GLOSSARY

Detection is a process by which events of potential international public health concern are identified and recorded. WHO detects signals (see *Signal*) using various sources. These include: (1) the Epidemic Intelligence from Open Sources (EIOS) system; (2) reporting through governmental channels, such as the Ministry of Health, national government agencies and public health centres or institutes; (3) other United Nations agencies; (4) partner networks, such as the Global Outbreak, Alert and Response Network (GOARN); and (5) the Joint FAO–WHO-WOAH Global Early Warning System (GLEWS+). Events are also directly reported by States Parties to WHO through National International Health Regulations Focal Point (NFP) channels.

Disease Outbreak News (DON) reports provide verified information on acute public health events to the public, which are shared by WHO under the International Health Regulations (2005) [IHR (2005)]. They provide validated epidemiological information on confirmed or potential acute public health events that have significant public health implications or the potential to become a public health emergency of international concern (PHEIC).

Event is defined by Article 1 of the IHR (2005) as "a manifestation of disease or an occurrence that creates a potential for disease". This can include events that are infectious, zoonotic, food safety, chemical, radiological or nuclear in origin and transmitted by persons, vectors, animals, goods/food or through the environment. Due to inherent differences in pathogen presence, epidemiological dynamics, socio-political factors, climatic conditions and other disease drivers, what might constitute an event in one geographical area at a certain time might not be sufficient to meet the threshold for an event in another area, at a comparable or different time. Therefore, the categorization of events will vary between WHO Regions. When comparing events between WHO Regions, the underlying dynamics that influence the emergence, spread and impact of acute public health events should always be taken into account.

Event designation is assigned during the risk assessment process to events recorded in the internal WHO Event Management System (EMS) (see *Event Management System*). There are six designation categories:

1. *Substantiated,* when the presence of a hazard is confirmed, or the number of human cases exceeds established thresholds.
2. *Discarded,* when no international risk is expected, or after assessment not deemed to be a significant public health risk.
3. *No outbreak,* when no human cases are reported (e.g., in instances of outbreaks among animals), or when the number of human cases reported does not meet the threshold of an outbreak, or when the occurrence of the hazard is within expected levels.

4. *Unverifiable,* when no information is forthcoming from the NFP or responsible national authority to substantiate its occurrence, despite the best efforts to obtain such information.
5. *Under verification,* when the event continues to be undergoing the process of verification.
6. *No designation,* when no information regarding the designation is available.

Event Information Site for IHR National Focal Points (EIS) is a secure web-platform developed by WHO to facilitate communications with NFPs as part of the IHR (2005) implementation, as warranted by Article 11 of the IHR (2005). EIS contains both EIS bulletins and announcements. An EIS bulletin relates to a single country event whereas an EIS announcement may be for multi-country events, an update on travel-related health measures, or a medical products alert that impacts several countries.

Event Management System (EMS) is the central electronic repository for event-related information. EMS is a password-protected web-based tool accessible to designated personnel at WHO Country and Regional Offices, and headquarters, subject to completion of relevant training. The key objectives of EMS are to support WHO users in the sharing and analyzing of information on events as well as reviewing the assessed risk to guide public health actions. There is a linkage between EMS and EIS to facilitate information sharing.

EMS is not intended to be an exhaustive database of all acute public health events occurring worldwide. Rather, its objective is to support the internal management of WHO for acute public health events.

Hazard refers to the nature or type of the event. WHO has adopted an all-hazards approach, in which events of any nature, including infectious diseases but also disasters, chemical, biological or nuclear threats, and human-made conflicts, are assessed. Hazards have been grouped into seven categories, which include the following:

1. *Animal* or *zoonosis,* if there is potential harm to public health from an animal or zoonosis.
2. *Chemical,* if there is potential harm to public health from the toxic effects of chemical substances, which are chiefly non-medical, as to source.
3. *Disaster,* if there is potential harm to public health from a natural disaster.
4. *Food safety,* if there is potential harm to public health from the toxic effects of food (poisoning or injury).
5. *Infectious,* if there is potential harm to public health from an infectious disease.
6. *Product,* if there is potential harm to public health from contaminated or faulty therapeutic goods including medicines, blood products, tissues and organs, medical devices, diagnostic tests and devices, etc. – including poisonings due to mislabelling of therapeutic goods.

7. *Other,* which includes the following hazards:
    a. *Nutritional deficiency,* if there is potential harm to public health from nutritional deficiencies.
    b. *Radionuclear,* if there is potential harm to public health from the toxic effects of ionizing radiation.
    c. *Societal,* if there are violent or hostile events, caused by humans, which have an impact on public health.
    d. *Noncommunicable,* if there is potential harm to public health from a noncommunicable disease.
    e. *Undetermined,* if there is potential harm to public health from an undetermined hazard.

National IHR Focal Point (NFP) is defined by Article 1 of the IHR (2005) as "the national centre, designated by each State Party, which shall be accessible at all times for communications with WHO IHR Contact Points under these Regulations". These are established as centres or offices rather than individuals.

Public health intelligence is defined by the United Nations terminology database[3] as "a core public health function responsible for identifying, collecting, connecting, synthesizing, analyzing, assessing, interpreting and generating a wide range of information for actionable insights and disseminating these for informed and effective decision-making to protect and improve the health of the population".

Risk assessment is conducted at various stages of public health intelligence activities, including at the signal detection stage, when a signal is designated as an event, or an event is notified to WHO. For all events risk assessment is conducted at the stage when the event is first entered into EMS against the following criteria: the potential public health impact, risk of international spread, risk of trade or travel restrictions, and if the event is considered epidemiologically unusual. This risk assessment is repeated whenever new information on the event becomes available.

Rapid Risk Assessment (RRA) is a formalized in-depth internal WHO risk assessment. It assesses the likelihood and consequences of an acute public health threat due to exposure to an identified hazard. RRA involves a joint assessment by the WHO Country and Regional Offices and headquarters. It is conducted for events with serious public health implications following pre-defined criteria within WHO. The RRA process provides a forum for the timely assessment of available data, which takes into account the contextual and hazard-specific knowledge and feedback of key experts across WHO. It supports a collaborative expert prioritization of immediate actions in a time-sensitive manner. The finalized RRA report may be shared with key stakeholders that could contribute to the response. RRA reports have become well accepted documents of high practical value both within WHO and among partners.

3. See: https://unterm.un.org/unterm2/en/search?searchTerm=public health intelligence.

Request for verification is defined by Article 10 of the IHR (2005) as "WHO shall request, in accordance with Article 9, verification from a State Party of reports from sources other than notifications or consultations of events which may constitute a public health emergency of international concern allegedly occurring in the State's territory. In such cases, WHO shall inform the State Party concerned regarding the reports it is seeking to verify."

Signal data and/or information detected that represents a potential acute risk to human health. Signals may consist of reports of cases or deaths (individual or aggregated), potential exposure of human beings to biological, chemical or radiological and nuclear hazards, or the occurrence of natural or human-made disasters. Signals can be detected through a variety of sources (see *Detection*).

Source of initial event reporting is the source through which the initial information on the event was obtained. Information can be routinely obtained through NFPs or national government channels. Alternatively, WHO may receive information through detection activities (see *Detection*) as part of wider public health intelligence operations.

EXECUTIVE SUMMARY

Early detection and rapid response to health threats and emergencies is one of the World Health Organization's (WHO) most important priorities. Therefore, WHO has implemented a robust approach to public health intelligence for the global detection, verification, risk assessments, and reporting and information dissemination of health threats.

Public health intelligence activities at WHO are underpinned by the legal mandate from the International Health Regulations (2005) [IHR (2005)]. Under the IHR (2005), which came into force in 2007, States Parties, which include all 194 WHO Member States, the Principality of Liechtenstein and the Holy See, agreed to strengthen surveillance efforts, and assess, notify and verify events that may constitute a public health emergency of international concern (PHEIC).

Importantly, WHO takes an all-hazards approach, meaning that health threats of any nature, including infectious diseases and also human-made hazards that may cause a PHEIC, are risk assessed. WHO also continuously risk assesses the multiple concurrent health threats in humanitarian emergencies, through a similar but distinct process.

This report focuses on WHO's public health intelligence activities in 2022. The report highlights the detection, verification, risk assessment, reporting and information dissemination activities conducted, and outputs produced by WHO public health intelligence teams globally.

Data on signals, requests for verification and events were extracted from a variety of WHO databases, including the internal WHO Event Management System (EMS). For this report, data on substantiated acute public health events (or simply, *events*) were extracted from EMS.

Data on rapid risk assessment (RRA) reports — a further formalized in-depth internal WHO risk assessment — as well as data on Event Information Site for IHR National Focal Points (EIS) bulletins and announcements, and Disease Outbreak News (DON) reports were obtained from internal WHO databases. EIS bulletins and announcements allow for communication with NFPs while DON reports provide authoritative information for the public.

In the last 20 years, 5807 events have been reported corresponding, on average, to 290 events annually. In this period, half of all of events occurred in two Regions: the African Region (30%) and the Region of the Americas (24%). The predominant cause of events, for each year between 2003 and 2022, were infectious diseases, ranging from 63% to 96%, respectively. However, in recent years, there was an increase in the proportion of events due to disasters in several WHO Regions. In addition, when examining the reporting and dissemination as part of the public health intelligence activities, in the last five years, on average, 50 RRA reports, 200 EIS bulletins or announcements and 80 DON reports per year were disseminated.

In 2022, nearly 7000 signals were detected globally, for which 351 requests for verification were sent, under the IHR (2005), as not all signals detected require requests for verification. A response was received for the majority of requests (89%), with 231 (66%) received within 48 hours of the request being sent.

Overall, in 2022, 457 new events were recorded in EMS, these were either verified signals or events directly reported under the IHR (2005) by a NFP. Slightly over half of these events (55%) were initially reported by NFPs or through official national government channels, which is higher when compared to the global estimate of the previous five years. The main cause of acute public health events globally in 2022 was infectious diseases (83%), while the second most common cause was disasters (7%).

All events recorded in EMS were risk assessed and, additionally, 65 more detailed RRA reports were produced and disseminated in 2022. In addition, more than 200 EIS bulletins or announcements and 74 DON reports were distributed in 2022. Moreover, WHO Regions regularly produce Region-specific risk assessment, bulletins, and situation reports.

This report highlights the importance of public health intelligence globally. It emphasizes the key role of the IHR (2005) framework for engagement by WHO with States Parties for the detection, verification, risk assessment, and information sharing regarding events that may constitute a PHEIC.

The COVID-19 pandemic and several other recent large-scale outbreaks, such as the Ebola and cholera outbreaks, have underscored the vital role of public health intelligence in the global health architecture.

In a world with increasing health threats, continued support for and strengthening of public health intelligence is indispensable and key for tackling and mitigating the health emergencies of tomorrow.

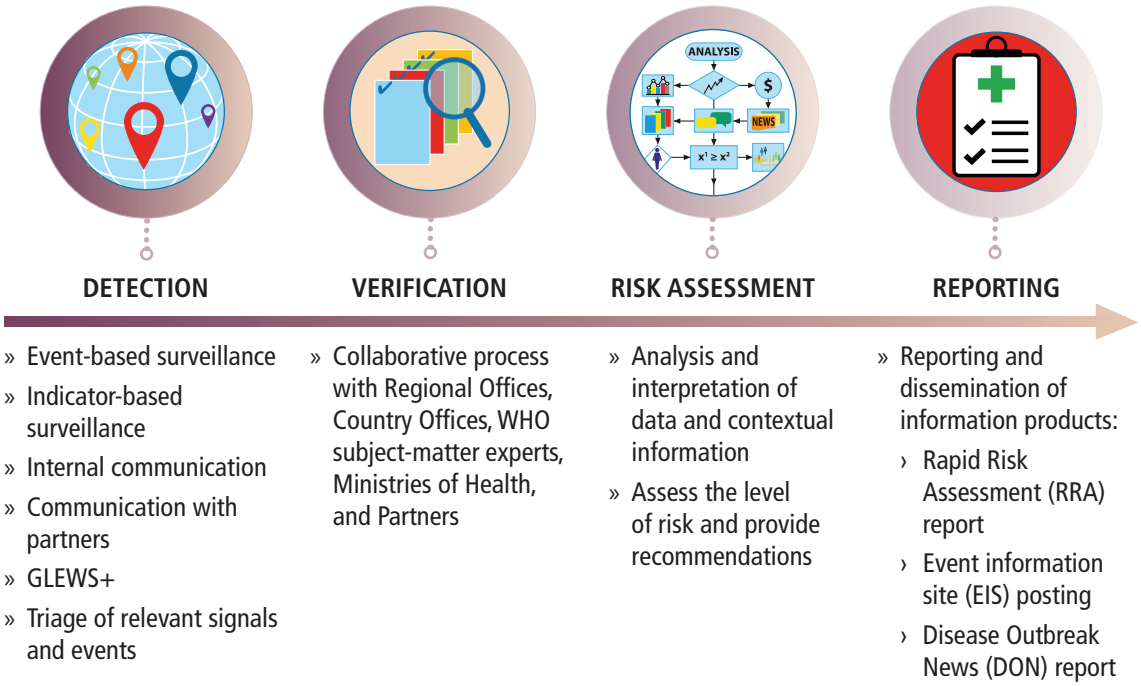
1. BACKGROUND

1.1 Introduction

Tackling health emergencies is one of the World Health Organization's (WHO) most important responsibilities. To mitigate and reduce the impact of health emergencies on people and communities, early detection and rapid response are essential. Therefore, WHO has implemented a robust approach to public health intelligence for the global detection, verification, risk assessment, and information sharing of health threats globally.

Public health intelligence is a crucial public health function, and WHO's approach to public health intelligence is composed of four interlinked steps: (1) detection, (2) verification, (3) risk assessment, and (4) reporting and dissemination (Fig 1).

FIG. 1 Framework of public health intelligence activities at WHO



Public health intelligence operations are guided by the International Health Regulations (2005) [IHR (2005)], which is a legally binding agreement on 196 entities (also termed "States Parties"), which include 194 WHO Member States, Liechtenstein and the Holy See[4].

4. See: https://unterm.un.org/unterm2/en/search?searchTerm=public-health-intelligence.

Under the IHR (2005), which came into force in 2007, States Parties agreed to strengthen surveillance capacities, and to assess, notify and verify events that may constitute a public health emergency of international concern (PHEIC).

The IHR (2005) also requires States Parties to designate a National IHR Focal Point (NFP) with whom WHO shares information through the Event Information Site for National IHR Focal Points (EIS). Furthermore, the IHR (2005) allows WHO to disseminate information to the public through Disease Outbreak News (DON) reports.

Public health intelligence operations are conducted continuously, every day of the year, by dedicated teams at WHO headquarters and its six WHO Regional Offices[5] in close collaboration with WHO Country Offices, national governments and partners. A full overview of States Parties — and which WHO Region they are part of — is provided in Annex 1 of this report.

This report aims to provide an overview and analysis of public health intelligence activities at WHO, with a focus on activities in 2022. The report highlights the detection, verification, risk assessment, reporting and information dissemination of activities conducted, and outputs produced by WHO public health intelligence teams globally.

1.2 Methodology

The methodology of this report is briefly described in the following sections. The section on data sources outlines where data were obtained from and gives more details on the data sources. The section on data analysis succinctly describes how the data were analyzed and which metrics and tools were utilized.

Data sources

Data on signals were obtained from different data management systems. Before 2022, management of signals was conducted in Regions and headquarters-specific data management systems. In 2022, a WHO internal signal management system, the signal management application, was adopted across the Organization to facilitate tracking and analytics, which was rolled out gradually and partially throughout 2022.

Data on the number of signals recorded between 1 January 2022 and 31 December 2022 were extracted from the various data management systems utilized. In addition, detailed data from WHO headquarters were also available for 2022 in full and, therefore, extracted. The adoption of the signal management application will allow for future detailed and comprehensive analytics.

5. There is a Regional Office in each of the six World Health Organization Regions, which are: the World Health Organization African Region (AFR), the World Health Organization Region of the Americas (AMR), the World Health Organization Eastern Mediterranean Region (EMR), the World Health Organization European Region (EUR), the World Health Organization South-East Asia Region (SEAR), and the World Health Organization Western Pacific Region (WPR).

Data on requests for verification were obtained through the Regional Offices. This is tracked by the monitoring of requests for verification sent by Regional Offices to NFPs between 1 January 2020 and 31 December 2022.

Data on events were extracted from the WHO Event Management System (EMS). EMS is the central electronic repository of event-related information. EMS is a password-protected web-based tool accessible to designated professional personnel at WHO Country and Regional Offices and headquarters, subject to completion of relevant training.

EMS is not intended to be an exhaustive database of all acute public health events occurring worldwide. For this report, data on substantiated acute public health events were extracted from EMS. Events were included based on the creation date in EMS, between 1 January 2003 and 31 December 2022. Therefore, importantly, this will only reflect newly recorded acute public health events and does not provide any information on already ongoing public health events.

Data on EIS bulletins and announcements were extracted from the EIS platform. Information on EIS bulletins and announcements that were posted between 1 January 2018 and 31 December 2022 were extracted. Similarly, data on rapid risk assessment (RRA) reports were extracted from EMS into a bespoke database for the report, with information extracted for RRA reports published between 1 January 2018 and 31 December 2022. Data on DON reports were extracted from an internal WHO database, with information extracted for DON reports published between 1 January 2018 and 31 December 2022.

Data analysis

Main findings were assessed for signals, request for verification, events, RRA reports, EIS bulletins and announcements, and DON reports. Findings overall were stratified by year and WHO Region. In addition, for events, results were assessed by the mode through which the event was initially reported (either WHO or the NFP or national government channels), type of disease, condition or hazard. Similarly, findings for RRA reports, EIS bulletins and DON reports were analyzed by disease, condition or hazard.

Data were presented as averages, medians or aggregated. Tables and figures were created using R (version 4.0.3, R Foundation for Statistical Computing, Vienna, Austria) and RStudio (version 1.3.1093, Boston, MA, USA). Previous and future reports may show minor differences due to routine updates and cleaning of signal, requests for verification, EMS, RRA, EIS and DON data.

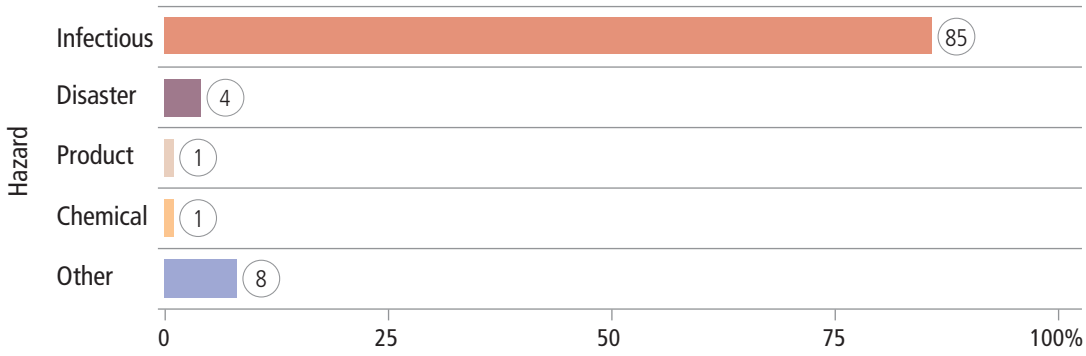
2. MAIN FINDINGS

2.1 Detection and verification

Detection

Globally, 6855 signals were detected in 2022 by dedicated teams at WHO headquarters and all six Regional Offices. For signals detected at WHO headquarters in 2022, the majority were due to infectious diseases (85%, 412/484), followed by disasters (4% 17/484), chemical (1%, 7/484), or product-related reasons (1%, 7/484). The remaining signals were the result of other reasons (8%, 41/484) (Fig. 2).

FIG. 2 Hazard categories (in percentage) for signals detected at WHO headquarters, 2022



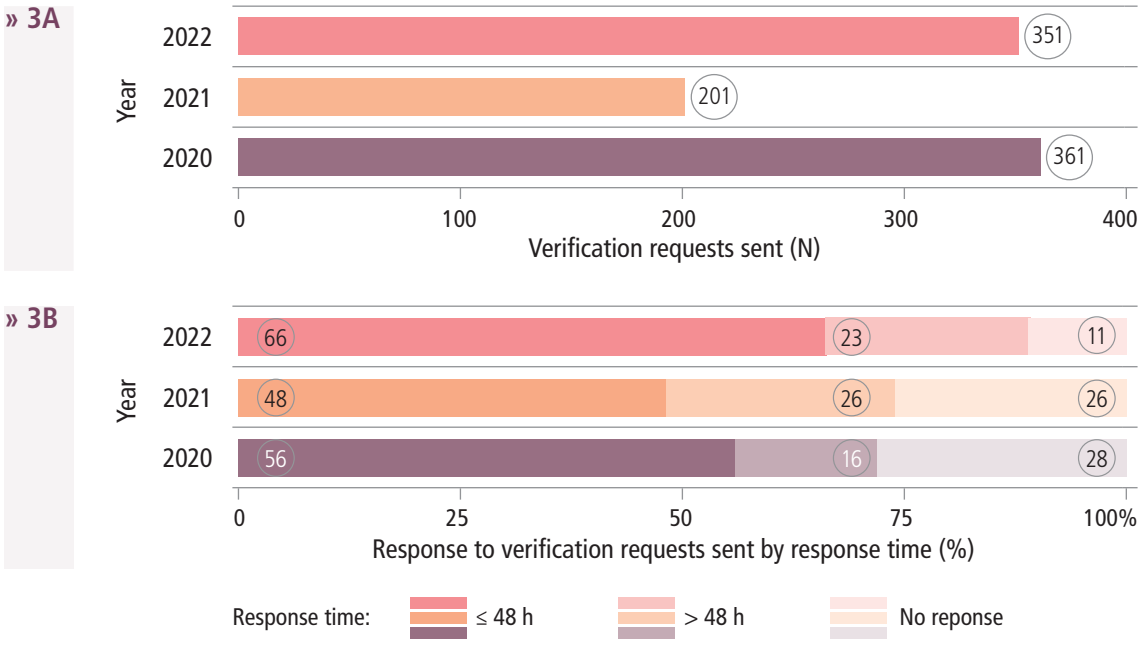
Verification of signals

Not all detected signals required requests for verification. Detected signals were triaged and assessed by event-based surveillance analysts. After triage and assessment, verification requests were sent only for those signals for which verification by NFPs was required.

In 2022, 351 requests for verification were sent to NFPs by WHO Regional and Country Offices. This is a marked increase compared to the previous year and comparable to the number of requests sent in 2020 (Fig. 3A). A response was received for the majority of verification requests sent (89%, 312/351) in 2022. Of these, 231 (66%) were received within 48 hours of the request being sent. Compared to previous years, both the overall as well as the response rate for those received within 48 hours has improved. In addition, the percentage of requests for verification for which no response was received has more than halved (Fig. 3B).

The number of requests for verification sent differed between WHO Regions. This is in part due to regional differences in the underlying health threats that occur and partly due to procedural and information management practices. In 2022, there was an improved overall or timely response rate, within 48 hours, for all requests for verification sent, compared to the previous year, in all but two WHO Regions (Fig. A1).

FIG. 3 **Request for verification sent (A) and response, by response time, to requests for verification sent (in percentage) (B), 2020–2022**



2.2 Acute public health events

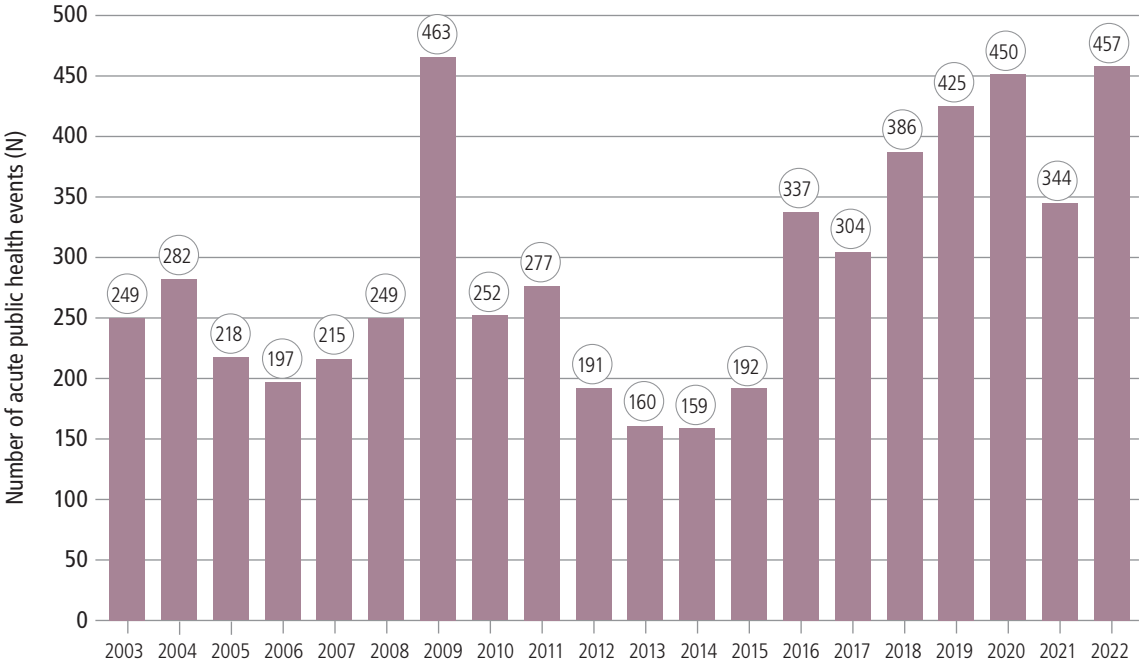
In this section, all findings refer to events that have been verified and designated as substantiated. To facilitate readability, they are referred to as "acute public health events" or simply "events", rather than "verified and substantiated acute public health events".

Acute public health events by year and WHO Region

In 2022, there were 457 acute public health events reported globally. This is a marked increase from the year prior and in line with some of the peaks reported in previous years (Fig. 4). In the last 20 years, 5807 events overall were reported and the number of events per year ranged from 159 to 463, with a median of 265 events.

The number of reported acute public health events varied by WHO Region. In 2022, the most events were reported in the African Region (27%, 125) and the Region of the Americas (25%, 112). The European Region reported 86 events (19%) followed by the Eastern Mediterranean and Western Pacific Regions, which reported a similar number, 48 (11%) and 50 (11%) events, respectively. The fewest events (8%, 36) in 2022 were reported by the South-East Asia Region (Fig. 5).

FIG. 4 **Acute public health events, 2003–2022**



In the last 20 years, the largest number of events reported have, consistently, been from either the African Region or the Region of the Americas. In recent years, events reported from these two Regions make up approximately 50% of all events, while the events in each of the other WHO Regions generally range from 5% to 20% (Fig. 5).

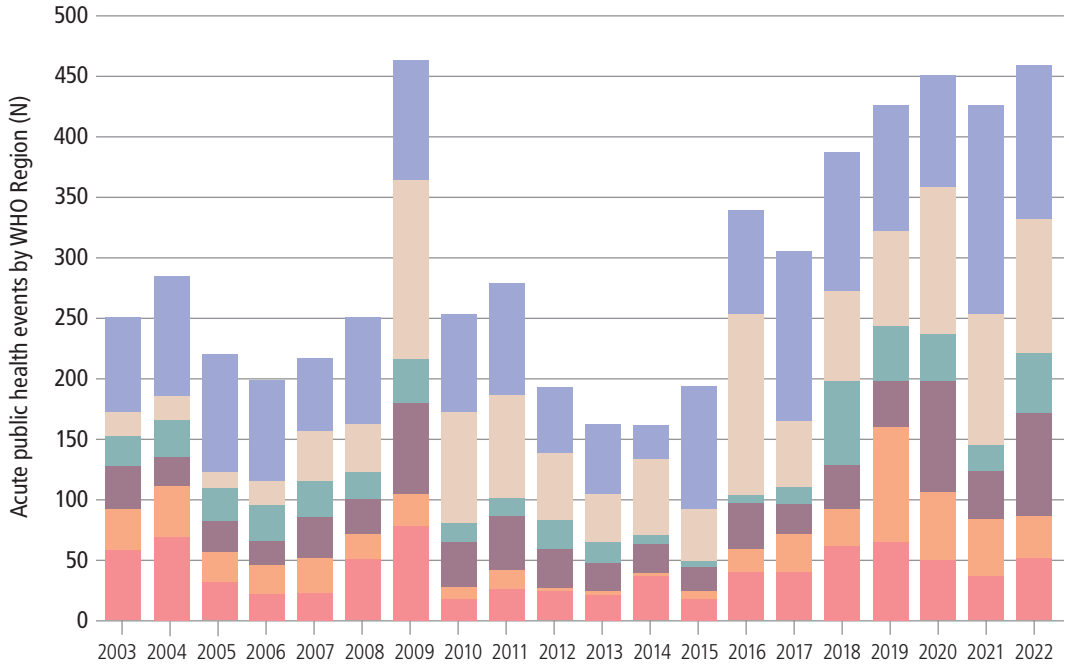
There are a multitude of factors that influence the difference in events by WHO Region, of which one is the number of countries, territories and areas per WHO Region. Therefore, it is useful to assess the number of countries, territories and areas reporting acute public health events by WHO Region relative to the total number of countries, territories and areas in that WHO Region.

When assessing this proportion of countries, territories and areas reporting acute public health events by year, in the last five years, most WHO Regions had a high proportion of countries, territories and areas reporting at least one acute public health event (Fig. 6).

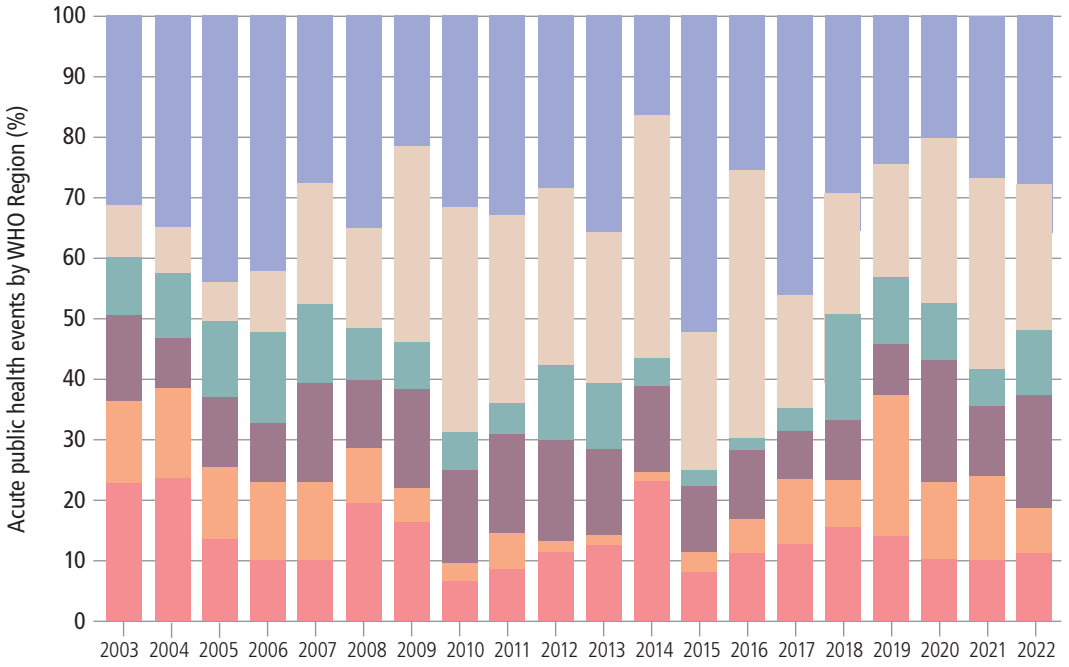
In 2022, all WHO Regions have at least 50% of countries, territories and areas reporting an event. Moreover, Regions with fewer absolute numbers of events in comparison to others, such as the South-East Asia, Western Pacific or Eastern Mediterranean Regions, generally have a high proportion (> 60%) of countries, territories or areas reporting a public health event (Fig. 6). Importantly, this only reflects newly reported acute public health events and does not provide any information on ongoing public health events.

FIG. 5 **Acute public health events by WHO Region, 2003–2022, (A) in absolute number and (B) in percentage**

» 5A

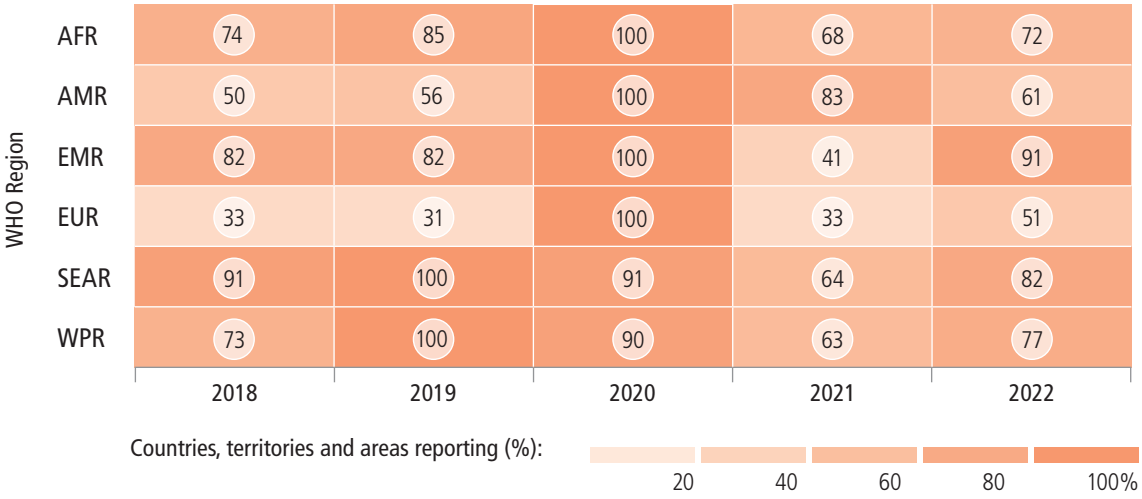


» 5B



WHO Regions:
- AFR: WHO African Region
- AMR: Region of the Americas
- EMR: WHO Eastern Mediterranean Region
- EUR: WHO European Region
- SEAR: WHO South-East Asia Region
- WPR: WHO Western Pacific Region

FIG. 6 **Proportion of countries, territories and areas, in percentage, reporting at least one acute public health event, by WHO Region, 2018–2022**



WHO Regions: AFR: WHO African Region; AMR: WHO Region of the Americas; EMR: WHO Eastern Mediterranean Region; EUR: WHO European Region; SEAR: WHO South-East Asia Region; WPR: WHO Western Pacific Region

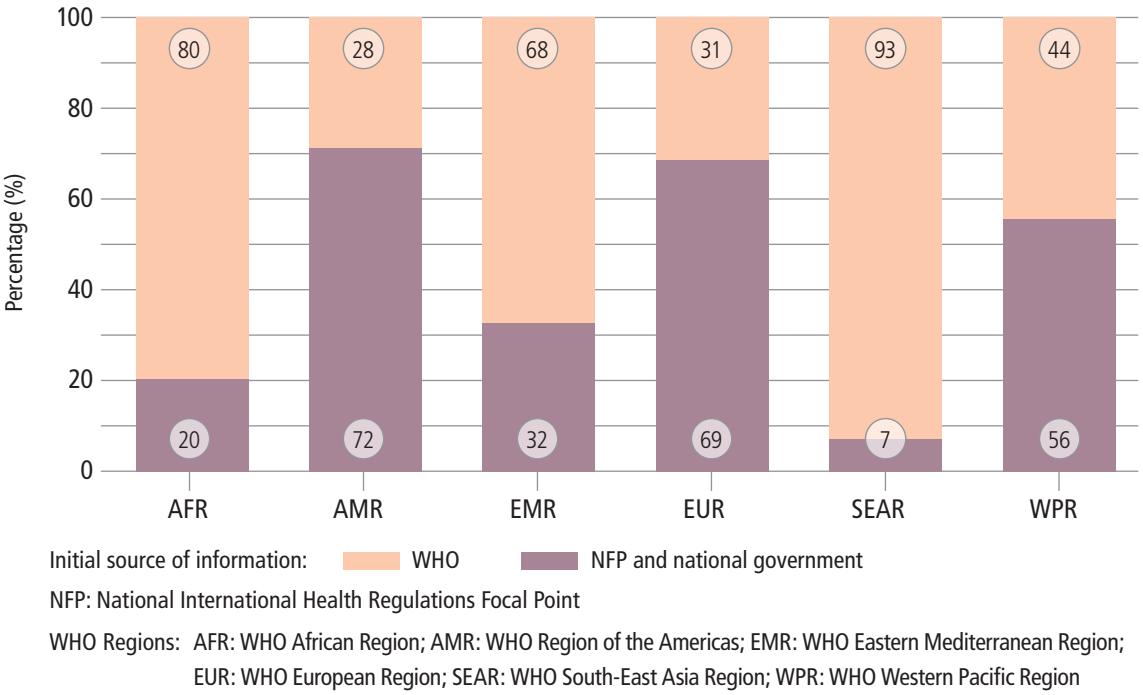
Initial source of event reporting

In 2022, slightly over half of all events (55%, 252/457) were initially reported by NFPs or through official national government channels, which is higher when compared to the global estimate of the previous five years (44%, 902/2062).

Between 2018 and 2022, 56–72% of acute public health events were initially reported by NFPs or through national governments channels in the Region of the Americas, the European Region and the Western Pacific Region. On the other hand, for the other three WHO Regions, the majority of events were initially identified by WHO. Only up to 30% of events in the African, Eastern Mediterranean and South-East Asia Regions were initially reported by NFPs or through national governments channels (Fig. 7).

The initial source of events varied by year, over the last five years, and WHO Region. In particular, there was marked variation for some WHO Regions (Fig. A2).

FIG. 7 Initial source of information for events, by WHO Region, 2018–2022



NFP: National International Health Regulations Focal Point

WHO Regions: AFR: WHO African Region; AMR: WHO Region of the Americas; EMR: WHO Eastern Mediterranean Region; EUR: WHO European Region; SEAR: WHO South-East Asia Region; WPR: WHO Western Pacific Region

Hazard type of acute public health events

In 2022, infectious diseases were the main cause of acute public health events globally. Over 80% (83%, 383) of all events were due to infectious diseases, while the second most common cause were disasters (7%, 33). The remaining events were caused by animal or zoonoses, chemical, food safety, product and other hazards, ranging from 0.2–4.6% per hazard. This is consistent with previous years, when infectious diseases have been the predominant hazard globally in each of the last twenty years (Fig.8).

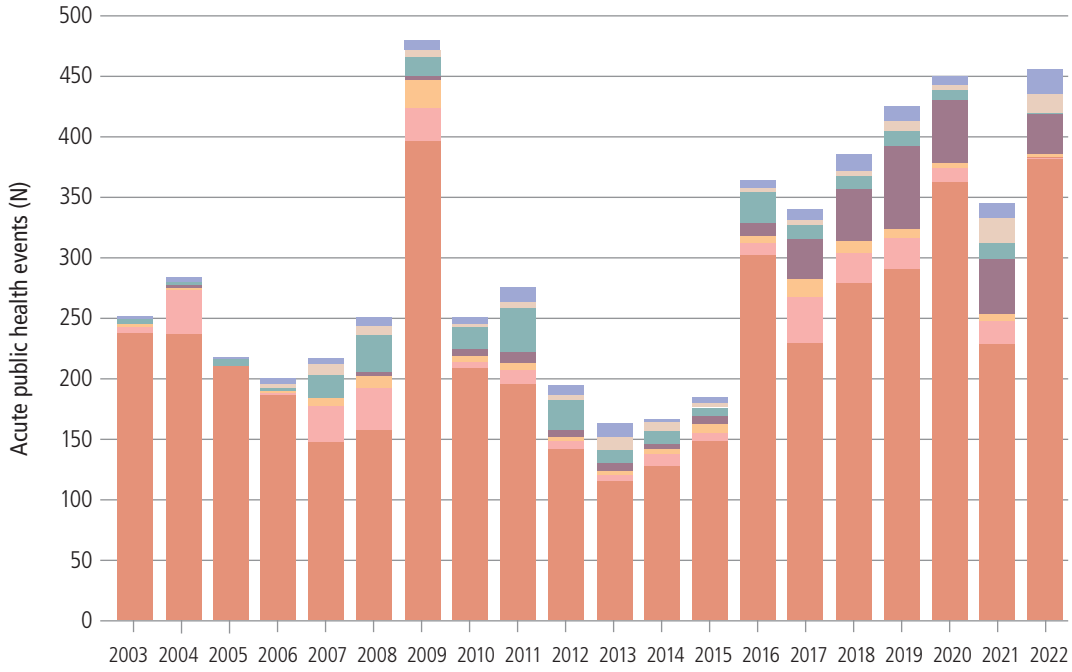
To examine the most common diseases or conditions of an infectious nature, the ten most frequently occurring diseases or conditions of an infectious nature were identified, for each year of the last five years and across the five-year period 2018–2022 (Table 1).

Over the five-year period there were 19 different diseases or conditions that were among the ten most common causes for acute public health events of an infectious nature in a given year. Six diseases (cholera, dengue fever, influenza, malaria, measles and poliomyelitis) were among the ten most frequent every year. In 2022, most acute public health events of an infectious nature were due to mpox. Across the five-year period, infectious disease events were dominated by coronavirus disease 2019 (COVID-19), followed by measles, dengue fever and cholera (Table 1).

The main hazard type of acute public health events differed by WHO Regions. Most notably, events caused by disasters have been more frequently recorded, particularly in the previous five years, in the South-East Asia and Western Pacific Regions (Fig. A3–A4 and Table A1).

FIG. 8 **Acute public health events by hazard type, 2003–2022, (A) in absolute number and (B) in percentage**

» 8A



» 8B

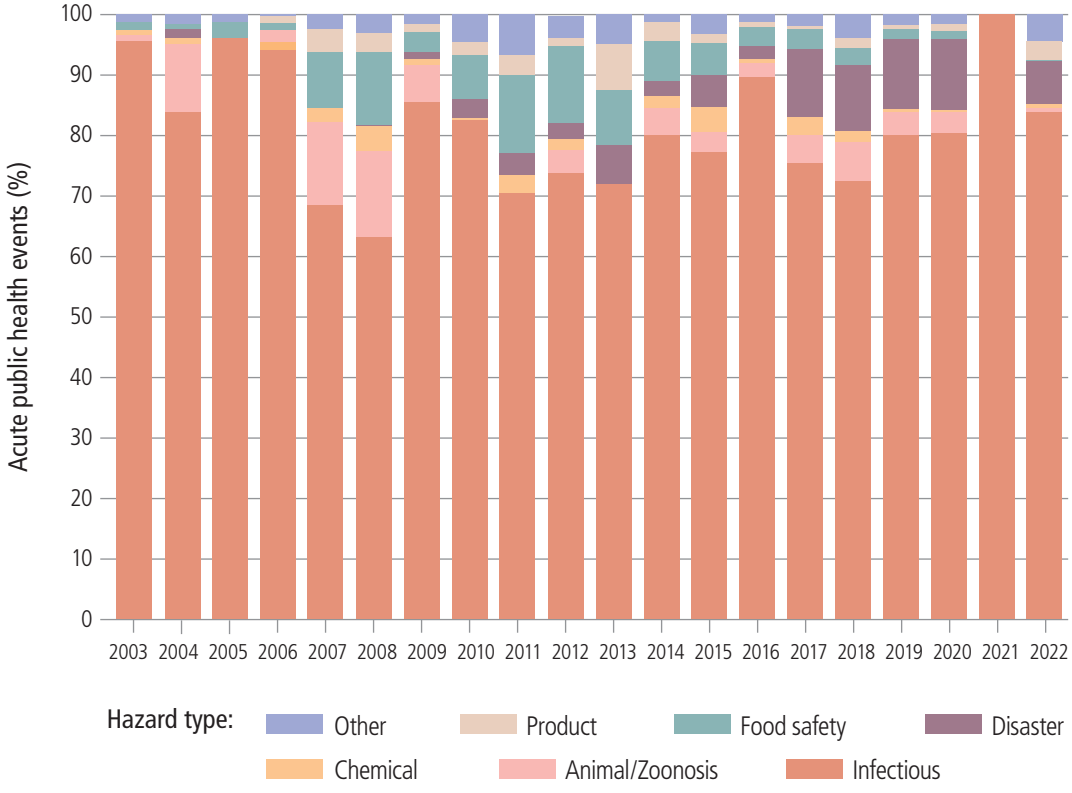


TABLE 1 **Acute public health events for the ten most frequently reported diseases, conditions or hazards of an infectious nature, for each year of the last five years and across the five-year period, 2018–2022**

No.	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	Acute hepatitis of unknown aetiology	—	—	—	—	11	—
2	Anthrax	—	6	—	—	—	—
3	Chikungunya virus disease	—	8	—	—	—	—
4	Cholera	30	21	6	19	43	**119**
5	COVID-19/SARS-CoV-2	—	—	225	44	—	**274**
6	Crimean–Congo haemorrhagic fever	6	9	—	—	12	**34**
7	Dengue fever	27	42	16	15	23	**123**
8	Diphteria	—	—	6	—	—	—
9	Gastroenteritis	6	—	—	—	—	—
10	Influenza, animal/human virus	8	14	6	18	16	**62**
11	Lassa fever	—	7	—	5	—	—
12	Malaria	6	10	8	8	14	**46**
13	Measles	43	45	8	11	23	**130**
14	Meningitis	—	—	—	—	14	—
15	Meningococcal disease	6	—	—	—	—	—
16	Mpox	—	—	—	—	91	**101**
17	Multisystem inflammatory syndrome in children (MIS–C)	—	—	18	8	—	—
18	Poliomyelitis	14	20	7	19	14	**74**
19	Yellow fever	9	—	14	7	—	**44**

Note: This table indicates the number of events for the ten most frequently occurring diseases or conditions of an infectious nature, per year or across the five-year period. Therefore, each column (one for each year or one indicating the five-year period) will only contain values for ten diseases, conditions or hazards.

2.3 Risk assessment of acute public health events

Risk assessments are conducted for all acute public health events when the event is first entered into EMS against the following criteria from Annex 2 of the IHR (2005): potential public health impact, risk of international spread, risk of trade or travel restrictions, and if the event is considered unusual or unexpected. This risk assessment is repeated whenever new information on the event becomes available.

For some acute public health events, additional risk assessments will be conducted. These could be regional risk assessments or RRAs. The latter is an in-depth risk assessment, conducted by WHO headquarters in collaboration with WHO Regional and Country Offices.

For humanitarian emergencies such as natural disasters and conflicts, in which multiple concurrent health threats are present (e.g., trauma, infectious diseases, exposure to chemicals and deterioration in access to health services), WHO's Health Emergencies Programme regularly undertakes a similar but distinct process, culminating in a Public Health Situation Analysis (PHSA)[6]. In 2022, PHSAs were conducted and/or updated for major emergencies, including the war in Ukraine; the refugee crisis resulting from the Ukraine war; the complex emergency in Syria; the drought and food insecurity crisis in the Horn of Africa; the complex emergency in the Sahel region; floods in Pakistan; intercommunal violence in Sudan; a tropical storm in Malawi; and floods in Madagascar. In subsequent sections, only information on RRAs will be presented and it is important to note that these risk assessments are only a very selected subset of those that WHO conducted.

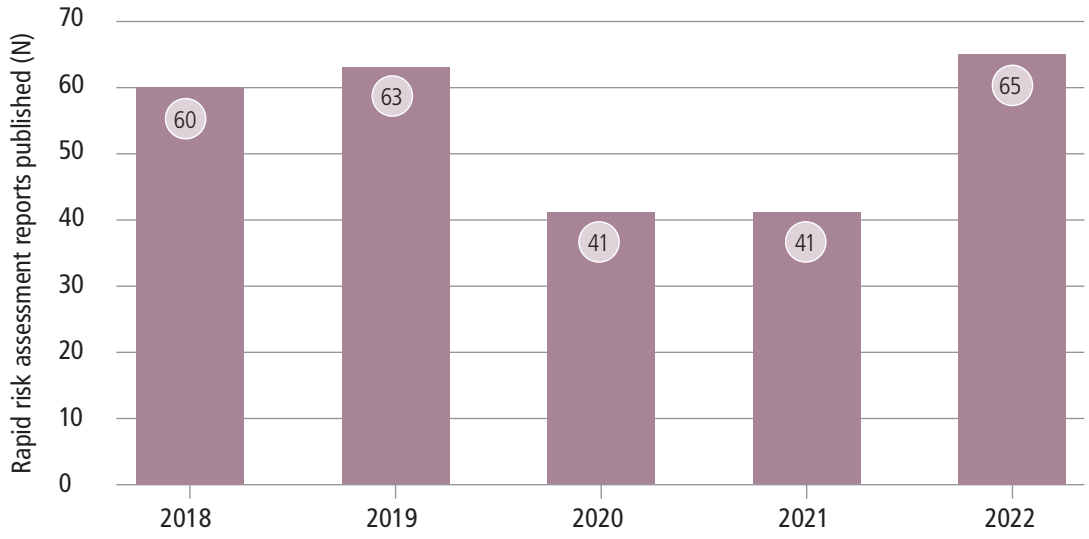
Rapid risk assessment reports, by year and WHO Region

Between 2018 and 2022, 270 rapid risk assessment (RRA) reports were published, ranging from 41 to 65 per year. The average number of RRA reports published in three of the last five years was around 60 per year. During the first two years of the COVID-19 pandemic, 2020 and 2021, fewer RRA reports were published, approximately 40 per year (Fig. 9).

The majority of RRA reports published in the last five years were related to acute public health events in the African Region (52%, 140/270), followed by the Eastern Mediterranean Region (15%, 40/270) and a comparable number in both the South-East Asia Region (8%, 22/270) and the Region of the Americas (7%, 20/270). The remaining RRA reports were related to events in two WHO Regions: Western Pacific Region and the European Region, 6% (16/270) and 4% (12/270) respectively. In addition, 6% (17/270) of RRA reports addressed global acute public health events, while 1% (3/270) related to multi-regional events, simultaneously affecting two WHO Regions.

6. More information about the Public Health Situation Analysis can be found at: https://healthcluster.who.int/our-work/task-teams/information-management-task-team/public-health-information-services-toolkit. Examples can be found at: https://www.humanitarianresponse.info/en/operations/ukraine/document/ukraine-public-health-situation-analysis-phsa-long-form-01-aug-2022-en and https://www.who.int/publications/m/item/public-health-situation-analysis--greater-horn-of--africa---january-2023.

FIG. 9 **Rapid risk assessment reports published, 2018–2022**



All WHO Regions produced fewer RRA reports during the first two years of the COVID-19 pandemic (2020 and 2021), with none published in the Region of the Americas or the Eastern Mediterranean Region in 2020 or in the Western Pacific Region in 2021 (Table 2). The number of RRA reports published yearly has since reached or exceeded pre-pandemic levels in three WHO Regions: the African Region, the South-East Asia Region and the Eastern Mediterranean Region. Important to note is the increase in multi-regional (i.e., related to multiple WHO Regions) and global RRA reports since 2020 (Table 2).

TABLE 2 **Rapid risk assessment reports published, by area, 2018–2022**

WHO Region	**2018** N = 60	**2019** N = 63	**2020** N = 41	**2021** N = 41	**2022** N = 65
AFR	33 (55%)	29 (46%)	26 (63%)	22 (54%)	30 (46%)
AMR	9 (15%)	7 (11%)	0 (0%)	1 (2.4%)	3 (4.6%)
EMR	8 (13%)	12 (19%)	0 (0%)	6 (15%)	14 (22%)
EUR	2 (3.3%)	4 (6.3%)	3 (7.3%)	2 (4.9%)	1 (1.5%)
SEAR	4 (6.7%)	7 (11%)	2 (4.9%)	4 (9.8%)	5 (7.7%)
WPR	4 (6.7%)	4 (6.3%)	7 (17%)	0 (0%)	1 (1.5%)
AFR & EMR	0 (0%)	0 (0%)	0 (0%)	1 (2.4%)	0 (0%)
AMR & EUR	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (3.1%)
Global	**0 (0%)**	**0 (0%)**	**3 (7.3%)**	**5 (12%)**	**9 (14%)**

WHO Regions: AFR: WHO African Region; AMR: WHO Region of the Americas; EMR: WHO Eastern Mediterranean Region; EUR: WHO European Region; SEAR: WHO South-East Asia Region; WPR: WHO Western Pacific Region

Rapid risk assessment reports by hazard, disease, or condition

Nearly all RRA reports (99%, 266/270) in the five-year period were conducted for infectious hazards. Only four RRA reports (one per event) were published for non-infectious acute public health events, which were related to exposure to contaminated products, hazardous agents, or environmental pollutants.

The five most common diseases or conditions for which RRA reports were published between 2018 and 2022 were cholera (20%, 53/270), Ebola virus disease (10%, 28/270), measles (9%, 24/270), yellow fever (9%, 24/270), and COVID-19/SARS-CoV-2 (8%, 22/270). These five diseases resulted in 56% (151/270) of all RRA reports produced in this time period. In addition, for three diseases (cholera, Ebola virus disease and yellow fever), at least one RRA report was produced each year between 2018 and 2022 (Table 3).

When examining RRA reports by year, there were five diseases (measles, dengue fever, Lassa fever, poliomyelitis and Rift Valley fever) with at least one RRA report for four of the five years. Other than these diseases, there was a marked year-to-year variation in the hazards or conditions that necessitated an RRA report (Table 3).

Further analysis by WHO Region of conditions or diseases for which RRA reports were published revealed cholera as the disease with the most published RRA reports in the African and Eastern Mediterranean Regions. On the other hand, vector-borne diseases, such as yellow fever in the Region of the Americas, and Nipah virus infection and dengue fever in the South-East Asia Region, were the leading conditions resulting in the production of RRA reports for those Regions. In both the European and Western Pacific Regions, most RRA reports were published for COVID-19 and poliomyelitis (Tables A2–A7). Global RRA reports were first published in 2020 for COVID-19/SARS-CoV-2, and in 2022 for cholera and mpox (Table A8).

Rapid risk assessment reports by type and risk level

The majority (89%, 239/270) of RRA reports published within the reporting period concerned acute public health events in a single country. The remaining RRA reports were for global (6%, 17/270), multi-regional (1%, 3/270), or regional (4%, 11/270) acute public health events.

RRA reports assess the risk at various geographical scales. For example, single country RRA reports will assess the risk at the country, regional and global levels, while regional RRA reports will assess the risk at regional and global levels, and global RRA reports only assess the risk at a global scale.

The majority of the RRA reports for public health events in a single country were rated as high (51%) or very high (22%) at the national level. For these RRA reports, the regional and global risks were generally low to moderate (Table 4). However, for regional and multi-regional RRA reports, at the lowest geographical level, more than 50% were assessed as having high or very high regional risk and, similarly, 80% of global RRA reports were high or very high at the global level (Table 4).

TABLE 3 **Rapid risk assessment reports published by disease, condition or hazard, 2018–2022**

No.	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	Acute gastrointestinal syndrome	—	—	—	1	—	**1**
2	Acute hepatitis of unknown aetiology	—	—	—	—	1	**1**
3	Acute kidney injury	—	—	—	—	1	**1**
4	Acute watery diarrhoea	1	1	—	—	—	**2**
5	Antibiotic-resistant bacterial infection	—	2	—	—	—	**2**
6	Argentine haemorrhagic fever	—	—	1	—	—	**1**
7	Chikungunya virus disease	1	2	1	—	—	**4**
8	Chlorine gas exposure	1	—	—	—	—	**1**
9	Cholera	17	6	3	8	19	**53**
10	COVID-19/SARS-CoV-2	—	—	11	6	5	**22**
11	Crimean–Congo haemorrhagic fever	—	—	1	—	1	**2**
12	Dengue fever	1	6	—	2	4	**13**
13	Diphteria	2	—	1	—	—	**3**
14	Ebola virus disease	5	11	6	4	2	**28**
15	Environmental contamination	—	—	1	—	—	**1**
16	Hantavirus pulmonary syndrome	1	—	—	—	—	**1**
17	Hepatitis E	2	—	2	2	—	**6**
18	HIV infection	—	1	—	1	—	**2**
19	Influenza, animal virus	1		2	1	—	**4**
20	Influenza, human virus	1	—	—	—	—	**1**
21	Japanese encephalitis	—	—	—	—	1	**1**
22	Lassa fever	3	3	1	—	3	**10**
23	Leptospirosis	—	—	—	—	1	**1**
24	Listeriosis	2	—	—	—	—	**2**
25	Malaria	1	3	—	2	—	**6**
26	Marburg virus disease	—	—	—	1	1	**2**
27	Measles	5	9	1	—	9	**24**
28	Meningococcal disease/Meningitis	—	1	—	1	4	**6**
29	Middle East respiratory syndrome	1	—	—	—	—	**1**
30	Mpox	—	—	1	—	4	**5**
31	Nipah virus infection	1	2	—	1	—	**4**
32	Plague	—	—	1	2	—	**4**
33	Poliomyelitis	3	6	—	2	2	**13**

TABLE 3 Rapid risk assessment reports published by disease, condition or hazard, 2018–2022, *(continued)*

No.	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
34	Rift Valley fever	3	1	1	—	1	**6**
35	Salmonella typhimurium infection	—	—	—	—	1	**1**
36	Shigellosis	—	—	—	—	1	**1**
37	Orthopoxvirus	—	1	—	—	—	**1**
38	Sudan virus disease	—	—	—	—	2	**2**
39	Typhoid fever	1	—	—	—	—	**1**
40	Viral haemorragic fever	—	—	1	—	—	**1**
41	West Nile fever	2	—	—	—	—	**2**
42	Whooping cough	—	1	—	—	—	**1**
43	Yellow fever	6	5	6	5	2	**24**
44	Zika virus disease	—	1	—	2	—	**3**

TABLE 4 Risk level by type (global, multi-regional, regional or single country) for rapid risk assessment reports published, 2018–2022

Country/Regional/Global	National risk level	Regional risk level	Global risk level
Single country (N = 239)			
» Very high	52 (22%)	18 (7.5%)	4 (1.7%)
» High	123 (51%)	38 (16%)	3 (1.3%)
» Moderate	46 (19%)	112 (47%)	2 (0.8%)
» Low	18 (7.5%)	71 (30%)	230 (96%)
Regional and multi-regional (N = 14)*			
» Very high	—	2 (14%)	0 (0%)
» High	—	6 (43%)	0 (0%)
» Moderate	—	6 (43%)	2 (15%)
» Low	—	0 (0%)	11 (85%)
Global (N = 16)*			
» Very high	—	—	10 (62%)
» High	—	—	2 (12%)
» Moderate	—	—	4 (25%)
» Low	—	—	0 (0%)

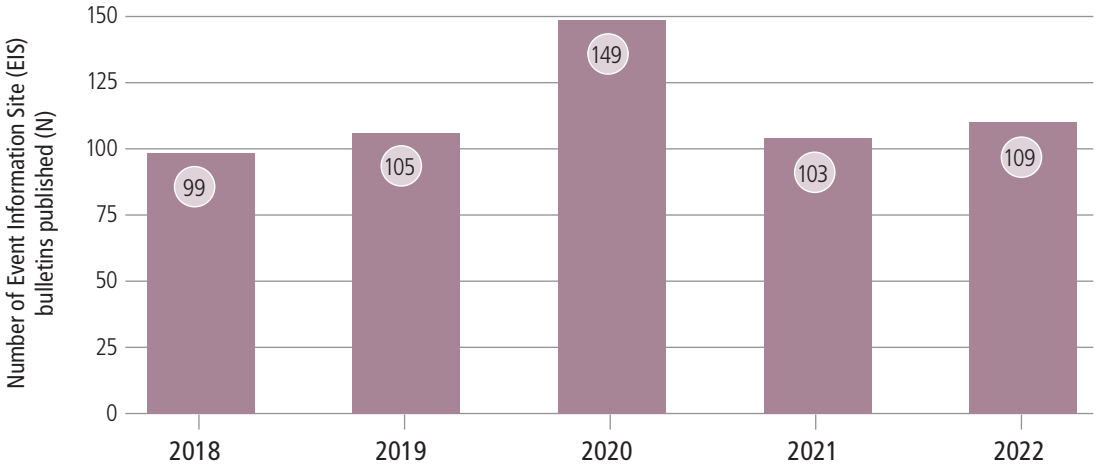
* One global RRA report was not included as it did not assign an overall global risk level and one regional RRA report only assigned a regional but not an overall global risk level.

2.4 Disseminating information for acute public health events

Event Information Site bulletins and announcements

There were 565 Event Information Site (EIS) bulletins published, ranging from 99 to 149 per year, between 2018 and 2022. The number of EIS bulletins published yearly has been largely constant, except in 2020 (Fig. 10). Moreover, 458 EIS announcements were published in the same five-year period.

FIG. 10 Event Information Site bulletins published, 2018–2022



Most EIS bulletins published in the last five years were about acute public health events in the Western Pacific Region (26%, 146/565), closely followed by bulletins for events in the African Region (24%, 137/565). The number of bulletins related to events in the Region of the Americas and Eastern Mediterranean Region was the same (17% each, 96/566), while fewer bulletins were published in the European Region and the South-East Asia Region, respectively, 12% (70/565) and 4% (20/565).

The number of EIS bulletins posted annually varied by WHO Region, in particular, there was a marked change for some Regions in the first two years of the COVID-19 pandemic. However, the number of EIS bulletins published in 2022 for four WHO Regions: Region of the Americas, Eastern Mediterranean, European and South-East Asia Regions, was largely comparable to pre-pandemic levels. On the other hand, comparing 2018 to 2022 for events in the African Region, a reduction in the number of bulletins was observed, while for the Western Pacific, there was a marked increase (Table 5).

TABLE 5 **Event Information Site bulletins published, by WHO Region, 2018–2022**

WHO Region	2018 N = 99	2019 N = 105	2020 N = 149	2021 N =103	2022 N =109
AFR	37 (37%)	22 (21%)	27 (18%)	26 (25%)	25 (23%)
AMR	16 (16%)	15 (14%)	40 (27%)	11 (11%)	14 (13%)
EMR	14 (14%)	34 (32%)	24 (16%)	8 (7.8%)	16 (15%)
EUR	9(9%)	8 (7.6%)	31 (21%)	9 (8.7%)	13 (12%)
SEAR	2 (2.0%)	4 (3.8%)	5 (3.4%)	4 (3.9%)	5 (4.6%)
WPR	21 (21%)	22 (21%)	22 (15%)	45 (44%)	36 (33%)

WHO Regions: AFR: WHO African Region; AMR: WHO Region of the Americas; EMR: WHO Eastern Mediterranean Region; EUR: WHO European Region; SEAR: WHO South-East Asia Region; WPR: WHO Western Pacific Region

All published EIS bulletins in the time period, except for two, pertained to infectious hazards, of which there were 46 different diseases or conditions. The five most common infectious diseases for which an EIS bulletin was published were avian or animal influenza (26%, 149/564), COVID-19 (13%, 90/564), poliomyelitis (8%, 47/564), Middle East respiratory syndrome (MERS) (6%, 47/564) and yellow fever (6%, 32/564). Nearly 65% (365/565) of all EIS bulletins published in the five-year period related to one of these five diseases (Table 6).

Diseases for which EIS bulletins were published differed by WHO Region. For EIS bulletins related to the African Region, Ebola virus disease and yellow fever were the main diseases. On the other hand, for bulletins on the Region of the Americas, the European and South-East Asia Regions, it was COVID-19. For the Western Pacific Region, human cases of animal influenza dominated the EIS bulletins while MERS was the predominant reason in the Eastern Mediterranean Region (Tables A9–A14).

Disease Outbreak News reports

Between 2018 and 2022, 396 Disease Outbreak News (DON) reports were published, which ranged from 38, in 2021, to 119, in 2019. The number of DON reports published annually fluctuated over the last five years, with fewer DON reports during the first two years of the COVID-19 pandemic, 2020 and 2021. In addition, a very high number of DON reports had been published in 2018 and 2019 due to regular DON reports for the 2018–2020 Ebola virus disease outbreak (Fig. 11).

In subsequent years situation reports were often produced for certain large-scale public health events, such as Ebola virus disease outbreaks, rather than regular DON reports.

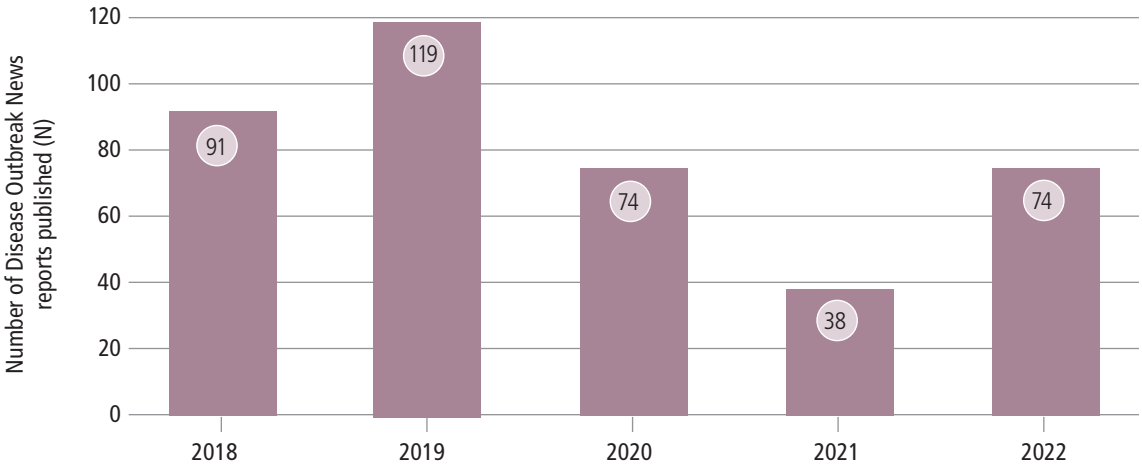
TABLE 6 **Event Information Site bulletins published, by disease, condition or hazard, 2018–2022**

No.	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	Acute gastrointestinal syndrome	—	—	—	1	—	**1**
2	Acute haemorrhagic fever syndrome	—	3	—	2	—	**5**
3	Acute hepatitis E	3	—	1	4	—	**8**
4	Acute hepatitis of unknown aetiology	—	—	—	—	1	**1**
5	Antibiotic-resistant bacterial infection	—	2	—	—	—	**2**
6	Arenaviral haemorrhagic fever	—	—	1	—	—	**1**
7	Argentine haemorrhagic fever	—	—	1	—	—	**1**
8	Chikungunya virus disease	2	1	1	—	—	**4**
9	Cholera	8	3	1	4	13	**29**
10	COVID-19/SARS-CoV-2	—	—	90	—	—	**90**
11	Crimean–Congo haemorrhagic fever	—	—	—	—	1	**1**
12	Dengue fever	3	10	3	2	7	**25**
13	Diphteria	1	—	—	—	—	**1**
14	Dracunculiasis	—	—	1	—	—	**1**
15	Ebola virus disease	7	1	4	5	4	**21**
16	Flood	—	—	1	—	—	**1**
17	Gonococcal infection	2	1	—	—	1	**4**
18	Hantavirus pulmonary syndrome	1	1	—	—	2	**4**
19	Histoplasmosis	—	1	—	—	—	**1**
20	HIV infection, AIDS	—	1	—	—	—	**1**
21	Influenza, *animal virus*	16	12	16	59	46	**149**
22	Influenza, *human virus*	1	1	—	—	—	**2**
23	Japanese encephalitis	—	—	—	—	1	**1**
24	Lassa fever	4	2	2	—	4	**12**
25	Legionellosis	—	—	—	—	1	**1**
26	Leptospirosis	—	—	—	1	1	**2**
27	Listeriosis	2	1	—	—	—	**3**
28	Malaria	2	1	—	—	1	**4**
29	Marburg virus disease	—	—	—	2	2	**4**
30	Mayaro virus disease	—	—	1	—	—	**1**
31	Measles	3	8	3	—	2	**16**
32	Meningitis	—	—	—	1	1	**2**
33	Meningococcal disease	—	1	—	—	—	**1**
34	Middle East respiratory syndrome	13	19	6	5	4	**47**

TABLE 6 Event Information Site bulletins published by disease, condition or hazard, 2018–2022 *(continued)*

No.	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
35	Mpox	5	1	1	4	2	**13**
36	Nipah virus infection	2	—	—	1	—	**3**
37	Non-infectious unknown aetiology	—	1	—	—	—	**1**
38	Oropouche virus disease	—	—	1	—	—	**1**
39	Plague	—	1	1	2	—	**4**
40	Poliomyelitis	9	20	3	4	11	**47**
41	Orthopoxvirus	—	1	—	—	—	**1**
42	Rabies	1	—	—	—	—	**1**
43	Rift Valley fever	4	2	1	1	1	**9**
44	Rubella	1	1	—	—	—	**2**
45	Sudan virus disease	—	—	—	—	1	**1**
46	Typhoid fever	1	—	—	—	—	**1**
47	Yellow fever	8	8	10	4	2	**32**
48	Zika virus disease	—	1	—	2	—	**3**

FIG. 11 Disease Outbreak News reports published, 2018–2022



The majority of DON reports published in the last five years were related to acute public health events in the African Region (55%, 218/396), followed by reports for events in the Eastern Mediterranean Region (17%, 67/396). A comparable percentage of DON reports were published in the European Region (8%, 33/396), the Region of the Americas (7%, 26/396) and the Western Pacific Region (6%, 23/396). However, only 4% (14/396) of all DON reports related to acute public health events were published in the remaining WHO Region, the South-East Asia Region. In addition, in this time period, 3% (13/396) of DON reports were for global acute public health events while 1% (2/396) were for multi-regional events that affected two WHO Regions simultaneously.

In the five-year period, there was a marked variation in the DON reports published annually by WHO Region. DON reports published increased, compared to pre-COVID-19 levels, for two WHO Regions: the European and the South-East Asia Regions. The number of DON reports for the Region of the Americas and the Eastern Mediterranean Region remained the same while those related to the African Region and Western Pacific Region decreased markedly (Table 7). Also, notable is the increase in multi-regional (i.e., pertaining to multiple WHO Regions) and global DON reports, since 2020 (Table 7).

TABLE 7 Disease Outbreak News reports published, by WHO Region, 2018–2022

WHO Region	2018 N = 91	2019 N = 119	2020 N = 74	2021 N = 38	2022 N = 74
AFR	61 (67%)	66 (55%)	46 (62%)	17 (45%)	28 (38%)
AMR	4 (4.4%)	7 (5.9%)	7 (9.5%)	4 (11%)	4 (5.4%)
EMR	11 (12%)	28 (24%)	9 (12%)	7 (18%)	12 (16%)
EUR	6 (6.6%)	8 (6.7%)	4 (5.4%)	4 (11%)	11 (15%)
SEAR	2 (2.2%)	2 (1.7%)	1 (1.4%)	4 (11%)	5 (6.8%)
WPR	7 (7.7%)	7 (5.9%)	6 (8.1%)	1 (2.6%)	2 (2.7%)
Multi-regional	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (2.7%)
Global	**0 (0%)**	**1 (0.8%)**	**1 (1.4%)**	**1 (2.6%)**	**10 (14%)**

WHO Regions: AFR: WHO African Region; AMR: WHO Region of the Americas; EMR: WHO Eastern Mediterranean Region; EUR: WHO European Region; SEAR: WHO South-East Asia Region; WPR: WHO Western Pacific Region

All DON reports published in the five-year were for infectious hazards. There were nearly 40 different infectious disease agents or hazards for which a DON report was published and the five most common diseases were Ebola virus disease (32%, 128/396), MERS (11%, 45/396), poliomyelitis (7%, 29/396), yellow fever (7%, 29/396) and COVID-19/SARS-CoV-2 variant (6%, 22/396). These five diseases resulted in 64% (253/396) of all DON reports produced in this time period. In addition, for seven diseases (dengue fever, Ebola virus disease, MERS, mpox, poliomyelitis, Rift Valley fever, and yellow fever) at least one DON report was produced each year between 2018 and 2022 (Table 8).

TABLE 8 **Disease Outbreak News reports published, by disease, condition or hazard, 2018–2022**

No.	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	Acute hepatitis of unknown aetiology	—	—	—	—	5	**5**
2	Antibiotic-resistant bacterial infection	—	1	—	—	—	**1**
3	Chikungunya virus disease	2	1	1	—	—	**4**
4	Cholera	9	1	—	2	10	**22**
5	COVID-19/SARS-CoV-2	—	—	10	—	—	**10**
6	Crimean–Congo haemorrhagic fever	—	—	—	—	1	**1**
7	Dengue fever	1	6	3	1	6	**17**
8	Dracunculiasis	—	—	1	—	—	**1**
9	Ebola virus disease	36	53	29	6	4	**128**
10	Gonococcal infection	—	1	—	—	—	**1**
11	Hantavirus pulmonary syndrome	—	2	—	—	—	**2**
12	Hepatitis E	1	—	1	1	1	**4**
13	HIV infection, AIDS	—	1	—	—	—	**1**
14	Influenza, *animal* virus	1	—	1	2	1	**5**
15	Influenza, *human* virus	2	—	1	3	4	**10**
16	Japanese encephalitis	—	—	—	—	1	**1**
17	Lassa fever	4	2	1	—	4	**11**
18	Legionellosis	—	—	—	—	1	**1**
19	Leptospirosis	—	—	—	—	1	**1**
20	Listeriosis	3	1	—	—	—	**4**
21	Malaria	—	—	—	—	1	**1**
22	Marburg virus disease	—	—	—	2	2	**4**
23	Mayaro virus disease	—	—	1	—	—	**1**
24	Measles	2	8	4	—	2	**16**
25	Meningitis	—	—	—	1	—	**1**
26	Middle East respiratory syndrome	11	18	7	5	4	**45**
27	Mpox	2	1	1	4	8	**16**
28	Nipah virus infection	2	—	—	1	—	**3**
29	Oropouche virus disease	—	—	1	—	—	**1**
30	Plague	—	—	1	1	—	**2**
31	Poliomyelitis	6	13	1	3	6	**29**
32	Rift Valley fever	2	2	1	1	1	**7**
33	Salmonella typhimurium infection	—	—	—	—	1	**1**
34	Shigellosis	—	—	—	—	1	**1**

TABLE 8 Disease Outbreak News reports published by disease, condition or hazard, 2018–2022 *(continued)*

No.	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
35	Streptococcus infection	—	—	—	—	1	**1**
36	Sudan virus disease	—	—	—	—	5	**5**
37	Typhoid fever	1	—	—	—	—	**1**
38	Yellow fever	6	7	9	4	3	**29**
39	Zika virus disease	—	1	—	1	—	**2**

Similarly, there were five other diseases (cholera, hepatitis E, influenza, Lassa fever and measles) that had at least one DON report for four of the five years. Other than these diseases, there was marked year-to-year variation, with 27 other infectious hazards occurring that necessitated a DON report (Table 8).

The main disease for which DON reports were published differed by WHO Region or geographic range. In the African Region, the main disease was Ebola virus disease while in the Region of the Americas, it was yellow fever. In the Eastern Mediterranean Region, the main disease was MERS and in the Western Pacific Region, it was COVID-19. In the European Region, three diseases were on par in the number of DON reports: dengue fever, human influenza, and mpox. Similarly, in the South-East Asia Region, dengue fever was the main cause for which DON reports were published (Tables A15–A20). In addition, global DON reports were first published in 2019 for measles, which continued in subsequent years and 2022 included reports on acute hepatitis of unknown aetiology, cholera and mpox (Table A21).

Regional information dissemination and reporting

In addition to EIS bulletins and DON reports, there are numerous Region-specific information reports or bulletins that were disseminated regularly.

These include, for example, the *Regional weekly bulletin* on outbreaks and other emergencies, produced by the African Region[7], which was launched in March 2017 and of which 52 editions were issued in 2022. Also, the Region of the Americas regularly produces *Epidemiological Alerts,* informative notes or regional risk assessments[8] and disseminated 46 of these in 2022. Similarly, the Western Pacific Region produces reports on avian influenza, seasonal influenza and dengue fever, of which over 100 were disseminated in 2022. In addition, the South-East Asia Region published 15 epidemiological bulletins for COVID-19 in 2022, as well as continues to maintain the regional database for COVID-19 and dashboard for information sharing, including on public health and social measures[9].

7. See: https://www.afro.who.int/health-topics/disease-outbreaks/outbreaks-and-other-emergencies-updates.
8. See: https://www.paho.org/en/epidemiological-alerts-and-updates.
9. See: https://www.who.int/southeastasia/outbreaks-and-emergencies/covid-19/what-is-happening/sear-weekly-situation-reports.

3. CONCLUSION

3.1 Discussion

This report underscores the importance of public health intelligence activities for the global detection, verification, risk assessment, and reporting and dissemination of acute public health events under the IHR (2005) framework, in collaboration with States Parties.

It emphasizes the numerous health threats detected globally, number of acute public health events across the various WHO Regions, detailed risk assessment by WHO and diligent reporting to both States Parties and the public in order to prevent potential PHEIC.

In 2022, nearly 7000 signals were detected globally, for which 351 requests for verification were sent. Not all signals detected require subsequent requests for verification. However, each signal does necessitate careful and detailed triage and assessment by experienced epidemiologists. This ensures that relevant signals are further assessed and those not considered a significant risk to public health are discarded. In 2022, a total of 457 new events were recorded in EMS, including both verified signals and events directly reported under the IHR (2005) by NFPs. Of all signals detected in 2022, approximately 5% required a request for verification while 7% were recorded as an event in EMS.

All events recorded in EMS were risk assessed and a further 65 RRA reports were produced and disseminated in 2022. In addition, in 2022, 109 EIS bulletins, 88 EIS announcements and 74 DON reports were distributed. The high volume of signals detected, events recorded, risk assessments conducted, and information disseminated in 2022 highlights the critical role of public health intelligence in the early detection and response to acute public health threats.

The number of requests for verification sent increased in 2022, to a level comparable with 2020, with the overall global response rate (89%) the highest of the last three years. This high overall response rate underscores the importance of clear channels of communication between WHO Regional and Country Offices, and NFPs or national government counterparts. It also demonstrates the positive impact of NFP trainings on rapidly responding to requests for verification. However, there still remains a lack of response to a minority of requests for verification emphasizing the need for continued engagement with, and trainings for, NFPs.

In the last 20 years, 5807 events were reported, with a median of 265 events per year. The number of events has varied throughout the years with, generally, an increase since 2015. The increase in events recorded is in part the result of the improved use of EMS due to training as well as country capacity strengthening efforts by WHO in national surveillance systems.

Half of all of events in the time period occurred in two Regions: the African Region (30%, 1753) and the Region of the Americas (24%, 1405). As not all WHO Regions include the same number of countries, territories and areas, the proportion of those within a Region reporting at least one new event per year was examined.

This showed that the South-East Asia, Western Pacific or Eastern Mediterranean Regions, with fewer absolute numbers of events, had for several years a higher proportion of countries, territories and areas with at least one event than Regions that reported a high absolute number of events, such as the African Region or the Region of the Americas.

This underscores, firstly, that the absolute number of events per WHO Region is an important metric for understanding the Region that is most impacted. However, secondly, this alone does not provide the full picture as Regions with fewer countries, territories and areas might have less events in absolute terms, but still be substantially affected and require support for response activities.

Infectious diseases were the predominant cause of events for each year, between 2003 and 2022, ranging from 63% to 96%, respectively. Across the last five years, the top ten most common infectious diseases each year, for events due to an infectious disease, were caused by 19 different infectious diseases. This shows that infectious diseases represent the main hazard type of events globally, but also emphasizes the varied nature of health threats. However, some consistency could be observed with six infectious diseases (cholera, dengue fever, influenza, malaria, measles and poliomyelitis) among the ten most frequent every year in the last five years.

Across WHO Regions, infectious disease events accounted for the highest number of events in the time period. However, disasters were also a common cause of events globally and the proportion of events due to natural disaster has increased in recent years in several WHO Regions. The variation in hazard type by WHO Region is expected to a certain extent as the underlying disease dynamics as well as societal and environmental factors differ between WHO Regions. Moreover, it is not unlikely that climate change will play an increasing role, direct and indirect, as a driver of acute public health events in all WHO Regions.

The varied type of hazards globally and by WHO Region emphasizes the importance of an all-hazards approach, as adopted in the IHR (2005). Although the majority of health threats globally, and in most WHO Regions, are due to infectious diseases, non-infectious disease threats commonly occur and can have a substantial public health impact. The multi-faceted nature of health threats requires interdisciplinary teams and knowledge to evaluate and assess threats. A key feature in this regard is the use, by public health intelligence teams, of the Joint FAO–WHO-WOAH Global Early Warning System (GLEWS+) for health threats and emerging risk at the human-animal-ecosystems interface.

Less than half of all events (44%) in the last five years were initially reported by NFPs or through official national government channels, with the remainder initially identified by WHO. However, there has been an increase in the initial report by NFPs or through official national government channels each year. Nonetheless, there was a marked variation in the initial reporting by NFPs or official national government channels between WHO Regions. This variation is due to differences in networks and relations built up over the years by WHO Regional and Country Offices with national governments. To continue improving initial reporting, all Regional and Country Offices regularly engage with national government counterparts to build and sustain collaborative relations. This also underlines the importance of public health information gathering by WHO to detect and verify signals in Regions where the reporting by NFP or national government as a source of initial information is low.

Information dissemination is an essential part of public health intelligence. In the last five years, 270 RRA reports, 565 EIS bulletins, 458 EIS announcements, and 396 DON reports were disseminated. This roughly corresponds to, on average, 50 RRA reports, 200 EIS bulletins or announcements and 80 DON reports annually. It emphasizes the importance of conducting in-depth risk assessments and sharing information with States Parties and the public.

The number of RRA reports and EIS bulletins in 2022 has reverted to pre-pandemic (2018–2019) levels, while the number of DON reports is far fewer than in 2018 or 2019. The elevated number of DON reports in 2018 and 2019 was due to regular DON reports being published in response to the Ebola outbreaks in the African Region: 88 DON reports alone were published for Ebola outbreaks in the Democratic Republic of the Congo in those two years.

In the last five years, there has been an overlap of infectious diseases for which RRA reports, EIS bulletins or DON reports were most commonly published. For all of these, yellow fever and COVID-19/SARS-CoV-2 were in the top five, while cholera, Ebola virus disease and poliomyelitis were shared among the top five in at least two reports or bulletins.

A significant recent trend for RRA reports is the increase in multi-regional or global RRA reports, which take up considerably more time and resources. In addition, it is important to emphasize that RRA reports are not the only risk assessment that is conducted but rather an in-depth risk assessment, which follows on from prior risk assessments. The fact that RRA reports are a subset of all risk assessments and are conducted for acute public health events of interest explains the high or very high national risk levels in 83% of all single country RRA reports.

The COVID-19 pandemic had a marked impact on public health intelligence activities, particularly during 2020 and 2021. It influenced the mode of communication of national governments and public health agencies. There was a marked shift in communication through social media to allow for direct communication with the public rather than, or prior to, reporting via routine IHR channels. This impacted both detection and follow-up of acute public health events for public health intelligence teams.

The COVID-19 pandemic also impacted the requests for verification, number of events recorded in EMS and the production and dissemination of RRA reports, EIS bulletins, and DON reports. In 2020, there was a high number of requests for verification and an increased number of events recorded in EMS as well as an elevated number of EIS bulletins disseminated. This was in response to the spread of SARS-CoV-2 globally at the early stages of the pandemic and the emergence of SARS-CoV-2 variants. However, at the same time, in 2020, fewer RRA and DON reports were produced compared to the preceding years, which continued in 2021. Similarly, in 2021, there was a decrease in requests for verification, events recorded in EMS and EIS bulletins disseminated, as resources were allocated to combat COVID-19, and less attention was given to other health threats.

3.2 Limitations

There are several limitations to this report. Foremost, acute public health events occur continuously across the globe. Therefore, WHO and national governments detected a multitude of events daily, not all of which are required to be reported to WHO. However, the acute public health events for this report were obtained from EMS, which is an internal WHO system used for the management of acute public health events. It is not intended as a unique repository of every acute public health event and, therefore, this report does not reflect all acute public health events whichever occurred globally, but rather those recorded in EMS.

Second, the report focuses on newly reported events in a given year. It does not take into account that events might continue across several years. Therefore, when focusing on events, the report underestimates the impact of acute public health events that countries, territories or areas might face.

Third, there are different data entry protocols and data management practices between WHO Regions for requests for verification and recording events in EMS. It cannot be excluded that these differences could partially explain the inter-Region variation observed in some of the findings. However, efforts are ongoing to increase understanding of standard operating practices across WHO Regions and, despite these differences, the use of EMS and other WHO platforms remains key for rapid information sharing and efficient data management. Moreover, EMS has developed into a unique historical repository of acute public health events globally.

Fourth, it might appear that there were no risk assessments conducted in some WHO Regions during certain years, as no RRA reports were published. However, it is very important to note that the analysis of RRA reports in this report is a subset of all risk assessments for acute public health events recorded in EMS. Therefore, the findings from the RRA reports are not reflective of all risk assessments that WHO conducts.

Fifth, although findings related to signal detection are included in the report, this section is not as extensive as others. This is due to the recent adoption of a novel data system for the management of signals. In the long term, this will facilitate operations and analytics, but, unfortunately, in the short term, it has limited the analytics that could be included in this report.

Finally, in terms of information products, this report focusses on RRA reports, EIS bulletins and announcements, and DON reports, which are information products linked to the IHR (2005). However, public health intelligence teams across WHO are involved in a multitude of other analyses and information products. These include regional information products, such as risk assessments, bulletins, situation reports and interactive dashboards. Thus, the findings from RRA reports, EIS bulletins and announcements, and DON reports only represent a fraction of all information products that public health intelligence teams lead on or are involved in.

3.3 Summary findings

This report underscores the importance of public health intelligence activities for the detection, verification, risk assessment, and information dissemination of acute public health events globally.

WHO's public health intelligence teams globally detected several thousands of signals annually, followed up with requests for verification with NFPs, and risk assessed events, including, on average, 50 in-depth risk assessments annually. In addition, they disseminated nearly an average of 300 bulletins, announcements, or reports, annually, as part of the information dissemination under the IHR (2005), to States Parties and the public.

Public health intelligence aims to detect health threats early and guide decision-making and response efforts. The COVID-19 pandemic and several other recent large-scale outbreaks, such as the Zika and Ebola virus outbreaks, highlight the vital role of public health intelligence in the global health architecture.

In a world with increasing health threats, (re)-emerging disease, conflict, and the ever-growing impact of climate change, continued support for and strengthening of public health intelligence is indispensable and key for tackling and mitigating future health emergencies.

BIBLIOGRAPHY

2021 Annual global public health intelligence report. Saad NJ, Hamblion EL, et al. Weekly Epidemiological Record. No 33, 2022 (https://apps.who.int/iris/handle/10665/361747).

2021 Annual global report on public health intelligence activities as part of the WHO Health Emergencies Programme. Geneva: World Health Organization; 2022 (https://www.who.int/publications/m/item/2021-annual-global-report-on-public--health-intelligence-activities-as-part-of-the--who-health-emergencies-programme).

Acute public health events assessed by WHO Regional Offices for Africa, the Americas, and Europe under the International Health Regulations (2005) – 2020 Report. World Health Organization; 2021 (https://www.paho.org/en/documents/acute-public-health-events-assessed-who-regional-offices-africa-americas-and-europe-5).

Early detection, assessment and response to acute public health events: Implementation of Early Warning and Response with a focus on Event-Based Surveillance. Geneva: World Health Organization; 2014 (https://www.who.int/publications/i/item/WHO-HSE-GCR-LYO-2014.4).

Hot spots in a wired world: WHO surveillance of emerging and re-emerging infectious diseases. Heymann DL, Rodier GR, WHO Operational Support Team to the Global Outbreak Alert and Response Network. Lancet Infectious Diseases. 2001 Dec;1(5):345–53 (http://www.ncbi.nlm.nih.gov/pubmed/11871807).

How better pandemic and epidemic intelligence will prepare the world for future threats. Morgan OW, Abdelmalik P, et al. Nature Medicine. 2022 Aug;28(8):1526–8 (http://www.ncbi.nlm.nih.gov/pubmed/35764683).

International health regulations (2005) -- 3rd edition. Geneva: World Health Organization; 2016 (https://www.who.int/publications/i/item/9789241580496).

Mitigating the spread of global public health threats: a review of WHO public health intelligence activities 2018–2020. Alexandrova Ezerska L., Dzelamonyuy E., et al. Weekly Epidemiological Record. No 27, 2021 (https://apps.who.int/iris/handle/10665/342526).

Public Health Intelligence. The United Nations Terminology Database. 2022 (https://unterm.un.org/unterm2/en/search?searchTerm=public health intelligence).

Rapid Risk Assessment of Acute Public Health Events. Geneva: World Health Organization; 2012 (https://www.who.int/publications/i/item/rapid-risk-assessment-of-acute-public-health-events).

Rumors of disease in the global village: outbreak verification. Grein TW, Kamara KB, et al. Emerging Infectious Diseases. 2000;6(2):97–102 (http://www.ncbi.nlm.nih.gov/pubmed/10756142).

The Epidemic Intelligence from Open Sources initiative: a collaboration to harmonize and standardize early detection and epidemic intelligence among public health organizations. Abdelmalik P., Peron E., et al. Weekly Epidemiological Record. No 20, 2018 (https://apps.who.int/iris/handle/10665/272601).

ANNEX 1

States Parties and areas by WHO Region

WHO African Region

The WHO African Region consists of the following 47 States Parties: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Eritrea, Eswatini,Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Africa, South Sudan, Togo, Uganda, United Republic of Tanzania, Zambia, Zimbabwe.

WHO Eastern Mediterranean Region

The WHO Eastern Mediterranean Region consists of the following 21 States Parties and the occupied Palestinian territory, including east Jerusalem: Afghanistan, Bahrain, Djibouti, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, Yemen.

WHO European Region

The WHO European Region consists of the following 55 States Parties: Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Holy See, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands (Kingdom of the), North Macedonia, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Türkiye, Turkmenistan, Ukraine, United Kingdom of Great Britain and Northern Ireland, Uzbekistan.

WHO Region of the Americas

The WHO Region of the Americas consists of the following 35 States Parties: Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia (Plurinational State of), Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, United States of America, Uruguay, Venezuela (Bolivarian Republic of).

WHO South-East Asia Region

The WHO South-East Asia Region consists of the following 11 States Parties: Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, Timor-Leste.

WHO Western Pacific Region

The WHO Western Pacific Region consists of the following 37 States Parties and areas: American Samoa (USA), Australia, Brunei Darussalam, Cambodia, China, Cook Islands, Fiji, French Polynesia (France), Guam (USA), Hong Kong SAR (China), Japan, Kiribati, Lao People's Democratic Republic, Macao SAR (China), Malaysia, Marshall Islands, Micronesia (Federated States of), Mongolia, Nauru, New Caledonia (France), New Zealand, Niue, Northern Mariana Islands [Commonwealth of the, (USA)], Palau, Papua New Guinea, Philippines, Pitcairn Island (UK), Republic of Korea, Samoa, Singapore, Solomon Islands, Tokelau (New Zealand), Tonga, Tuvalu, Vanuatu, Viet Nam, Wallis and Futuna (France).

ANNEX 2: Supplementary figures

For all the figures in this Annex, the legends are: AFR: WHO African Region, AMR: WHO Region of the Americas, EMR: WHO Eastern Mediterranean Region, EUR: WHO European Region, SEAR: WHO South-East Asia Region, WPR: WHO Western Pacific Region

FIG. A1 Request for verification sent (A) and response, by response time, to requests for verification sent (in percentage) (B), by WHO Region, 2020–2022

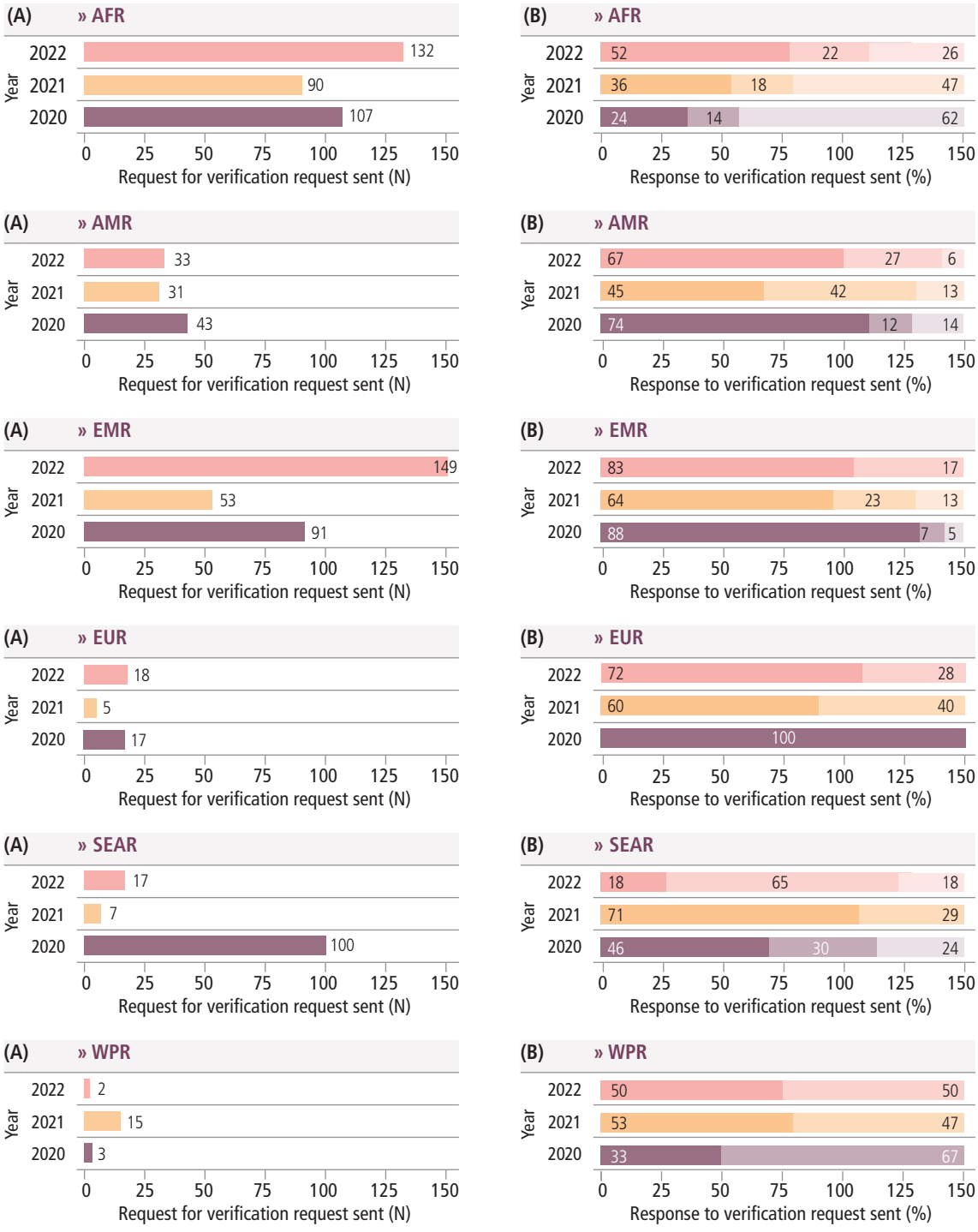
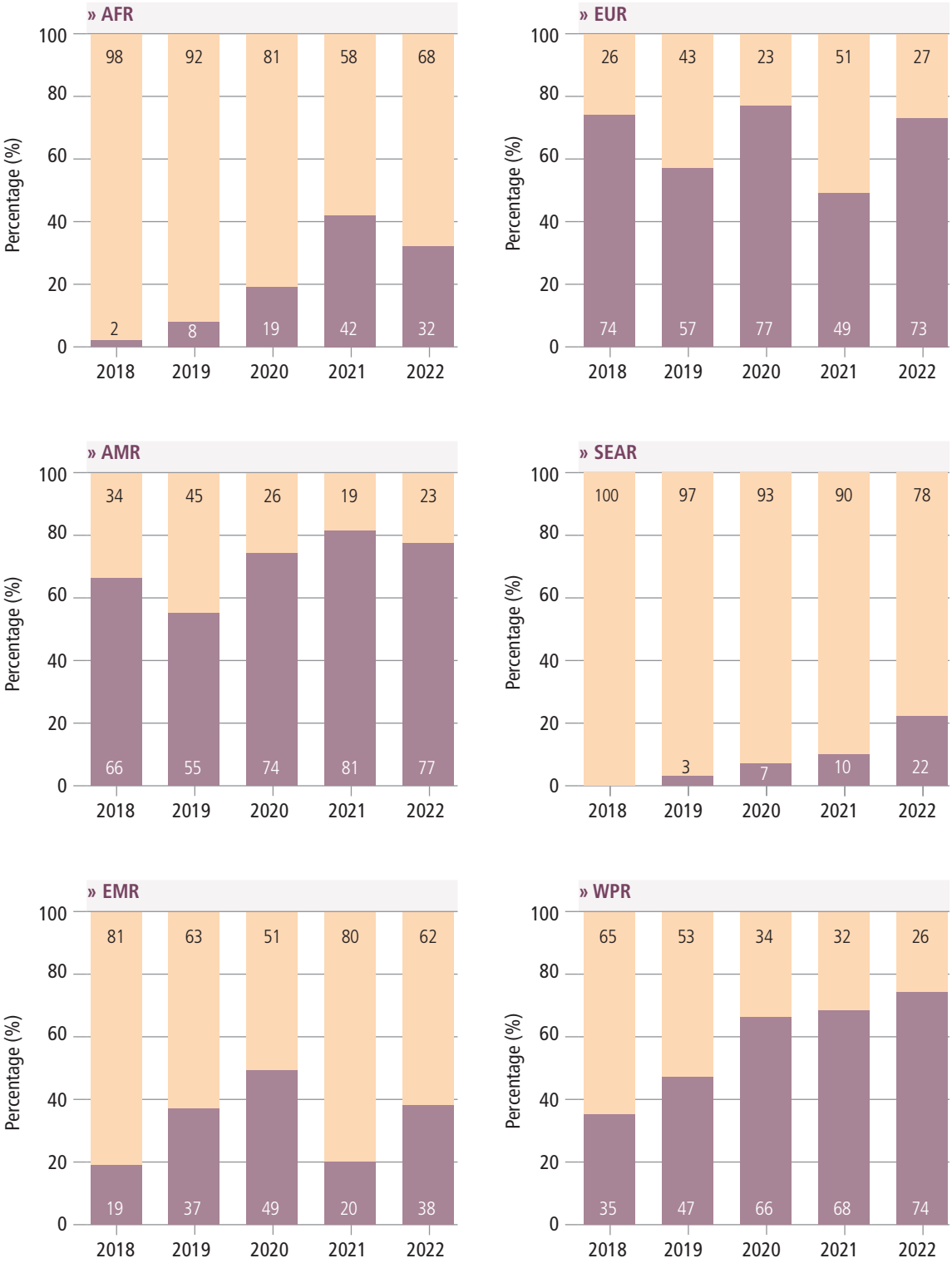


FIG. A2 **Initial source of information for events reported globally, by year and WHO Region, 2018–2022**



NFP: National International Health Regulations Focal Point

Source of information: WHO NFP and national government

FIG. A3 Acute public health events, in absolute number, by hazard type and WHO Region, 2003–2022

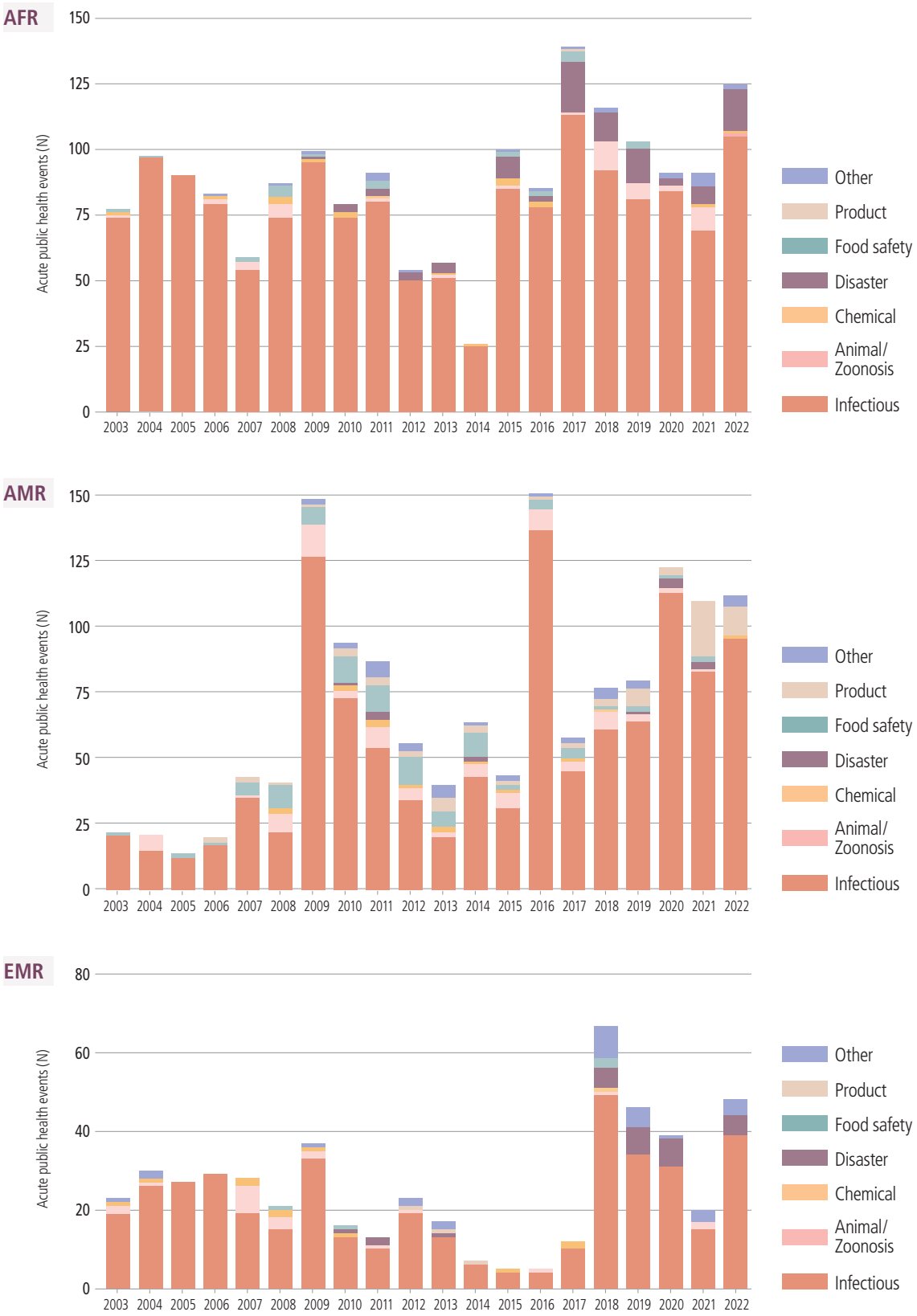


FIG. A3 Acute public health events, in absolute number, by hazard type and WHO Region, 2003–2022 *(continued)*

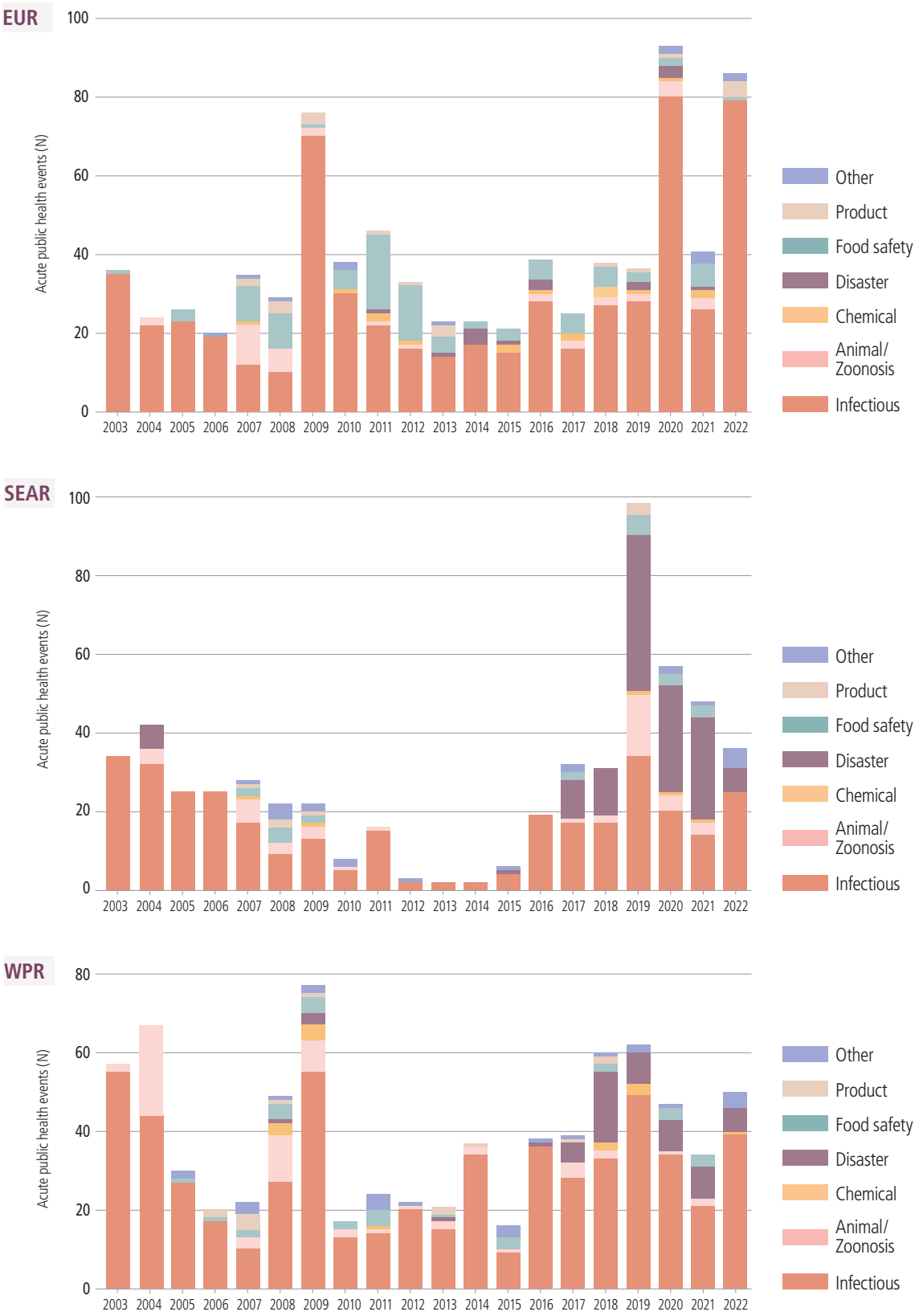


FIG. A4 **Acute public health events, in percentage, by hazard type and WHO Region, 2003–2022**

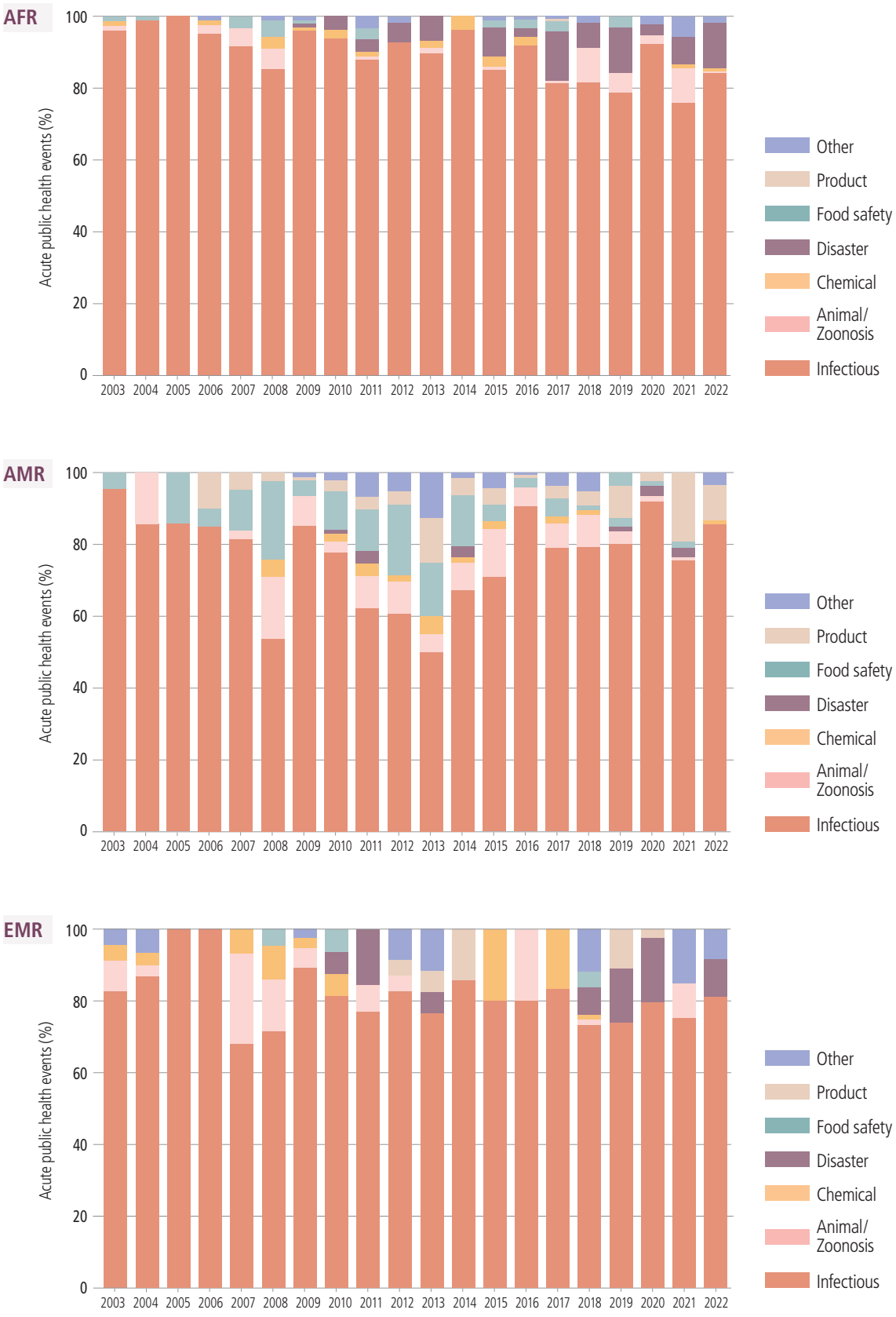
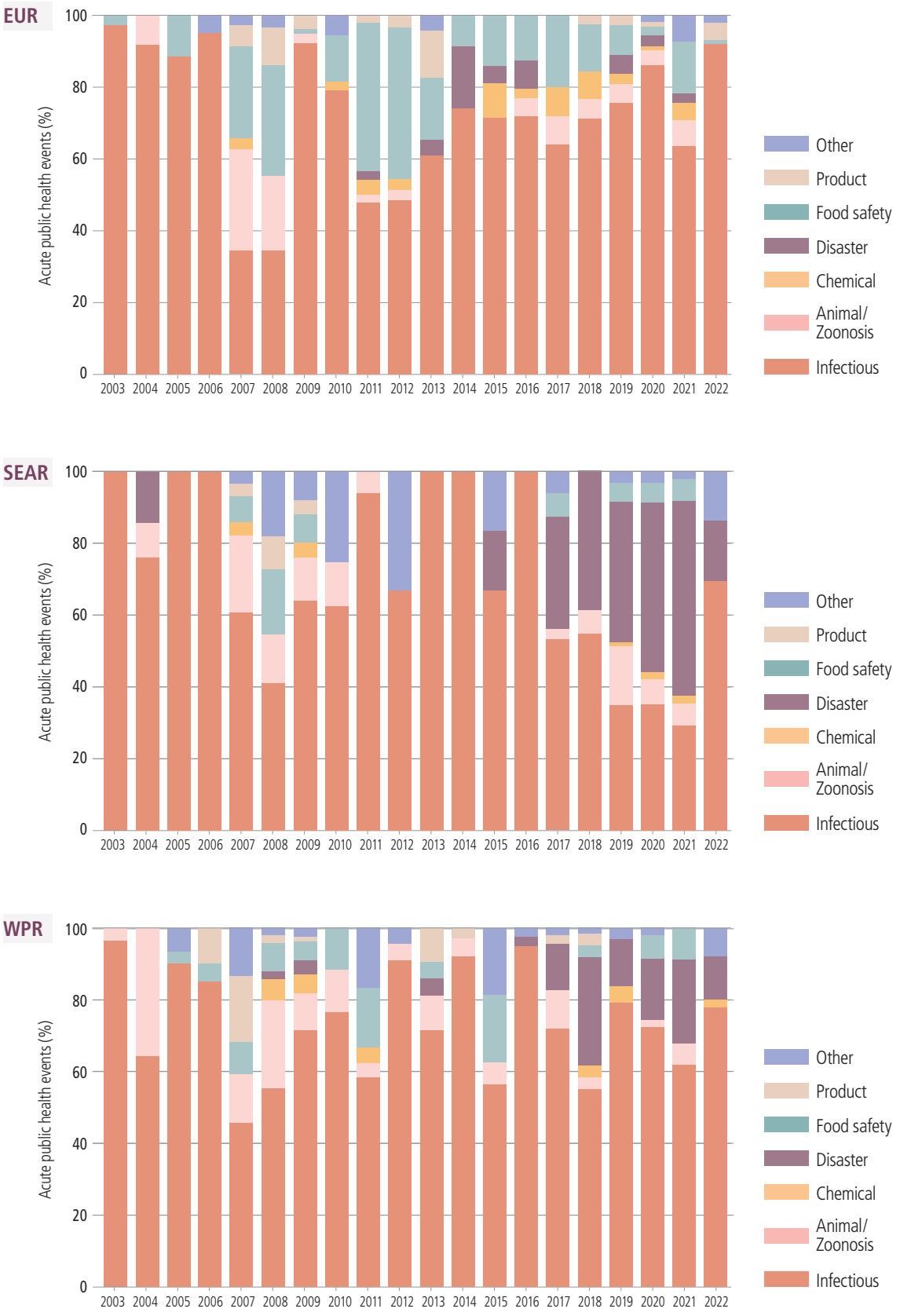


FIG. A4 Acute public health events, in percentage, by hazard type and WHO Region, 2003–2022 *(continued)*



ANNEX 3: Supplementary tables

Tables from A2 to A7:

Rapid Risk Assessment (RRA) reports published by disease, condition or hazard and year, or across the five-year time period 2018–2022, for acute public health events in the following WHO Regions: Africa (AFR), Americas (AMR), Eastern Mediterranean (EMR), Europe (EUR), South-East Asia (SEAR) and Western Pacific (WPR).

TABLE A1 Acute public health events by hazard type and WHO Region, 2018–2022

Hazard category	AFR N = 523	AMR N = 502	EMR N = 220	EUR N = 295	SEAR N = 269	WPR N = 253
Animal/Zoonosis	29 (5.5%)	13 (2.6%)	3 (1.4%)	11 (3.7%)	25 (9.3%)	5 (2.0%)
Chemical	2 (0.4%)	2 (0.4%)	1 (0.5%)	7 (2.4%)	3 (1.1%)	6 (2.4%)
Disaster	47 (9.0%)	8 (1.6%)	24 (11.0%)	6 (2.0%)	109 (40.5%)	48 (19.0%)
Food safety	3 (0.6%)	6 (1.2%)	3 (1.4%)	17 (5.8%)	11 (4.1%)	8 (3.2%)
Infectious	431 (82.0%)	417 (83.0%)	168 (76.3%)	240 (81.0%)	110 (41.1%)	176 (70.0%)
Other	11 (2.1%)	11 (2.2%)	21 (9.5%)	7 (2.4%)	11 (4.1%)	8 (3.2%)
Product	0 (0%)	45 (9.0%)	0 (0%)	7 (2.4%)	0 (0%)	2 (0.8%)

WHO Regions: AFR: WHO African Region, AMR: WHO Region of the Americas, EMR: WHO Eastern Mediterranean Region, EUR: WHO European Region, SEAR: WHO South-East Asia Region, WPR: WHO Western Pacific Region

TABLE A2 Rapid risk assessment reports published by disease, condition or hazard, for acute public health events in the African Region, 2018–2022

AFR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	Acute gastrointestinal syndrome	—	—	—	1	—	**1**
2	Acute kidney injury	—	—	—	—	1	**1**
3	Chikungunya virus disease	—	2	1	—	—	**3**
4	Cholera	14	4	3	6	8	**35**
5	COVID-19/SARS-CoV-2	—	—	1	—	—	**1**
6	Crimean–Congo haemorrhagic fever	—	—	1	—	—	**1**
7	Dengue fever	1	—	—	1	1	**3**
8	Ebola virus disease	5	11	6	4	2	**28**

TABLE A2 Rapid risk assessment reports published by disease, condition or hazard, for acute public health events in the African Region, 2018–2022 *(continued)*

AFR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
9	Hepatitis E	2	—	2	1	—	**5**
10	Lassa fever	3	2	1	—	3	**9**
11	Leptospirosis	—	1	—	—	1	**1**
12	Listeriosis	2	—	—	—	—	**2**
13	Malaria	—	1	—	2	—	**3**
14	Marburg virus disease	—	—	—	1	1	**2**
15	Measles	1	3	1	—	4	**9**
16	Meningococcal disease/Meningitis	—	—	—	1	1	**2**
17	Mpox	—	—	1	—	—	**1**
18	Plague	—	—	1	2	—	**3**
19	Poliomyelitis	—	3	—	—	—	**3**
20	Rift Valley fever	2	—	1	—	1	**4**
21	Sudan virus disease	—	—	—	—	2	**2**
22	Viral haemorrhagic fever	—	—	1	—	—	**1**
23	Yellow fever	3	3	6	4	2	**18**

TABLE A3 Rapid risk assessment reports published by disease, condition or hazard, for acute public health events in the Region of the Americas, 2018–2022

AMR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020*	2021	2022	
1	Acute hepatitis of unknown aetiology	—	—	—	—	1	**1**
2	Antibiotic-resistant bacterial infection	—	1	—	—	—	**1**
3	Cholera	—	—	—	—	2	**2**
4	Diphteria	1	—	—	—	—	**1**
5	Hantavirus pulmonary syndrome	—	1	—	—	—	**1**
6	Malaria	1	1	—	—	—	**2**
7	Measles	3	—	—	—	—	**3**
8	Poliomyelitis	1	—	—	—	1	**2**
9	Salmonella typhimurium infection	—	—	—	—	1	**1**
10	Orthopoxvirus	—	1	—	—	—	**1**
11	Whooping cough	—	1	—	—	—	**1**
12	Yellow fever	3	2	—	1	—	**6**

* There were no RRA reports published for this WHO Region in this year. However, it is very important to note that RRAs are a subset of all risk assessments that WHO conducts.

TABLE A4 Rapid risk assessment reports published by disease, condition or hazard, for acute public health events in the Eastern Mediterranean Region, 2018–2022

EMR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020*	2021	2022	
1	Acute gastrointestinal syndrome	—	—	—	1	—	1
2	Acute watery diarrhoea	1	—	—	—	—	1
3	Chikungunya virus disease	1	—	—	—	—	1
4	Chlorine gas exposure	1	—	—	—	—	1
5	Cholera	3	2	—	2	7	14
6	Crimean-Congo hemorrhagic fever	—	—	—	—	1	1
7	Dengue fever	—	3	—	1	1	5
8	Hepatitis E	—	—	—	1	—	1
9	HIV infection	—	1	—	1	—	2
10	Influenza, *animal virus*	—	—	—	1	—	1
11	Malaria	—	1	—	—	—	1
12	Measles	—	4	—	—	5	9
13	Rift Valley fever	1	1	—	—	—	2
14	Typhoid fever	1	—	—	—	—	1

* There were no RRA reports published for this WHO Region in this year. However, it is very important to note that RRAs are a subset of all risk assessments that WHO conducts.

TABLE A5 Rapid risk assessment reports published by disease, condition or hazard, for acute public health events in the European Region, 2018–2022

EUR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	Acute hepatitis of unknown aetiology	—	—	—	—	1	1
2	Antibiotic-resistant bacterial infection	—	1	—	—	—	1
3	Argentine haemorrhagic fever	—	—	1	—	—	1
4	COVID-19/SARS-CoV-2	—	—	2	—	—	2
5	Dengue fever	—	1	—	—	—	1
6	Lassa fever	—	1	—	—	—	1
7	Poliomyelitis	—	—	—	2	—	2
8	Salmonella typhimurium infection	—	—	—	—	1	1
9	Shigellosis	—	—	—	—	1	1
10	West Nile fever	2	—	—	—	—	2
11	Zika virus disease	—	1	—	—	—	1

TABLE A6 Rapid risk assessment reports published by disease, condition or hazard, for acute public health events in the South-East Asia Region, 2018–2022

SEAR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	Acute watery diarrhoea	—	1	—	—	—	1
2	Cholera	—	—	—	—	1	1
3	COVID-19/SARS-CoV-2	—	—	—	1	1	2
4	Dengue fever	—	2	—	—	2	4
5	Diphteria	1	—	1	—	—	2
6	Environmental contamination	—	—	1	—	—	1
7	Influenza, *human virus*	1	—	—	—	—	1
8	Measles	1	—	—	—	—	1
9	Nipah virus infection	1	2	—	1	—	4
10	Poliomyelitis	—	2	—	—	1	3
11	Zika virus disease	—	—	—	2	—	2

TABLE A7 Rapid risk assessment reports published by disease, condition or hazard, for acute public health events in the Western Pacific Region, 2018–2022

WPR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021*	2022	
1	COVID-19/SARS-CoV-2	—	—	5	—	—	5
2	Influenza, *animal virus*	1	—	2	—	—	3
3	Japanese encephalitis	—	—	—	—	1	1
4	Measles	—	2	—	—	—	2
5	Meningococcal disease/Meningitis	—	1	—	—	—	1
6	Middle East respiratory syndrome	1	—	—	—	—	1
7	Poliomyelitis	2	1	—	—	—	3

* There were no RRA reports published for this WHO Region in this year. However, it is very important to note that RRAs are a subset of all risk assessments that WHO conducts.

TABLE A8 Rapid Risk Assessment reports published by disease, condition or hazard, for acute public health events across all WHO Regions, 2018–2022

No.	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018*	2019*	2020	2021	2022	
1	Cholera	—	—	—	—	1	1
2	COVID-19/SARS-CoV-2	—	—	3	5	4	12
3	Mpox	—	—	—	—	4	4

* There were no global RRA reports published in this year. However, it is very important to note that RRAs are a subset of all risk assessments that WHO conducts.

Tables from A9 to A14:

Event Information Site (EIS) bulletins published by disease, condition or hazard and year, or across the five-year time period 2018–2022, for acute public health events in the following WHO Regions: Africa (AFR), Americas (AMR), Eastern Mediterranean (EMR), Europe (EUR), South-East Asia (SEAR) and Western Pacific (WPR).

TABLE A9 Event Information Site bulletins published by disease, condition or hazard, for acute public health events in the African Region, 2018–2022

AFR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	Acute gastrointestinal syndrome	—	—	—	1	—	**1**
2	Acute haemorrhagic fever syndrome	—	3	—	2	—	**5**
3	Acute hepatitis E	3	—	1	3	—	**7**
4	Chikungunya virus disease	1	1	1	—	—	**3**
5	Cholera	7	2	1	4	6	**20**
6	COVID-19/SARS-CoV-2	—	—	3	—	—	**3**
7	Dengue fever	2	—	—	1	1	**4**
8	Dracunculiasis	—	—	1	—	—	**1**
9	Ebola virus disease	7	1	4	5	4	**21**
10	Influenza, *animal virus*	—	—	—	1	—	**1**
11	Lassa fever	4	1	2	—	3	**10**
12	Leptospirosis	—	—	—	—	1	**1**
13	Listeriosis	1	—	—	—	—	**1**
14	Marburg virus disease	—	—	—	2	2	**4**
15	Measles	—	3	2	—	—	**5**
16	Meningitis	—	—	—	1	1	**2**
17	Mpox	2	—	1	—	—	**3**
18	Plague	—	—	1	2	—	**3**
19	Poliomyelitis	4	6	—	—	3	**13**
20	Rift Valley fever	4	—	1	1	1	**7**
21	Sudan virus disease	—	—	—	—	1	**1**
22	Yellow fever	2	5	9	3	2	**21**

TABLE A10 Event Information Site bulletins published by disease, condition or hazard, for acute public health events in the Region of the Americas, 2018–2022

AMR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	Antibiotic-resistant bacterial infection	—	2	—	—	—	**2**
2	Acute haemorrhagic fever syndrome	—	—	1	—	—	**1**
3	Cholera	—	—	—	—	2	**2**
4	COVID-19/SARS-CoV-2	—	—	29	—	—	**29**
5	Dengue fever	—	3	2	—	—	**5**
6	Diphteria	1	—	—	—	—	**1**
7	Hantavirus pulmonary syndrome	1	1	—	—	2	**4**
8	Histoplasmosis	—	1	—	—	—	**1**
9	Influenza, *animal virus*	2	1	4	8	5	**20**
10	Legionellosis	—	—	—	—	1	**1**
11	Malaria	2	1	—	—	—	**3**
12	Marburg virus disease	—	—	1	—	—	**1**
13	Measles	2	—	1	—	—	**3**
14	Mpox	—	—	—	2	—	**2**
15	Oropouche virus disease	—	—	1	—	—	**1**
16	Poliomyelitis	3	2	—	—	4	**9**
17	Product safety	—	1	—	—	—	**1**
18	Yellow fever	5	3	1	1	—	**10**

TABLE A11 Event Information Site bulletins published by disease, condition or hazard, for acute public health events in the Eastern Meditarrenean Region, 2018–2022

EMR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	Acute hepatitis E	—	—	—	1	—	**1**
2	Chikungunya virus disease	1	—	—	—	—	**1**
3	Cholera	1	1	—	—	5	**7**
4	COVID-19/SARS-CoV-2	—	—	16	—	—	**16**
5	Crimean–Congo haemorrhagic fever	—	—	—	—	1	**1**
6	Dengue fever	—	5	—	1	2	**8**
7	Flood	—	—	1	—	—	**1**

TABLE A11 Event Information Site bulletins published by disease, condition or hazard, for acute public health events in the Eastern Mediterranean Region, 2018–2022 *(continued)*

EMR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
8	HIV infection, AIDS	—	1	—	—	—	**1**
9	Influenza, *animal virus*	—	1	—	—	—	**1**
10	Malaria	—	—	—	—	1	**1**
11	Measles	—	4	—	—	2	**6**
12	Middle East respiratory syndrome	10	19	6	5	4	**44**
13	Poliomyelitis	1	2	1	1	1	**6**
14	Rift Valley fever	—	1	—	—	—	**1**
15	Typhoid fever	1	—	—	—	—	**1**

TABLE A12 Event Information Site bulletins published by disease, condition or hazard, for acute public health events in the European Region, 2048–2022

EUR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	Acute hepatitis of unknown aetiology	—	—	—	—	1	**1**
2	Argentine hemorrhagic fever	—	—	1	—	—	**1**
3	COVID-19/SARS-CoV-2	—	—	26	—	—	**26**
4	Dengue fever	1	2	1	—	—	**4**
5	Gonococcal infection	1	1	—	—	1	**3**
6	Influenza, *animal virus*	1	—	2	5	6	**14**
7	Influenza, *human virus*	1	1	—	—	—	**2**
8	Lassa fever	—	1	—	—	1	**2**
9	Listeriosis	—	1	—	—	—	**1**
10	Middle East respiratory syndrome	1	—	—	—	—	**1**
11	Mpox	3	—	—	2	2	**7**
12	Poliomyelitis	—	—	1	2	2	**5**
13	Rift Valley fever	—	1	—	—	—	**1**
14	Yellow fever	1	—	—	—	—	**1**
15	Zika virus disease	—	1	—	—	—	**1**

TABLE A13 Event Information Site bulletins published by disease, condition or hazard, for acute public health events in the South-East Asia Region, 2018–2022

SEAR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	COVID-19/SARS-CoV-2	—	—	5	—	—	**5**
2	Dengue fever	—	—	—	—	4	**4**
3	Influenza, *animal virus*	—	2	—	1	—	**3**
4	Nipah virus infection	2	—	—	1	—	**3**
5	Poliomyelitis	—	2	—	—	1	**3**
6	Zika virus disease	—	—	—	2	—	**2**

TABLE A14 Event Information Site bulletins published by disease, condition or hazard, for acute public health events in the Western Pacific Region, 2018–2022

WPR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	COVID-19/SARS-CoV-2	—	—	11	—	—	**11**
2	Gonococcal infection	1	—	—	—	—	**1**
3	Influenza, *animal virus*	13	8	10	44	35	**110**
4	Japanese encephalitis	—	—	—	—	1	**1**
5	Listeriosis	1	—	—	—	—	**1**
6	Measles	1	1	—	—	—	**2**
7	Meningococcal disease	—	1	—	—	—	**1**
8	Middle East respiratory syndrome	2	—	—	—	—	**2**
9	Mpox	—	1	—	—	—	**1**
10	Non-infectious unknown aetiology	—	1	—	—	—	**1**
11	Plague	—	1	—	—	—	**1**
12	Poliomyelitis	1	8	1	1	—	**11**
13	Rabies	1	—	—	—	—	**1**
14	Rubella	1	1	—	—	—	**2**

Tables from A15 to A20:

Disease Outbreak News (DON) reports published by disease, condition or hazard and year, 2018–2022, or across the five-year time period for acute public health events in the following WHO Regions: Africa, Americas, Eastern Mediterranean, Europe, South-East Asia and Western Pacific

TABLE A15 Disease Outbreak News reports published by disease, condition or hazard, for acute public health events in the African Region, 2018–2022

AFR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	Chikungunya virus disease	1	1	1	—	—	**3**
2	Cholera	8	—	—	2	4	**14**
3	Dengue fever	—	—	—	—	1	**1**
4	Dracunculiasis	—	—	1	—	—	**1**
5	Ebola virus disease	36	53	29	6	4	**128**
6	Hepatitis E	1	—	1	1	1	**4**
7	Lassa fever	4	1	1	—	3	**9**
8	Leptospirosis	—	—	—	—	1	**1**
9	Listeriosis	2	—	—	—	—	**2**
10	Marburg virus disease	—	—	—	2	2	**4**
11	Measles	—	1	2	—	—	**3**
12	Meningitis	—	—	—	1	—	**1**
13	Mpox	2	—	1	—	—	**3**
14	Plague	—	—	1	1	—	**2**
15	Poliomyelitis	4	6	—	—	3	**13**
16	Rift Valley fever	2	—	1	1	1	**5**
17	Sudan virus disease	—	—	—	—	5	**5**
18	Yellow fever	1	4	8	3	3	**19**

TABLE A16 Disease Outbreak News reports published by disease, condition or hazard, for acute public health events in the Region of the Americas, 2018–2022

AMR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	Acute hepatitis of unknown aetiology	—	—	—	—	1	1
2	Antibiotic-resistant bacterial infection	—	1	—	—	—	1
3	Cholera	—	—	—	—	2	2
4	Dengue fever	—	1	2	—	—	3
5	Hantavirus pulmonary syndrome	—	2	—	—	—	2
6	Influenza, *human virus*	—	—	1	2	1	4
7	Legionellosis	—	—	—	—	1	1
8	Mayaro virus disease	—	—	1	—	—	1
9	Measles	1	—	1	—	—	2
10	Mpox	—	—	—	1	—	1
11	Oropouche virus disease	—	—	1	—	—	1
12	Poliomyelitis	—	—	—	—	1	1
13	Yellow fever	3	3	1	1	—	8

TABLE A17 Disease Outbreak News reports published by disease, condition or hazard, for acute public health events in the Eastern Mediterranean Region, 2018–2022

EMR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	Chikungunya virus disease	1	—	—	—	—	1
2	Cholera	1	1	—	—	3	5
3	Crimean–Congo haemorrhagic fever	—	—	—	—	1	1
4	Dengue fever	—	3	—	1	1	5
5	HIV infection, AIDS	—	1	—	—	—	1
6	Malaria	—	—	—	—	1	1
7	Measles	—	2	1	—	2	5
8	Middle East respiratory syndrome	7	18	7	5	4	41
9	Poliomyelitis	1	2	1	1	—	5
10	Rift Valley fever	—	1	—	—	—	1
11	Typhoid fever	1	—	—	—	—	1

TABLE A18 Disease Outbreak News reports published by disease, condition or hazard, for acute public health events in the European Region, 2018–2022

EUR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	Acute hepatitis of unknown aetiology	—	—	—	—	2	**2**
2	COVID-19/SARS-CoV-2	—	—	3	—	—	**3**
3	Dengue fever	1	2	1	—	—	**4**
4	Gonococcal infection	—	1	—	—	—	**1**
5	Influenza, *animal virus*	—	—	—	—	1	**1**
6	Influenza, *human virus*	1	—	—	1	2	**4**
7	Lassa fever	—	1	—	—	1	**2**
8	Listeriosis	—	1	—	—	—	**1**
9	Measles	—	1	—	—	—	**1**
10	Middle East respiratory syndrome	2	—	—	—	—	**2**
11	Mpox	—	—	—	2	2	**4**
12	Poliomyelitis	—	—	—	1	2	**3**
13	Rift Valley fever	—	1	—	—	—	**1**
14	Salmonella typhimurium infection	—	—	—	—	1	**1**
15	Shigellosis	—	—	—	—	1	**1**
16	Streptococcus infection	—	—	—	—	1	**1**
17	Yellow fever	2	—	—	—	—	**2**
18	Zika virus disease	—	1	—	—	—	**1**

TABLE A19 Disease Outbreak News reports published by disease, condition or hazard, for acute public health events in the South-East Asia Region, 2018–2022

SEAR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	COVID-19/SARS-CoV-2	—	—	1	—	—	**1**
2	Dengue fever	—	—	—	—	4	**4**
3	Influenza, *animal virus*	—	—	—	1	—	**1**
4	Mpox	—	—	—	1	—	**1**
5	Nipah virus infection	2	—	—	1	—	**3**
6	Poliomyelitis	—	2	—	—	1	**3**
7	Zika virus disease	—	—	—	1	—	**1**

TABLE A20 Disease Outbreak News reports published by disease, condition or hazard, for acute public health events in the Western Pacific Region, 2018–2022

WPR	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018	2019	2020	2021	2022	
1	COVID-19/SARS-CoV-2	—	—	5	—	—	**5**
2	Influenza, *animal virus*	1	—	1	1	—	**3**
3	Influenza, *human virus*	1	—	—	—	1	**2**
4	Japanese encephalitis	—	—	—	—	1	**1**
5	Listeriosis	1	—	—	—	—	**1**
6	Measles	1	3	—	—	—	**4**
7	Middle East respiratory syndrome	2	—	—	—	—	**2**
8	Mpox	—	1	—	—	—	**1**
9	Poliomyelitis	1	3	—	—	—	**4**

TABLE A21 Disease Outbreak News reports published by disease, condition or hazard, for acute public health events across all WHO Regions, 2018–2022

No.	Disease/Condition/Hazard	Annually					Five-year period 2018–2022
		2018*	2019	2020	2021	2022	
1	Acute hepatitis of unknown aetiology	—	—	—	—	3	**3**
2	Cholera	—	—	—	—	1	**1**
3	COVID-19/SARS-CoV-2	—	—	1	—	—	**1**
4	Measles	—	1	—	—	—	**1**
5	Mpox	—	—	—	—	6	**6**
6	Poliomyelitis	—	—	—	1	—	**1**

* There were no global DON reports published in this year.