SURVEILLANCE

Hantavirus infection

Annual Epidemiological Report for 2023

Key facts

- For 2023, 28 EU/EEA countries reported 1 885 cases of hantavirus infection (0.4 cases per 100 000 population).
- The year, along with 2020, marked the lowest rate recorded over the 2019–2023 period. During this time, the overall notification rate fluctuated between 0.4 and 1.1 cases per 100 00 population.
- Two countries (Finland and Germany) accounted for 60.5% of all reported cases.
- Prevention mainly relies on rodent control, avoidance of contact with rodent excreta (urine, saliva or droppings), and disinfecting areas contaminated by rodent excreta.

Introduction

Hantaviruses are rodent-borne viruses that can be transmitted to humans by contact with faeces/urine from infected rodents or with dust containing infective particles [1]. There are several hantaviruses, with different geographical distributions and causing different clinical diseases. Hantaviruses are usually specific to certain rodent reservoir hosts. Three main clinical syndromes can be distinguished after hantavirus infection: haemorrhagic fever with renal syndrome (HFRS), mainly caused by Seoul virus, Puumala virus (PUUV) and Dobrava virus (DOBV) prevalent in Europe; nephropathia epidemica, a mild form of HFRS caused by PUUV; and hantavirus cardiopulmonary syndrome, which may be caused by Andes virus, Sin Nombre virus, and several others prevalent in the Americas. The clinical presentation varies from subclinical, mild, and moderate to severe, depending in part on the causative agent of the disease. There is no curative treatment, and eliminating or minimising contact with rodents is the best way to prevent infection.

Methods

This report is based on data for 2023 retrieved from The European Surveillance System (TESSy) on 6 November 2024. 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 [2].

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].

In 2023, out of the 28 EU/EEA reporting countries, 25 reported case-based data and three countries (Belgium, Bulgaria and Croatia) reported aggregate data. Twenty-one countries used the EU case definition for viral haemorrhagic fevers, four countries used an alternative case definition, and three countries did not specify the definition they used. Surveillance was comprehensive in all countries except Belgium (other system) and Cyprus (unspecified) and was mostly passive.

Suggested citation: European Centre for Disease Prevention and Control. Hantavirus infection. In: ECDC. Annual Epidemiological Report for 2023. Stockholm: ECDC; 2025. Stockholm, March 2025.

Epidemiology

For 2023, 28 EU/EEA countries reported data on hantavirus infections (Denmark and Iceland did not report). Among these, 19 countries reported 1 885 cases. Nine countries reported zero cases. Almost all cases reported (1 765; 99.2%) were classified as confirmed. Germany and Finland accounted for 60.5% of all reported cases (Table 1). The reported cases decreased by 13.7% in 2023 compared to 2022. In 2023, Estonia, Hungary, and Slovakia each reported one death. The EU/EEA notification rate for 2023 was 0.4 cases per 100 000 population. Within the 2019–2023 period, the lowest notification rates were reported for 2020 and 2023 (0.4 cases per 100 000 population), with other years within the period ranging from 0.5 to 1.1

The number of cases and the notification rate were highest in Finland (14.5 cases per 100 000 population) (Table 1, Figure 1).

Of the 1 045 cases with available information on importation status, 19 cases (1.8%) were travel-associated. Of those 19 cases, eight had a probable country of infection within the EU/EEA and nine had a probable country of infection outside the EU/EEA; for two cases, the probable country of infection was unknown.

PUUV was the most commonly identified pathogen, accounting for 1 132 (95.6%) of 1 184 cases with available information on the causative agent. Hantaan virus was identified in 32 cases and DOBV in 20 cases.

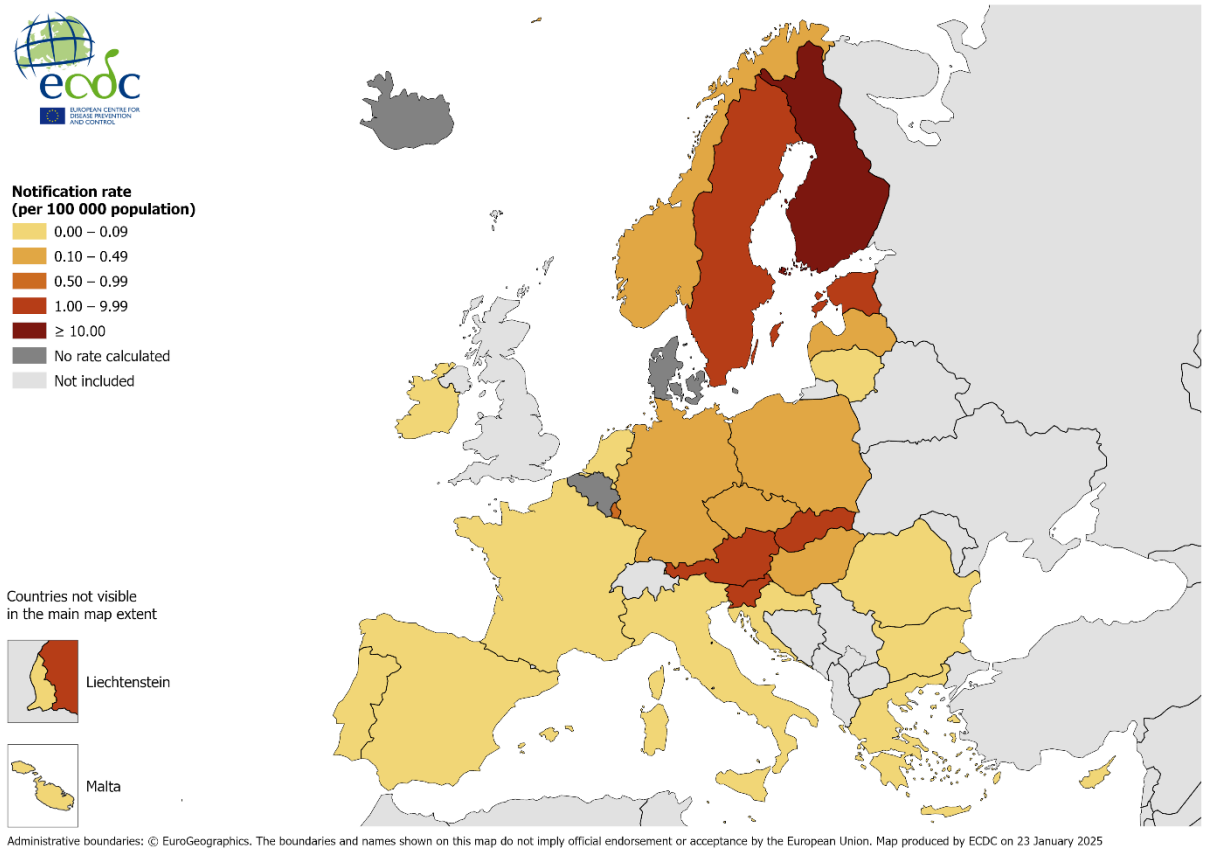
Table 1. Hantavirus infection cases and notification rates per 100 000 population by country and year, EU/EEA, 2019–2023

Country	2019		2020		2021		2022		2023	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Austria	276	3.1	30	0.3	233	2.6	24	0.3	97	1.1
Belgium	94	0.8	45	0.4	81	0.7	80	0.7	99	NRC
Bulgaria	6	0.1	1	0.0	11	0.2	1	0.0	6	0.1
Croatia	191	4.8	17	0.4	7	0.2	6	0.2	2	0.1
Cyprus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Czechia	15	0.1	5	0.0	8	0.1	7	0.1	11	0.1
Denmark	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC
Estonia	26	2.0	17	1.3	12	0.9	13	1.0	19	1.4
Finland	1 256	22.8	1 164	21.1	1 427	25.8	1 299	23.4	806	14.5
France	131	0.2	26	0.0	324	0.5	23	0.0	50	0.1
Germany	1 535	1.8	237	0.3	1 740	2.1	143	0.2	335	0.4
Greece	1	0.0	1	0.0	4	0.0	0	0.0	1	0.0
Hungary	13	0.1	4	0.0	3	0.0	1	0.0	11	0.1
Iceland	0	0.0	0	0.0	0	0.0	0	0.0	NDR	NRC
Ireland	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Italy	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Latvia	5	0.3	3	0.2	3	0.2	3	0.2	4	0.2
Liechtenstein	NDR	NRC	NDR	NRC	0	0.0	0	0.0	0	0.0
Lithuania	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Luxembourg	8	1.3	0	0.0	33	5.2	2	0.3	5	0.8
Malta	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Netherlands	6	0.0	3	0.0	6	0.0	1	0.0	0	0.0
Norway	11	0.2	12	0.2	38	0.7	20	0.4	15	0.3
Poland	9	0.0	3	0.0	42	0.1	5	0.0	43	0.1
Portugal	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Romania	4	0.0	1	0.0	12	0.1	7	0.0	6	0.0
Slovakia	94	1.7	49	0.9	117	2.1	84	1.5	154	2.8
Slovenia	252	12.1	14	0.7	569	27.0	7	0.3	64	3.0
Spain	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Sweden	155	1.5	61	0.6	277	2.7	459	4.4	157	1.5
EU/EEA (30 countries)	**4 088**	**0.9**	**1 693**	**0.4**	**4 947**	**1.1**	**2 185**	**0.5**	**1 885**	**0.4**
United Kingdom	3	0.0	NA	NA	NA	NA	NA	NA	NA	NA
EU/EEA (31 countries)	**4 091**	**0.8**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Source: Country reports. NDR: No data reported. NRC: No rate calculated. NA: Not applicable.

No data from 2020 onwards were reported by the United Kingdom, due to its withdrawal from the EU on 31 January 2020.
For 2023, the rate for Belgium was not calculated as the surveillance system changed so that it was no longer comprehensive.

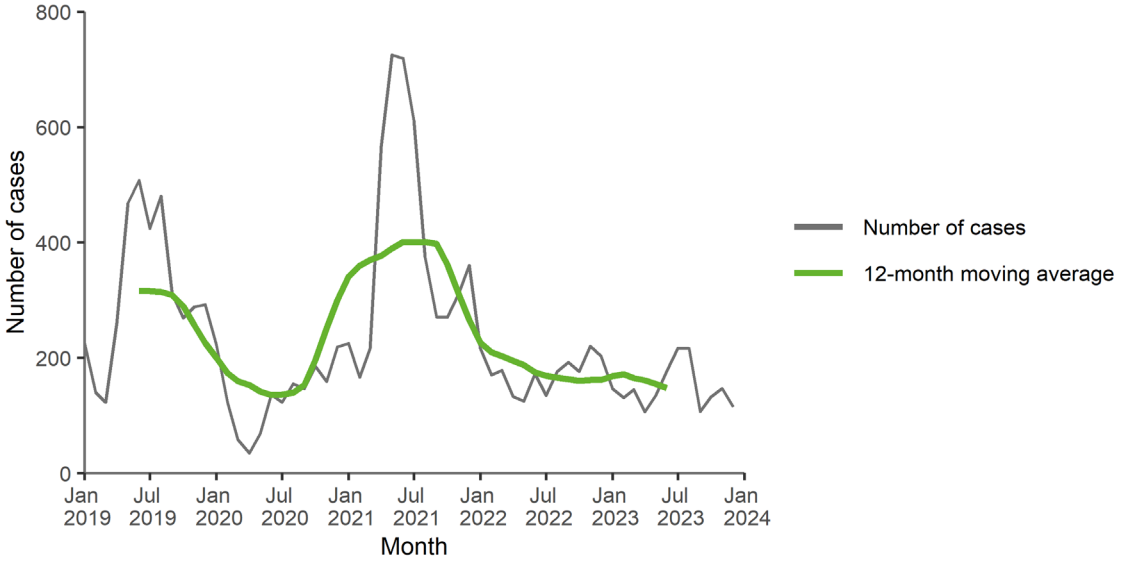
Figure 1. Distribution of hantavirus infection rates per 100 000 population by country, EU/EEA, 2023



The notification rate for Belgium was not calculated as the surveillance system changed so that it was no longer comprehensive.

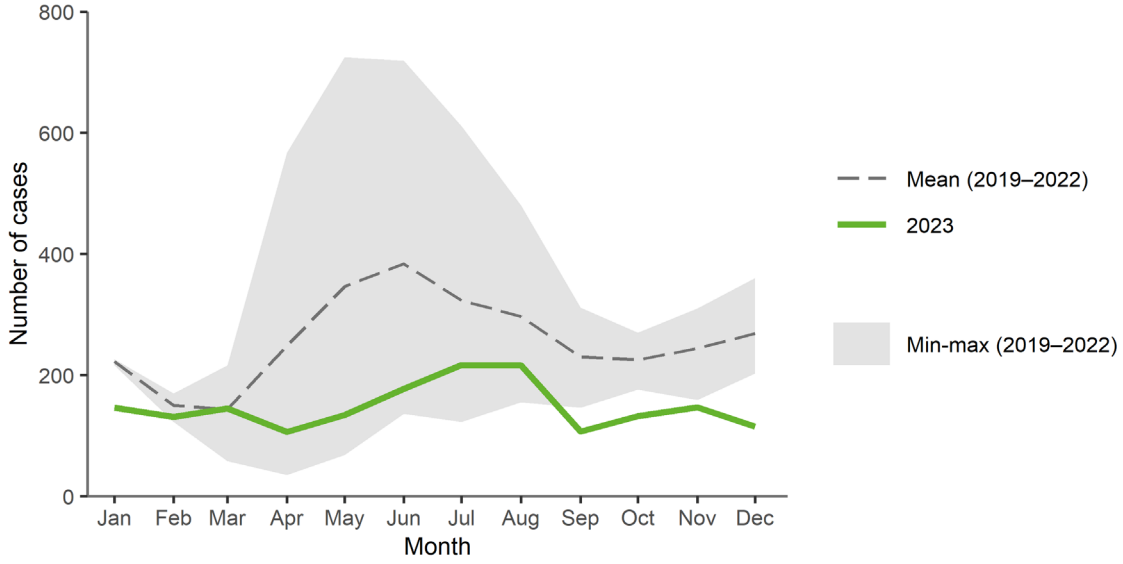
Relatively low case numbers were reported throughout the year, with a peak in July and August (Figure 2). In all months, the number of cases was below or equal to the mean recorded in 2019–2022 (Figure 3).

Figure 2. Hantavirus infection cases by month, EU/EEA, 2019–2023



Source: Country reports from Austria, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden. Belgium, Bulgaria, Croatia, Denmark, Iceland, Liechtenstein and Luxembourg were not included as these countries did not report data for all months from 2017 to 2021.

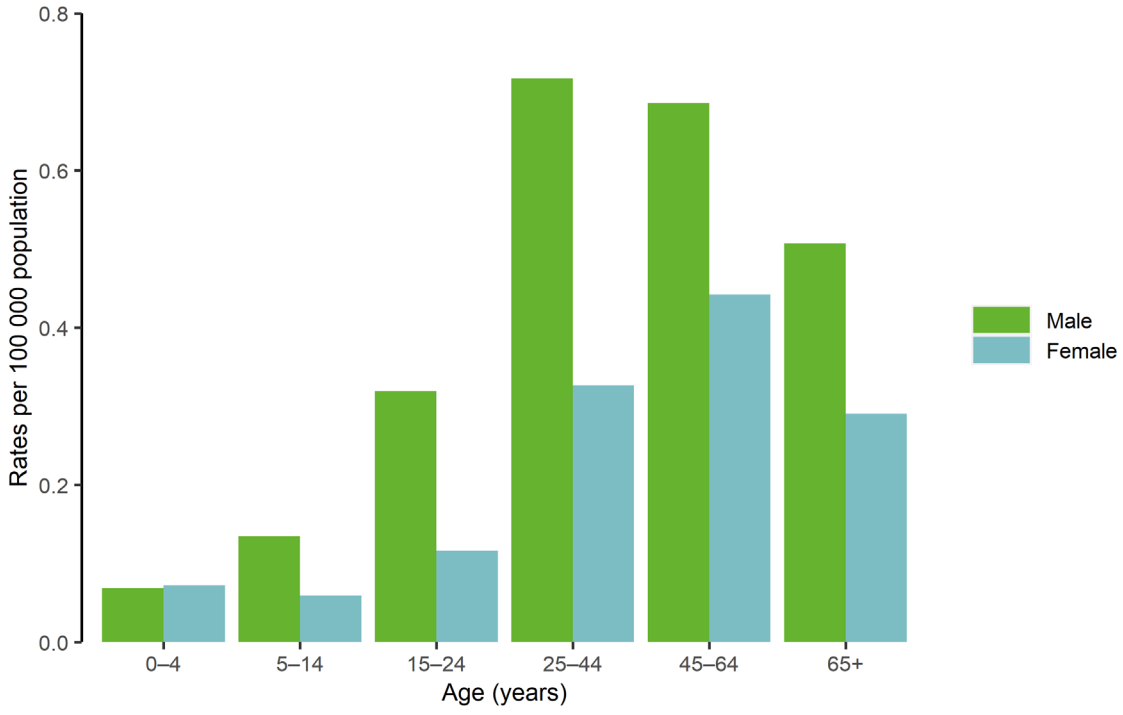
Figure 3. Hantavirus infection cases by month, EU/EEA, 2023 and 2019–2022



Source: Country reports from Austria, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden. Belgium, Bulgaria, Croatia, Denmark, Iceland, Liechtenstein and Luxembourg were not included as these countries did not report data for all months from 2017 to 2021.

In 2023, people aged 25 years and older accounted for 90.6% (1 707) of the 1 885 cases with information on age available (Figure 4). The notification rate peaked in those aged 45–64 years at 0.6 cases per 100 000 population. In all age groups, except 0-4 years, hantavirus infections were more common in males, with an overall crude male-to-female ratio of 1.7:1.

Figure 4. Hantavirus infection rates per 100 000 population, by age and gender, EU/EEA, 2023



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

Discussion

The year 2023, together with 2020, marked the lowest rate of hantavirus infection cases recorded in TESSy over the past five years (2019–2023). In 2023, among all the countries that reported cases, the notification rate was highest in Finland (14.5 per 100 000 population), as for previous years, except for 2021 when the highest notification rate was reported from Slovenia (27.0 per 100 000 population).

Hantavirus infections are known to follow both seasonal and multi-annual fluctuations, influenced mainly by the population dynamics of the rodent reservoir hosts [4]. Changes in hantavirus epidemiology seem to be influenced by modifications in landscape characteristics and climatic factors [5,6]. A recent External Quality Assessment conducted through the Emerging Viral Diseases-Expert Laboratory Network (EVD-LabNet) revealed that serological diagnosis, which encompasses nearly all diagnostic methods used for acute human orthohantavirus infections in Europe, is at a satisfactory level [7].

Public health implications

No vaccines against diseases caused by hantavirus are available in Europe. Prevention mainly relies on controlling rodent populations, avoiding contact with rodents and their excreta (urine, saliva, or droppings), and using appropriate precautions when cleaning and disinfecting areas contaminated by rodent excreta. Professions related to forestry and farming, as well as activities such as camping, using summer houses, and visiting forest houses have been identified as risk factors [8-10]. The communication of preventive measures is vital for preventing seasonal infections. In 2014, ECDC published a report summarising preventive measures and communication strategies for hantavirus infection in Europe [8].

References

1. Avsic-Zupanc T, Saksida A, Korva M. Hantavirus infections. Clin Microbiol Infect. 2019 Apr;21S:e6-e16. Available at: https://www.ncbi.nlm.nih.gov/pubmed/24750436
2. European Centre for Disease Prevention and Control (ECDC). Introduction to the Annual epidemiological report. Stockholm: ECDC; 2024. Available at: https://ecdc.europa.eu/en/annual-epidemiological-reports-2016/methods
3. European Centre for Disease Prevention and Control (ECDC). Surveillance atlas of infectious diseases. Stockholm: ECDC; 2023. Available at: http://atlas.ecdc.europa.eu/public/index.aspx?Dataset=27&HealthTopic=24.
4. Kallio ER, Begon M, Henttonen H, Koskela E, Mappes T, Vaheri A, et al. Cyclic hantavirus epidemics in humans--predicted by rodent host dynamics. Epidemics. 2009 Jun;1(2):101-7. Available at: https://www.ncbi.nlm.nih.gov/pubmed/21352757
5. Reusken C, Heyman P. Factors driving hantavirus emergence in Europe. Curr Opin Virol. 2013 Feb;3(1):92-9. Available at: https://www.ncbi.nlm.nih.gov/pubmed/23384818
6. Zeimes CB, Quoilin S, Henttonen H, Lyytikainen O, Vapalahti O, Reynes JM, et al. Landscape and regional environmental analysis of the spatial distribution of hantavirus human cases in europe. Front Public Health. 2015 2015-March-31;3:54. Available at: https://www.ncbi.nlm.nih.gov/pubmed/25874194
7. Erdin M, Stanoeva KR, Mogling R, Korva M, Knap N, Resman Rus K, et al. External quality assessment of orthohantavirus and lymphocytic choriomeningitis virus molecular detection and serology in Europe, 2021. Euro Surveill. 2023 Oct;28(40):2300054. Available at: https://www.ncbi.nlm.nih.gov/pubmed/37796441
8. European Centre for Disease Prevention and Control (ECDC). Prevention measures and communication strategies for hantavirus infection in Europe. Stockholm: ECDC; 2014. Available at: https://www.ecdc.europa.eu/en/publications-data/prevention-measures-and-communication-strategies-hantavirus-infection-europe
9. Ricco M, Peruzzi S, Ranzieri S, Magnavita N. Occupational Hantavirus Infections in Agricultural and Forestry Workers: A Systematic Review and Metanalysis. Viruses. 2021 Oct 25;13(11) Available at: https://www.ncbi.nlm.nih.gov/pubmed/34834957
10. Winter CH, Brockmann SO, Piechotowski I, Alpers K, an der Heiden M, Koch J, et al. Survey and case-control study during epidemics of Puumala virus infection. Epidemiol Infect. 2009 Oct;137(10):1479-85. Available at: https://www.ncbi.nlm.nih.gov/pubmed/19288958