HELLENIC CENTER FOR DISEASE CONTROL & PREVENTION (H.C.D.C.P.)
MINISTRY OF HEALTH

Annual epidemiological report for West Nile virus human infection, Greece, 2014

This report aims to present an overview of the epidemiological characteristics of the reported human cases of West Nile Virus (WNV) infection in Greece for the transmission period 2014 and the Hellenic Center for Disease Control and Prevention (HCDCP-KEELPNO) public health measures.

The 2014 surveillance data for West Nile virus (WNV) infection in Greece presented in this report was derived from the notifications of laboratory diagnosed (confirmed and probable) human cases of WNV infection sent to the KEELPNO 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 Department of Microbiology, School of Medicine, University of Athens, iii) the Hellenic Pasteur Institute.

The Department of Epidemiological Surveillance and Intervention of KEELPNO investigated all diagnosed cases, within 24 hours after notification, through communication with the treating physicians and the patients, as necessary, in order to identify the suspected place of exposure, the disease characteristics and possible risk factors for infection and severe disease.

In 2014, a total of fifteen (15) laboratory diagnosed cases of WNV infection were reported to KEELPNO, of which 14 presented with neuro-invasive disease (WNND, encephalitis and/or meningitis and/or acute flaccid paralysis) and one case with febrile syndrome (Table 1). A total of six deaths were recorded in patients with WNV infection.

Table 1. Number of reported cases of WNV disease, with and without neuro-invasive disease (WNND), Greece, 2014.

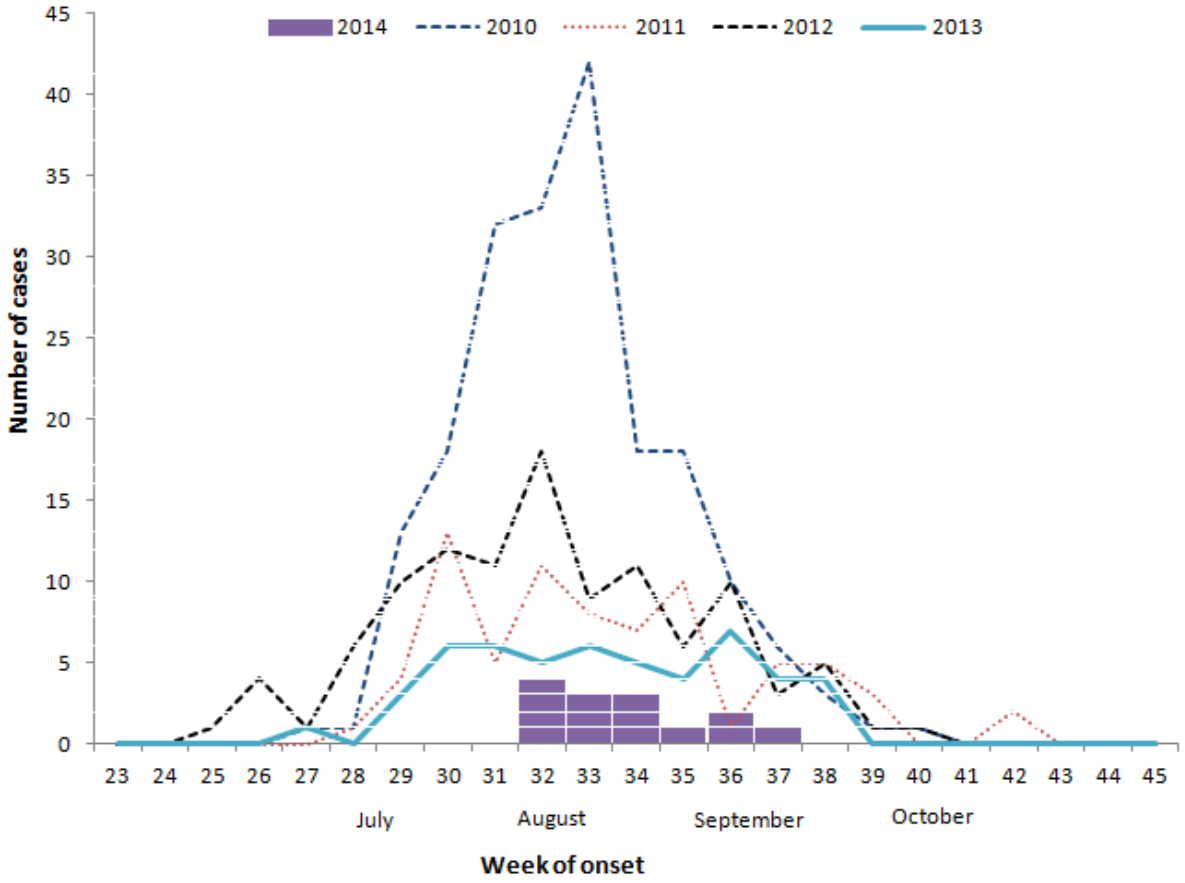
	Number of **cases with** WNND	Number of **cases without** WNND	**Total number of cases**	**Number of deaths** [1]
Number of WNV cases and deaths	14	1	**15**	6

1. The number of deaths is included in the total number of cases

Six out of 15 patients diagnosed with WNV infection in 2014 were hospitalized in an Intensive Care Unit.

Figure 1 shows the reported WNND cases by week of symptom onset. The first laboratory diagnosed case of WNV disease for the 2014 transmission period reported onset of symptoms on 05 August 2014 (wk 32) and the last on 08 September 2014 (wk 37).

Figure 1. Number of laboratory diagnosed WNND cases by week of symptom onset, Greece, 2010 - 2014*



* The blue dotted line = WNND cases reported in 2010, the red dotted line = WNND cases reported in 2011, the black dotted line = WNND cases reported in 2012, the light blue line = WNND cases reported in 2013. Each purple box represents one laboratory diagnosed case of WNND reported to KEELPNO in transmission period 2014.

Table 2 and Figure 2 show the geographic distribution of the notified cases with laboratory diagnosed WNV disease (with and without WNND). The patient's estimated place of exposure is a rough indicator of the area of WNV circulation.

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

Table 2. Reported human cases with laboratory diagnosed WNV disease (with and without WNND) by estimated Municipality of exposure, Greece, 2014 transmission period (n=15).

Regional Unit	Estimated Municipality of exposure	Number of cases with WNND	Incidence of WNND per 100,000 population*	Number of cases without WNND
East Attica	Lavreotiki	1	3,98	0
	Marathon	1	2,99	0
Ileia (Heleia)	Andravida - Killini	2	9,27	0
Rodopi	Iasmos	2	14,48	0
	Komotini	5	7,47	0
	Maroneia-Sapes	1	6,79	0
Xanthi	Avdira	2	10,52	1
Total, Greece		**14**	**0,13**	**1**

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

Figure 2: Map showing the estimated place of exposure of reported cases with laboratory diagnosed WNV infection, Greece, 2014 (n=15)*.

Source: KEELPNO

***Each red dot represents one case with WNND and each blue triangle a case with mild symptoms (without WNND).

During the 2014 WNV transmission period a limited number of human cases of WNV infection were recorded, compared to previous years (2010-2013). In particulae human cases were recorded in 2014 in one new area of WNV circulation (Regional Unit of Rodopi (n=8)), as well as in areas with known circulation of the virus from previous years, such as the Regional Units of Xanthi (n=3), East Attica (n=2) and Ileia (n=2).

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The age of cases in 2014 ranged between 44– 87 years. The median age of WNND cases was 80 years (range: 44-87), while median age of the six lethal cases was 82 years (range: 76-85).

Out of the 14 WNND cases, 10 (71%) were male and 4 (29%) were female. Tables 3 and 4 show the number of WNND cases per age-group and gender and the age- and gender- specific incidence respectively.

Table 3. Number of WNND cases per age-group and age-specific incidence, Greece, 2014 (n=14)

Age-group (years)	Number of cases	Incidence (per 100,000 population)*
40-59	2	0,07
60-69	1	0,09
70-79	4	0,39
≥80	7	1,20

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

Table 4. Number of WNND cases per gender and gender-specific incidence, Greece, 2014 (n=14)

Gender	Number of cases	Incidence (per 100,000 population)*
Male	10	0,19
Female	4	0,07

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

All 14 WNND cases exhibited symptoms of either encephalitis (7 cases) or meningoencephalitis (7 cases), and one patient with encephalitis also had acute flaccid paralysis (polyneuropathy).

According to information from the National Reference Centre for Arboviruses and Hemorrhagic Fever Viruses, Aristotle University of Thessaloniki, WNV lineage 2 (Nea Santa-Greece-2010) circulated during the 2014 transmission period, similar to the virus that was detected in previous transmission periods in the country (2010-2013).

PUBLIC HEALTH MEASURES SUPPORTED BY THE KEELPNO, 2014

The following public health measures were implemented by KEELPNO and other involved stakeholders:

1. **Enhanced surveillance for encephalitis and WNV disease in humans – Communication with health professionals and stakeholders**

   i. **Enhanced surveillance of encephalitis, including suspect cases:** Physicians round the country were informed about WNV infection and were given guidance to test for WNV in all suspected cases (such as cases with encephalitis, aseptic meningitis, acute flaccid paralysis, fever of undetermined

etiology) during the transmission period. KEELPNO provided guidelines for the recognition and diagnosis of WNV disease and the recommended laboratory investigation (mailings and website www.keelpno.gr).

ii. **Enhanced laboratory surveillance -** Daily communication and information exchange with laboratories conducting diagnostic testing for WNV.

iii. **Support of the two reference/diagnostic laboratories** for free of charge testing of suspected cases.

iv. **Case investigation:** The Unit for Vector-borne Diseases of HCDCP undertakes the investigation of every reported WNV human case within 24 hours, in order to determine the estimated place of exposure, the risk factors and the severity of the disease.

v. **Daily update of stakeholders** on the diagnosed cases in order to timely implement preventive measures (Ministry of Health, Ministry of Rural Development and Food, Regions, Directorate of Public Health and Social Welfare, Directorate of Environmental Health, National Centre for Blood Donations, National Transplant Organization, laboratories).

vi. **Daily communication with the local authorities and the health professionals** in areas with WNV circulation recorded through any surveillance system (human, animal, vector).

vii. **Weekly surveillance report on human WNV infection cases** (sent to stakeholders and uploaded on the KEELPNO website).

2. **Communication and health promotion activities for the public:** distribution of leaflets with educational material for the public on the precautions against mosquito bites in collaboration with local authorities, educational material on the KEELPNO website. In 2014, KEELPNO distributed more than 67,500 leaflets in previously affected Regions.

3. **Coordination of an intersector Working Group (WG) on the designation of affected areas by vector borne diseases.** This WG considers all available entomological and epidemiological data and decides on the characterization of affected areas, which is then used by the National Centre for Blood Donations to issue guidance on blood safety. The list of affected municipalities is published on our website (www.keelpno.gr) and updated regularly according to reported cases.

   The WG considered all available data and decided that there was no evidence of WNV circulation in Greece after 12.11.2014, for the 2014 transmission period.

4. **Communication to the National Centre for Blood Donations** (www.ekea.gr) of the list of affected areas in order to issue the necessary blood safety measures to the blood donation units in all hospitals.

5. **Entomological surveillance**: The HCDCP, in collaboration with the Department of Parasitology, Entomology and Tropical Diseases of the National School of Public Health, the MALWEST project, local authorities and the subcontractors of the local mosquito control programs, implemented for the 2014 transmission period active entomological surveillance covering the majority of the country. The entomological surveillance included identification of circulating mosquito species and testing of mosquito pools for WNV (59 adult mosquito traps were placed in 31 Regional Units, in 10 Regions, every 15 days, from June to October 2014). The entomological data were immediately communicated to all national, regional and local stakeholders. According to these findings, the highest mosquito populations were observed throughout Greece during the beginning of August and WNV was detected in mosquitoes from the Regions of Central Macedonia, Attica, Thessaly and Crete.

6. **Raising awareness about vector borne diseases and guidance to Regional Authorities:** KEELPNO communicates regularly with all Regional Authorities in Greece recommending the timely planning, organization and implementation of integrated vector control programmes, identifying the high risk areas.

7. KEELPNO collaborated with the University of Thessaly and a number of other partners for the project: "**Control of West Nile Virus and Malaria- Strengthening of Surveillance in the Greek territory**" (MALWEST project), funded by the NSRF (2007-2013)(www.malwest.gr). Work under this project included the development of geographical information systems (GIS), the strengthening of epidemiological surveillance for both diseases, the mapping of mosquito habitats and mosquito sampling from high-risk areas, the strengthening of wild bird and horse monitoring for WNV transmission, information campaigns addressing the public, especially high-risk groups, and health professionals who are involved directly with the control and treatment of both diseases.
   In the context of this program the following activities were implemented in 2014:
   - Collaboration for the implementation of entomological surveillance (see point 5).
   - E- learning platform for health professionals (www.malwest.gr).

8. Collaboration and exchange of information with the Veterinary Public Health (VPH) services of the Ministry of Rural Development and Food, especially regarding **WNV infection in equidae**.

9. Collaboration and communication with University Schools of Veterinary Medicine, which undertook bird surveillance projects: i. wild bird surveillance conducted by the Faculty of Veterinary Medicine, University of Thessaly and ii. sero-epidemiological surveillance survey of young domestic birds in Central Macedonia Region by the School of Veterinary Medicine, Aristotle University of Thessaloniki.

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

CONCLUSIONS

The 2014 transmission period was the fifth consecutive transmission period with human West Nile virus infection cases recorded in Greece. In the transmission period 2014, the diagnosis of the first human cases occurred relatively late (wk 32) and the total number of the reported cases was much lower than in the previous years.

In 2014, human WNV cases were recorded in the Regional Units of East Attica, Ileia and Xanthi, where the circulation of WNV was known from previous years, as well as in the Regional Unit of Rodopi Thrace, new area of circulation.

In Europe and neighboring countries, during transmission period 2014 cases of WNV disease were also recorded in Israel, Russia, Serbia, Bosnia & Herzegovina, Austria, Romania, Hungary, Palestine and Italy (source: ECDC).