SURVEILLANCE REPORT

West Nile virus infection

Annual Epidemiological Report for 2019

Key facts

- For 2019, eleven EU/EEA Member States reported 443 West Nile virus infections, 425 (96%) of which were locally-acquired.
- Most locally-acquired cases were reported by Greece and Italy, representing 65% and 13% of EU cases, respectively.
- For 2019, the EU notification rate for locally-acquired cases was 0.1 cases per 100 000 population, compared to 0.3 for 2018.
- For 2019, 52 deaths among locally-acquired West Nile virus infections were reported by Greece (n=35), Romania (n=9), Italy (n=4), Hungary (n=2), Cyprus (n=1) and Bulgaria (n=1). The case fatality among infections with known outcome was 12%.

Introduction

West Nile virus (WNV) infection is a mosquito-borne zoonosis that is endemo-epidemic in countries across southern, eastern and western Europe. The virus is transmitted among birds via the bite of infected mosquitoes and humans and other mammals may become infected incidentally. In Europe, the mosquito species *Culex pipiens* and *Culex modestus* are the main vectors of WNV. About 80% of WNV infections in humans are asymptomatic. West Nile fever (WNF) is the most common clinical presentation. The elderly and immunocompromised people are at higher risk of developing West Nile neuroinvasive disease (WNND). No specific prophylaxis or treatment exists against the disease in humans.

Methods

This report is based on data for 2019 retrieved from The European Surveillance System (TESSy) on 9 October 2020. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases in the EU/EEA.

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 at the ECDC website [2].

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

This report is based on data collected through two complementary processes:

- real-time reporting during the period of high mosquito activity (June–December);
- annual data collection. Countries that did not detect any cases during the year are asked to report 'zero cases'. All other countries are encouraged to report complementary data on detected cases, if considered relevant.

Suggested citation: European Centre for Disease Prevention and Control. West Nile virus infection. In: ECDC. Annual epidemiological report for 2019. Stockholm: ECDC; 2021.

Stockholm, March 2021

For 2019, 29 EU/EEA countries reported data (Denmark and Liechtenstein did not report). All data were case-based. Twenty-six countries used the EU case definition, while France and the United Kingdom used an alternative case definition and Germany did not specify the case definition they used. Reporting was compulsory in 26 countries, voluntary in France and the United Kingdom and reported as 'other' in Belgium. Surveillance was comprehensive in all reporting countries and mostly passive.

Epidemiology

For 2019, eleven EU/EEA Member States reported 443 WNV infections, 425 (96%) of which were locally-acquired (Table 1). Sixty-four percent (n=271) of locally-acquired cases were confirmed. Most locally-acquired infections were reported by Greece and Italy, representing 65% and 13% of EU cases, respectively (Table 1, Figure 1). Non-EU/EEA Member States did not report any locally-acquired WNV infections.

A sharp increase in locally-acquired WNV infections had been reported in the EU/EEA for 2018 (n=1 549), exceeding by far the total number for the previous four years. For 2019, reported WNV infections decreased again in most countries (n= 425), except for Greece where the number remained at a high level (n=227). For 2019, Cyprus reported 23 locally-acquired WNV infections, after previously having reported only one WNV infection in 2016 and 2018, respectively. During 2019, Slovakia and Germany reported the first mosquito-borne locally-acquired WNV infections. For 2019, the EU/EEA notification rate for locally-acquired infections was 0.1 cases per 100 000 population, compared to 0.3 for 2018.

For 2019, 52 deaths among locally-acquired WNV infections were reported by Greece (n=35), Romania (n=9), Italy (n=4), Hungary (n=2), Cyprus (n=1) and Bulgaria (n=1). The case fatality among infections with known outcome was 12%. All affected Member States, except for Germany and Italy, provided data on hospitalisation status. Of the 364 WNV infections with reported hospitalisation status, 94% (n=342) were hospitalised. Among the infections with known clinical manifestations (99.5% of total infections), 67% (n=282) were neuroinvasive, 31% (n=133) were cases with non-neurological symptoms and 2% (n=8) were asymptomatic blood donors, compared with 64% (n=992), 30% (n=469) and 5% (n=83) respectively in 2018. For 2019, infections among blood donors were reported by Italy (n=6) and Romania (n=2).

For 2019, 18 travel-related cases were reported. Ten cases were associated with travel within the EU/EEA, while five cases were reported to have travelled outside the EU/EEA (Djibouti, Serbia, Tunisia, Turkey and the United States). For three cases, the place of infection was reported as unknown.

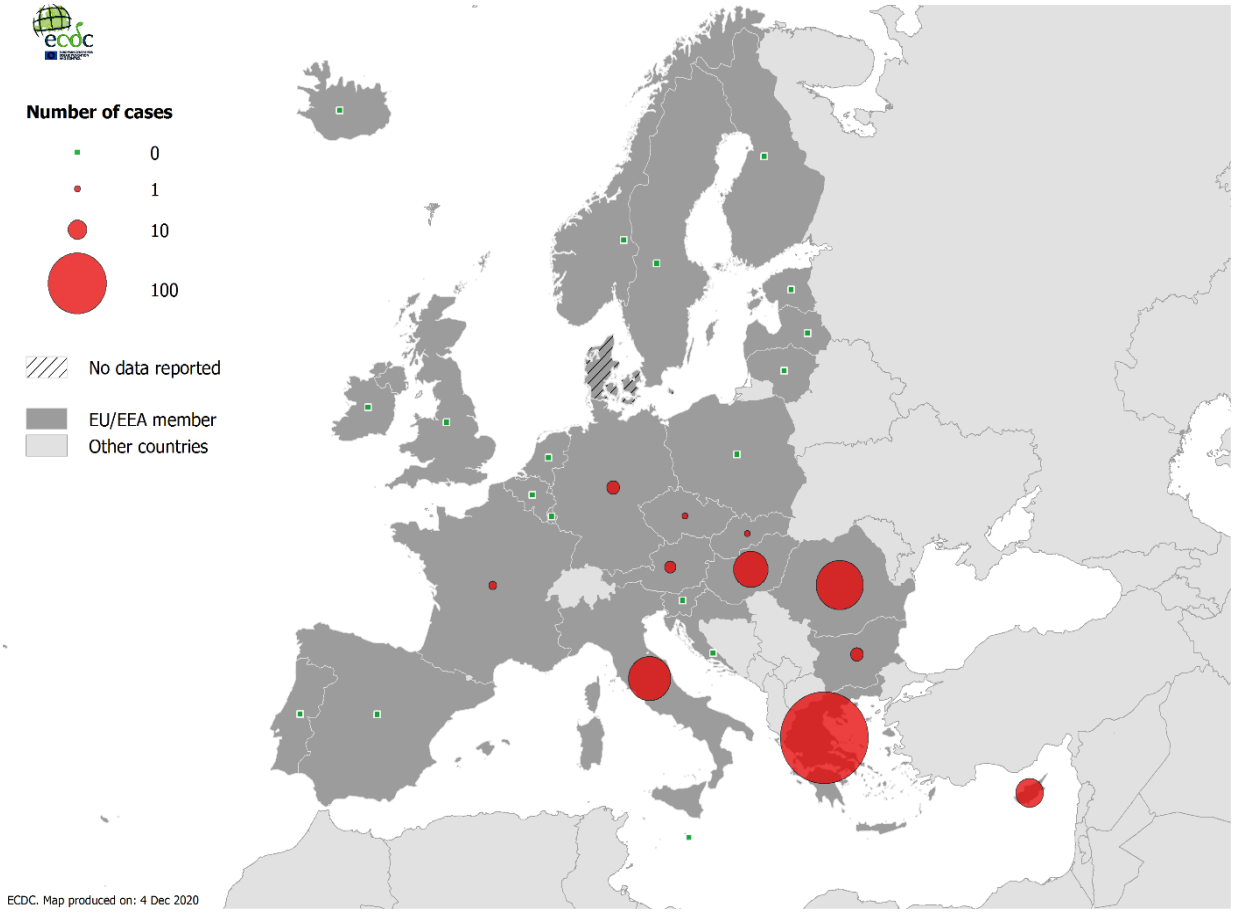
Table 1. Distribution of locally-acquired West Nile virus infection cases and rates per 100 000 population by country and year, EU/EEA, 2015–2019

Country	2015		2016		2017		2018		2019		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Austria	6	0.1	5	0.1	6	0.1	21	0.2	4	0.0	0.0
Belgium	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Bulgaria	2	0.0	2	0.0	1	0.0	15	0.2	5	0.1	0.1
Croatia	1	0.0	2	0.0	5	0.1	58	1.4	0	0.0	0.0
Cyprus	0	0.0	1	0.1	0	0.0	1	0.1	23	2.6	2.7
Czechia	0	0.0	0	0.0	0	0.0	5	0.0	1	0.0	0.0
Denmark	.	.	.	.	.	.	.	.	.	.	.
Estonia	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Finland	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
France	1	0.0	0	0.0	2	0.0	27	0.0	2	0.0	0.0
Germany	-	-	-	-	-	-	1	0.0	5	0.0	0.0
Greece	0	0.0	0	0.0	48	0.4	315	2.9	227	2.1	1.8
Hungary	18	0.2	44	0.4	20	0.2	215	2.2	36	0.4	0.3
Iceland	-	-	-	-	0	0.0	0	0.0	0	0.0	0.0
Ireland	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Italy	61	0.1	76	0.1	53	0.1	610	1.0	54	0.1	0.1
Latvia	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Liechtenstein	.	.	.	.	.	.	.	.	.	.	.
Lithuania	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Luxembourg	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Malta	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Netherlands	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Norway	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Poland	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Portugal	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Romania	32	0.2	93	0.5	66	0.3	277	1.4	67	0.3	0.3
Slovakia	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0	0.0

Country	2015		2016		2017		2018		2019		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Slovenia	0	0.0	0	0.0	0	0.0	4	0.2	0	0.0	0.0
Spain	0	0.0	3	0.0	0	0.0	0	0.0	0	0.0	0.0
Sweden	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
United Kingdom	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
EU/EEA	**122**	**0.0**	**226**	**0.1**	**201**	**0.0**	**1549**	**0.3**	**425**	**0.1**	**0.1**

Source: Country reports.
ASR: age-standardised rate
.: no data reported
-: no rate calculated.

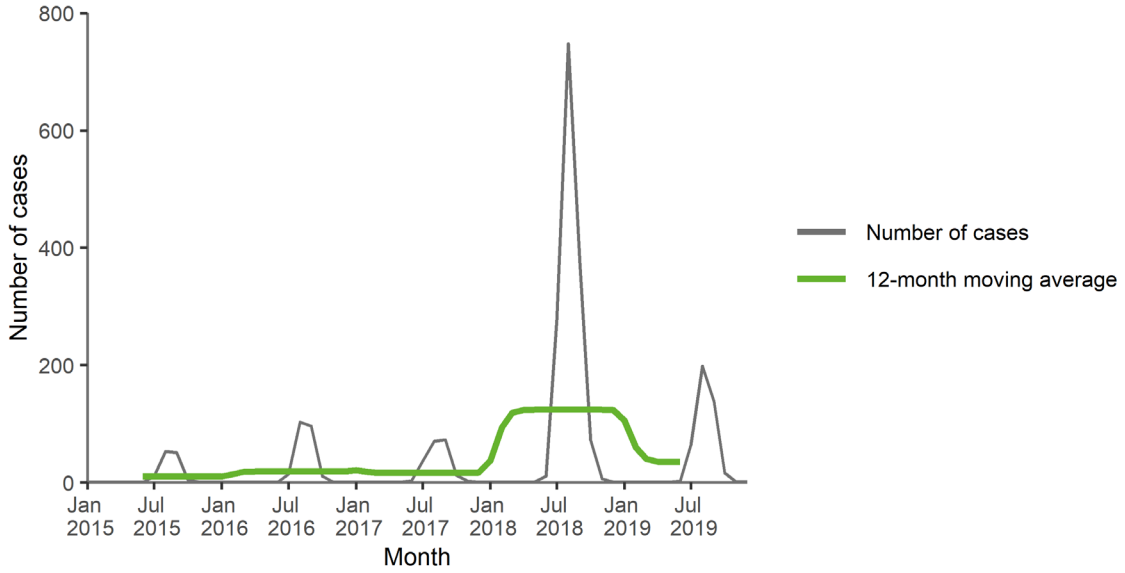
Figure 1. Distribution of locally-acquired West Nile virus infection cases by country, EU/EEA, 2019



Source: Country reports from Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, 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.

There was no statistically significant ($p < 0.01$) increase or decrease over the last five years (2015–2019) for WNV infections in the EU/EEA (Figure 2). At country level, Greece reported a significantly ($p < 0.01$) increasing trend over the past five years (2015–2019).

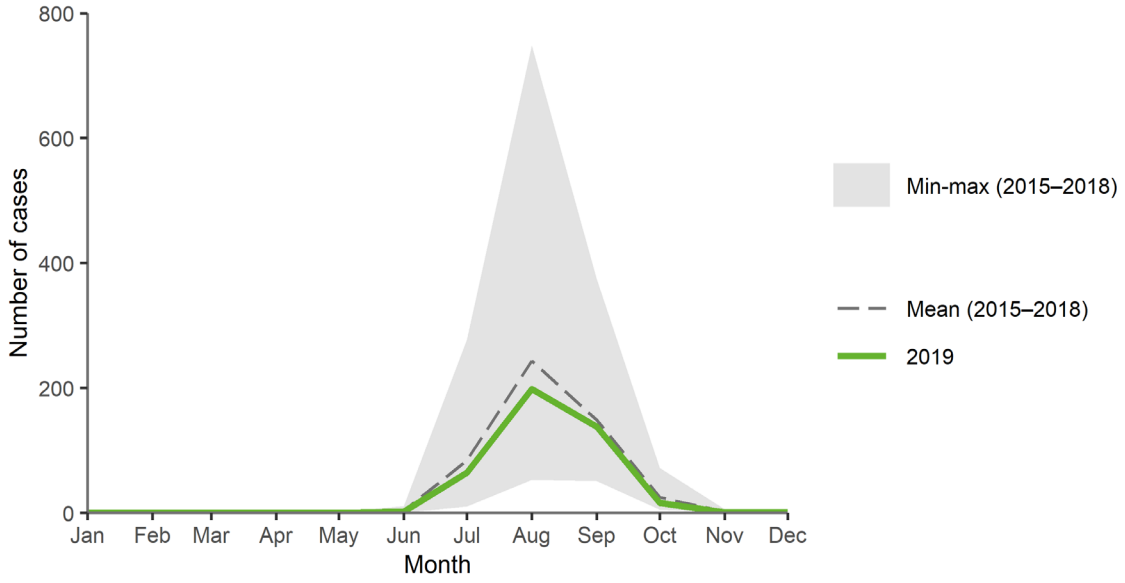
Figure 2. Distribution of locally-acquired West Nile virus infection cases by month, EU/EEA, 2015–2019



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

WNV infections show a strong seasonal pattern, with the first cases usually reported in June and most cases occurring from July–October. The peak of infections in 2019 was recorded in August, which is consistent with previous years (Figure 3).

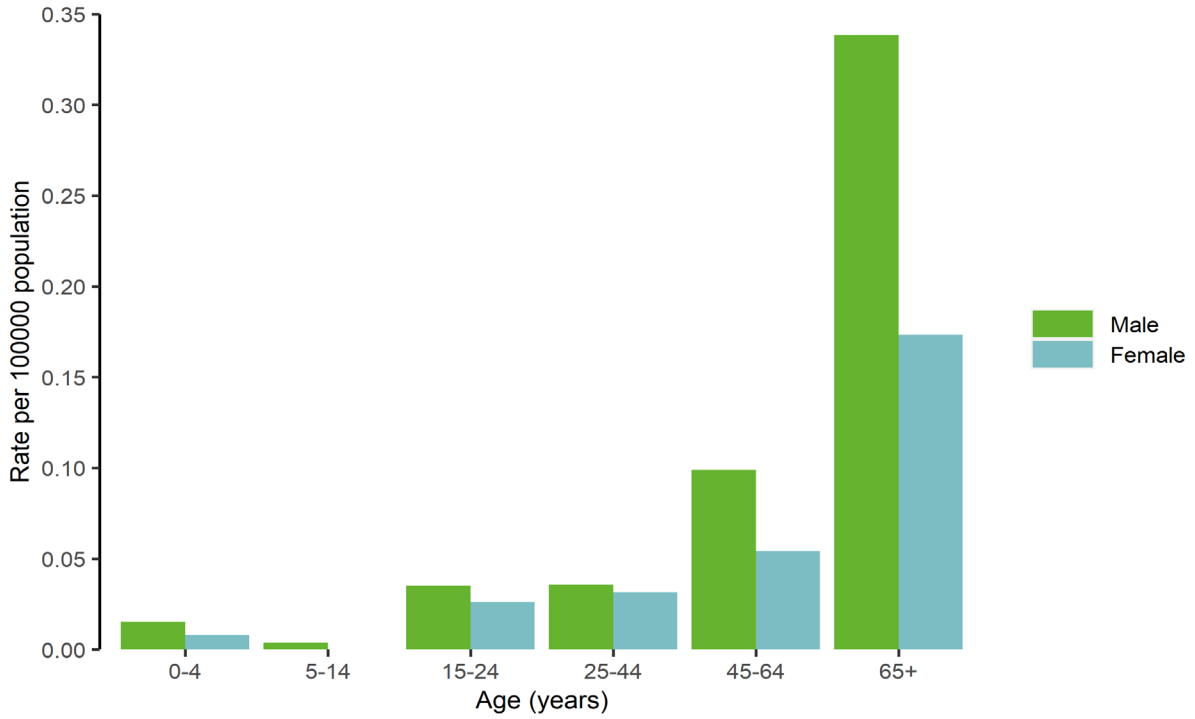
Figure 3. Distribution of locally-acquired West Nile virus infection cases by month, EU/EEA, 2019 and 2015–2018



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

In 2019, the overall rate of WNV infections was higher among men than women (0.10 cases and 0.06 cases per 100 000 population, respectively) and the overall male-to-female ratio was 1.8:1 (Figure 4). Notification rates in men and women increased with age, except for the age group 5–14 years. Notification rates in both men and women were highest in the age group over 64 years (0.34 and 0.17 cases per 100 000 population, respectively).

Figure 4. Distribution of locally-acquired West Nile virus infection rate per 100 000 population, by age and gender



Discussion

After a sharp increase in locally-acquired WNV infections in the EU/EEA in 2018, reported WNV infections decreased again in 2019 in most countries. The exceptions were Greece, where the numbers remained high, and Cyprus which reported 23 locally-acquired WNV infections after previously having only reported one WNV infection in 2016 and 2018 respectively. During 2019, Slovakia and Germany reported the first mosquito-borne locally-acquired WNV infections, demonstrating the further spread of the virus across the EU. Previously, in 2018, WNV infections had been detected for the first time in resident wild and captive birds in Germany [4].

The peak for WNV infections, generally between July and October, coincides with the period when mosquito vectors are most active and the ambient temperature is sufficiently high for virus multiplication in vectors across the EU/EEA. In 2018, the transmission season lasted longer than in other years and an early disease onset [5], as well as unusually late dates of onset were observed. However, in 2019 the seasonality followed the mean of the previous years.

In 2019, the proportion of neuroinvasive infections among infections with known clinical manifestation (67%) was slightly higher than in 2018 (64%). The case fatality in 2019 was also slightly higher than in 2018 (12% compared to 11%).

Public health implications

No vaccine is available against WNV infection in humans. Personal protection from mosquito bites is advisable for individuals residing in or visiting affected areas, especially the elderly and immunocompromised who are at higher risk of developing severe symptoms. Personal protective measures to reduce the risk of mosquito bites include the use of mosquito repellent in accordance with instructions indicated on the product label and the wearing of long-sleeved shirts and trousers. In addition, screen windows and screen doors can keep mosquitoes out [6].

To prevent transfusion-transmitted WNV infections during the active virus transmission period, EU/EEA countries should implement 28-day blood donor deferral or nucleic acid testing of prospective donors who have visited or live in an affected area. Donors of organs, tissues and cells living in or returning from an affected area should be tested for WNV infection [6].

In addition to surveillance of human infections, WNV surveillance in other vertebrate hosts, such as equids and birds, and in vectors may support the early detection of virus circulation [7,8].

Mosquito vectors may be controlled through larval source reduction and measures against adult mosquitoes. Larviciding is the primary method of response against WNV vectors (predominantly *Culex spp.*) [9]. However, it has limitations (e.g. patchy and non-homogenous applications due to vast and/or inaccessible areas, such as

domestic breeding sites, may have a significant impact on the overall efficacy of larviciding efforts). Achieving reductions in mosquito populations to levels below thresholds for WNV transmission solely through larviciding has proved challenging and been shown to often not to be feasible [9]. Other methods need to be applied in parallel with larviciding, including adulticiding interventions, to reduce the risk of WNV. Aerial ultra-low volume adulticiding is the only method for which scientific evidence is currently available showing that it can reduce the incidence of WNV human cases, therefore making it a useful method for WNV response strategies [9]. Source reduction and public education campaigns are also essential vector control measures. Vector breeding sites include stagnant water collections in dishes, buckets, barrels and cans, flowerpots, rain gutters, discarded tires and other containers. In urban environments, infrastructure such as underground heating, sewage pipes and basements liable to flooding can act as breeding and resting sites for vectors.

References

1. European Centre for Disease Prevention and Control. Introduction to the Annual Epidemiological Report Stockholm: ECDC; 2020. Available at: https://ecdc.europa.eu/en/annual-epidemiological-reports/methods
2. European Centre for Disease Prevention and Control. Surveillance systems overview [downloadable spreadsheet]. Stockholm: ECDC; 2019. Available at: https://www.ecdc.europa.eu/en/publications-data/surveillance-systems-overview-2018
3. European Centre for Disease Prevention and Control. Surveillance atlas of infectious diseases. Stockholm: ECDC; 2019 [21 Oct 2019]. Available at: http://atlas.ecdc.europa.eu/public/index.aspx?Dataset=27&HealthTopic=60
4. Ziegler U, Lühken R, Keller M, Cadar D, van der Grinten E, Michel F, et al. West Nile virus epizootic in Germany, 2018. Antiviral Research. 2019 2019/02/01/;162:39-43.
5. Haussig JM, Young JJ, Gossner CM, Mezei E, Bella A, Sirbu A, et al. Early start of the West Nile fever transmission season 2018 in Europe. Eurosurveillance: bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin. 2018;23(32):1800428.
6. European Centre for Disease Prevention and Control. Factsheet about West Nile virus infection. 2018 [updated 29 Nov 2018]. Available at: https://www.ecdc.europa.eu/en/west-nile-fever/facts/factsheet-about-west-nile-fever
7. Gossner CM, Marrama L, Carson M, Allerberger F, Calistri P, Dilaveris D, et al. West Nile virus surveillance in Europe: moving towards an integrated animal-human-vector approach. Eurosurveillance : bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin. 2017;22(18).
8. Young JJ, Coulombier D, Domanović D, European Union West Nile fever working group, Zeller H, Gossner CM. One health approach for West Nile virus surveillance in the European Union: relevance of equine data for blood safety. Eurosurveillance. 2019;24(16):1800349.
9. European Centre for Disease Prevention and Control (ECDC). Vector control practices and strategies against West Nile virus. Stockholm: 2020. Available at: https://www.ecdc.europa.eu/en/publications-data/vector-control-practices-and-strategies-against-west-nile-virus