

SURVEILLANCE REPORT

Annual Epidemiological Report for 2016

Malaria

Key facts

- For 2016, 8 231 cases were reported in the EU/EEA, 8 225 (99.9%) of which were confirmed.
- Among 7 485 cases with known importation status, 99.8% were travel-related. Thirteen confirmed cases were reported as locally acquired (eight by Greece, two by France and one each by Germany, Lithuania and Spain).
- A marked seasonal trend was observed across all countries, with cases increasing during and immediately after the summer holiday months (July–September).
- As in previous years, the overall rate of confirmed malaria cases was higher among men than women (1.8 and 0.8 per 100 000 population respectively).

Methods

This report is based on data for 2016 retrieved from The European Surveillance System (TESSy) on 10 December 2018. 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, refer to the *Methods* chapter [1].

An overview of the national surveillance systems is available online [2].

A subset of the data used for this report is available through ECDC's online *Surveillance atlas of infectious diseases* [3].

For 2016, 30 EU/EEA countries reported data on malaria. Twenty-seven countries reported case-based and three reported aggregated data (Belgium, Bulgaria and Croatia). Twenty-five countries used the EU case definition, three (Denmark, France and Germany) used an alternative case definition and two (Belgium and Finland) did not specify the case definition they used. Reporting is compulsory in 28 countries, voluntary in France and 'other' in the United Kingdom. Surveillance is comprehensive and mostly passive.

Epidemiology

For 2016, 8 231 cases were reported in the EU/EEA, 8 225 (99.9%) of which were confirmed. Most cases for 2016 were reported by France, followed by the United Kingdom and Germany (Table 1, Figure 1).

The overall notification rate was 1.2 cases per 100 000 population, a slight decrease compared to the previous year (1.3 cases per 100 000 population). The notification rate was highest in the United Kingdom (2.4 per 100 000 population). For France, no notification rate was calculated since reporting is voluntary. Age-standardised notification rates did not differ substantially from crude rates (Table 1).

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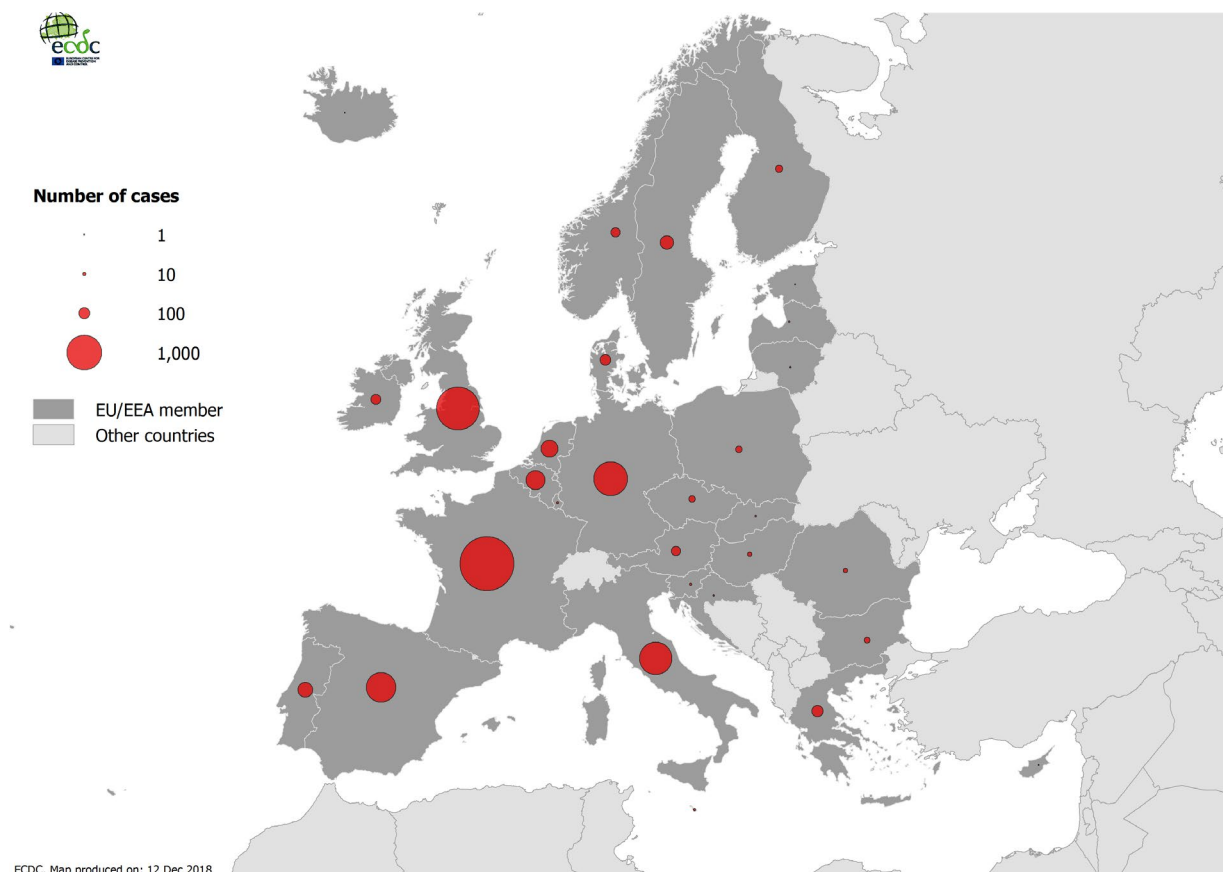
Table 1. Distribution of confirmed malaria cases by country and year, EU/EEA, 2012–2016

Country	2012		2013		2014		2015		2016			
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Confirmed cases	Rate	ASR	Reported cases
Austria	28	0.3	42	0.5	68	0.8	81	0.9	82	0.9	1.0	82
Belgium	206	-	253	-	235	-	276	-	311	-	-	311
Bulgaria	16	0.2	8	0.1	10	0.1	20	0.3	28	0.4	0.5	28
Croatia	23	0.5	0	0.0	6	0.1	7	0.2	4	0.1	-	4
Cyprus	1	0.1	3	0.3	8	0.9	3	0.4	1	0.1	0.1	1
Czech Republic	25	0.2	27	0.3	30	0.3	29	0.3	38	0.4	0.4	38
Denmark	67	1.2	63	1.1	102	1.8	101	1.8	102	1.8	1.9	102
Estonia	6	0.5	3	0.2	3	0.2	4	0.3	1	0.1	0.1	1
Finland	46	0.9	38	0.7	39	0.7	39	0.7	47	0.9	1.0	47
France	1 851	-	2 165	-	2 299	-	2 500	-	2 447	-	-	2 447
Germany	551	0.7	638	0.8	1 007	1.2	1 061	1.3	961	1.2	1.3	961
Greece	95	0.9	25	0.2	38	0.3	84	0.8	121	1.1	1.3	121
Hungary	5	0.1	5	0.1	15	0.2	12	0.1	17	0.2	0.2	17
Iceland	.	.	.	.	.	.	.	.	2	0.6	0.6	2
Ireland	65	1.4	71	1.5	79	1.7	82	1.8	88	1.9	1.8	88
Italy	642	1.1	677	1.1	705	1.2	706	1.2	888	1.5	-	888
Latvia	3	0.1	4	0.2	6	0.3	1	0.1	3	0.2	0.1	3
Liechtenstein	.	.	.	.	.	.	.	.	.	.	.	.
Lithuania	6	0.2	8	0.3	5	0.2	8	0.3	3	0.1	0.1	3
Luxembourg	7	1.3	4	0.7	3	0.5	1	0.2	5	0.9	0.9	5
Malta	2	0.5	5	1.2	3	0.7	7	1.6	7	1.6	1.6	7
Netherlands	194	1.2	162	1.0	276	1.6	680	4.0	245	1.4	1.5	245
Norway	37	0.7	72	1.4	120	2.3	94	1.8	75	1.4	1.5	75
Poland	21	0.1	36	0.1	19	0.0	29	0.1	38	0.1	0.1	38
Portugal	71	0.7	117	1.1	144	1.4	194	1.9	197	1.9	1.9	197
Romania	32	0.2	43	0.2	47	0.2	30	0.2	21	0.1	0.1	21
Slovakia	6	0.1	4	0.1	5	0.1	0	0.0	4	0.1	0.1	4
Slovenia	7	0.3	3	0.1	7	0.3	5	0.2	6	0.3	0.3	6
Spain	421	0.9	518	1.1	688	1.5	706	1.5	755	1.6	1.7	761
Sweden	85	0.9	119	1.2	354	3.7	250	2.6	154	1.6	1.7	154
United Kingdom	1 378	2.2	1 501	2.3	1 510	2.3	1 397	2.2	1 574	2.4	2.5	1 574
EU/EEA	5 897	0.9	6 614	1.0	7 831	1.2	8 407	1.3	8 225	1.2	1.3	8 231

ASR: age-standardised rate

.: no data reported

-: no rate calculated.

Figure 1. Distribution of confirmed malaria cases by country, EU/EEA, 2016

Source: Country reports from Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

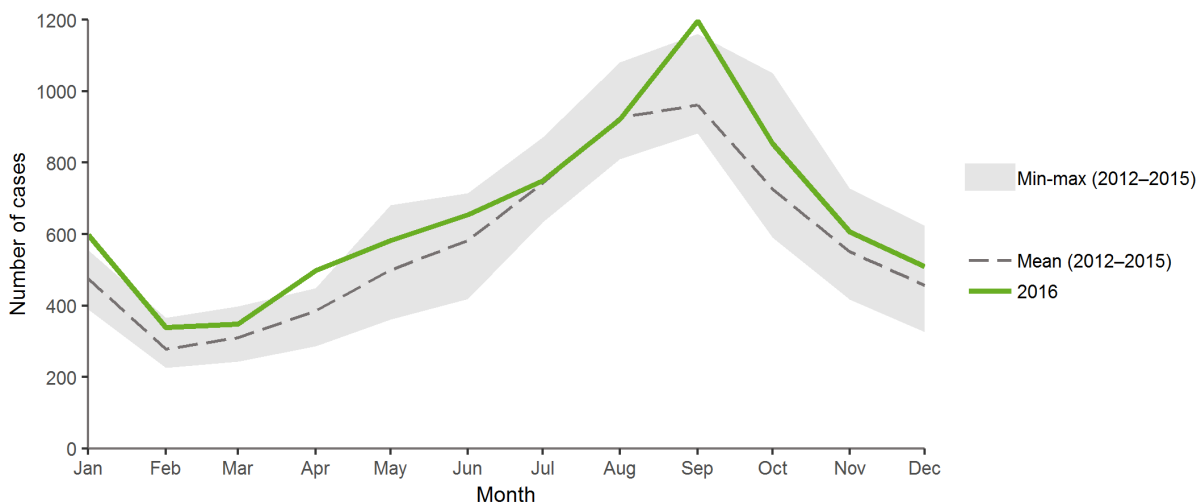
Among 4 947 cases for which the detected *Plasmodium* species was reported, 3 883 had *P. falciparum*, 714 *P. vivax*, 210 *P. ovale*, 113 *P. malariae*, 1 *P. knowlesi* and 26 cases were co-infected with various *Plasmodium* species. The case fatality was 0.8% (n=28) among all 3 441 malaria cases with known outcome and 1.3% (n=20) among *P. falciparum* malaria cases with known outcome.

Among the 7 485 cases with known importation status, 99.8% were travel-related. Thirteen confirmed cases were reported as locally acquired (eight *P. vivax* cases by Greece, two cases of unknown *Plasmodium* species by France and one *P. falciparum* case each by Germany, Lithuania and Spain).

From 2012–2015, the notification rate increased continuously. It declined slightly in 2016 and was at the same level as in 2014 (Table 1).

A marked seasonal trend was observed across all countries, with cases increasing during and immediately after the summer holiday months (July–September). Compared with the trend in 2012–2015, the September peak was higher in 2016 (Figure 2).

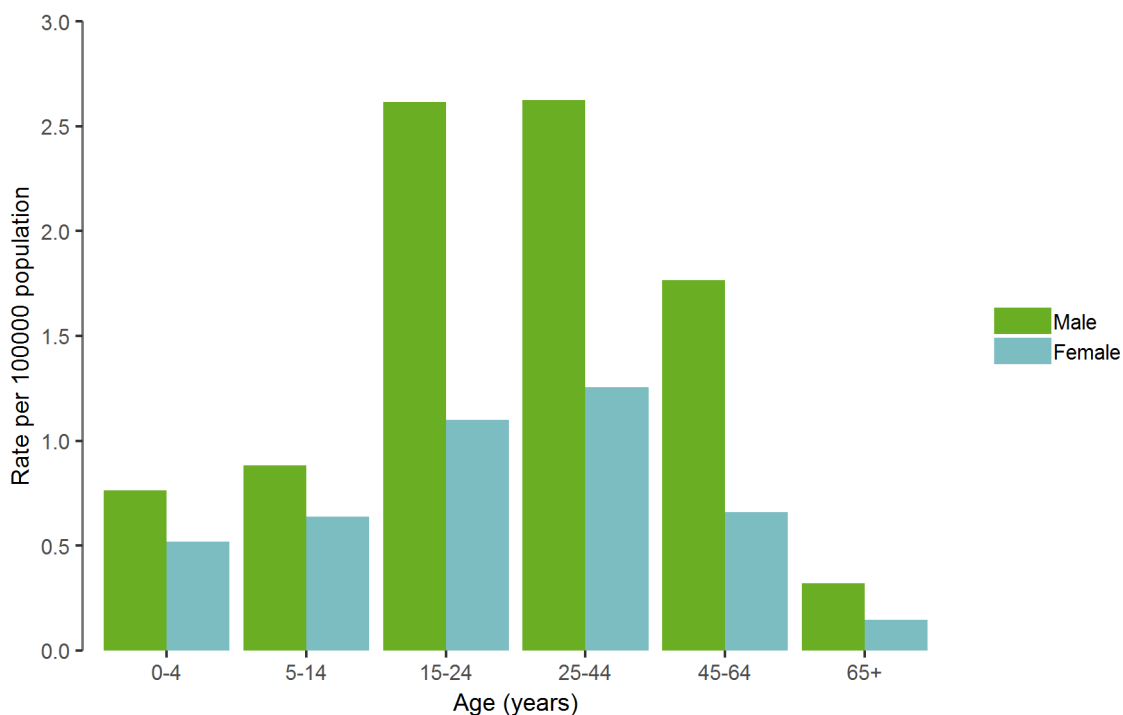
Figure 2. Distribution of confirmed malaria cases by month, EU/EEA, 2012–2015 and 2016



Source: Country reports from Austria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

In 2016, the overall rate of confirmed malaria cases was higher among men than women (1.8 cases and 0.8 cases per 100 000 population respectively; rounded male-to-female ratio: 2:1). The notification rate among men was highest in the age groups 15–24 and 25–44 years (2.6 cases per 100 000 population for both), followed by the age group 45–64 years. Among women, the highest notification rate was in the age group 25–44 years (1.3 cases per 100 000 population), followed by the group 15–24 years (Figure 3).

Figure 3. Distribution of confirmed malaria cases per 100 000 population, by age and gender, EU/EEA, 2016



Discussion

According to WHO, in 2016, an estimated 216 million cases and 445 000 deaths from malaria occurred worldwide [4]. From 2010–2016, the incidence rate of malaria is estimated to have decreased by 18% globally. However, from 2014–2016, despite the overall reduction, case incidence increased substantially in the WHO Region of the Americas and marginally in the WHO South-East Asia, Western Pacific and African regions. From 2015–2016, mortality rates stalled in the WHO South-East Asia, Western Pacific and African Regions and increased in the WHO Eastern Mediterranean Region and Region of the Americas. *P. falciparum* is the most prevalent malaria parasite in sub-Saharan Africa, while *P. vivax* accounts for 64% of malaria cases in WHO Region of the Americas, over 30% in the WHO South-East Asia and 40% in the Eastern Mediterranean Regions [4].

The reduction in global malaria incidence has so far not resulted in a significant decline of the notification rate observed in the EU/EEA.

Nearly all malaria cases reported by EU/EEA countries for 2016 were imported. The countries reporting the highest numbers of cases have strong historical, economic, linguistic and cultural ties with endemic areas, particularly in Africa. Imported malaria cases were clearly linked to travel routes from West Africa to France and the United Kingdom [5]. Seasonality and age distribution most likely reflect travel patterns to malaria-endemic countries. Information on the reasons for travel, i.e. holidays, visiting friends and relatives, or business, was not available. A review of the literature suggests that a substantial proportion of imported malaria cases in the EU/EEA occur among recent immigrants from malaria-endemic countries and more settled migrants and their families who have travelled to visit friends and relatives in malaria-endemic home countries [6]. Outside continental Europe, certain European territories are endemic for malaria (e.g. Mayotte and French Guiana), but data for these regions are not collected through TESSy.

A small number of locally acquired malaria cases were reported in the EU/EEA in 2016 (13). Greece reported eight locally acquired cases of *P. vivax* malaria, of which two cases were attributed to the 2015 transmission season [7]. The remaining six cases were located in the regions of Central Macedonia and Western Greece, where locally acquired cases had not been reported in the previous seven years, as well as in Thessaly, where cases had already occurred in previous years. No locally acquired malaria case was directly linked to the presence of refugee/migrant camps in the area [8]. In 2015, Greece had reported six locally acquired *P. vivax* malaria cases.

The locally acquired case reported by Spain involved a man diagnosed with *P. falciparum* malaria without travel history who was under treatment for myeloma. The patient had been admitted several times to the hospital in 2016 and also visited an emergency room when there was an imported case of malaria (*P. falciparum*). Clinical specimens from both cases were analysed, but the molecular typing investigations were inconclusive. Blood or blood-product transmission were ruled out. Although an entomological investigation was not conducted, vector-borne transmission from local *Anopheles* mosquitoes was deemed unlikely because the event took place in winter and environmental conditions were incompatible with the mosquito's life cycle. It was concluded that hospital transmission was the most likely mode of transmission [9].

The locally acquired case of *P. falciparum* malaria reported by Germany was probably a nosocomial transmission involving a woman who stayed on the same hospital ward as a patient with imported malaria caused by *P. falciparum* [10].

No further information was available for locally acquired cases reported by France and Lithuania.

Public health implications

Awareness among clinicians and travellers, particularly among people visiting friends and relatives in malaria-endemic countries, should remain high. In Europe, malaria chemoprophylaxis is only recommended for travellers to malaria-endemic countries, which are classified in three (or four) groups to determine the most effective drug regimen. The choice of drugs also depends on the duration of potential exposure to vectors, parasite resistance pattern, level and seasonality of transmission, age and pregnancy status. Because of the nocturnal feeding habits of most *Anopheles* mosquitoes, protection against mosquito bites includes the use of (preferably long-lasting insecticide-treated) bed nets, clothes that cover most of the body and insect repellent on exposed skin.

Vigilance should remain high with regard to transmission through substances of human origin, e.g. blood products or organ transplants. Healthcare providers should be aware that hospital transmission of malaria is rare but possible, irrespective of the *Plasmodium* species involved. Clinicians should therefore consider the possibility of hospital-acquired malaria in hospitalised or recently discharged patients who develop an unexplained fever or a malaria-like clinical syndrome, especially if hospital admission coincided with that of another patient admitted with malaria [9].

Data also indicate that local transmission of *P. vivax* remains possible in the EU, although transmission routes are not always easily detected. This emphasises the need for malaria surveillance, preparedness and prevention in the EU/EEA.

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