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EPIDEMIOLOGICAL DATA FOR MALARIA IN GREECE

(MANDATORY NOTIFICATION SYSTEM)

Key Points

- The notification rate of malaria in Greece shows an increasing tendency.
- Based on data for the period 2005-2009:
 - The disease had the highest frequency of occurrence among men belonging to the age group 15-44 years old. The notification rate among males (0.4/100,000 population) was 4 times higher than that among females.
 - The disease showed a seasonal trend, presenting an increase during summer months, with a peak in August.
 - Among reported cases, 78% were of foreign origin.
 - Transmission of the disease was related to travel or stay in an endemic country. However, in Greece, the re-appearance of autochthonous cases is possible due to the simultaneous presence of *anopheles* mosquitoes and immigrants from countries, where the disease is endemic.

Malaria is an infectious disease caused by an intracellular protozoan parasite, called plasmodium, which is transmitted via the infected female *Anopheles* sp. mosquito bites. There are 4 species of this plasmodium that can cause infection in humans: *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale* and *Plasmodium malariae*. The disease's symptoms (high fever, chills, headache and myalgia) appear usually between 1 and 4 weeks after infection, whereas relapses of the disease are common, especially following infection with *Plasmodium vivax* [1].

Time trend

The temporal distribution of malaria notification rate for the decade 2000-2009 is presented in Figure 1. During 2009, 51 cases of malaria were reported in Greece, a number that represents a 28% increase compared to the previous year. During the period 2005-2009, 171 cases were reported in total, with the mean annual notification rate reaching 0.3 cases per 100,000 population (mean number of cases per year: 34).

Age and gender distribution

For the period 2005-2009, the disease occurred more frequently in the age group 15-24 years old (0.9/100,000 population), with second in frequency the age group 25-44 years old (0.7/100,000 population) (Figure 2). During the same period, the mean annual notification

rate of the disease among males (0.4/100,000 population) was 4 times higher than the one in females.

Seasonality

Malaria shows an apparent seasonal trend, with the mean rate for the period 2005-2009 increasing steadily during the spring months, peaking in August and subsequently steadily decreasing (Figure 3). This trend is probably related to the *Anopheles* mosquito activity, which peaks during the summer months.

Geographical distribution

During the period 2005-2009, 62% of the cases, were reported in Attica (mean annual notification rate: 0.4/100,000 population), whereas in Central Greece, Northern Greece and the Aegean islands/Crete the mean annual notification rate was 0.1/100,000 population (Figure 4).

Types of pathogen

The most frequently isolated plasmodium during the period 2005-2009, was *P. falciparum*, which was responsible for 54% (n=79) of the reported cases, followed by *P. vivax* (42%, n=61) (Figure 5). In 24 of the cases the type of the plasmodium could not be identified. All cases with *P. falciparum* infection, reported recent traveling to an endemic country, 75% of which in a sub-Saharan Africa country.

Burden of disease

93% of the cases notified during 2005-2009 were hospitalized, whereas 2 deaths were reported, due to *P. falciparum* infection. Malaria, especially the one caused by *P. falciparum*, can lead to severe disease and death. Timely request of medical assistance can significantly improve the disease prognosis.

Risk factors

95% of the cases reported in the country during the period 2005-2009, were probably infected following recent exposure in an endemic country.

During the period 2005-2009, the majority of the cases (78%, n=133) were of foreign origin, of which 40% (n=53) reported recent travel to the country of origin, prior to symptoms onset (Figure 6). Among country of origin, the most frequently reported was Pakistan (21%), followed by Bangladesh (13%), Afghanistan (10%) and Nigeria (10%).

Among cases with recent travel to an endemic area, 79% (n=64) reported that they did not take any kind of chemoprophylaxis. 25% of those that had not taken chemoprophylaxis, had been re-infected in the past. Transmission via blood or blood products transfusion has not been verified for any of the reported cases.

Among reported cases, 16% (n=21) belonged to a high risk occupation, with 43% (n=9) of them being people working in the navy (Figure 6). Regarding the cases of Greek nationality, 44% (n=12) reported high risk occupation, 42% (n=5) of which were people working in the navy (n=5) and 33% (n=4) worked as diplomatic officers.

Conclusions

The notification rate of malaria in Greece presents an increasing trend, which can be assumed to be even higher, taking into account the low clinical awareness levels of the health professionals in Greece, as well as the probable under-reporting of the notification systems.

Almost all cases reported recent travel (up to 10 months prior the symptoms onset) in an endemic for malaria country or were immigrants from such a country, suggesting that the disease transmission took place probably during staying or traveling to an endemic area. However, approximately only one fifth of these cases reported having taken chemoprophylaxis. Increasing awareness and properly educating travelers on the need of appropriate chemoprophylaxis and protection against mosquito bites can significantly contribute to the minimization of the risk for infection during traveling to a malaria-endemic country.

Although the majority of reported malaria cases were due to recent exposure in an endemic for malaria country, the re-emergence of the disease in the country is possible, due to the presence of mosquitoes of the genus *anopheles* [2], as well as due to the presence of undiagnosed cases, i.e. immigrants from countries endemic for malaria. This fact underlines the need for adopting a combined strategy for dealing with the disease, including among others intensifying the mosquitoes control programme, informing the public and increasing the awareness among clinicians in order to achieve more timely diagnosis and treatment of all malaria cases.

References

1. Heymann DL. Control of Communicable Diseases Manual. Washington DC: American Public Health Association; 2008.
2. Vakalis N. et al. Mosquito surveillance and control. In: Tsouros A et al, editors. Mass gatherings and public health. WHO Europe: 2007. p.193-208

Figure 1. Time trend of malaria notification rate, Greece, 2000-2009

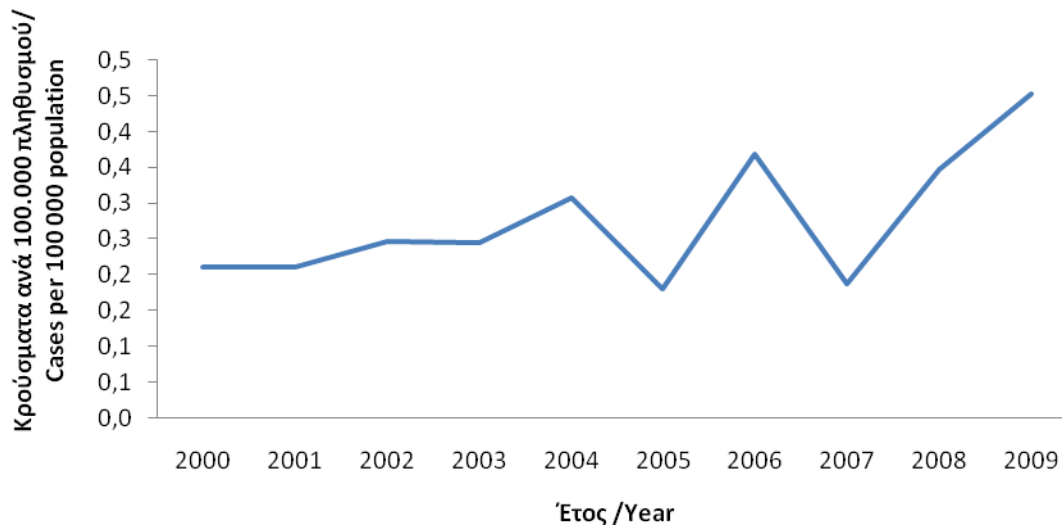


Figure 2. Mean annual notification rate (cases/100,000 population) of malaria by sex and age group, Greece, 2005-2009

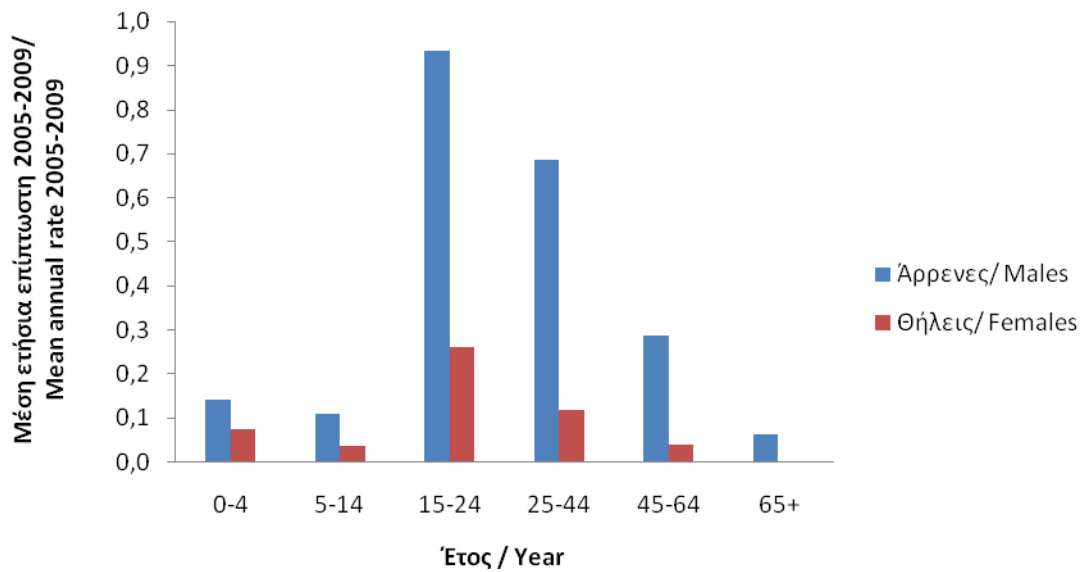


Figure 3. Mean notification rate (cases/100,000 population) of malaria by month, Greece, 2005-2009

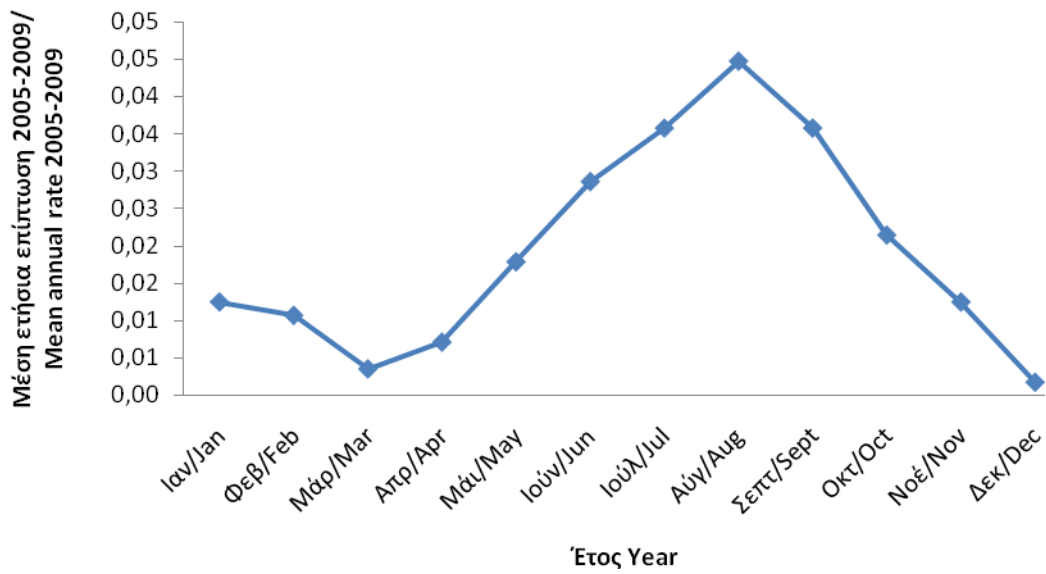


Figure 4. Mean annual notification rate (cases/100,000 population) of malaria by geographical area (NUTS-I), Greece, 2005-2009

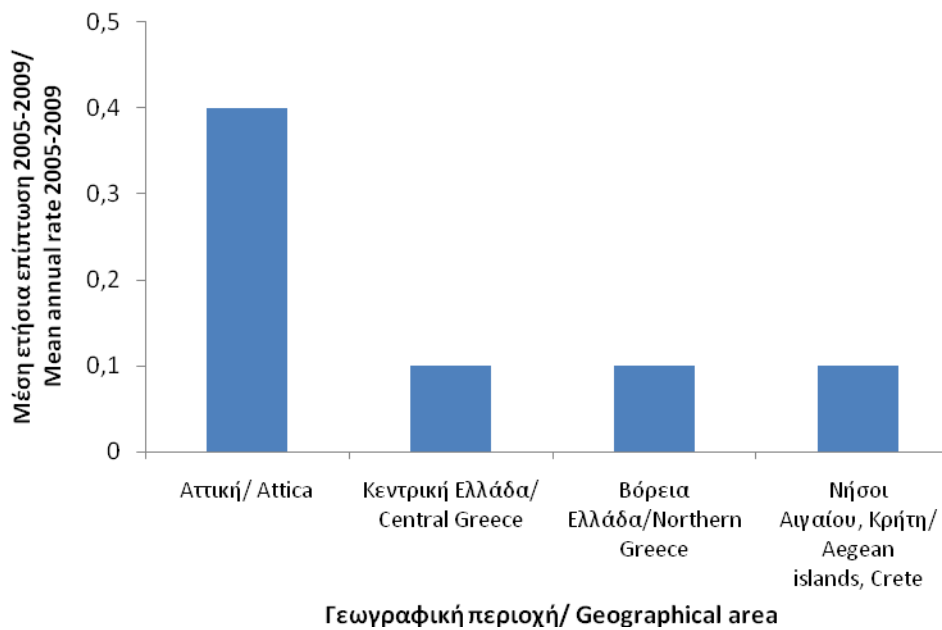


Figure 5. Frequency distribution of malaria notified cases by plasmodium species, Greece, 2005-2009

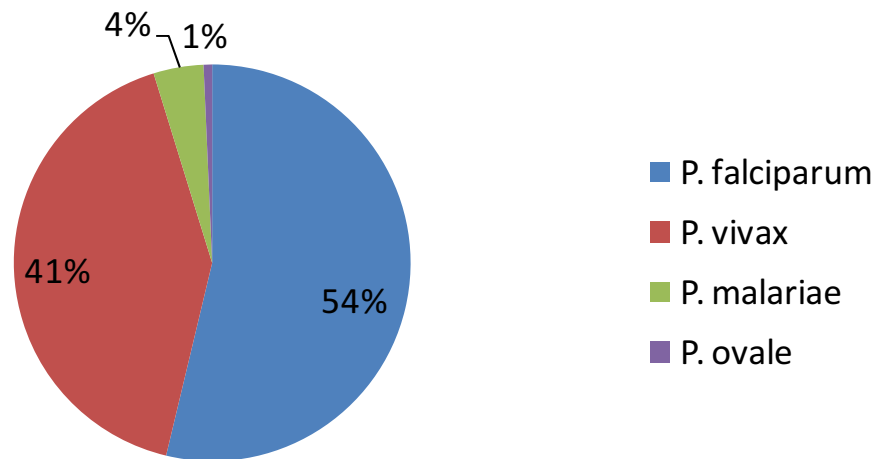
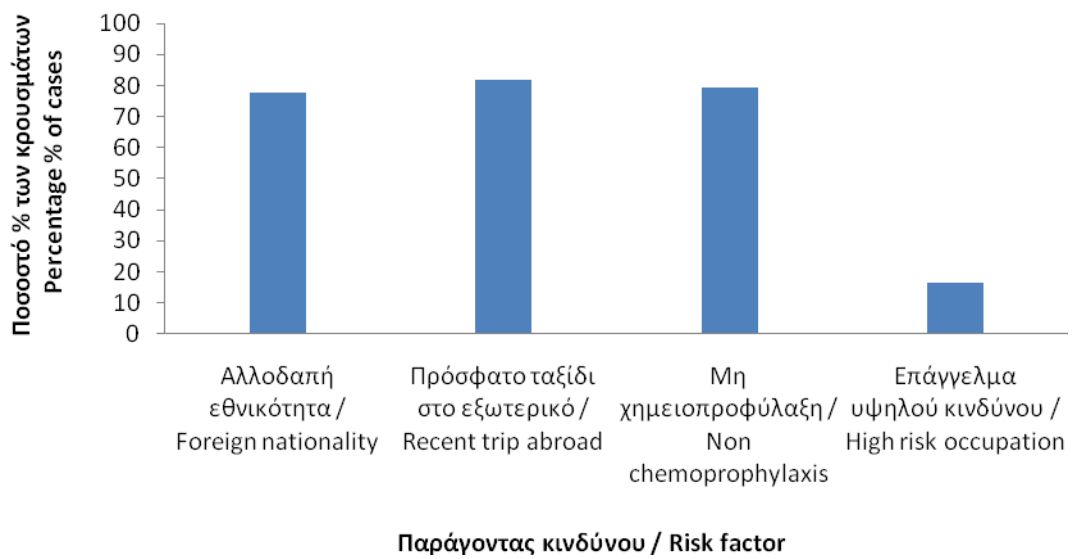


Figure 6. Frequency distribution of malaria notified cases by risk factor, Greece, 2005-2009



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