NATIONAL PUBLIC HEALTH ORGANIZATION

Protect yourself from mosquitoes

Annual epidemiological report for West Nile virus human infection, Greece, 2018

This report aims to present an overview of the reported cases and public health response to West Nile Virus (WNV) infection in humans in Greece for transmission period 2018.

Data presented in this report was derived from the notifications of laboratory diagnosed human cases of WNV infection sent to the National Public Health Organization (NPHO, former Hellenic Center for Disease Control and Prevention, HCDCP) by the treating physicians and from the daily communication with diagnostic laboratories: i) the National Reference Laboratory for Arboviruses, Aristotelian University of Thessaloniki, ii) the Department of Microbiology, School of Medicine, University of Athens, iii) the Hellenic Pasteur Institute, iv) Laboratory of Clinical Virology, School of Medicine, University of Crete. The Department of Epidemiological Surveillance and Intervention of the NPHO/ former HCDCP undertook a verification procedure through communication with the treating physicians and the patients, as necessary.

In 2018, a total of three hundred sixteen (316) laboratory diagnosed cases of WNV infection were reported to NPHO/ former HCDCP, two hundred forty three (243) of which presented with neuro-invasive disease (WNND, encephalitis and/or meningitis and/or acute flaccid paralysis) and seventy three (73) cases with mild symptoms (febrile syndrome) (Table 1). Among the cases, fifty (50) deaths were reported in patients ≥63 years old.

Table 1. Number of reported cases of WNV disease, Greece, 2018

	Number of cases **with** central nervous system (CNS) manifestations [1]	Number of cases **without** CNS manifestations	**Total number of cases**	**Number of deaths** [2]
Number of WNV cases and deaths	243	73	**316**	**50**

1. Refers mainly to encephalitis, aseptic meningitis and meningoencephalitis cases
2. The number of deaths is included in the total number of cases

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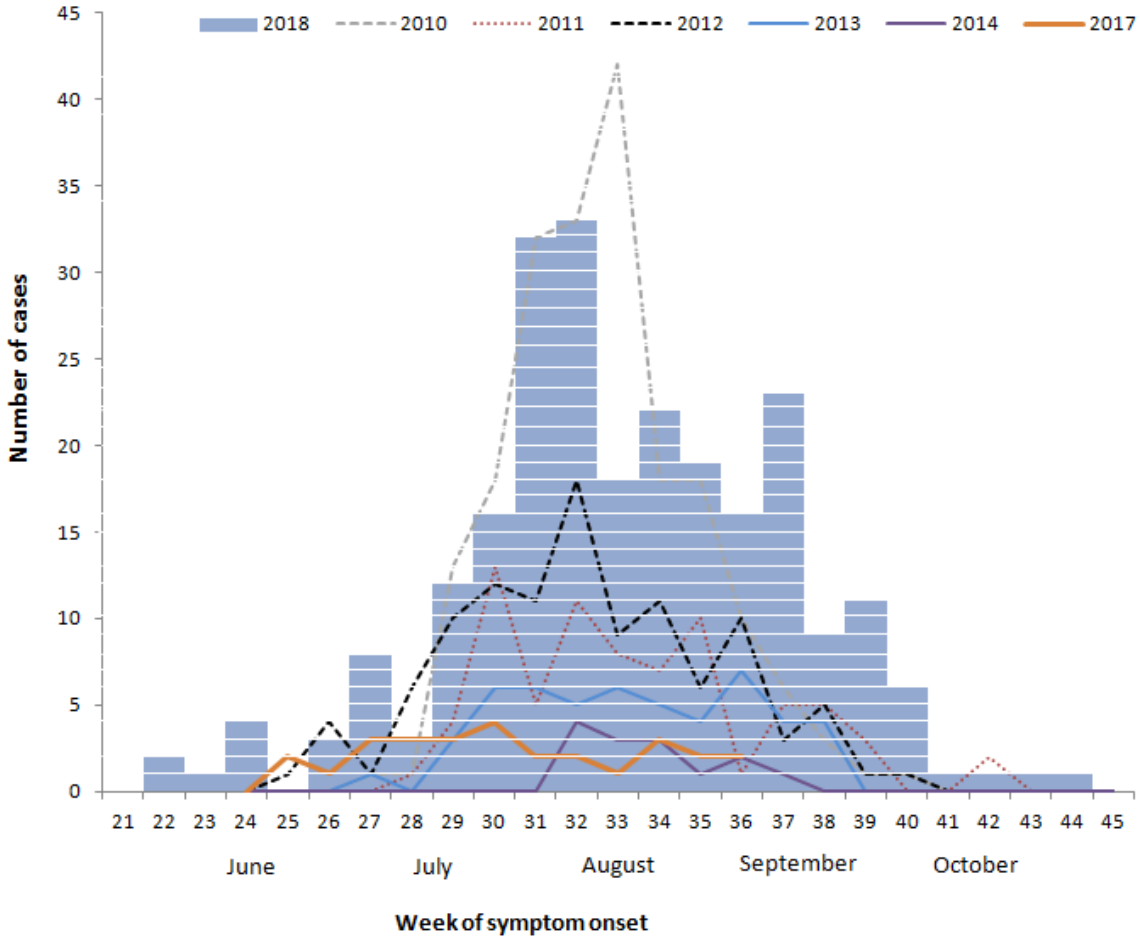
Forty eight (48) out of three hundred sixteen (316) patients diagnosed with WNV infection in 2018 were hospitalized in an Intensive Care Unit.

Figure 1 shows the reported WNND cases by week of symptom onset. The first diagnosed case of WNV infection for transmission period 2018 reported onset of symptoms on 31st May 2018 (wk 22/2018) and the last diagnosed case had date of positive blood sampling on 2nd November 2018 (wk 44/2018).

Figure 1. Number of laboratory diagnosed WNND cases by week of symptom onset, Greece, 2018 (n=242)*



* Each blue box represents one laboratory diagnosed case of WNND reported to NPHO/HCDCP in transmission period 2018. For one WNND case the week of symptom onset was undetermined.

Table 2 and Figure 2 show the geographic distribution of the notified human cases with laboratory diagnosed WNV disease at the level of suspected Municipalities of exposure. The patient's suspected place of exposure is a rough indicator of the area of WNV circulation.

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

Table 2. Reported cases with laboratory diagnosed WNV disease (with and without WNND) by suspected Municipality of exposure, Greece, transmission period 2018 (n=316)

Regional Unit	Suspected Municipality of exposure	Number of cases with WNND	Incidence of WNND per 100,000 population[1]	Number of West Nile Fever cases (non WNND)
East (Anatoliki) Attiki	Oropos	5	14,81	1
	Marathon	3	8,98	0
	Saronikos	2	6,90	0
	Dionysos	1	2,49	0
	Markopoulou- Mesogeas	1	4,99	0
	Rafina- Pikermi	1	4,93	0
Western (Dytiki) Attiki	Megara	14	37,92	4
	Elefsina	10	33,44	3
	Aspropyrgos	9	29,75	1
	Mandras- Eidyllias	2	11,18	0
	Fili	3	6,53	0
Kentrikos Tomeas Athinon	Ilioupoli	1	1,28	0
	Galatsi	1	1,69	0
	Athens, 1st District	1	1,32	0
	Athens, 2nd District	2	1,94	1
	Athens, 3rd District	1	2,15	0
	Athens, 4th District	0	0,00	1
	Athens, 5th District	5	5,07	1
	Athens, 6th District	3	2,33	0
	Athens, 7th District	3	2,35	0
	Zografou	1	1,41	0
	Philadelphia-Chalkidona	1	2,81	0
Dytikos Tomeas Athinon	Agia Varvara	3	11,30	1
	Egaleo	4	5,72	1
	Ilion	2	2,36	0

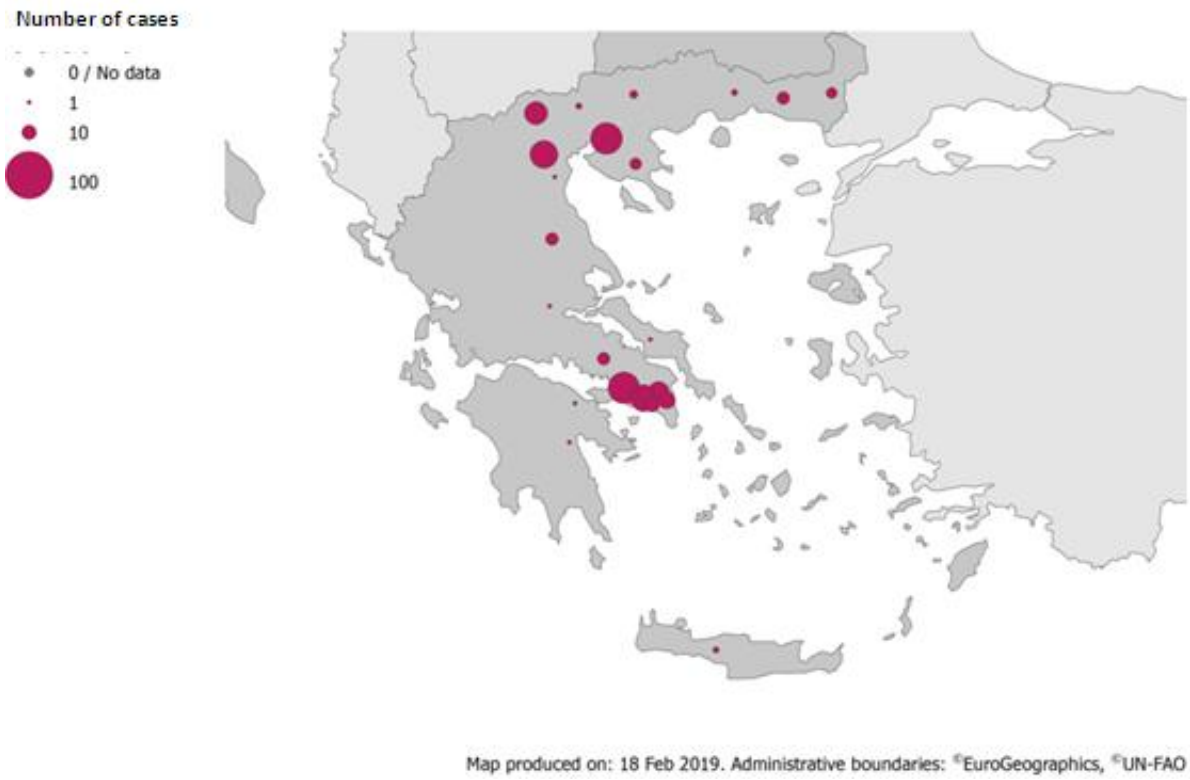
	Agioi Anargiroi- Kamatero	1	1,60	0
	Chaidari	2	4,26	0
Voreios Tomeas Athinon	Penteli	0	0,00	1
	Amaroussion	4	5,53	1
	Iraklio Attiki	3	6,04	1
	Vrilissia	4	13,01	1
	Papagos-Cholargos	0	0,00	1
	Chalandri	0	0,00	2
	Nea Ionia	2	2,98	0
	Kifisia	1	1,41	0
Notios Tomeas Athinon	Kallithea	6	5,96	0
	Moschato - Tavros	2	4,95	0
	Glyfada	1	1,15	0
	Nea Smyrni	2	2,74	0
Peiraias (Pireaus) & Nisoi	Piraeus	5	3,05	0
	Salamina	7	17,82	1
	Korydallos	2	3,15	1
	Nikaia – Agios Ioannis	8	7,59	1
	Troizinia-Methana	3	42,00	0
	Perama	3	11,82	0
	Keratsini- Drapetsona	1	1,10	0
Corinthia	Loutraki-Perachora-Agioi Theodoroi	1	4,71	0
Argolis	Argos-Mycenae	0	0,00	1
Voiotia	Tanagra	3	15,44	1
	Aliartos-Thespies	1	9,19	1
	Thiva (Thebes)	1	2,74	1
Fthiotida	Amfikleia- Elateia	1	9,16	0
Evvoia	Chalkideon	1	0,98	0
	Chalkidona	1	2,97	2

Thessaloniki	Oraiokastro	2	5,22	1
	Volvi	2	8,52	0
	Kordelio-Evosmos	6	5,90	2
	Thessaloniki	5	1,54	2
	Delta	2	4,36	1
	Thermaikos	3	5,97	2
	Pavlou Mela	1	1,01	1
	Lagadas	1	2,43	1
	Thermi	4	7,52	0
	Kalamaria	4	4,38	2
	Ampelokipoi- Menemeni	0	0,00	1
Imathia	Alexandria	11	26,46	7
	Veria	8	12,02	2
	Heroic City of Naoussa	4	12,31	3
Pella	Almopia	1	3,63	0
	Pella	7	11,09	9
	Skidra	5	24,77	1
	Edessa	1	3,47	0
Kilkis	Paionia	1	3,51	0
	Kilkis	1	1,93	0
Pieria	Diou- Olimpou	1	3,90	0
Serres	Irakleia	2	9,46	0
	Amfipolis	1	10,89	0
Chalkidiki	Kassandra	2	12,00	0
	Nea Propontida	2	5,48	2
Rodopi	Komotini	5	7,47	0
	Maroneia- Sapes	1	6,79	1
Evros	Didymoteicho	2	10,26	0
	Orestiada	1	2,65	0
	Alexandroupoli	1	1,37	0

	Soufli	0	0,00	1
Larisa	Larisa	5	3,08	0
	Tempi	1	7,29	0
	Tirnavos	1	3,99	1
Xanthi	Xanthi	1	1,54	0
	Topeiros	0	0,00	1
Rethymno	Mylopotamos	1	6,96	0
	Rethymni	1	1,80	0
Unknown place of exposure		1	-	2
Total Greece		**243**	**2,25**	**73**

*Calculations based on 2011 census data (Hellenic Statistical Authority).

Figure 2: Map showing the suspected place of exposure of reported cases with laboratory diagnosed WNV infection, Greece, 2018 (n=313).



In 2018, human WNV cases were recorded mainly in Regional Units (NUTS3) with previously recorded human cases, in the Regions of Attica, Central Macedonia, East Macedonia & Thrace, Thessaly, Central Greece, Crete and Peloponnese, and also in two new Regional Units where no human cases were previously recorded (Evros and Fthiotida). The two main epicenters of the seasonal circulation were in the Regions of Attica and Central Macedonia.

The median age of WNND cases was 75 years (range: 10 - 95), while the median age of the lethal cases was 79 years (range: 63 - 97). Out of the 316 cases, 197 (62%) were male and 119 (38%) were female. Tables 3 and 4 show the number and incidence of WNND cases per age-group and gender respectively.

Table 3. Number of cases, number and incidence of WNND cases per age-group, Greece, 2018

Age-group (years)	Number of cases (n=316)	Number of WNND cases (n=243)	Incidence of WNND (per 100,000 population)*
0-19	4	3	0,3
20-29	6	3	0,2
30-39	17	13	0,8
40-49	23	11	0,7
50-59	30	17	1,2
60-69	48	35	3,1
70-79	101	82	8,1
≥80	87	79	13,5

*Calculations based on 2011 census data (Hellenic Statistical Authority).

Table 4. Number of cases, number and incidence of WNND cases per gender, Greece, 2018

Gender	Number of cases (n=316)	Number of WNND cases (n=243)	Incidence of WNND (per 100,000 population)*
Male	197	157	3,0
Female	119	86	1,6

*Calculations based on 2011 census data (Hellenic Statistical Authority).

Among the 243 WNND cases, 128 (39%) exhibited symptoms of encephalitis, 78 (39%) symptoms of meningoencephalitis and 34 (14%) cases symptoms of meningitis. Fourteen cases had acute flaccid paralysis (out of which 11 patients simultaneously presented with encephalitis/ meningitis signs).

PUBLIC HEALTH MEASURES SUPPORTED BY THE NPHO/ former HCDCP, 2018

The following public health measures have been implemented by the NPHO/HCDCP and other involved stakeholders:

I. Enhanced surveillance for encephalitis and WNV disease in humans:

- **Awareness raising of physicians** about the WNV infection: Testing for West Nile virus infection in suspected cases (such as cases with encephalitis, aseptic meningitis, acute flaccid paralysis, fever of undetermined etiology) is recommended. The NPHO/HCDCP provided guidelines for the recognition and diagnosis of WNV disease and the recommended laboratory investigation (mailings and website www.keelpno.gr).
- **Daily communication and information exchange with laboratories** conducting diagnostic testing for WNV (active laboratory-based surveillance).
- **Enhancing laboratory diagnosis** of WNV infection and testing of suspected cases, by supporting the National Reference Laboratory and other specialised diagnostic laboratories.
- **Case investigation:** The Office for Vector-borne Diseases of NPHO/HCDCP undertakes the investigation of every reported WNV infection case within 24-48 hours after diagnosis, in order to determine the suspected place of exposure, the risk factors and the severity of the disease. The clinical condition of all hospitalized patients is followed up on a daily basis and the final outcome until discharge is recorded.
- **Immediate update of stakeholders** (Ministry of Health, Ministry of Rural Development and Food, National Centre for Blood Donations, Regions/ Directorate of Public Health and Social Welfare, Municipalities) on the diagnosed cases, and of local and regional authorities about the recommended prevention and response measures.
- **Weekly surveillance report on human WNV infection cases** (uploaded on the NPHO/HCDCP website).

II. **Communication and health promotion activities for the public:** Distribution of leaflets with educational material for the public regarding the recommended protective measures against mosquito bites in collaboration with local authorities; educational material in the NPHO/HCDCP website. In 2018, information material (leaflets, posters) was distributed to the Regional authorities, according to their needs (upon request). In addition, NPHO/HCDCP sent leaflets and posters in areas where cases were recorded.

III. Coordination of an intersectional Working Group (WG) on the definition of affected areas by vector borne diseases. This WG, under the MoH Committee for the Prevention and Management of Tropical Diseases, considered all available entomological and epidemiological data and decided on the characterization of affected areas assisting the implementation of blood safety measures. The list of affected areas was published on our website (www.keelpno.gr) and updated regularly. These were used by the National Centre for Blood Donation (www.ekea.gr) to issue guidance on blood safety. In addition, the Coordinating Haemovigilance Centre of NPHO/ HCDCP issued guidance for the haemovigilance competent authorities.

IV. Collaboration and exchange of information with the **Ministry of Rural Development and Food** regarding the West Nile virus infection in equids.

V. Vector surveillance and control activities:

- **Raising awareness and guidance to Regional Authorities:** NPHO/ HCDCP communicates regularly (workshops, meetings, letters) with all Regional Authorities in Greece recommending the timely planning, organization and implementation of integrated vector control programmes. In 2018, NPHO/ former HCDCP sent relevant awareness letters in February 2018 (with a brief guide to the key steps to achieve timely implementation of the vector control program) and urgently informed local authorities of the recently affected areas regarding the recommended preventive and response measures (intensified mosquito control and raising awareness of the local population).
- **Monitoring of the vector control programmes' stage** at each Region/ Regional Unit.
- **Entomological surveillance**: The NPHO/ HCDCP, in collaboration with the Department of Parasitology, Entomology and Tropical Diseases of the National School of Public Health (NSPH), the Benaki Phytopathological Institute, the MALWEST project (2012-2014), Universities, Regions, local authorities and subcontractors of the local mosquito control programmes implemented, participated or coordinated -from 2010 to 2014- active vector surveillance programme. HCDCP/ NPHO recommended to local authorities to perform vector surveillance, and intensify it in the affected areas.
- **Communication with international public health stakeholders:** Frequent communication and weekly information exchange with ECDC (real-time reporting of the diagnosed cases in TESSy).

CONCLUSIONS

In 2010-2014 and 2017 (June - October), cases of West Nile virus infection were recorded in humans in various areas of Greece, while virus circulation was recorded in almost all regions, suggesting that the virus is established in the country.

In 2018, early circulation of WNV and increased number of human cases was recorded, in our country and other countries in Europe, from late May to early November. In 2018, human WNV cases have been recorded in several areas, in the Regional Units (RU, NUTS3 level) of West (Dytiki) Attiki, East (Anatoliki) Attiki, Kentrikos Tomeas Athinon (Central Athens), Voreios Tomeas Athinon, Dytikos Tomeas Athinon, Notios Tomeas Athinon, Evros, Rodopi, Serres, Voiotia, Chalkidiki, Thessaloniki, Evvoia, Imathia, Peiraias (Pireaus) & Nisoi, Pella, Larisa, Fthiotida, Pieria, Corithia, Kilkis, Rethymno, Xanthi and Argolis.

The occurrence of human cases in 2010-2014 and 2017- 2018 suggests that **WNV has been established in our country**; **its circulation and occurrence of cases remain likely and expected in the following transmission periods**, in previously affected and in new areas.

In the transmission period 2018, in the EU Member States and neighboring countries, a higher number of cases were reported compared with transmission seasons in previous years, with the total number of infections (n=2.083) exceeding, by far, the total number from the previous seven years. WNV human cases were also reported -besides Greece- from Italy, Cyprus, Serbia, Romania, Hungary, Kosovo*, France, Croatia, Israel, Czech Republic, Austria, Slovenia, Bulgaria and Turkey (source: ECDC, West Nile Fever).

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.

In this context, it is necessary to maintain the vigilance both of the healthcare professionals and the local and national authorities.

Given the complex epidemiology of the virus, the areas of virus circulation during each transmission season cannot be predicted; thus, **personal protective measures against mosquitoes are strongly encouraged** all over Greece, in each transmission season, during the whole period of mosquito activity.