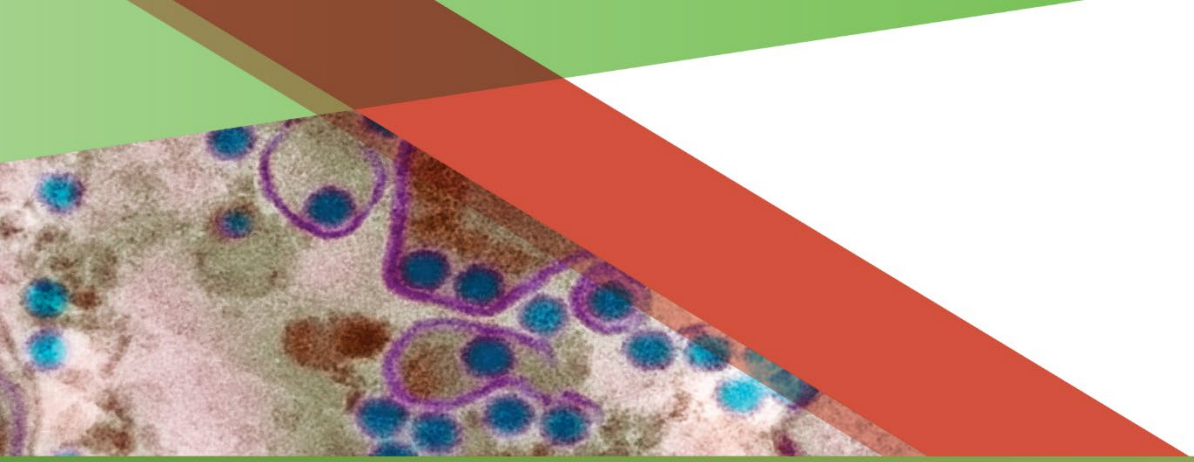


SURVEILLANCE REPORT

Dengue

Annual Epidemiological Report for 2022

Key facts

- In 2022, 27 EU/EEA countries reported 1 757 cases of dengue, 1 560 of which (89%) were confirmed.
- The EU/EEA notification rate in 2022 was 0.4 cases per 100 000 population.
- The number of dengue cases rose compared to 2021, most likely due to a combination of an increase in international travel and an increase in dengue cases globally.
- The highest rates in both men and women were among those aged 25–44 years, with the distribution nearly equal between men and women (ratio = 1.1:1).
- The number of cases peaked in August.
- Most travel-associated cases with a known probable country of infection were imported from the Americas, mainly from Cuba (n = 584, 38%).
- In 2022, there were outbreaks in seven regions across France (65 cases) and an outbreak in Ibiza, Spain (six cases).

Introduction

Dengue is a mosquito-borne disease caused by viruses of the *Flaviviridae* family (DENV-1, 2, 3 and 4) [1]. The disease is transmitted by the *Aedes* mosquito, mainly *Aedes albopictus* and *Ae. aegypti* of which the former is established in many European countries [2]. Dengue is widespread in tropical and subtropical regions [1]. While most clinical cases present a febrile illness, severe forms have been reported, in some instances leading to the death of the patient [1].

Methods

This report is based on data for 2022 retrieved from The European Surveillance System (TESSy) on 20 December 2023. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases.

For a detailed description of methods used to produce this report, please refer to the 'Methods' chapter [3].

An overview of the national surveillance systems is available online [4].

A subset of the data used for this report is available through ECDC's online 'Surveillance atlas of infectious diseases' [5].

All countries reported case-based data, except for Belgium which reported aggregated data. Sixteen countries referred to the 2018 dengue EU case definition (Belgium, Estonia, France, Greece, Iceland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Slovakia and Spain), seven countries used the EU generic case definition for viral haemorrhagic fevers (Austria, Croatia, Finland, Hungary, Ireland, Slovenia and Sweden), and four countries applied other case definitions (Czechia, Germany, Liechtenstein and the Netherlands).

Suggested citation: European Centre for Disease Prevention and Control (ECDC). Dengue. In: ECDC. Annual epidemiological report for 2022. Stockholm: ECDC; 2024.

Stockholm, June 2024

All reporting countries, except for the Netherlands, had a comprehensive surveillance system. Reporting was compulsory in all countries, apart from Belgium where reporting is only compulsory for infections acquired within Europe [6].

Epidemiology

For 2022, 27 countries reported data on dengue. Among these, 23 countries reported 1 757 cases, 1 560 of which (89%) were confirmed (Table 1). This was an increase compared with the previous year in which 428 cases were reported. Four countries (Czechia, Latvia, Romania and Iceland) reported zero cases. Data was not reported by Bulgaria, Cyprus or Denmark.

From 2018 to 2019, the number of dengue cases reported in the EU/EEA increased, which was followed by a decrease in 2020 and 2021 (although France experienced an increase in cases for 2020). In 2022, the number of cases surged again (Table 1). In 2022, the highest numbers of cases in the EU/EEA were reported in Spain (29%), France (22%) and Germany (22%) (Table 1, Figure 1).

The overall EU/EEA notification rate was 0.4 cases per 100 000 population; the country-specific rate was highest in Liechtenstein (2.5, but based on a single dengue case), Spain (1.1), Belgium (0.9) and Norway (0.8).

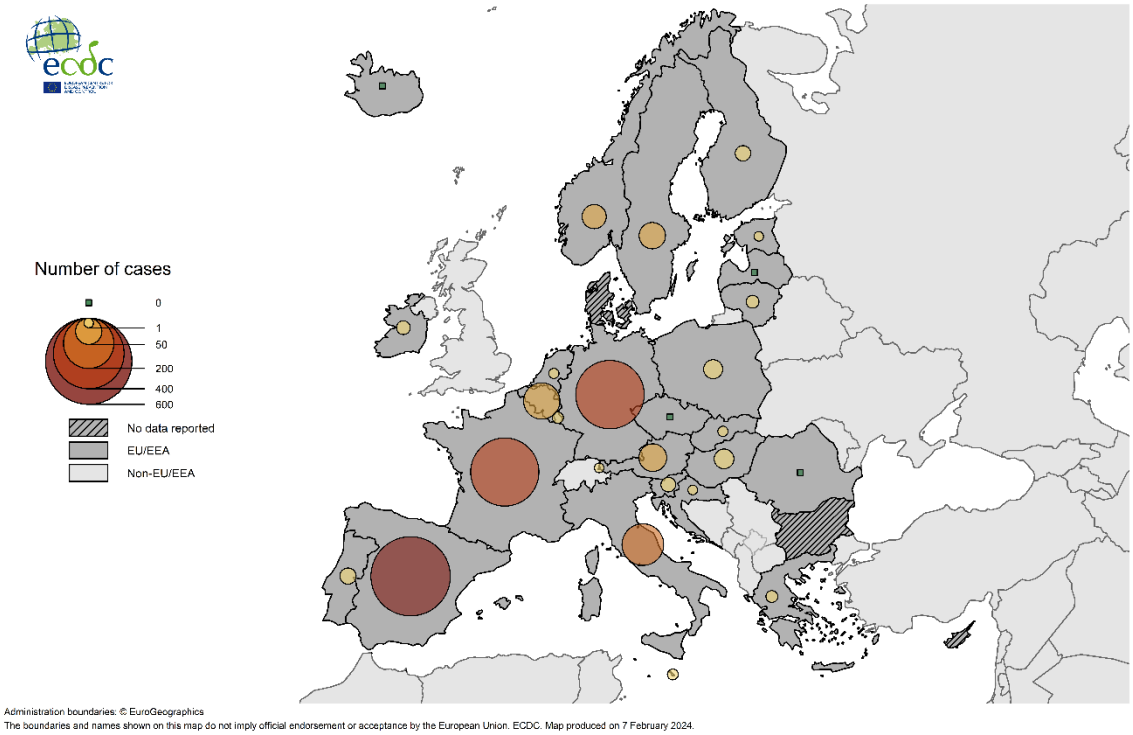
Table 1. Dengue cases and rates per 100 000 population by country and year, EU/EEA, 2018–2022

Country	2018		2019		2020		2021		2022		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Austria	85	1.0	142	1.6	38	0.4	5	0.1	56	0.6	0.6
Belgium	101	0.9	202	1.8	80	0.7	27	0.2	101	0.9	0.9
Bulgaria	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NRC
Croatia	2	0.0	4	0.1	4	0.1	0	0.0	1	0.0	0.0
Cyprus	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NRC
Czechia	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Denmark	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NRC
Estonia	6	0.5	6	0.5	3	0.2	1	0.1	1	0.1	0.1
Finland	56	1.0	81	1.5	21	0.4	7	0.1	13	0.2	0.2
France	331	0.5	904	1.3	1 362	2.0	231	0.3	372	0.5	0.6
Germany	614	0.7	1 178	1.4	200	0.2	60	0.1	375	0.5	0.5
Greece	2	0.0	10	0.1	1	0.0	1	0.0	5	0.0	0.1
Hungary	14	0.1	44	0.5	15	0.2	3	0.0	25	0.3	0.3
Iceland	1	0.3	4	1.1	0	0.0	0	0.0	0	0.0	0.0
Ireland	17	0.4	18	0.4	3	0.1	2	0.0	9	0.2	0.2
Italy	108	0.2	232	0.4	45	0.1	11	0.0	135	0.2	0.3
Latvia	12	0.6	11	0.6	5	0.3	0	0.0	0	0.0	0.0
Liechtenstein	NDR	NRC	NDR	NRC	NDR	NRC	0	0.0	1	2.5	2.9
Lithuania	8	0.3	9	0.3	5	0.2	1	0.0	7	0.2	0.3
Luxembourg	1	0.2	1	0.2	1	0.2	0	0.0	4	0.6	0.6
Malta	1	0.2	2	0.4	1	0.2	0	0.0	3	0.6	0.5
Netherlands	0	NRC	0	NRC	3	NRC	0	NRC	2	NRC	NRC
Norway	49	0.9	102	1.9	27	0.5	9	0.2	41	0.8	0.8
Poland	30	0.1	55	0.1	9	0.0	2	0.0	23	0.1	0.1
Portugal	14	0.1	30	0.3	6	0.1	8	0.1	15	0.1	0.2
Romania	4	0.0	15	0.1	3	0.0	0	0.0	0	0.0	0.0
Slovakia	7	0.1	6	0.1	1	0.0	0	0.0	2	0.0	0.0
Slovenia	8	0.4	21	1.0	1	0.0	0	0.0	11	0.5	0.6
Spain	205	0.4	431	0.9	155	0.3	48	0.1	505	1.1	1.1
Sweden	106	1.0	235	2.3	58	0.6	12	0.1	50	0.5	0.5
EU/EEA (30 countries)	**1 782**	**0.4**	**3 743**	**0.9**	**2 047**	**0.5**	**428**	**0.1**	**1 757**	**0.4**	**0.4**
United Kingdom	432	0.7	827	1.2	NDR	NRC	NA	NA	NA	NA	NA
EU/EEA (31 countries)	**2 214**	**0.5**	**4 570**	**0.9**	**2 047**	**0.5**	**NA**	**NA**	**NA**	**NA**	**NA**

Source: Country reports.
ASR: Age-standardised rate.
NDR: No data reported.
NRC: No rate calculated.
NA: Not applicable.

Rates were not calculated for the Netherlands because no information was provided on the level of coverage of the national surveillance system.

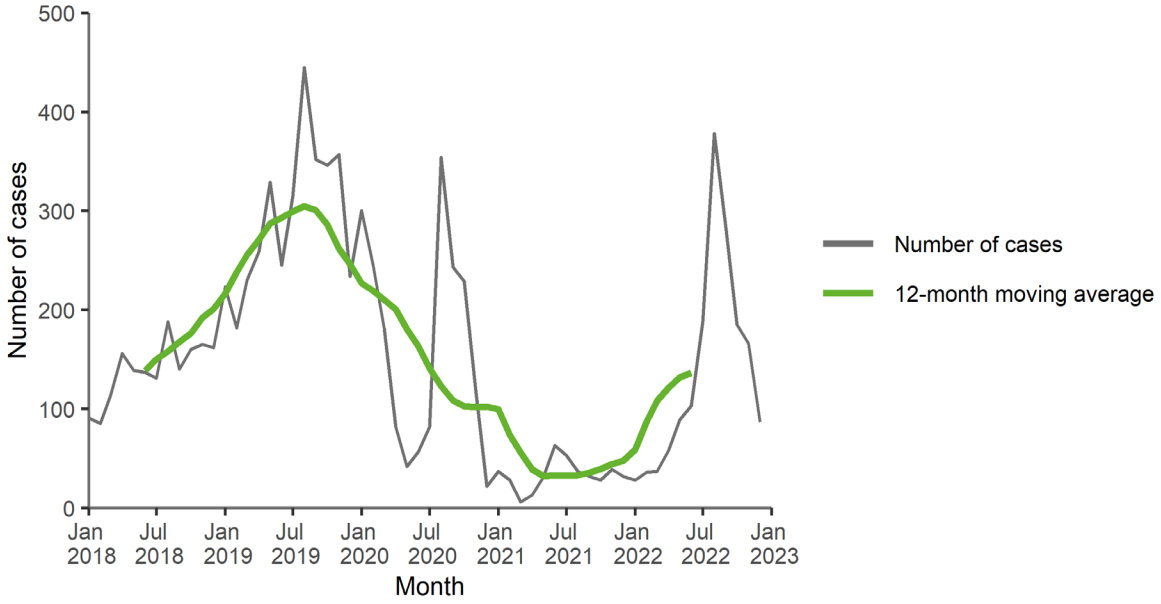
Figure 1. Number of dengue cases by country, EU/EEA, 2022



Source: Country reports.

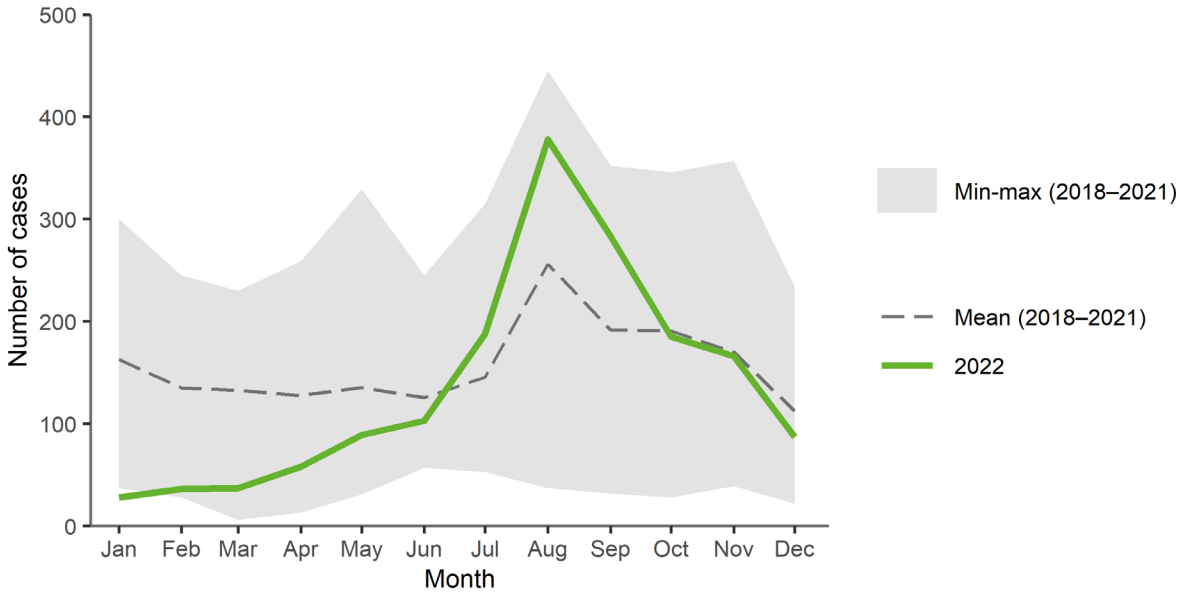
In 2022, a large proportion of the cases was observed in the summer, peaking in August (n = 371) (Figures 2 and 3). For the months July to September, the monthly number of cases exceeded the average number of cases for 2018–2021 (Figure 3).

Figure 2. Dengue cases by month, EU/EEA, 2018–2022



Source: Country reports from Austria, Czechia, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

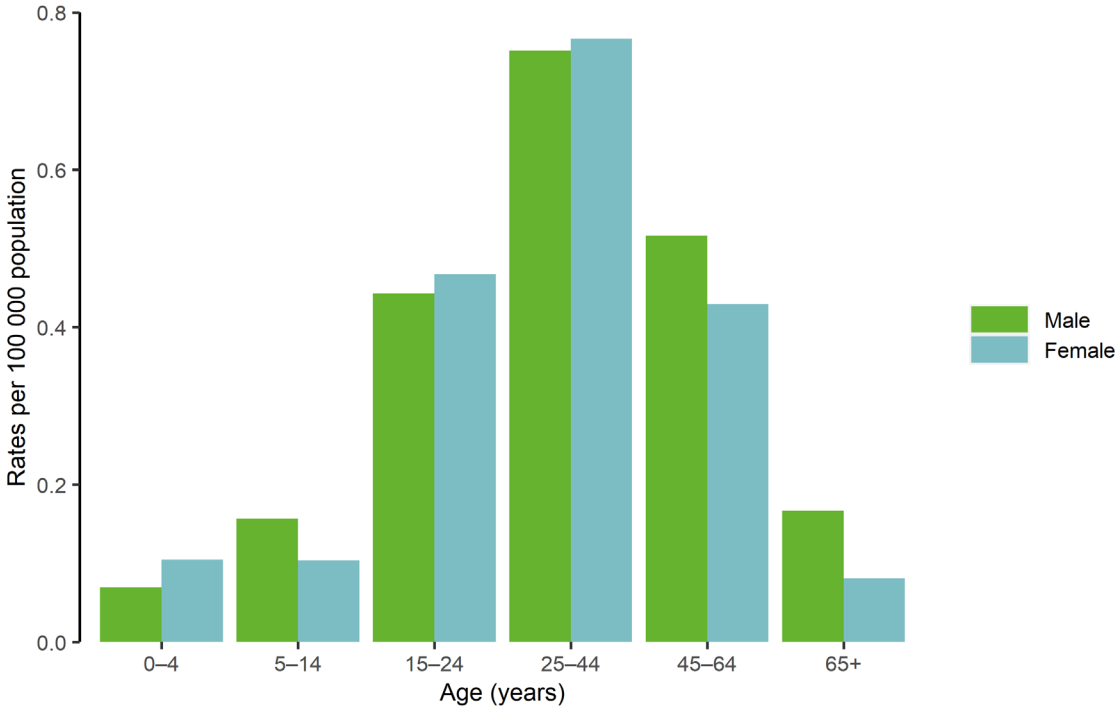
Figure 3. Dengue cases by month, EU/EEA, 2022 and 2018–2021



Source: Country reports from Austria, Czechia, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

Information on gender and age was available for 1 755 and 1 753 cases, respectively. The male-to-female ratio was 1.1:1. The majority (n = 1 372; 78%) of cases were aged 25–64 years. The highest rates were observed in the age group 25–44 years, with 0.8 cases per 100 000 population (Figure 4). A near similar age distribution was observed for both males and females (Figure 4).

Figure 4. Dengue rates per 100 000 population, by age and gender, EU/EEA, 2022



Source: Country reports from Austria, Belgium, Croatia, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

Information on the importation status was available for 1 632 cases. Only France reported autochthonous dengue cases in 2022 (n = 60, 4%). In addition, four cases were imported from another EU country: Germany and France reported two and one imported case(s) from Spain respectively, while Spain reported one imported case from France. However, most cases reported at the EU/EEA level were related to travel to dengue-endemic countries (n = 1 572, 96%). The probable place of infection was available for 1 521 travel associated cases. Most cases were imported from Cuba (n = 584, 38%), followed by India (n = 107, 7%), Thailand (n = 71, 5%), Nepal (n = 67, 4%), Maldives (n = 66, 4%), Indonesia (n = 64, 4%), Mexico (n = 62, 4%) and Brazil (n = 62, 4%). It must be noted that cases from the French overseas territories were included as imported cases (Guadeloupe, n = 13; La Réunion, n = 9; Martinique, n = 2 and Mayotte, n = 1).

Outbreaks and other threats

Between 2019 and 2021, La Réunion experienced a large epidemic of dengue with seasonal epidemic waves. There were 18 217, 16 414 and 29 830 (data as of 17 December 2021) confirmed cases in 2019, 2020 and 2021, respectively [7]. In 2022, the situation improved with 1 205 confirmed cases reported between 1 January 2022 and 8 January 2023 [8]. Among the other outermost regions of France, there were four cases in Mayotte, 55 in French Guiana, 69 in Guadeloupe, 16 in Martinique for 2022 and no cases in Saint Martin for 2022.

No cases were reported from the other EU outermost regions (i.e. Madeira, the Azores and the Canary Islands) [9].

Worldwide, in 2022, 4 110 465 cases of dengue and 4 099 dengue-related deaths were recorded. The majority of these cases were reported in Brazil (2 363 490), Viet Nam (367 729), the Philippines (220 705), Indonesia (125 888) and India (110 473) [10]. This was an increase compared to the previous year for which 1 612 850 cases were reported worldwide [11].

Discussion

In 2022, the notification of dengue cases surged in the EU/EEA compared to 2021, mirroring the global increase in dengue [12,13]. As a consequence of global climate change, it has been suggested that, compared to the period 1951−1960, the transmission potential of dengue (the average R_0) for *Ae. aegypti* and *Ae. albopictus* has risen by 28.6% and 27.7% respectively for the period 2013−22 [14]. In addition, 2022 saw the resumption of international air travel following the lifting of COVID-19 restrictions [15]. This probably brought more travellers to dengue-endemic regions, leading to an increase in cases. A strong association has been suggested between COVID-19-related societal disruption and a reduced dengue risk, while some experts have also emphasised the role of human movement in dengue virus transmission [16,17].

In 2022, the vast majority of the dengue cases reported at the EU/EEA level were related to travel to dengue-endemic countries, with 37% of the cases having a travel history to Cuba. In 2022, a large outbreak of dengue was reported in Cuba, resulting in 3 036 reported dengue cases and one death in a population of around 11 million, which probably explains the increase in travel-associated cases with a link to Cuba [12,18]. Other travel-related cases (e.g. with a history of travel to India, Thailand, Nepal, the Maldives, Indonesia, Mexico or Brazil) could be explained by the high(er) number of cases recorded in these countries. It should be noted that whenever a possible link is considered between the number of travel-related dengue cases related to a specific country and the overall incidence in that particular country, it is essential to analyse the corresponding volume of travel to that country. However, an analysis of this type was not within the scope of this report.

An increasing number of reported dengue cases from March onwards, peaking in August, is to be expected, reflecting the seasonality of travel and increasing mobility in the EU/EEA region following the lifting of pandemic restrictions. However, this also reflects the seasonal transmission pattern in the probable countries of infection. Furthermore, the age and gender distribution of the dengue cases reported in the EU/EEA most probably reflects the demographic characteristics of travellers, rather than other risk factors.

Vector-borne transmission events involving dengue virus within the EU/EEA are expected in areas where *Aedes albopictus* and/or *Aedes aegypti* are established and when environmental conditions allow sufficient vector capacity (roughly from early summer to mid-autumn) [19,20]. Vector-borne transmission has regularly occurred within mainland Europe since 2010, but all these events have remained limited until 2021 [21]. In 2022, 60 autochthonous cases of dengue were reported in France through TESSy[1]. Similarly, the Spanish authorities communicated six autochthonous cases related to German residents visiting Ibiza[2] [22].

[1] In addition to the 60 cases reported by France, five more cases with a strong epidemiological link, though lacking laboratory confirmation, were identified. This brings the total number of cases to 65, as published on the ECDC webpage on autochthonous dengue cases [21].

[2] Two of these cases had undergone laboratory tests (one confirmed and one probable), while four had strong epidemiological links. Germany reported the two laboratory-tested cases in TESSy as imported cases while all cases are listed in the ECDC webpage on autochthonous dengue cases [21].

Public health implications

Vigilance regarding travel-related cases of dengue and other *Aedes*-related infections remains essential. Public health authorities in the EU/EEA should consider raising awareness among clinicians and travel clinic specialists of the risk related to such diseases, especially when and where vector-borne secondary transmission may take place. The detection of an autochthonous case in the EU/EEA should trigger epidemiological and entomological investigations to assess the size of the transmission area and the potential for onward transmission and to guide vector control measures.

To date, *Aedes albopictus* is the main competent vector for dengue virus in Europe and is largely established throughout Europe [2]. *Aedes aegypti*, the primary vector for dengue virus transmission globally, has recently established itself in Cyprus [23]. It is also established around the Black Sea and in several EU outermost regions (i.e. Madeira, Martinique, Mayotte, Guadeloupe, French Guiana, La Réunion) [24-26]. Further spread and subsequent establishment of *Aedes aegypti* in mainland EU/EEA would probably increase the likelihood of autochthonous transmission events within the region, as well as the size of the epidemics.

Transmission of dengue virus through transfusion of erythrocytes, platelets and plasma [27-30], as well as through kidney, liver and bone marrow transplantation, has been documented [31,32]. Therefore, measures to prevent dengue virus transmission via substances of human origin should be implemented for travellers returning from affected areas and in response to autochthonous transmission within the EU/EEA. These measures may include donor deferral, donor/donation screening, blood donation, blood donation quarantine, post-donation information and pathogen inactivation of plasma and platelets [33].

Two tetravalent (live, attenuated) dengue vaccines have been granted an authorisation by the European Medicines Agency (EMA) for use in the EU: Dengvaxia (in 2018) and Qdenga (in 2022) [34-36]. Dengvaxia can be given to those aged between six and 45 years old who live in endemic areas and have had a prior dengue virus infection (seropositive individuals). This vaccine is therefore not recommended for the population of mainland Europe, but could be used in EU overseas countries and territories and EU outermost regions where dengue is endemic. Qdenga is indicated for the prevention of dengue disease in individuals from four years of age. However, the Strategic Advisory Group of Experts (SAGE) on Immunization established by the World Health Organization (WHO), which met on 25–29 September 2023, has not recommended the programmatic use of this vaccine in settings with low to moderate dengue transmission to date [37]. SAGE also stated that the highest public health impact of vaccination can be expected in areas with a high intensity of dengue transmission. It should be noted that both of the vaccines mentioned should always be used in accordance with official recommendations from the relevant international and national public health authorities.

Personal protective measures focus principally on protection against mosquito bites. *Aedes* mosquitoes have diurnal biting activities in both indoor and outdoor environments [38]. Personal protection measures should therefore be applied all day long, and especially during the hours of highest mosquito activity (mid-morning and late afternoon to twilight). Personal protective measures to reduce the risk of mosquito bites include wearing long sleeves and trousers impregnated with insect repellent, the use of repellent sprays applied in accordance with the instructions indicated on the product label and limiting activities that increase mosquito exposure [39]. In addition, it is recommended to sleep or rest in screened or air-conditioned rooms [40]. In regions where dengue epidemics occur, the use of mosquito bed nets (preferably insecticide-treated nets) is also recommended.

Travellers returning from dengue-endemic areas and residing in receptive areas of mainland Europe should continue applying personal protective measures after their return for a period of three weeks [41]. This is to avoid infecting local mosquitoes, which could result in autochthonous transmission within mainland Europe. It should be noted that asymptomatic individuals infected with dengue virus can be infectious and further transmit the virus. In addition, local authorities may consider conducting preventive vector control measures in receptive areas close to the domicile of an imported dengue case.

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