



Weekly Epidemiological Report for West Nile Virus infection, Greece, 2024 - 4 December 2024 -

This weekly epidemiological report aims to present an overview of the epidemiological data on West Nile virus (WNV) human infection, the reported cases and the public health response to WNV in Greece for transmission period 2024. As the last diagnosed cases in the 2024 transmission season had symptoms onset or a positive molecular blood test at least one month ago, this is the final weekly update for the 2024 transmission season. Any updates on 2024 surveillance data will be included in the 2024 annual epidemiological report.

Data presented in this report are derived from the notifications of laboratory diagnosed human cases of WNV infection sent to the Hellenic National Public Health Organization (NPHO) by the treating physicians and from the daily communication with diagnostic laboratories: i) the National Reference Centre for Arboviruses, Aristotelian University of Thessaloniki, ii) the Hellenic Pasteur Institute, iii) the Department of Microbiology, School of Medicine, University of Athens, iv) the Laboratory of Clinical Virology, School of Medicine, University of Crete.

The Vector-borne Diseases Department of the Directorate of Epidemiological Surveillance and Intervention for Infectious Diseases of the NPHO undertakes a verification procedure and investigates all reported cases within 24 hours, through communication with the treating physicians and the patients, in order to identify the probable place of exposure, the characteristics of the disease and the risk factors. In addition, the health status/ outcome of hospitalized cases is daily updated.

In 2024 period, up to 04/12/2024, two hundred nineteen (219) laboratory diagnosed locally acquired cases of WNV infection have been reported to NPHO, one hundred fifty-six (156) of which presented with neuro-invasive disease (WNND, encephalitis and/or meningitis and/or acute flaccid paralysis) and sixty-three (63) cases with mild symptoms (e.g., febrile syndrome) (Table 1). Five more imported cases were recorded, in patients infected abroad (three in Albania, one in Austria and one in India), who are not included in the following analysis. Thirty-four (34) deaths have been recorded concerning patients older than 60 years of age (median age of the deceased: 80 years, range: 61 - 92 years). One more death in a patient was attributed to another cause (and is not included in the total number of deaths).

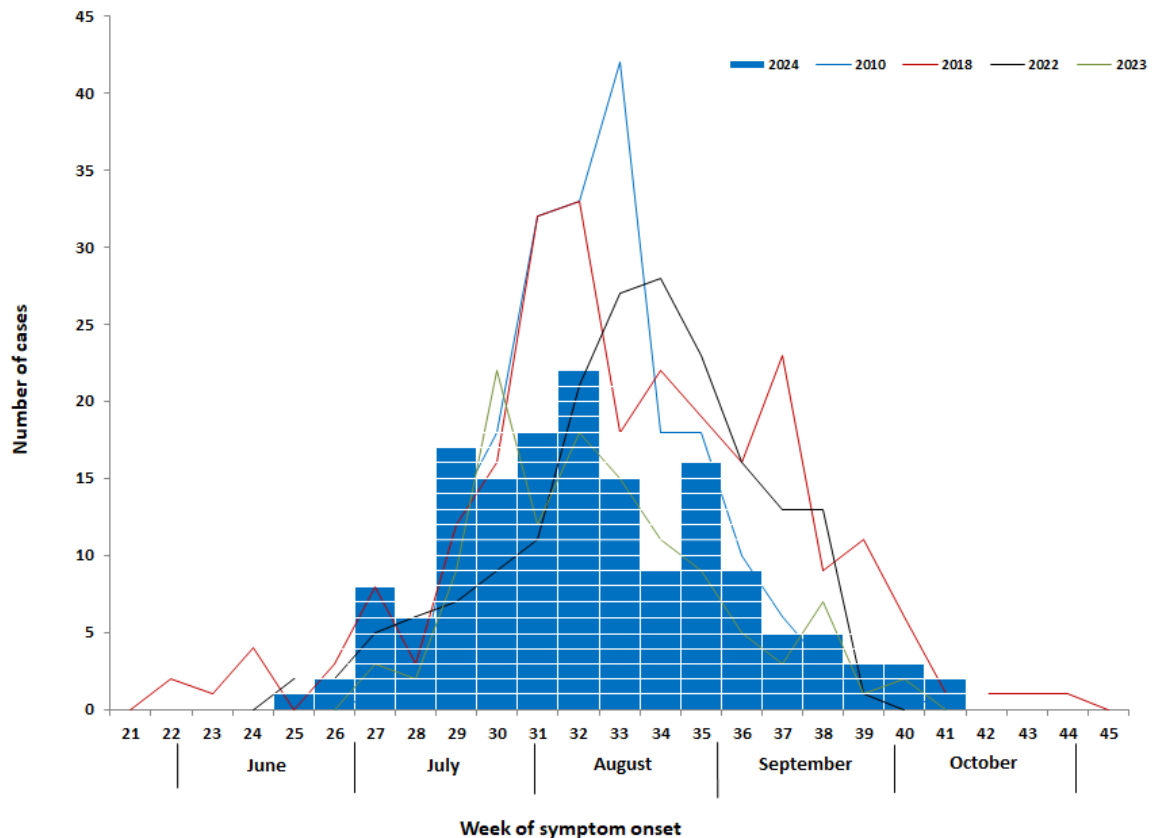
Table 1. Number of reported locally acquired cases of WNV disease, with and without central nervous system (CNS) manifestations, Greece, period 2024, up to 04/12/2024

	Number of WNND cases - with	Number of cases without	Total number of cases	Number of deaths
Number of WNV cases and deaths	156	63	219	34 ^[2]

1. Refers mainly to encephalitis, aseptic meningitis and meningoencephalitis cases.
2. One more death in a patient was attributed to another cause.

Figure 1 shows the reported WNND cases by week of symptom onset, in 2024, in the previous 2023 transmission period and in the three previous years with the highest number of recorded cases (2010, 2018 and 2022). For the first diagnosed case of WNV infection for transmission period 2024 (case with WNND), the reported onset of symptoms was on 21st June 2024 (week 25/2024), and the last -up to 04/12/2024-diagnosed case (without CNS manifestations) had a positive molecular blood test on 30th October 2024 (wk 44/2024).

Figure 1. Number of locally acquired reported WNND cases (with central nervous system manifestations) by week of symptom onset, Greece, 2010, 2018, 2022, 2023 and 2024, up to 04/12/2024 (n=156)¹.



1. Lines represent the number of WNND cases in 2010, 2018, 2022 and 2023. Each blue box represents one laboratory diagnosed case of WNND reported to NPHO in transmission period 2024.

The median age of WNND cases is 75 years (range: 4 - 92 years).

Table 2 shows the geographic distribution of the recorded cases with laboratory diagnosed WNV infection at the level of probable Municipality of exposure. The patient’s probable place of exposure is a rough indicator of WNV circulation areas.

According to a serosurvey conducted in 2010 by the NPHO and the National School of Public Health, at the epicentre of the 2010 WNV outbreak in Central Macedonia, it was estimated that WNV neuro-invasive disease develops in 1:140 infected persons.

Table 2. Reported locally acquired cases of WNV infection (with and without central nervous system manifestations/ WNND) by probable Municipality of exposure, Greece, transmission period 2024, up to 04/12/2024 (n=219)

Region	Regional Unit	Probable Municipality of exposure	Number of cases with CNS manifestations (WNND cases)	Incidence of WNND per 100,000 population ^[1]	Number of cases without CNS manifestations
Thessaly	Larissa	Larissa	13	7,9	10
		Kileler	7	38,7	1
		Agia	3	28,0	4
		Elassona	0	0	1
		Tempi	2	16,7	2
		Tirnavos	4	18,0	1
		Farsala	1	6,1	1
	Karditsa	Karditsa	4	7,1	0
		Palamas	2	14,9	0
		Sofades	1	5,9	1
Trikala	Trikala (Triokkaion)	1	1,3	1	
Central Macedonia	Thessaloniki	Lagadas	3	8,1	3
		Volvi	3	15,2	5
		Pavlos Melas	1	1,0	1
		Thermaikos	2	4,4	0
		Thermi	2	3,6	0
		Neapoli - Sykies	1	1,2	0
		Delta	1	2,2	0
		Kalamaria	1	1,1	0
		Chalkidona	1	3,3	0
	Chalkidiki	Aristotle (Aristotelis)	4	23,6	3
		Kassandra	1	5,9	0
		Polygyros	2	9,4	0
		Sithonia	1	8,3	0
		Nea Propontida	0	0	1 ^[2]
	Serres	Serres	6	8,1	0
		Emmanouil Pappas	5	43,2	1
		Sintiki	2	10,8	0
		Amfipoli	1	14,0	0
		Visaltia	4	24,9	0
		Nea Zichni	1	12,1	0
		Irakleia	1	6,4	0
	Pella	Skydra	4	21,8	0
		Pella	2	3,5	1
	Pieria	Katerini	2	2,4	0
	Kilkis	Paeonia	1	4,0	1
		Kilkis	1	2,2	0

	Imathia	Alexandria	4	10,4	4
		Veroia	2	3,2	1
		Heroic City of Naoussa	1	3,3	0
Ionian Islands	Lefkada	Lefkada	5	22,8	1
West Greece	Achaia	Aigialeia (Egialia)	2	4,3	0
		West Achaia	2	7,8	0
		Patras	1	0,5	0
	Aetoloakarnania	Agrinion	1	1,1	0
	Ilia (Elis)	Andravida - Kyllini	5	22,2	0
Ilida		1	3,4	0	
Epirus	Thesprotia	Igoumenitsa	1	3,9	0
	Preveza	Preveza	1	3,2	1
	Ioannina	Ioannina (Ioannites)	1	0,9	0
Peloponnese	Argolida	Argos - Mykines	1	2,5	0
	Arcadia	Tripoli	5	11,3	0
East Macedonia and Thrace	Rodhope	Arriana	2	13,4	0
		Komotini	2	3,1	1
		Maroneia - Sapes	0	0	5
		Iasmos	1	8,2	0
	Evros	Alexandroupoli	3	4,2	4
		Didymoteicho	3	18,7	0
		Orestiada	5	15,8	0
		Soufli	2	17,1	5
		Samothrace	0	0	1
	Drama	Drama	1	1,8	0
	Xanthi	Topeiros	1	10,6	0
		Avdira	0	0	1
	Kavala	Nestos	1	4,9	0
		Kavala	1	1,5	0
	Thassos	Thassos	1	7,6	0
Attica	Central Athens	Athens	2	0,3	0
		Zografos (Zografou)	0	0	1
	South Athens	Kallithea	1	1,0	0
	East Attica	Saronikos	2	6,7	0
	West Attica	Megara (Megareon)	1	2,6	0
Central Greece	Fthiotida	Lokroi	1	5,6	0
		Lamia (Lamieon)	1	1,5	0
	Voiotia (Boeotia)	Orchomenos	1	10,7	0
Total Greece			156	1,5	63

1. Calculations based on 2021 census data (Hellenic Statistical Authority).
2. This case concerns a patient with complex travel history, for whom the more probable place of infection was considered to be at the Municipality of Nea Propontida, Chalkidiki Regional Unit.

In addition, in the context of the surveillance of WNV infection in equids performed by the national animal health authorities/ Ministry of Rural Development and Food, in the 2024 period, up to 04/12/2024, five (5) cases of recent WNV infection in equids were recorded (in two outbreaks), in the Regional Units of Xanthi (n=3) and Ioannina (n=2), indicating the circulation of WNV in these specific areas.

PUBLIC HEALTH MEASURES SUPPORTED BY THE NATIONAL PUBLIC HEALTH ORGANIZATION, 2024

Aiming at the timely implementation of targeted response and prevention measures, in each transmission since 2010, the NPHO continuously implements enhanced epidemiological surveillance of WNV infection, immediately investigates the cases, informs health and public health professionals and is in constant communication and cooperation with the competent national and local authorities. In March 2024, the comprehensive "Action Plan for West Nile virus infection" was published, developed by the Ministry of Health (MoH) in collaboration with the NPHO, with the aim of standardized implementation of actions to reduce WNV transmission risk, based on a risk assessment. In more detail, the prevention and response actions carried out by the NPHO -in collaboration with other stakeholders - include:

I. Enhanced surveillance for WNV infection in humans and communication for health professionals and stakeholders:

- **Enhanced surveillance for WNV infection in humans - Laboratory investigation of suspected cases - Awareness raising of physicians about the WNV infection:** Testing for WNV infection in suspected cases (such as cases with encephalitis, aseptic meningitis, acute flaccid paralysis, fever of undetermined etiology) is recommended. The NPHO provides guidelines for the recognition and diagnosis of WNV disease and the recommended laboratory investigation (mailings and website www.eody.gov.gr). For the 2024 period, an informative letter was sent to all Health Units and Medical Associations of the country for vigilance regarding WNV, in May 2024. In addition, following the recording of cases in an area, local Health Units are urgently informed.
- **Daily communication and information exchange with laboratories** conducting diagnostic testing for WNV (active laboratory-based surveillance).
- **Enhancing laboratory diagnosis** of suspected cases, by supporting the National Reference Centre and other specialised diagnostic laboratories.
- **Case investigation:** The Department of Vector Borne Diseases of NPHO undertakes the investigation of every reported WNV infection case within 24 hours after diagnosis, in order to determine the probable place of exposure, the risk factors and the severity of the disease. Health status of hospitalized cases is daily updated.
- **Communication - awareness raising of authorities:**
 - **Immediate update of stakeholders** on the diagnosed cases (Ministry of Health, Ministry of Rural Development and Food, Hellenic National Blood Transfusion Center, Regions/ Directorates of Public Health and Social Welfare, Municipalities), and the recommended public health measures.
 - **Awareness raising before the onset of the 2024 transmission period:** Information and guidance on WNV circulation risk assessment, surveillance, vigilance and enhancement of targeted prevention measures was provided to regional/ local authorities, before the onset of 2024 transmission season (in February 2024). In April 2024, the NPHO informed the relevant regional authorities regarding the classification of all Municipalities in risk levels, based on historical surveillance data and in accordance with the criteria described in the Action Plan. In addition, the NPHO provided historical surveillance data (numbers of cases recorded in the previous years, by locality and year)

to the regional authorities, in order to guide risk assessment and enhanced targeted prevention measures at local level, based on the Action Plan.

- **Weekly surveillance reports on human WNV infection cases** (uploaded on the NPHO website).

II. Communication and health promotion activities for the public: Informative material for the public regarding WNV infection and the recommended protective measures against mosquito bites is available in the NPHO's website (<https://eody.gov.gr>). In 2024, NPHO:

- Published a Press Release (in mid-May 2024) regarding the expected recurrence of cases in the current transmission period, and the recommended prevention measures.
- Published a Press Release (on 5th of July 2024) regarding the diagnosis of the first case of WNV infection in 2024 and the recommended prevention measures.
- Published a Press Release (on 5th of August 2024) regarding the intense WNV circulation in the current 2024 season and the recommended prevention measures.
- Sent -via email- informative material (leaflets) for the protection against mosquito bites and for WNV infection to regional and local authorities, in early June 2024.
- Sent/ sends informative leaflets for the protection against mosquito bites to regional authorities of Greece, in order to be distributed to the public.
- In every affected area, informative leaflets and posters are urgently provided, if needed.

III. Coordination of an intersectoral “Working Group (WG) on the designation of affected areas by vector borne diseases” - Designation of affected and high-risk areas for implementing targeted blood safety and haemovigilance measures: This WG, under the MoH Committee for the Prevention and Management of Tropical Diseases, considers all available epidemiological and entomological data and decides on the characterization of affected and high-risk areas, assisting the targeted implementation of blood safety measures. In these areas, the Hellenic National Blood Transfusion Center issues guidance on blood safety. The list of affected and high-risk areas is also published on the NPHO's website and updated regularly. In addition, the Coordinating Centre for Haemovigilance and Surveillance of Transfusion of NPHO issues guidance for the haemovigilance competent authorities.

IV. Collaboration and exchange of information with the Ministry of Rural Development and Food (MoRD&F), which performs enhanced surveillance programme for the WNV infection in equids and wild birds. Following the information provided by the MoRD&F, the NPHO informs the relevant public health regional authorities regarding the WNV infection cases in animals and the recommended prevention and response measures.

V. Vector surveillance and control activities:

Vector management programmes are performed under the responsibility of regional and municipal authorities. The MoH publishes an annual Circular on integrated mosquito management, action plan, and communication to the public. The “Action Plan for West Nile virus infection” of the MoH includes analytical guidance on vector management according to the risk level of each area.

In addition, the NPHO performs supplementary actions for raising awareness of regional/ local authorities and active mosquito surveillance programmes nationwide:

- **Raising awareness and guidance to regional and municipal authorities** for the timely planning, organization and implementation of integrated vector control programmes. For the 2024 transmission period, NPHO sent relevant awareness letters to all relevant regional and municipal authorities, in mid-February 2024 (including key steps to achieve timely implementation of the

vector control programmes), and promptly informs local authorities of the affected areas regarding the cases and the recommended preventive and response measures (intensified mosquito control and communication campaigns for the local population).

- **Entomological surveillance:** In the last years, the NPHO performs/ coordinates active mosquito surveillance programmes nationwide, in collaboration with several stakeholders and agencies, by placing mosquito traps in various areas throughout the country and testing of mosquito vectors for the presence of WNV, as an early warning and alert system. Following the recording of WNV infected mosquitoes, the NPHO informs the relevant public health regional authorities, in order to implement targeted response measures.

For the 2024 period, NPHO performs an extended active mosquito surveillance programme, in collaboration with Universities and public Institutes, with an expanded network of mosquito traps, with standardized methodology and representative geographical distribution. The programme is implemented -under the coordination of the NPHO- in collaboration with the University of West Attica, the Benaki Phytopathological Institute, the Foundation for Research and Technology, the MoRD&F's Organization ELGO-Dimitra, the Agricultural University of Athens, the Aristotle University of Thessaloniki, the University of Thessaly, the Democritus University of Thrace and the University of Patras. The mosquito surveillance data are directly available and accessible to the relevant regional authorities.

VI. Communication with international public health stakeholders: Frequent communication and weekly information exchange with ECDC (real-time reporting of the diagnosed cases in TESSy).

CONCLUSIONS

West Nile virus infection cases are recorded -on an annual basis- in many countries worldwide, including many European countries. In 2010-2014 and 2017-2023, cases of West Nile virus infection were recorded in various areas of Greece also, while WNV circulation has been recorded in all regions in the past. The occurrence of human cases in an almost annual basis during the last decade suggests that WNV has been established in our country, as well as in other European and neighboring countries; thus, its circulation and the recurrence of cases was considered likely and expected in the country (in previously affected and in new areas), as well as in other European countries, in the 2024 period (as in each transmission season). The NPHO informed (in May 2024) health professionals nationwide for vigilance and awareness raising for the WNV diagnosis, and the public regarding the expected recurrence of cases in the current transmission period and the recommended prevention measures.

In 2024, up to 04/12/2024, human cases of WNV infection have been recorded in Greece, in the Regional Units (NUTS3 level) of Larissa, Karditsa, Trikala, Lefkada, Thesprotia, Preveza, Ioannina, Thessaloniki, Chalkidiki, Pella, Pieria, Serres, Kilkis, Imathia, Rodhope, Drama, Evros, Xanthi, Kavala, Thassos, Achaia, Aetoloakarnania, Iliia (Elis), Argolida, Arcadia, South Athens, Central Athens, East Attica, West Attica, Fthiotida, and Voitia (Boeotia). The last diagnosed case in Greece (without CNS manifestations) in 2024, up to 04/12/2024, had a positive molecular blood test on 30th October 2024 (week 44/2024).

In the EU Member States and EU neighboring countries, in transmission period 2024, up to 20/11/2024, human WNV infection cases have been also recorded -besides Greece- in: Italy, Spain, France, Germany, Austria, Hungary, Romania, Czechia, Slovakia, Slovenia, Croatia, Kosovo*, Albania, Serbia, North Macedonia, Bulgaria, Turkiye and Cyprus (source: ECDC, [ECDC, Weekly updates: 2024 West Nile virus transmission season](#)).

Epidemiological surveillance of the disease, systematic and early implementation of mosquito control programs and personal protective measures against mosquito bites are considered the most appropriate measures to control WNV infection outbreaks.

Since the circulation of WNV and its geographical distribution (i.e., the areas with recording of human cases) during each period cannot be predicted, **personal protective measures against mosquitoes are encouraged, during the period of mosquito activity**. General information regarding personal protection measures against mosquitoes is available at: https://eody.gov.gr/wp-content/uploads/2019/04/mosquito_brochure_2019.pdf.

National public health authorities conduct a series of preventive and response measures, including enhanced surveillance, case investigation, information dissemination and communication activities, and collaborate with regional and local authorities, aiming at the timely implementation of targeted response measures at local level.

In addition, during the transmission season, weekly surveillance reports are published on the NPHO website every Wednesday (available from: <https://eody.gov.gr/en/disease/west-nile-virus/>), in english also, which include updated information.

As the last diagnosed cases in the 2024 transmission season had symptoms onset or a positive molecular blood test at least one month ago, this is the final weekly update for the 2024 transmission season. Any updates on 2024 surveillance data will be included in the 2024 annual epidemiological report.

*This designation is without prejudice to positions on status and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.