance, data management, communications and operations. Partner organizations also sent teams to support emergency operations and innovative vaccination campaign solutions.

WHO risk assessment

At the time of the DON report (3 March 2022), the risk at the national level in Malawi was assessed as high, given the presence of high population density, low vaccination coverage (< 80%) in many districts and lack of a catch-up campaign for more than six years, accumulated susceptible populations, suboptimal AFP surveillance, and lack of environmental surveillance. Furthermore, the switch from the tOPV to the bOPV in Malawi was completed on 25 April 2016, and inactivated polio vaccine was introduced on 14 December 2018. The most recent supplementary immunization activities (SIAs) with a vaccine containing type 2 vaccine were conducted in 2013. The risk at the regional level was assessed as moderate given the significant population movement between Mozambique and Malawi, suboptimal vaccination coverage in the neighbouring countries, and suboptimal AFP surveillance activities.

The risk at the global level was assessed as low given the existing response capacity in place and the moderately high global polio coverage estimates.

WHO advice

Isolation of poliovirus in a previously non-infected area represents an event or outbreak that requires national authorities to complete an immediate risk assessment to inform the type and scale of response. Following the initial investigation and risk assessment, national authorities must continue to collect detailed information to update the situation analysis and risk assessment (i.e. results from laboratory investigations, or detailed information on affected communities, etc.). Neighbouring countries/regions must also continue to update their risk assessment with support from WHO regional offices.

Countries, territories, and areas should also maintain systematically high routine immunization coverage rates (> 90%) both at national and subnational levels to minimize the consequences of any new poliovirus introduction. WHO recommends that two high-quality large-scale vaccination campaigns (> 90% of children vaccinated) should be completed within eight weeks of laboratory sequencing results. A mop-up round might be required as an additional step, wherever monitoring suggests children have been missed in certain health districts or areas, to ensure interruption of transmission (even in the absence of new poliovirus detections). Communication and social mobilization activities should be an integrated part of reactive polio immunization campaigns.

MOZAMBIQUE

On 15 May 2022, a case of wild poliovirus type 1 was reported in Mozambique through the Global Polio Laboratory Network.

The case is a 12-year-old female with acute flaccid paralysis, with onset of paralysis on 25 March, from Changara district, Tête province bordering Zimbabwe and Malawi.

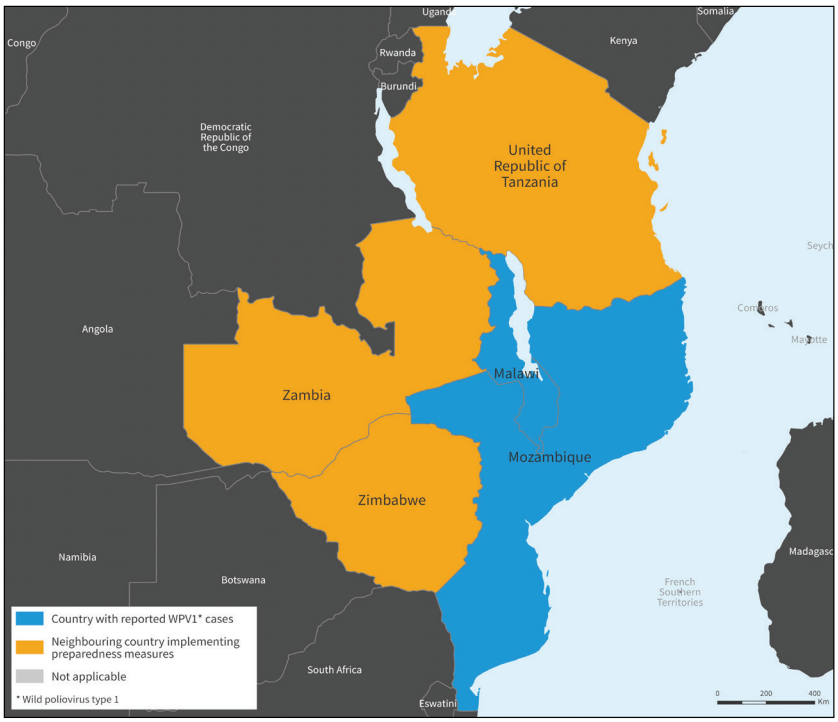
Two stool specimens were collected for testing on 1 and on 2 April. On 14 May, the samples were confirmed to be WPV1 by the National Institute for Communicable Diseases in South Africa.

The child had previously received three doses of bivalent oral poliovirus vaccine but no inactivated poliovirus vaccine. Genomic sequencing analysis indicated that the newly confirmed case is linked to a strain that had been circulating in Pakistan in 2019, similar to a case of WPV1 reported in Malawi in February 2022.

The last indigenous wild poliovirus case in Mozambique was reported in 1993.

According to GPEI ***(59)***, at the time of DON report (23 June 2022), Mozambique was co-affected by WPV1, cVDPV1 and cVDPV2. In 2022, the country reported eight cases of WPV1, 22 cases of cVDPV1 and four cases of cVDPV2. In 2023 (as of 26 June), Mozambique reported three cases of cVDPV1.

FIG. 20 **Countries reporting cases of WPV1 and neighbouring countries implementing preparedness plans**



Public health response

Mozambique has been actively participating in the multi-country emergency outbreak response implemented across the south-east African Region in response to the case of WPV1 reported in Malawi in February 2022, alongside Tanzania, Zambia and Zimbabwe to reach more than 23 million children across the region. Two rounds of bivalent OPV vaccination campaigns were implemented, with more than 4.5 million children vaccinated in Mozambique. At the same time, the response in the country to the cVDPV2 outbreak is also ongoing.

National and subnational authorities continue to be supported by partners of the Global Polio Eradication Initiative, notably by experts of the African Rapid Response Team, the GPLN, UNICEF and local organizations. Surveillance across the sub-region continues to be strengthened.

WHO risk assessment

WHO considers that there is a continuous high risk of international spread of WPV1, particularly across the south-east sub-region of Africa, due to persisting sub-optimal national immunity and surveillance gaps, and large-scale population movements. The risk is further increased due to the decreased immunization rate related to the ongoing COVID-19 pandemic.

The risk of spread associated with the concurrent cVDPV2 outbreak was assessed as moderate at the time of the DON report (23 June 2022) due to historical and epidemiological evidence suggesting that WPVs have a significantly higher propensity for geographic spread than cVDPVs.

WHO advice

It is important that all countries, in particular those with frequent travels to and contacts with polio-affected countries and areas, strengthen surveillance for AFP cases and commence planned expansion of environmental surveillance, in order to rapidly detect any new virus importation and to facilitate a rapid response. Countries, territories and areas should also maintain uniformly high routine immunization coverage at the district level to minimize the consequences of any new virus introduction.

The foremost priority is to continue to implement the sub-regional emergency response, by continuing to conduct large-scale, rapid and high-quality response campaigns.

UNITED KINGDOM, UNITED STATES OF AMERICA

In the United Kingdom of Great Britain and Northern Ireland (UK), since February 2022, the WHO Global Polio Laboratory Network located at the National Institute for Biological Standards and Control (NIBSC) in London consistently detected Sabin-like type 2 poliovirus isolates in sewage samples collected from London. Samples collected on 24 and 31 May had sufficient mutations to qualify as vaccine-derived poliovirus type 2. Subsequently, due to a new detection of the virus more than two months later, these samples were classified as "circulating" VDPV2 on 8 August. As of 5 September, no human case associated with VDPV2 has been reported in the United Kingdom.

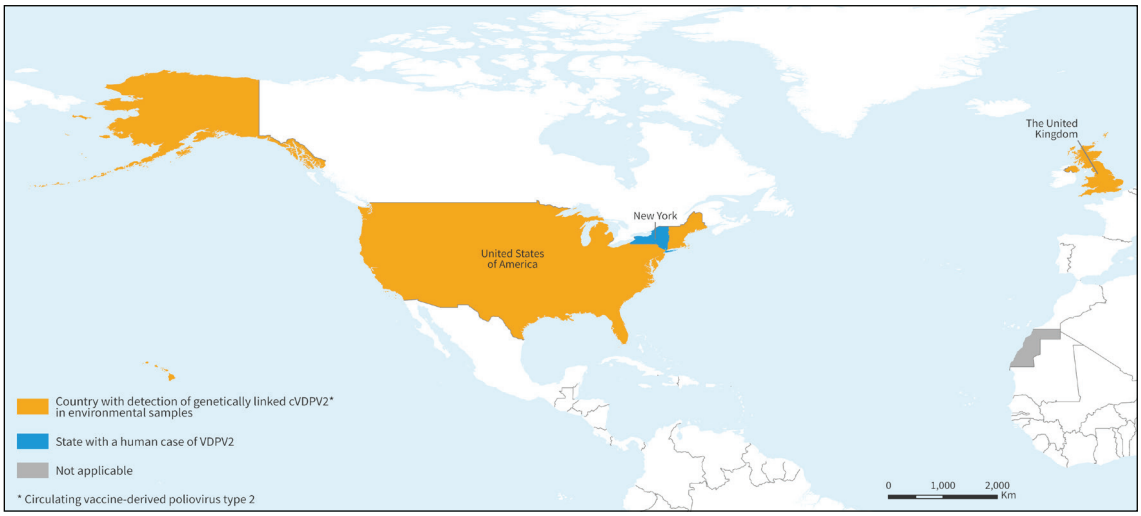
In the United States of America (USA), Sabin-like type 2 poliovirus was consistently detected in environmental samples collected between 21 April to 26 August 2022 from Rockland County, New York State and nearby counties. In late July, a case of VDPV2 was reported in an unvaccinated individual in Rockland County, who presented with paralysis. The case had no recent history of international travel. This is the first case of poliomyelitis reported in the country since 2013. Due to the detection of environmental viral sequences (collected on 3 August and 11 August) containing more than five nucleotide changes and both linked to the case reported in Rockland County – these viruses were classified as "circulating" VDPV2.

The virus detected in environmental samples in New York State, the United States of America, was genetically linked to viruses detected in sewage samples from London and in sewage samples collected between January to June 2022 from Jerusalem District, Israel.

According to GPEI ***(60)***, following the isolation of vaccine-derived poliovirus type 2 (VDPV2) from environmental samples in London, UK, in May 2022, further virological and epidemiological analysis confirms the circulation of this strain. As of 26 June 2023, however, no cases of paralysis associated with this strain have been detected — the virus has been isolated only from environmental (sewage) samples.

According to GPEI ***(61)***, no cases of cVDPV2 have been reported in 2023 (as of 26 June). In 2022, a total of 30 environmental samples tested positive for cVDPV2.

FIG. 21 **Detection of genetically linked cVDPV2 isolates in environmental samples, in the United Kingdom and the United States of America, from February to August 2022**



Public health response

WHO, in coordination with national authorities, continues to evaluate the genetic and epidemiological situation to determine the possible spread of the virus and the potential risk associated with these isolates detected from different locations around the world.

London and UK public health authorities continue to implement a timely and appropriate response to cVDPV2, in order to rapidly interrupt its circulation, including by: continuing to intensify surveillance efforts (including for potential cases of paralysis), identifying population sub-groups/areas with potential immunity gaps, offering an additional dose of inactivated polio vaccine (IPV) to all children (1–9 years of age) across London, and proactively reaching out to communities with known immunity gaps to strengthen vaccination coverage.

In the United States of America, a state disaster emergency due to polio was declared in New York State. New York and USA public health authorities implemented a timely and appropriate response to this circulating VDPV2, in order to rapidly interrupt its circulation, including continuing to intensify surveillance efforts (including for potential cases of paralysis), identifying population sub-groups/areas with potential immunity gaps, and proactively reaching out to communities with known immunity gaps to strengthen vaccination coverage.

WHO risk assessment

The emergence of cVDPV2 in the United Kingdom and the United States of America underlined that until polio is eradicated, polio-free countries will remain at risk of polio re-infection or re-emergence.

WHO will continue to support the ongoing investigation, risk assessment and outbreak response by national authorities.

WHO advice

The detection of this VDPV2 strain underscored the importance of:

» maintaining high levels of routine polio vaccination coverage at all levels and in all communities to minimize the risk and consequences of any poliovirus circulation; and

» having sensitive surveillance systems for the timely detection of VDPV importation or VDPV emergence.

WHO reiterates to all Member States the importance of reaching and maintaining polio vaccination coverage of more than 95% in each district or municipality; maintaining high quality for three main surveillance indicators: (1) acute flaccid paralysis rate, percentage of cases investigated within 48 hours, (2) percentage of cases with an adequate sample; and (3) optimizing supplementary (environmental and enterovirus) poliovirus surveillance and updating national poliovirus outbreak response plans in order to rapidly detect and respond to new virus importations, or VDPV emergence, to minimize the consequences of poliovirus transmission and facilitate a rapid response.

3.6 Viral haemorrhagic fevers

Summary

In 2022, outbreaks of dengue, Ebola virus disease and yellow fever were reported to WHO, resulting in a total of 21 published DON reports covering these viral haemorrhagic fevers events.

Most of the DON reports (*n* = 11) were related to Ebola virus disease in the Democratic Republic of the Congo ***(62)*** and Uganda ***(63)***.

Six DON reports covered dengue outbreaks that occurred in countries in the WHO South-East Asia Region — Bangladesh ***(64)***, including one DON ***(65)*** report on dengue among Rohingya refugee/Forcibly Displaced Myanmar Nationals (FDMN) camps in Cox's Bazar, Nepal ***(66)*** and Timor-Leste ***(67)*** — followed by the WHO Africa (São Tomé and Príncipe) ***(68)*** and the Eastern Mediterranean Regions (Pakistan) ***(69)***.

DON reports covering yellow fever were all related to outbreaks that occurred across countries in the WHO African Region (Kenya ***(70)***, Uganda ***(71)*** and one DON ***(72)*** report covering countries in East, West, and Central Africa), as well as the two DON ***(73)*** reports covering Marburg virus disease outbreaks that occurred in Ghana.

3.6.1 Dengue

BANGLADESH

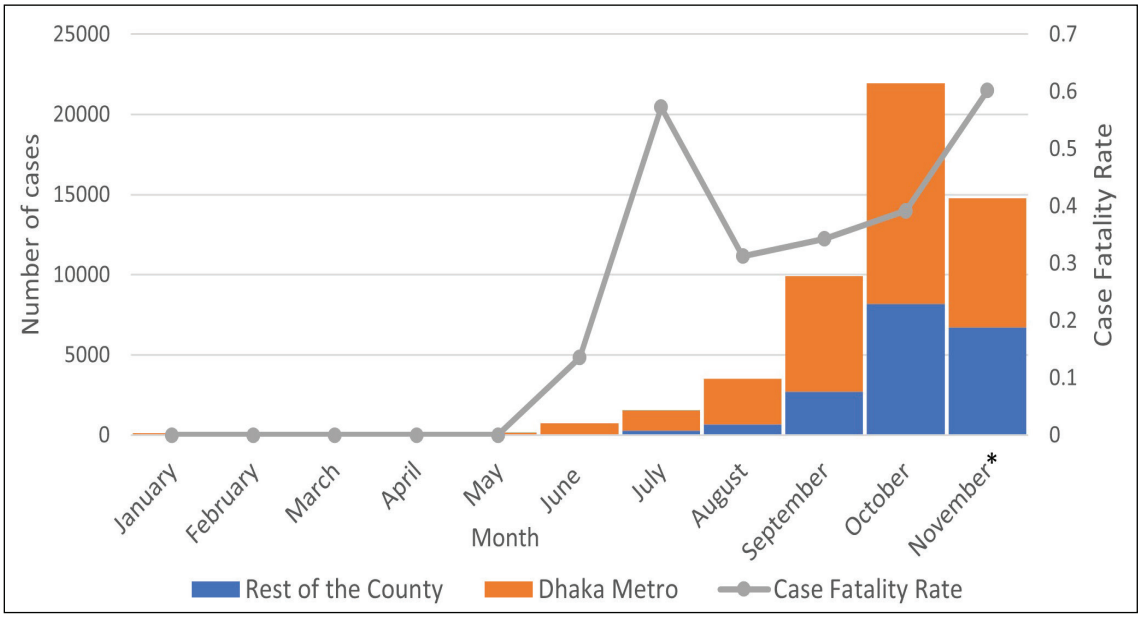
Between 1 January and 20 November 2022, a total of 52 807 dengue cases including 230 related deaths (CFR < 1 %) were reported by the Ministry of Health & Family Welfare (MOHFW) of Bangladesh. The median age of cases was 25 years (range: 0–89) with males accounting for 60% of the cases.

All eight divisions in the country reported cases and deaths. The most affected division is Dhaka, accounting for 71% of cases and 60% of deaths.

Dhaka city, the largest city in Bangladesh, located in Dhaka division, has reported 65% (*n* = 34 071) of the total number of cases. Other affected divisions include Chattogram division (13% of cases and 25% of deaths) and Khulna division (5% of cases and 5% of deaths).

In the frame of the national surge in dengue cases in Bangladesh, the Rohingya refugee/ Forcibly Displaced Myanmar Nationals (FDMN) camps in Cox's Bazar district, experienced an acute surge in dengue cases, that started at the end of May 2022 (epi week 22).

FIG. 22 Number of dengue cases and deaths reported in Bangladesh, 1 January–20 November 2022 (*n* = 52 807)



As of 24 July 2022 (end of epi week 29), a total of 7687 confirmed cases and 6 deaths (CFR < 1%) were reported among FDMN.

Cases of reported dengue in Rohingya refugee/FDMN camps were significantly higher as compared to similar periods over the past four years; 2018 (four cases), 2019 (seven cases), 2020 (three cases), and 2021 (1530 cases and three deaths with a surge from October to December).

Serotyping results processed at the Institute of Epidemiology, Disease Control and Research (IEDCR) reference laboratory in the capital Dhaka identified DENV-3 and DENV-2 (three samples) as the responsible strains of dengue cases occurring in Bangladesh.

As of 11 June 2023 *(74)*, the outbreak is ongoing. A total of 1036 cases of dengue were reported in Bangladesh during May 2023, 7.2 times higher than the number of cases reported in April 2023 (*n* = 143) and 6.4 times higher than the total number of cases reported in May 2022 (*n* = 163). From 1 to 11 June 2023, 1188 cases have been reported compared to a total of 737 cases reported for the entirety of June 2022.

FIG. 23 Number of dengue cases by district, Bangladesh, 1 January–20 November 2022 (*n* = 52 807)

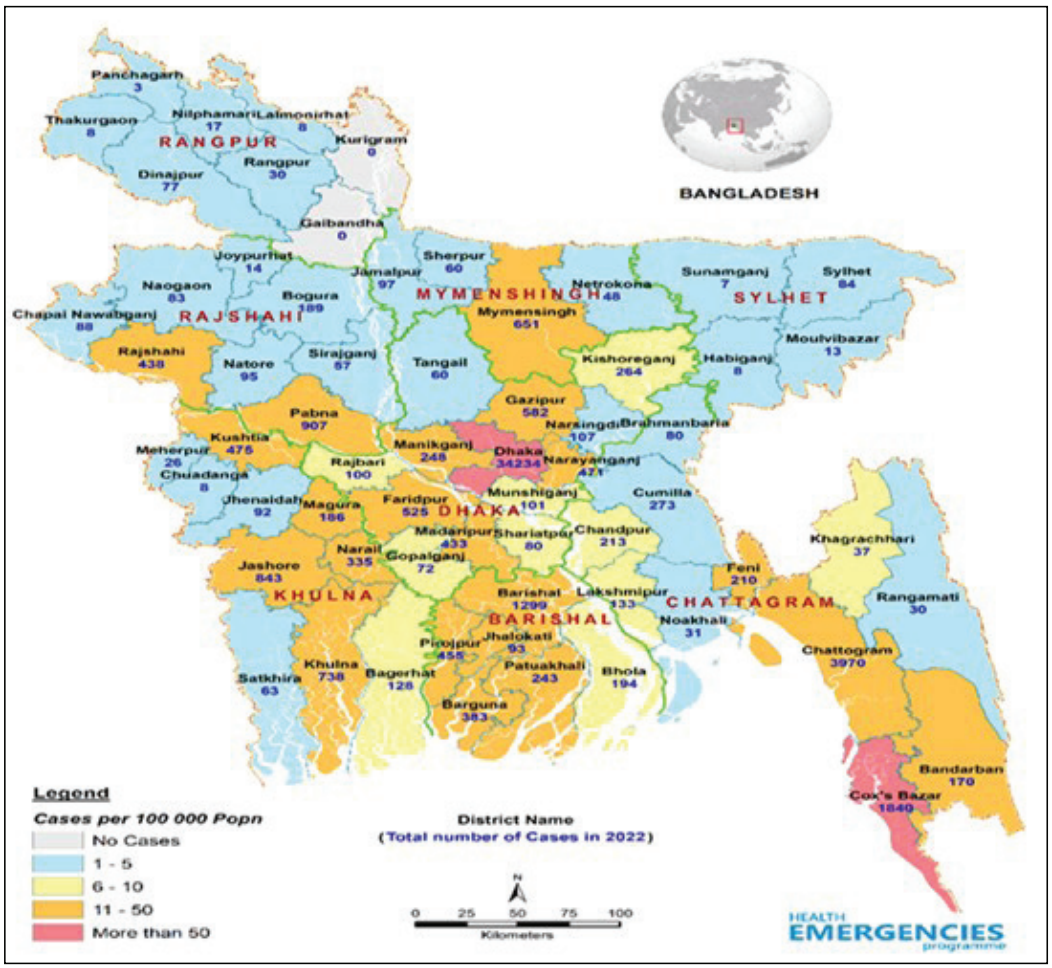


FIG. 24 Confirmed cases of dengue in Rohingya refugee/FDMN camps, Cox's Bazar District, Bangladesh, by notification date, 1 January 2018–24 July 2022 (*n* = 7687)

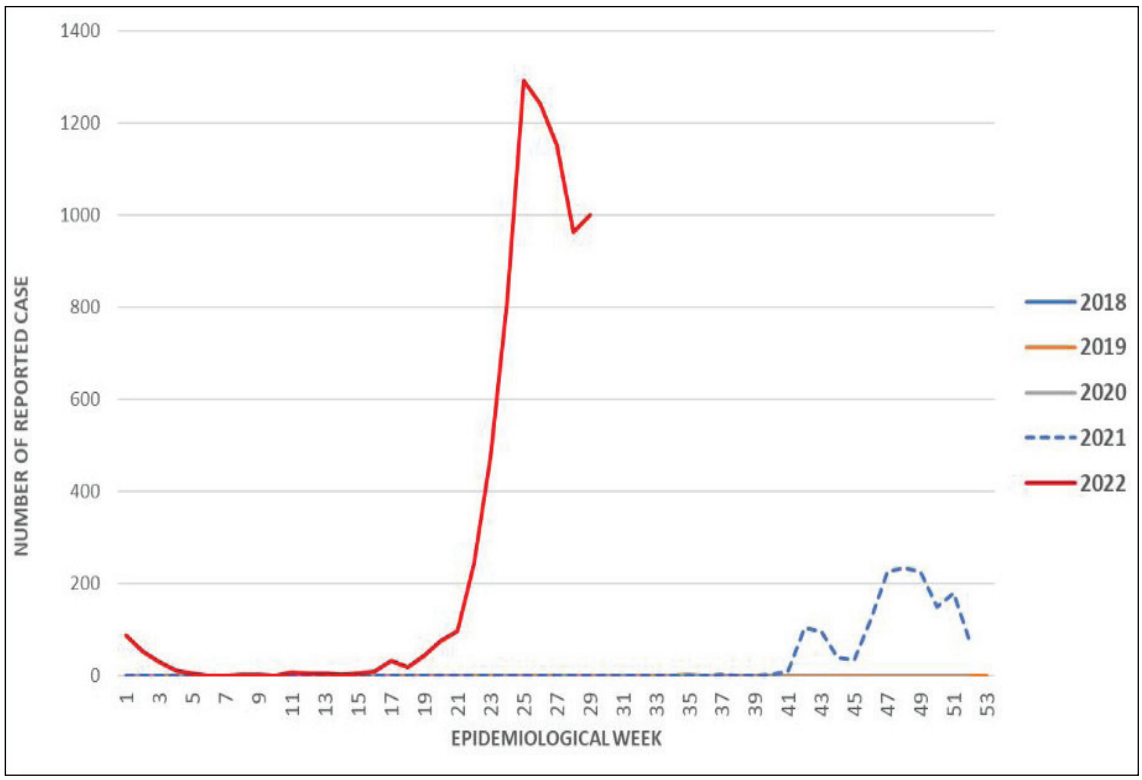
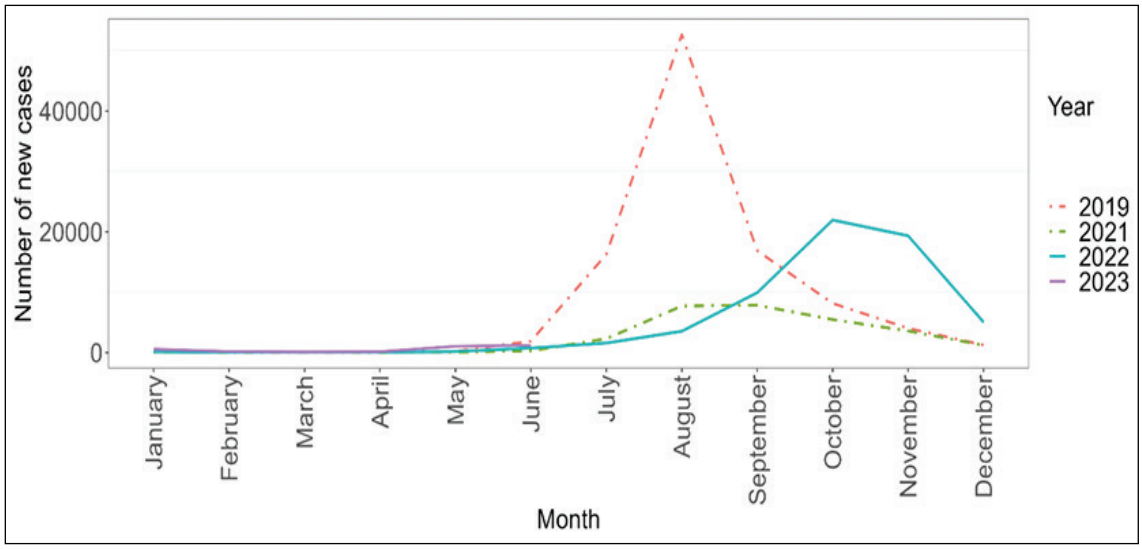


FIG. 25 Number of new cases of dengue by month, Bangladesh, January 2019–11 June 2023



Public health response

» The government of Bangladesh and the Health Sector established a multi-sector coordination group.
» The MOHFW and WHO distributed a total of 284 000 non-structural protein diagnostic kits.
» WHO led a risk assessment visiting camps in Cox's Bazar district.
» WHO-supported emergency buffer stock of adequate IV Saline and other supportive medicines were distributed all over the country
» RCCE campaigns were implemented through television and other mass media. The local ward counsellors were trained in community awareness. The City Corporations carried out an awareness programme and alerted building owners including buildings under construction to prevent water collection. Fines were imposed on buildings where the *Aedes* larvae were found.
» The local government engineering department (LGED) led vector control activities including the elimination of breeding sites and larvicidal, and adult mosquito control using different insecticides.
» Cox's District Referral Hospital and Médecins sans Frontières managed severe cases. Other hospitals and isolation facilities at Primary Health-Care Centres or dedicated centres managed moderate and mild cases.
» WHO procured and distributed rapid diagnostics test (RDT) kits to health sector partners to ensure timely diagnosis across all sentinel facilities, some of which have isolation capacity.
» Multi-agency integrated response interventions — including WASH, environmental management, health and Risk Communication and Community Engagements —were scaled up in the affected camps.

WHO risk assessment

Bangladesh experienced moderate rainfall during October 2022 that was unusual (the monsoon is from May to September). Due to the untimely rainfall and favourable climate conditions, the density of the *Aedes* mosquito population is increasing. In addition, many people keep water in different containers like buckets and pots in their houses, enabling *Aedes* mosquitoes to readily breed in such artificial collections of water.

In Cox's Bazar district, approximately 700 000 Rohingya nationals fled from Myanmar, joining more than 200 000 Rohingya nationals already present, and settling into informal makeshift camps, marked by inadequate access to potable water or quality sanitation and challenging living conditions.

Dengue poses a significant public health concern for Bangladesh that experiences regular seasonal outbreaks of dengue. Furthermore, the clinical management of people who develop severe illnesses, often requiring hospital care, puts additional strain on an already overburdened health system. In Cox's Bazar district, in addition to the COVID-19 pandemic, other ongoing health events such as cholera/AWD (persistent low level of transmission) and diphtheria (persistent low level of transmission since September 2021) may pose additional challenges in response measures by competing for resources.

WHO advice

The proximity of mosquito vector breeding sites to human habitation is a significant risk factor for dengue virus infection. Although dengue does not spread from human to human, *Aedes* species mosquitoes can become infected after biting dengue-infected individuals, thus creating a cycle of transmission capable of spreading dengue and leading to clusters of cases.

Vector control activities should focus on all areas where there is a risk of human-vector contact. WHO promotes a strategic approach known as integrated vector management (IVM) to control mosquito vectors. Vector control activities can include covering, draining, and cleaning household water storage containers on a weekly basis. Space spraying with insecticide can be deployed as an emergency measure. Chlorination and application of suitable larvicides/insecticides for water storage in outdoor containers should also be considered.

Indoor space spraying (fogging) is another approach for rapid containment of a dengue outbreak but may be challenging to deliver in densely populated areas as camps. Larvicidal prevention measures recommended by MOHFW and WHO are considered more impactful in breaking transmission compared to the targeting of adult mosquitoes with fogging and fumigation.

Entomological surveillance should be undertaken to assess the breeding potential of *Aedes* mosquitoes in containers as well as conducting insecticide-resistance testing for vector control intervention. Rapid detection of severe dengue cases and timely referrals to tertiary hospitals can reduce mortality. Case surveillance should continue to be enhanced in all affected areas and across the country.

NEPAL

Between 1 January and 28 September 2022, a total of 28 109 suspected and confirmed cases of dengue, including 38 deaths among confirmed cases (CFR < 1 %) were reported from all seven provinces of Nepal, affecting all 77 districts in Nepal.

According to the Epidemiology and Disease Control Division (EDCD) of the Ministry of Health and Population, the highest number of new cases in 2022 were reported in the districts of Kathmandu (*n* = 9528; 34%), Lalitpur (*n* = 6548; 23%) and Makwanpur (*n* = 2776, 10%).

Dengue cases increased since July coinciding with the rainy season with the majority of the cases reported during September (84%; *n* = 23 516).

As of 25 June 2023 ***(75)***, the outbreak is ongoing. During the week of 19–25 June 2023, a total of 61 dengue cases were reported in Nepal compared with the same week of 2022 (24 cases). Most of these cases were reported from the district of Sunsari (18 cases), Shankhuwasabha (7 cases), Dhading (6 cases), Dolpa (3 cases), and six districts were reported with two cases of dengue each including Banke, Lalitpur and Nuwakot.

FIG. 26 Number of dengue cases reported by districts, Nepal, 1 January–28 September 2022 (*n* = 28 109)

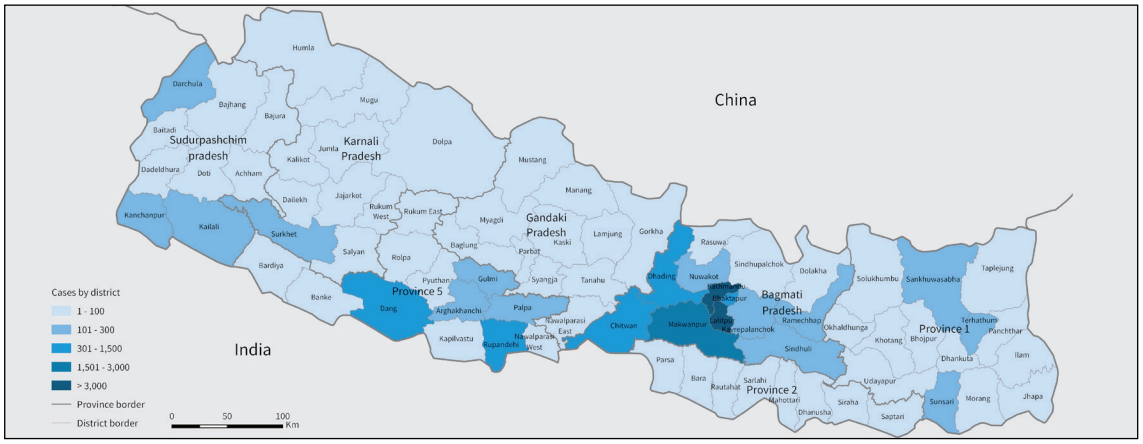
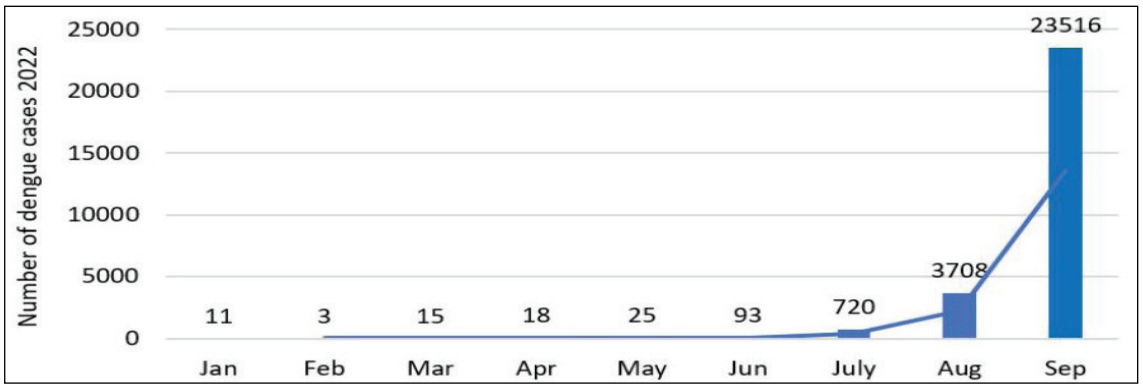


FIG. 27 Number of dengue cases reported by months, Nepal, 1 January–28 September 2022 (*n* = 28 109)



Public health response

» The Ministry of Health and Population (MoHP) together with WHO and hospitals convened a meeting to review the preparedness and map out strategic interventions for the dengue outbreak in the country.

» WHO drafted the multisectoral engagement plan to accelerate the dengue response and submitted it to the EDCD for review and implementation of action plans.

» WHO assisted in the development of a standard operating procedure for vector control activities. Search and destroy campaigns for mosquitoes in municipalities, including Lalitpur and Kathmandu (prioritizing main breeding containers), were implemented.

» A total of 39 000 diagnostic kits were provided through WHO and Government funding.

» A total of 200 physicians and medical officers were trained in September, in the case management of dengue, referral of dengue patients and reporting for the dengue surveillance system.

WHO risk assessment

Nepal reported its first dengue case in a traveller returning from India in 2004. Since then, dengue has been endemic in Nepal. The country has expertise and experience in managing dengue, however, at the time of the DON report (10 October 2022), WHO considered the overall risk for the current dengue outbreak high at the national level, also due to the limited hospital capacity in-country and limited access to and use of health services.

The international spread of the disease cannot be ruled out considering the frequent population movement across the Nepal–India land border and the fact that Nepal is a popular tourist destination.

WHO advice

The prevention and control of dengue depend on effective vector control. WHO promotes a strategic approach known as Integrated Vector Management (IVM) to control mosquito vectors, including the *Aedes* subspecies (the vector of dengue). IVM should be enhanced to remove potential breeding sites, reduce vector populations and minimize individual exposure. This should involve vector control strategies for larvae and adults (i.e. environmental management and source reduction, and chemical control measures), as well as strategies for protecting people and households.

Vector control activities should focus on all areas where there is a risk of human-vector contact (place of residence, workplaces, schools and hospitals, and construction sites in Kathmandu Valley). Vector control activities can include covering, draining, and cleaning household water storage containers on a weekly basis. Space spraying with insecticide can be deployed as an emergency measure. Chlorination and application of suitable larvicides/insecticides for water storage in outdoor containers should also be considered.

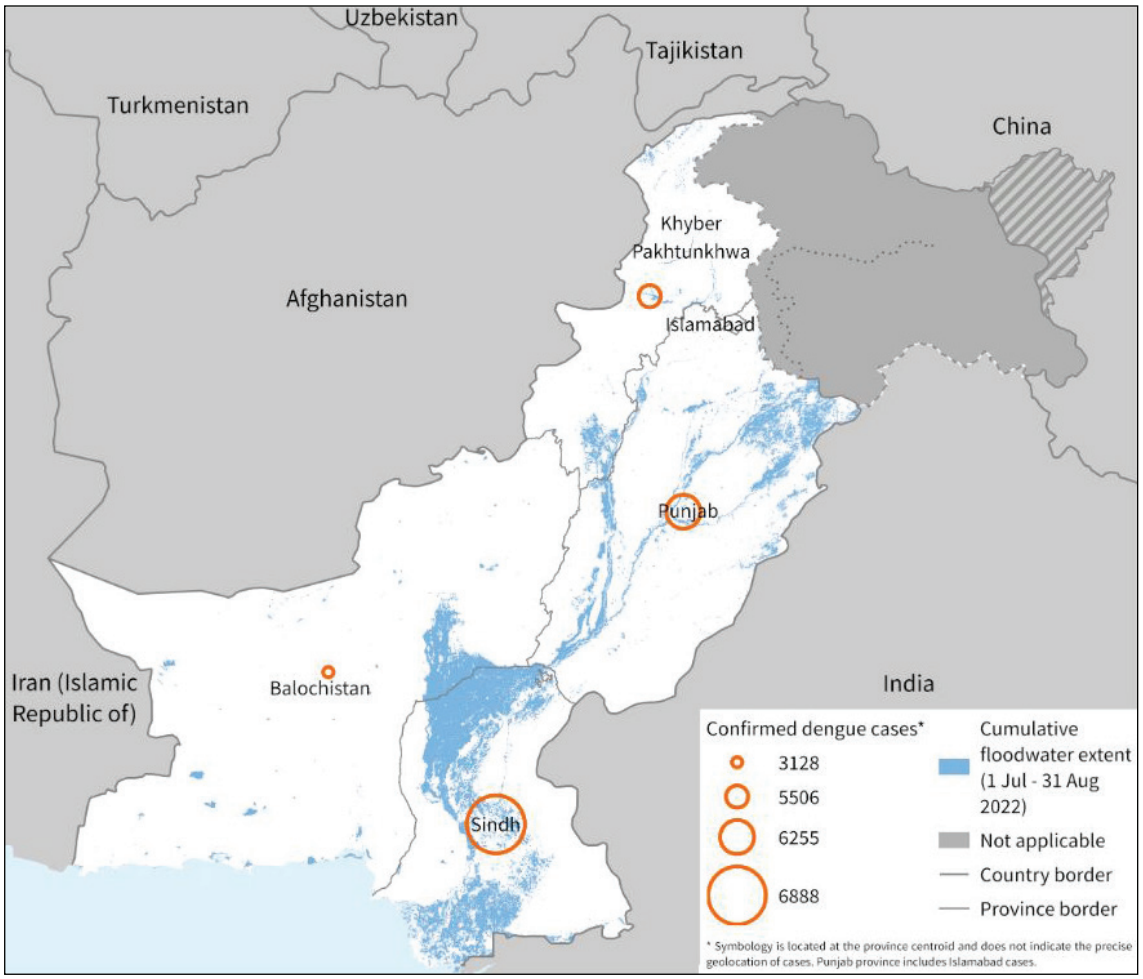
PAKISTAN

Between 1 January and 22 September 2022, a total of 25 932 confirmed dengue cases and 62 deaths (CFR 0.2%) were reported in Pakistan, with 74% of these cases reported in the month of September alone.

As of 22 September 2022, the distribution of cases by province was available for 83% (*n* = 21 777) of the total cases, of which 32% (*n* = 6888) were reported from Sindh, 29% (*n* = 6255) from Punjab (including the Islamabad Capital Territory), 25% (*n* = 5506) from Khyber Pakhtunkhwa and 14% (*n* = 3128) from Balochistan.

According to the *WHO Pakistan Floods Situation Report* of 17 March 2023 ***(76)***, the outbreak is over, although sporadic cases are still reported in the country.

FIG. 28 Distribution of confirmed dengue cases by province, Pakistan, 1 January–22 September 2022 (*n* = 25 932)



Public health response

The Ministry of Health, in collaboration with the Global Fund, conducted vector surveillance and control activities as a part of IVM. WHO provided support by:

» Strengthening of laboratory and hospital-based disease surveillance across all provinces.

» Providing training on case management, vector surveillance and vector control.

» Provision of 230 000 rapid diagnostic tests for dengue and other diseases, including malaria, acute watery diarrhoea, chikungunya and hepatitis A and E.

WHO risk assessment

During the first six months of 2022, Pakistan experienced abnormal monsoon rainfall and unprecedented floods, affecting the national health system capacity, and there is a high risk of serious health impacts from dengue.

Ongoing disease outbreaks in Pakistan, including acute watery diarrhoea, dengue, malaria, measles, polio and COVID-19 are being further aggravated, particularly in internally displaced persons and refugee camps, as well as where water and sanitation facilities were damaged.

There is high population movements between Pakistan and bordering countries, especially the Islamic Republic of Iran and Afghanistan. Thus, at the time of the DON report (13 October 2022), the transmission of dengue from Pakistan to border countries could not be ruled out.

WHO advice

Pakistan needs improved vector surveillance, enhanced laboratory capacity for better detection, sensitization of health-care providers on case management (including warning signs of severe dengue) and improved surveillance of acute febrile illness to better define disease burden and seasonality patterns. In addition, vector and human case surveillance should continue to be enhanced across the country. Key public health messages on reducing the risk of dengue transmission among the population are expected to continue to be provided.

SÃO TOMÉ AND PRÍNCIPE

On 13 May 2022, the Ministry of Health of São Tomé and Príncipe notified WHO of a dengue outbreak. From 15 April to 17 May, 103 cases of dengue and no deaths were reported.

The most commonly affected age groups were: 10–19 years (5.9 cases per 10 000), 30–39 years (7.3 cases per 10 000), 40–49 years (5.1 cases per 10 000) and 50–59 years (6.1 cases per 10 000). Laboratory testing confirmed that the predominant serotype was dengue virus serotype 3 (DENV-3). The majority of cases (90; 87%) were reported from the Água Grande health district followed by Mézochi (seven cases; 7%), Lobata (four cases; 4%); Cantagalo (one case; 1%); and Autonomous Region of Principe (one case, 1%).

As of 4 June 2023 *(77)*, the outbreak is ongoing. From 15 April to 30 April 2023, a total of 1210 cases and 11 deaths (CFR 1%) have been confirmed via RDT from: Água Grande (824; 67%), Mézôchi (182; 15%), Lobata (98; 8%), Cantagalo (48; 4%), Caué (23; 2%), Lemba (21; 2%) and RAP (14; 1%). During March 2023, there were 10 new cases registered in the country. Água Grande's attack rate is by far the highest (96 per 10 000 inhabitants). Those aged 50–59 years are experiencing the highest attack rate at 78.3 cases per 10 000.

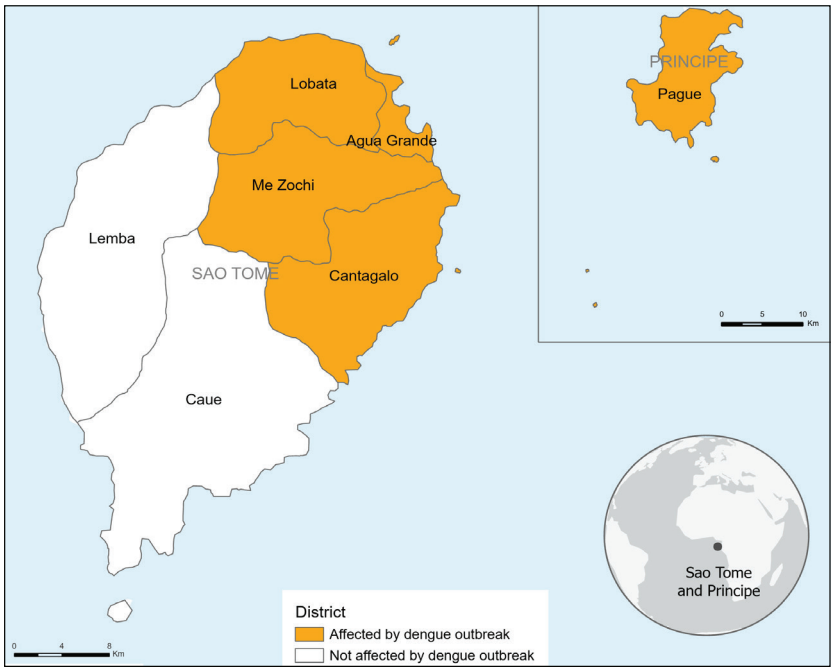
Public health response

National health authorities initiated the following response measures:

» Holding weekly meetings between MoH and WHO to discuss technical aspects of the outbreak.

» Developed, validated and disseminated a dengue response plan.

FIG. 29 Distribution of confirmed cases of dengue by district, São Tomé and Príncipe, 15 April–17 May 2022 (*n* = 103)



» Conducted multidisciplinary epidemiological investigations and active case detections in several health districts.
» Carried out entomological investigations to identify breeding sites, and conduct fogging and source reduction measures in some affected localities.
» Publishing a daily bulletin on the outbreak and regularly sharing it with WHO.
» Organizing deployments of external experts to strengthen laboratory capacity to São Tomé and Príncipe, as well as other potential experts for case management, risk communication, entomology and vector control.

WHO risk assessment

At the time of the DON report (26 May 2022), the risk at the national level was assessed as high due to the (1) presence of the mosquito vectors; (2) favourable environment for mosquito breeding grounds; (3) concurrent outbreaks of diarrhoeal disease, malaria, COVID-19 among other health challenges; and (4) decreased functionality of sanitation and water management systems in health facilities due to structural damage after heavy flooding.

The reported numbers are likely an underestimate because a high proportion of dengue cases are asymptomatic, and there are limitations to the capacity to conduct surveillance and diagnose cases. Clinical management of severe dengue cases is also a challenge. Community awareness in the country is low and risk communication activities are insufficient.

The overall risk at the regional and global levels was assessed as low. The likelihood of further spread from São Tomé and Príncipe to other countries is unlikely because the country is an island that does not share land borders and it would require the presence of susceptible vectors.

WHO advice

It is important for health facilities to have access to diagnostic tests to detect and/or confirm dengue cases. IVM activities should be enhanced to remove potential breeding sites, reduce vector populations, and minimize individual exposure. This should include both larval and adult vector control strategies, such as environmental management, source reduction and chemical control measures.

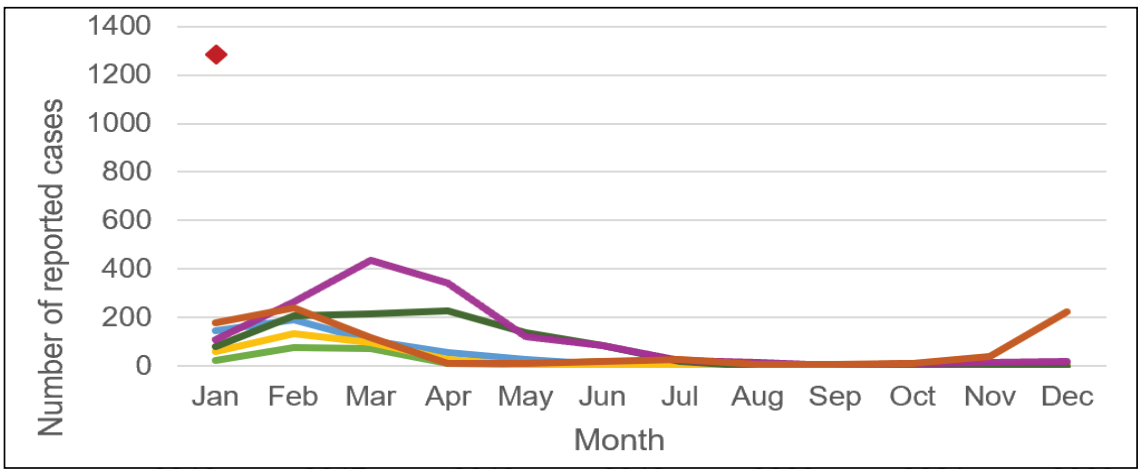
It is recommended to use protective clothing that minimizes skin exposure and apply repellents that can be applied to exposed skin or on clothes. The use of repellents must be in strict accordance with the label instructions.

TIMOR-LESTE

Timor-Leste reported a surge of dengue cases in late 2021, at unusually high levels compared to previous years. There were 1451 reported cases and 10 deaths (CFR 1%) in 2020 and 901 cases and 11 deaths (CFR 1%) in 2021. In January 2022 alone 1286 cases were reported, of which 790 (61%) were children under the age of 14 years, 142 were severe dengue cases and 20 fatalities were reported (CFR 2%).

Dili municipality, which includes the capital city of Timor-Leste, reported the highest number of cases (857 cases; 67%), followed by Manatuto municipality (92 cases; 7%).

FIG. 30 Number of dengue cases, Timor-Leste, 1 January 2016–31 January 2022



Public health response

The Ministry of Health implemented several response activities including:

» Strengthening clinical management as a top priority. WHO supported the government to train health workers in clinical management.
» Drafting the national dengue control guidelines with support from WHO, which includes the clinical management algorithm.
» Conducting a nationwide information, education and communication campaign to disseminate information about prevention and home care for dengue.
» WHO supported 60 public health inspectors to conduct vector control and source reduction activities in the community, including distributing larvicides, fumigating malathion (mosquito adulticide) in residential quarters and mobilizing communities and volunteers to clean up water containers and the environment.

WHO risk assessment

Although dengue in Timor-Leste is not unexpected, the significant daily increase in the number of dengue cases and the rate of hospitalization in the reported outbreak was unusual. The number of reported cases between 1 December 2021 and 31 January 2022 is substantially higher compared to the same periods in previous years since 2016.

International spread by vectors or asymptomatic travellers cannot be ruled out because Timor-Leste shares a land border with Indonesia where dengue is also endemic and the primary vectors are present.

WHO advice

This outbreak underscores the need for improved vector surveillance, enhanced laboratory capacity for better detection, increased bed capacity in hospitals, sensitized health providers on case management, and improved surveillance of acute febrile illness to better assess disease burden and seasonality patterns. Establishing sentinel sites for systematically testing and subtyping dengue virus will support the detection and response to dengue in affected areas.

3.6.2 Ebola virus disease

DEMOCRATIC REPUBLIC OF THE CONGO

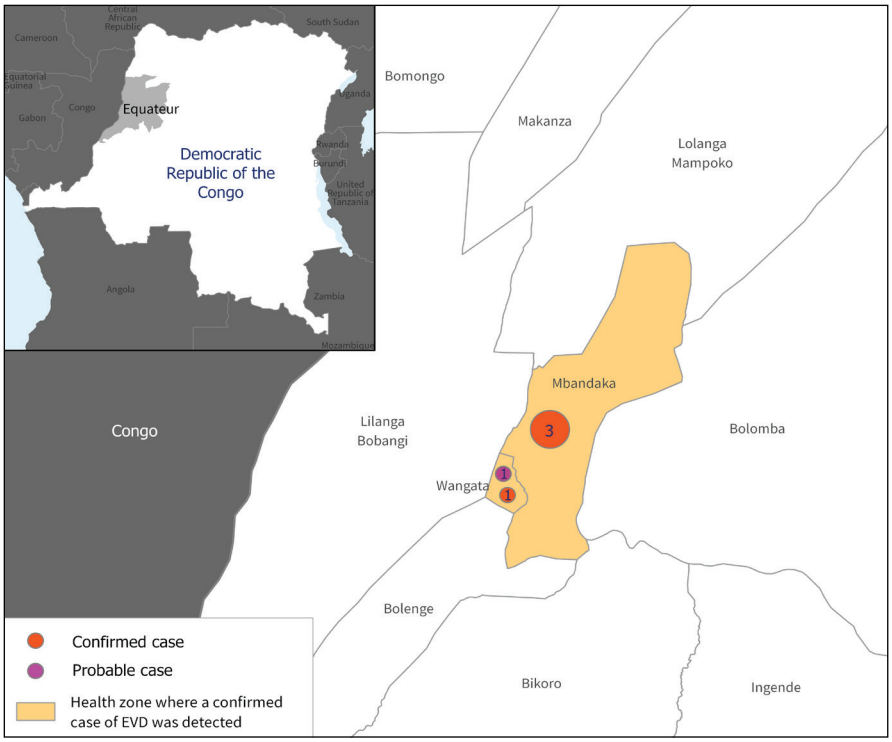
On 23 April 2022, the Ministry of Health of the Democratic Republic of the Congo declared an outbreak of Ebola virus disease (EVD) after laboratory confirmation of a case, a 31-year-old male from Mbandaka, Équateur province.

The provincial laboratory in Mbandaka confirmed EVD by transcriptase-polymerase chain reaction on 21 April both in blood and oral swab samples.

Between 25 April and 19 May 2022, four secondary cases, that had epidemiological links to the index case were reported, bringing the total number of EVD cases in the outbreak to five (four confirmed and one probable). The CFR was 100%; all five cases died. Of the reported cases, four were male and one was female; they were aged from 9 to 48 years.

All of the cases were reported from three health areas in Équateur province. All health areas are in Mbandaka city: Mama Balako health area in Wangata health zone, and Libiki and Motema Pembe health areas in Mbandaka health zone. On 4 July 2022, the MoH declared the end of the outbreak, 42 days (twice the maximum incubation period) after the burial of the last confirmed case who died in the community, and WHO released the related DON *(78)* report on the same day.

FIG. 31 Confirmed and probable cases of Ebola virus diseases, Democratic Republic of the Congo, 23 April–3 July 2022 (*n* = 5)



Public health response

The MoH, together with WHO and other partners, initiated response measures to control the outbreak and prevent further spread. National and district emergency management committees to coordinate the response were activated. Multidisciplinary teams were deployed to the field to actively search for cases; identify, reach and follow-up contacts; and sensitize communities on outbreak prevention and control interventions. Surveillance at points of entry was activated. Ring vaccination activities started on 27 April targeting contacts, contacts of contacts and frontline workers. As of 3 July, 2104 persons in the affected health zones had been vaccinated against EVD, of which 1307 (62%) are frontline health workers. Infection prevention and control interventions were implemented in health facilities and the community. One Ebola treatment centre was rehabilitated, and seven transit centres (e.g. facilities with the capacity to isolate and care for suspected EVD cases before referral to ETC if cases were confirmed) were constructed for the management of suspected and confirmed Ebola cases. A cargo airplane was sent from Goma to Mbandaka with supplies for EVD and ultra-cold chain equipment. WHO deployed logisticians to support response operations.

WHO risk assessment

This outbreak was the third EVD outbreak in Équateur province and the sixth in the country since 2018. The last outbreak in the Équateur Province was declared over in November 2020, after 130 confirmed and probable cases were recorded and nearly six months after the first cases were reported (more details, published in Disease Outbreak News *(79)* on 18 November 2020). Results from full genome sequencing performed at the National Institute of Biomedical Research (INRB) in Kinshasa indicated that this outbreak represents a new spillover from the animal population.

This outbreak was declared over on 4 July 2022, with no new cases reported for 42 days after the burial of the last confirmed case. Given the fact that the Ebola virus is enzootic, present in some animal populations in the country and in the region, the risk of re-emergence through exposure to an animal host or from the persistent virus in certain body fluids of survivors, cannot be excluded.

WHO considers ongoing challenges in terms of access, security and epidemiological surveillance, coupled with the emergence of COVID-19, and other ongoing concurrent outbreaks, might jeopardize the ability of several countries where EVD is enzootic to rapidly detect and respond to a new outbreak.

WHO advice

WHO advised the following risk reduction measures as an effective way to reduce EVD transmission in humans:

» Reducing the risk of wildlife-to-human transmission from contact with infected fruit bats or monkeys/apes and the consumption of their raw meat.

» Reducing the risk of human-to-human transmission from direct or close contact with people with Ebola symptoms, particularly with their bodily fluids.

» Urgently refer any suspected cases to the health facility where patients should be screened, triaged and isolated accordingly.
» Reducing the risk of human-to-human transmission and amplification of outbreaks in health settings by strengthening IPC measures.
» WHO recommends that male survivors of EVD practice safe sex for 12 months from the onset of symptoms or until their semen tests negative twice for the Ebola virus. WHO does not recommend the isolation of male or female convalescent patients whose blood has tested negative for Ebola virus.
» All EVD control interventions should be grounded into strong community engagement.

UGANDA

Uganda declared an outbreak of Ebola disease caused by Sudan ebolavirus (SVD) on 20 September 2022, after a case at Mubende Regional Referral Hospital (MRRH) in Mubende district was confirmed by the Uganda Virus Research Institute (UVRI).

In total, 164 cases (142 confirmed, 22 probable) with 77 deaths (55 among confirmed cases and 22 among probable cases) were reported. Mubende district was the epicentre of the outbreak, accounting for 45% of confirmed cases (64 confirmed and 19 probable), followed by Kassanda with 35% of confirmed cases (49 confirmed and two probable).

On 11 January 2023, the Ministry of Health (MoH) of Uganda declared the end of the Ebola disease outbreak caused by the *Sudan ebolavirus* that affected nine districts.

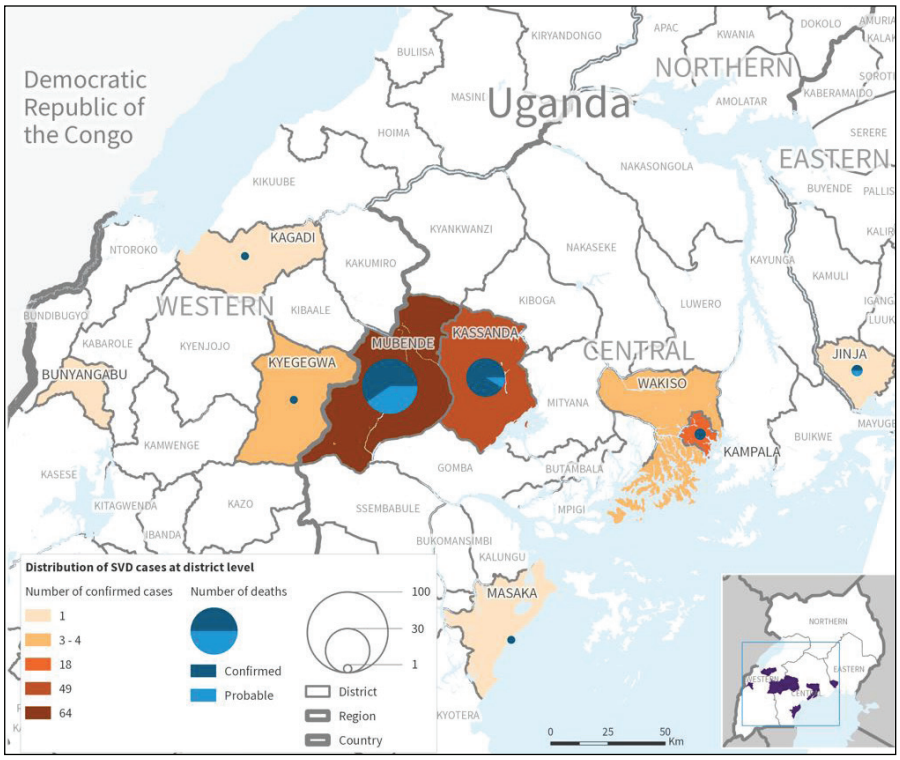
Public health response

Uganda MoH, together with WHO and other partners, initiated response measures to control the outbreak and prevent further spread. The MoH activated the national and district emergency management committees to coordinate the response.

WHO supported the MoH in the implementation of enhanced surveillance activities. Multi-disciplinary teams were deployed to the field to actively search for an Ebola survivors programme has been established with the goal to improve the well-being of survivors by integrating survivor health care into the National MoH System.

WHO, GOARN and partners supported the MoH in the establishment of screening, triage, isolation and care areas at designated reference hospitals in affected districts to identify suspected patients. They also supported the establishment of Ebola treatment centres in affected districts and Ebola testing mobile laboratories. Over 2000 health workers were trained during the outbreak on IPC, psychosocial support and care for both patients and affected families, and enhanced clinical care for SVD patients. WHO supported RCCE activities and awareness campaigns implemented by the MoH.

FIG. 32 **Map of confirmed cases (*n* = 142) and deaths (*n* = 55) of Ebola disease caused by SVD, by district, Uganda, 20 September 2022–11 January 2023**



WHO risk assessment

This outbreak was not unexpected given that SVD is enzootic and present in animal reservoirs in the region. Thus, the risk of re-emergence of any filoviruses through exposure to an animal host or from a persistent virus cannot be excluded.

WHO considers that ongoing challenges in terms of epidemiological surveillance, infection prevention and control programmes and practices in health-care settings, coupled with the impact of the COVID-19 pandemic, as well as ongoing outbreaks, might jeopardize the country's ability to rapidly detect and respond to any re-emergence of Ebola viruses.

WHO advice

Successful SVD outbreak control relies on applying a package of interventions, including case management, early supportive care, risk communication and community engagement, surveillance and contact tracing, strengthening laboratory capacity, safe and dignified burials.

Although the outbreak has been declared over, WHO advises health authorities to maintain surveillance activities in place. Neighbouring countries are encouraged to remain on alert and continue strengthening their capacities to detect and respond to infectious disease outbreaks.

3.6.3 Marburg virus disease

GHANA

On 28 June 2022, two suspected viral haemorrhagic fever cases were notified to health authorities in the Ashanti region, Ghana. The Ministry of Health of Ghana declared the outbreak on 7 July 2022, after confirmation of Marburg virus on 1 July 2022 among the two suspected cases by RT-PCR at Noguchi Memorial Institute for Medical Research.

Between 28 June and 16 September 2022, the Ministry of Health of Ghana reported three confirmed cases of Marburg virus disease (MVD) including two deaths (CFR 67%).

FIG. 33 Region of the confirmed cases of Marburg virus disease reported, Ghana, 28 June–16 September 2022

All three cases were from the same household. A total of 198 contacts were identified, monitored, and completed their recommended initial 21-day observation period that was then extended for another 21 days by the health authorities.

On 16 September 2022, the MoH declared the end of the outbreak, 42 days (twice the maximum incubation period) after the second negative test of the last confirmed case on 5 August 2022.

Public health response

The MoH established a national coordination mechanism and response activities were initiated by WHO and other key partners, US CDC, UNICEF and the United Kingdom, Foreign, Commonwealth & Development Office (FCDO). Technical experts were deployed by WHO to support the country in IPC, coordination, surveillance, and to conduct investigations and risk assessment. Health workers were sensitized on case definition and infection prevention. Samples of all suspected cases were tested at the laboratory of NMIMR. Orientation was held for community-based surveillance volunteers to enhance surveillance in the community.

WHO risk assessment

The outbreak of MVD in Ghana was declared over, with no new cases reported for 42 days after the second negative test of the last confirmed case on 5 August 2022. This was the first MVD outbreak reported in Ghana. Outbreaks of MVD are not frequent in West Africa. The most recent MVD outbreak was reported in the Republic of Guinea (one confirmed case) in August 2021.

WHO advice

Health workers caring for patients with suspected or confirmed Marburg virus disease should apply standard and transmission-based IPC precautions to avoid any exposure to blood and/or bodily fluids, as well as unprotected contact with the possibly contaminated environment. Integrated disease surveillance and response activities, including community-based surveillance, must continue to be strengthened within all affected health zones. Raising awareness of the risk factors for Marburg virus disease and the protective measures individuals can take to reduce human exposure to the virus are the key measures to reduce human infections and deaths.

3.6.4 Yellow fever

KENYA

On 4 March 2022, the Ministry of Health of Kenya declared an outbreak of yellow fever in the county of Isiolo, in central Kenya (around 270 kilometres north of the capital Nairobi).

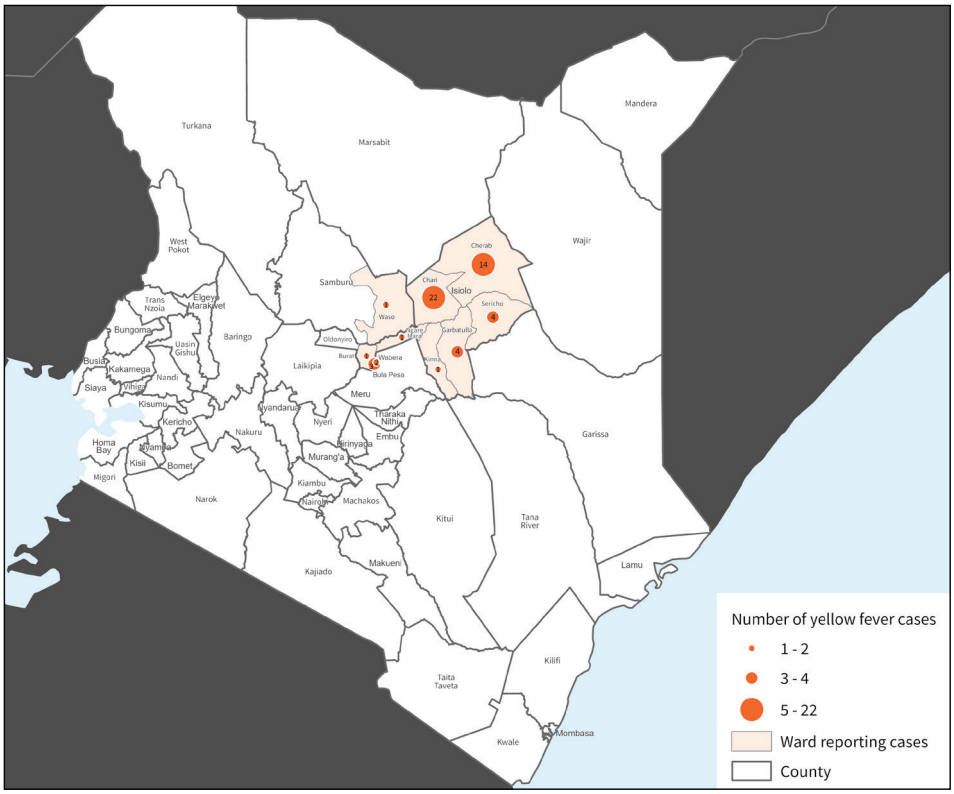
As of 15 March, a total of 53 suspected yellow fever cases were reported from Isiolo county during the period 12 January to 15 March 2022, including six deaths (CFR 11%). As of 15 March, samples were collected from 34 suspected cases (64%), and were tested for yellow fever at the national laboratory — Kenya Medical Research Institute — through RT–PCR and IgM antibodies by the enzyme-linked immunosorbent assay (ELISA).

Two samples (6%) were found to be positive by RT-PCR, and six (18%) were positive for IgM antibodies by ELISA.

There is no information on the vaccination status of the reported cases, however, Isiolo and the surrounding counties have no history of yellow fever vaccination campaigns.

At the last update, according to the WHO AFRO Bulletin of 22 January 2023 *(80)*, no new cases were reported after 16 December 2022. Overall, a total of 141 suspected cases of yellow fever including 11 deaths (overall CFR 8%) have been reported in this outbreak.

FIG. 34 **Number of yellow fever cases reported, by ward, 12 January–15 March 2022, in Isiolo county, Kenya (*n* = 53)**



Public health response

The Government implemented a national incident management structure to manage the outbreak and developed a response plan, deploying a rapid response team to Isiolo and neighbouring counties to determine the extent of the outbreak, identify the at-risk population, conduct a risk assessment, risk communication and community engagement activities and implement integrated vector control measures.

The Government and the WHO, together with partners (Action Aid, Amref Health Africa, Food and Agriculture Organization, Kenya Red Cross, Living Goods, Médecins sans Frontières, UNICEF, US CDC, World Vision) mobilized resources to support response activities.

WHO risk assessment

Kenya is endemic for yellow fever and is classified as a high-risk country. However, yellow fever has never been reported in Isiolo county, which is a pastoralist and remote area, around 270 km north of the capital Nairobi. At the time of DON report (25 March 2022), WHO assessed the risk posed by this outbreak as high at the national and regional levels, and low at the global level.

WHO advice

WHO recommends close monitoring of the situation with active cross-border coordination and information sharing, due to the possibility of cases in neighbouring countries and the risk of onward spread. Enhanced surveillance with investigation and laboratory testing of suspect cases is recommended. Vaccination is the primary means for the prevention and control of yellow fever. A review of the risk analysis and scope of immunization activities to protect the population could help avert the risk of future outbreaks.

UGANDA

On 6 March 2022, WHO received notification from the Uganda Ministry of Health of four suspected yellow fever cases. As of 25 April 2022, a total of seven suspected cases tested positive for yellow fever antibodies by plaque reduction neutralization test. However, further investigations identified only one laboratory-confirmed case of yellow fever reported from Wakiso district, Central Region.

Cases presented with symptoms including fever, vomiting, nausea, diarrhoea, intense fatigue, anorexia, abdominal pain, chest pain, muscle pain, headache and sore throat. None of the cases presented with severe yellow fever symptoms of acute jaundice.

As of 4 June 2023 *(77)* the outbreak is ongoing. From 1 January 2022 to 24 April 2023, a total of 1178 suspected cases have been reported (984 during 2022 and 194 during 2023 so far). Four cases have been confirmed from the following districts: Kasese (1), Buikwe (2) and Buvuma (1) classified by having positive PRNT results and no record of yellow fever vaccination.

Public health response

The MoH activated the Public Health Emergency Operation centre and deployed a rapid response team to affected districts where all cases were reported to determine the extent of the outbreak, identify the at-risk population, conduct a risk assessment, initiate risk communication and community engagement activities, and implement integrated vector control measures.

WHO risk assessment

Uganda is endemic for yellow fever and is classified as a high-risk country. However, the country has not introduced the yellow fever vaccine into routine immunization.

The confirmed case was reported from Wakiso district, close to the greater Kampala metropolitan area. The district also includes Entebbe, where the international airport is located.

The recurrent outbreaks indicate the ongoing risk of zoonotic spillover of yellow fever and risk for disease amplification in both rural and densely settled urban areas in the largely unimmunized population. At the time of the DON report (25 April 2022), WHO assessed the risk posed by this outbreak as high at the national and regional levels, and low at the global level.

WHO advice

WHO recommended close monitoring of the situation with active cross-border coordination and information sharing, due to the possibility of cases in neighbouring countries, the presence of a yellow fever outbreak in neighbouring Kenya, and the risk of onward spread. Enhanced surveillance with investigation and laboratory testing of suspect cases is also recommended.

WHO supports the plan of the Uganda Ministry of Health to introduce the yellow fever vaccine into the national routine immunization schedule, as well as the following implementation of phased mass vaccination campaigns.

EAST, WEST AND CENTRAL AFRICA

In 2021, nine African countries — Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Gabon, Ghana and Nigeria — reported a total of 151 confirmed cases of yellow fever. In 2022, two additional countries, Kenya and Uganda, reported confirmed cases of yellow fever.

Between 1 January and 26 August 2022, a total of 33 confirmed cases of yellow fever were reported from eight African countries, including Cameroon (24%, eight cases), Central African Republic (33%, 11 cases), Chad (6%, two cases), Congo (6%, two cases), Democratic Republic of the Congo (13%, four cases), Ghana (3%, one case), Kenya (9%, three cases) and Uganda (6%, two cases).

Ten countries — Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Ghana, Kenya, Niger and Nigeria — also reported a total of 274 probable cases of yellow fever from 1 January 2021 to 26 August 2022.

Since 1 January 2021 and as of 7 December 2022 ***(81)***, a total of 203 confirmed and 252 probable cases with 40 deaths and a CFR of 9% have been reported to WHO from 13 countries in the WHO African Region. Of these, 23 deaths have been reported among confirmed cases (CFR among confirmed cases 11%). The high overall CFR among confirmed cases in 2021 (17 deaths, 11%) continued in 2022 (six deaths, 12%).

FIG. 35 Distribution of probable and confirmed cases of yellow fever in the WHO African Region, 1 January 2021–26 August 2022 (*n* = 33)

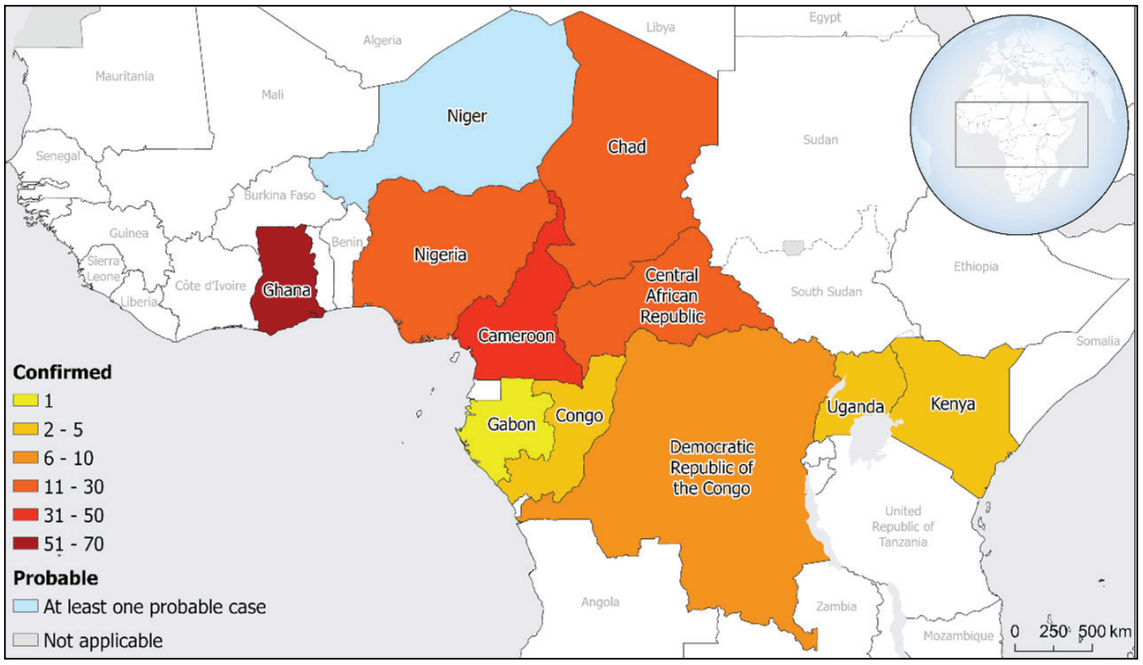


FIG. 36 Number of probable and confirmed yellow fever cases by week of symptom onset in 13 reporting countries in the WHO African Region, 1 January 2021–7 December 2022 (*n* = 455)

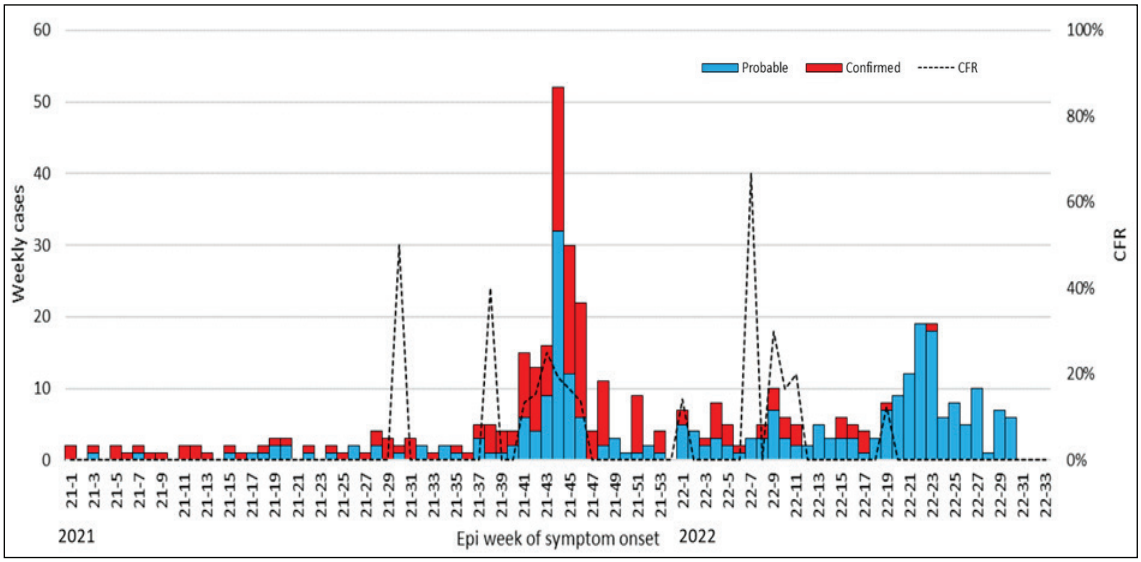


TABLE 3 Classification of reported probable and confirmed yellow fever cases and deaths, by country in the WHO African Region, 1 January 2021–7 December 2022

COUNTRY	Probable cases (number)	Confirmed cases (number)	Deaths among probable cases (number)	Deaths among confirmed cases (number)	CFR (in probable and confirmed cases) (%)
Cameroon	19	35	0	0	0
Central African Republic	6	23	1	3	14
Chad	31	30	1	6	13
Congo	29	4	0	0	0
Côte d'Ivoire	63	8	0	0	0
Democratic Republic of the Congo	10	6	0	1	6
Gabon	0	1	0	0	0
Ghana	75	62	9	12	15
Kenya	10	3	5	0	38
Niger	2	4	1	1	33
Nigeria	7	24	0	0	0
Sierra Leone	0	1	0	0	0
Uganda	0	2	0	0	0
TOTAL	**252**	**203**	**17**	**23**	**9**

Public health response

WHO is providing coordination and technical support to countries in conducting comprehensive investigations and outbreak response, including but not limited to:

» Supporting national authorities with field investigations, including training of health personnel on yellow fever case investigation, review of case investigation reports, and undertaking case classification sessions to ascertain the epidemiological classification of yellow fever cases.

» An innovative programme to facilitate the international shipment of yellow fever samples to regional reference laboratories, as well as laboratory testing and capacity building, has been initiated with support from the EYE Strategy. WHO is engaged in ongoing activities to support countries in the laboratory diagnosis of yellow fever, including periodic accreditation visits and capacity development.

» Since the beginning of the current outbreak (2021 to 7 December 2022), a total of 4 385 320 persons have been vaccinated in five countries: Cameroon, Central African Republic, Chad, Ghana and Kenya.

» Most priority countries have conducted a preventive mass campaign vaccination (PMCV) against yellow fever or are in process. Gabon, Kenya and Niger have not planned PMCVs, however, they are included in the EYE Strategy as priority countries. Approximately 50 million people are expected to be protected by PMCVs conducted in 2022.

» All 13 countries that reported confirmed cases have implemented requirements for proof of vaccination against yellow fever as a condition for entry. Ten countries require proof of vaccination against yellow fever for any traveller, regardless of the origin of their voyage; whereas three countries (Chad, Kenya and Nigeria) require proof of vaccination against yellow fever for travellers arriving from countries with areas at risk for yellow fever transmission as determined by the WHO Secretariat.

WHO risk assessment

The risk at the regional level was re-assessed as moderate on 12 December 2022 ***(81)*** (high in November 2021 and June 2022) due to:

» The decrease in the number of reported cases and the increasing population immunity.

» Yellow fever virus circulation in some high-risk areas, and outbreaks reported in areas impacted by underlying risk factors, including gaps in routine immunization, missed special populations (e.g., nomadic or pastoralists and other mobile populations), security and access challenges.

» Confirmations of cases from urban areas and/or locations with little or no underlying immunity (e.g., near urban areas in Cameroon and Uganda; areas with no history of yellow fever vaccination).

» Challenges in case classifications and response operations.

» Delays in detection and investigation; delays in the implementation of previously planned PMCV; population movements.

The overall global risk remains low, as no cases related to this current outbreak have been reported at this stage outside of the African region.

WHO advice

WHO recommends close monitoring of the situation with active cross-border coordination and information sharing. Enhanced surveillance with investigation and laboratory testing of suspect cases is recommended.

Vaccination is the primary means for the prevention and control of yellow fever. Yellow fever vaccines approved by WHO are safe, highly effective and provide life-long protection against infection.

To protect populations in high-risk areas in the longer term, it is important to continue the roll-out of PMCVs and bolster routine immunization (RI), as well as take steps to strengthen the application of IHR 2005 and bolster surveillance for rapid detection aligned to EYE objectives.

WHO recommends vaccination for all international travellers, aged 9 months and older, going to areas determined by the WHO Secretariat as at risk for yellow fever transmission and for additional areas, the recommendation for vaccination of international travellers is subject to the assessment of the likelihood of exposure of each traveller.

In urban centres, targeted vector control measures are also helpful to interrupt transmission. As a general precaution, WHO recommends avoidance of mosquito bites, including the use of repellents and insecticide-treated mosquito nets. The highest risk for transmission of yellow fever virus is during the day and early evening.

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

4. Discussion

This first edition of the *Annual (2022) Disease Outbreak News* report covers 27 acute public health events reported across all six WHO regions. As of June 2023, 21 of these events are still ongoing at the time of publication, and public health responses continue to be implemented.

These protracted outbreaks require prolonged multisectoral responses that, in the context of other concurrent outbreaks, natural and humanitarian crises, may pose additional pressure on national health systems, overstretching country capacities, impairing an effective response and consequently increasing the risk of further spread and impact on the population.

In 2022, a total of 457 acute public health events were reported globally to WHO, following which 109 Event Information Site (EIS) bulletins and 74 DONs reports were disseminated ***(83)***.

As of June 2023, WHO is responding to 39 graded emergencies in 49 countries across all WHO regions including eight grade-3 events: Afghanistan, Horn of Africa Drought, Northern Tigray, Türkiye–Syria Earthquake, COVID-19 pandemic, multicountry cholera event, global mpox multi-country outbreaks and Ukraine. *For more information:* https://extranet.who.int/publicemergency ***(2)***.

Among events described in this compendium, cholera is currently posing a serious risk for global public health. The simultaneous progression of several cholera outbreaks, compounded in countries facing complex humanitarian crises with fragile health systems and aggravated by climate change, poses challenges to outbreak response and risks further spreading to other countries. The overall capacity to respond to multiple and simultaneous outbreaks is strained due to the global lack of resources, including the oral cholera vaccine, as well as overstretched public health and medical personnel, who are often dealing with multiple disease outbreaks at the same time.

The mpox outbreak is another ongoing multicountry event, showing unusual transmission patterns and atypical clinical presentations different from what has previously been documented. Cases have been mainly identified among people who identify as gay, bisexual and other men who have sex with men who have had recent sexual contact with a new partner or partners; but the risk is not limited to these groups. On 23 July 2022, the WHO Director-General declared the escalating global mpox outbreak a Public Health Emergency of International Concern (PHEIC) ***(36)*** and, nearly a year later, on 11 May 2023, the WHO Director-General concurred that the event no longer constitute a PHEIC ***(37)***.

The Ebola virus disease outbreaks in the Democratic Republic of the Congo and Uganda have been successfully managed and declared over following the rapid response implemented by the national emergency teams.

The resurgence of EVD is not unexpected in enzootic countries, therefore, continuous surveillance and rapid detection and response are essential in identifying sporadic cases and mitigating subsequent outbreaks.

Dengue and yellow fever represent two vector-borne diseases that, in 2022, caused several cases and deaths, in particular across the African and South-East Asia Regions. In 2022, a significant increase in the incidence and geographical distribution of dengue have been also reported in the Region of the Americas *(82)*.

Multiple outbreaks of yellow fever are currently affecting several countries in the African Region. Among the affected countries, some are classified as having a fragile, conflict-affected or vulnerable setting, in addition to low yellow fever population immunity. The overall yellow fever vaccination coverage in these countries is not sufficient to provide herd immunity and prevent outbreaks. Estimates from WHO and UNICEF in 2020 on routine yellow fever vaccination coverage was 44% in the African Region, much lower than the 80% threshold required to confer herd immunity against yellow fever.

Polio continues to represent a PHEIC since 2014. The thirty-fourth meeting of the Emergency Committee under the IHR (2005) on the international spread of poliovirus, convened by the WHO Director-General on 25 January 2023, recognized the risk of WPV1 international spread facilitated by sub-optimal immunization coverage, surveillance gaps and pockets of insecurity in the remaining endemic transmission zones. Also the risk of international spread of cVDPV2 remains high.

5. Conclusions

The WHO Alert and Response Coordination (ARC) Department, within the WHO Health Emergencies Programme, provides end-to-end capacity for the detection, management, coordination and monitoring of acute public health emergencies (acute events), as well as generation and dissemination of public health information around such events.

Information dissemination, implemented by WHO through DON reports, as well as through other products such as emergency situation reports *(3)*, represents a crucial part of the reporting phase of the public health intelligence cycle, providing factual epidemiological information on substantiated acute public health events or potential events of concern, documenting the situation, recommendations, risk assessments and public health responses to outbreaks.

Under IHR (2005), the DON report represents one of WHO's mechanisms of disseminating authoritative, verified, and timely information on the epidemiology of an outbreak, updates, and factual news about WHO's support to Member States during public health events.

WHO continuously works to improve the timeliness of DON reports, and their completeness in terms of epidemiological information, in order to rapidly provide high-quality and comprehensive public health information on acute events.

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