NATIONAL PUBLIC
HEALTH ORGANIZATION

EPIDEMIOLOGICAL DATA FOR TYPHOID/PARATYPHOID FEVER IN GREECE

2004-2023

MANDATORY NOTIFICATION SYSTEM

Main points

- The notification rate of typhoid/paratyphoid fever in Greece is low.
- Based on the data for the 2004-2023 period:
  - Seventy-seven (44.0%) of the confirmed cases had traveled abroad during the incubation period
  - Travel-related cases were mainly foreigners who had traveled to their home country (VFRs, Visiting Friends or Relatives)
  - A seasonal pattern was apparent; the mean monthly notification rate reached a peak in August

Typhoid fever is a systematic disease, caused by *Salmonella* Typhi. The incubation period of the disease is 3-40 days. Paratyphoid fever is also a systematic disease, with an incubation period of 7-10 days. It is caused by *Salmonella* Paratyphi, for which three types have been identified; A, B and C [1]. Humans get infected after consuming contaminated food or water. Two to 5% of the cases become chronic carriers. Chronic carriage is more frequent among *S.* Typhi cases than it is among *S*. Paratyphi B cases. Paratyphi A and C have only short-term carriers.

Time trend

The number of notified cases for the period 2004-2023 is shown in **Table 1**. Out of the 190 reported cases, 113 (59.5%) were typhoid and 77 (40.5%) were paratyphoid cases. Time trend of the typhoid/paratyphoid fever notification rate is depicted in **Graph 1**.

The annual notification rate for typhoid/paratyphoid fever for the period 2004-2023, ranged from 0.2 cases in 2021 to 1.8 cases per 1,000,000 population in 2004 and 2005, respectively. The mean annual notification rate for typhoid/paratyphoid fever for the same period was 1

(standard deviation: ±0.52) case per 1,000,000 population and the mean annual number of reported cases was 9.5 (standard deviation: ±5.71).
Notification rates of typhoid and paratyphoid fever were 0.52 and 0.35 cases per 1,000,000, respectively.

Age and gender distribution

For the 2004-2023 period, the disease had a higher mean annual notification rate in the age group 0-4 years (3.34 cases per 1,000,000 population), followed by the age group of 5-14 years (1.44 cases per 1,000,000 population) (**Graph 2**).

The mean annual notification rate for typhoid/paratyphoid fever for the same period was 1.18/1,000,000 in males and 0.56/1,000,000 in females.

As shown in **Table 2**, the majority of foreigners (nationality other than Greek) (83.3%) were males and 51.6% of them were between 25 and 44 years old.

Seasonality

The mean monthly notification rate for the period 2004-2023 was higher during summer months reaching a peak in August (**Graph 3**).

Geographical distribution

The geographical area of Epirus had the highest mean annual notification rate for 2004-2023 (1.76 cases per 1,000,000 population), and the areas of Peloponnesos and Central Macedonia had the lowest (0.26 cases per 1,000,000 population). **Figure 1** depicts the mean annual notification rate of typhoid/paratyphoid fever by region for the period 2004-2023.

Laboratory data

All notified cases during this period were laboratory-confirmed. *S.* Paratyphi type A was identified in 34 (53,9%) out of the 63 cases that the respective information was known and *S.* Paratyphi type B in 29 (46.1%).

It should be noted that the presented data here regard the cases reported via the Mandatory Notification System. For some of them the respective information from the reference laboratory is available while for others it is not. Data on the total number of

isolates serotyped at the National Reference Centre for *Salmonella* and *Shigella* can be found at: http://www.mednet.gr/whonet/.

Risk factors

Ninety-six (51.6%) of the laboratory-confirmed cases that were notified during 2004-2023 were of foreign nationality. Seventy-seven (44.0%) of the reported cases, had traveled abroad during the incubation period; nine Greeks and 60 foreigners (**Table 3**), out of the sixty-nine cases with the respective information available. Traveling abroad mainly regarded migrants, who had traveled to their country of origin prior to disease onset (VFRs, Visiting Friends or Relatives) (86.7%). Fourteen (7.8%) cases reported the presence of another person with similar symptoms among their contacts.

Discussion

Typhoid and paratyphoid fever present a low notification rate in Greece (0.5 case/1,000,000 population for the year 2023). The mean notification rate in the EU and EEA countries (excluding UK) was 1.7 cases per 1,000,000 population for the year 2022 [2].

The high proportion of imported cases is consistent with data reported by other European countries [3-6]. This finding agrees with the fact that the majority of the economical migrants in the country are young adult men.

The low notification rate of typhoid/paratyphoid fever in the period 2020-2021 may be explained by the COVID-19 pandemic during which, among other public health measures that were implemented, the frequency of travelling to other countries decreased. This finding is compatible with those of other European countries [2]. The notification rate of the disease remained low in 2022, despite the slight observed increase.

References

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3. Clark TW, Daneshvar C, Pareek M, Perera N, Stephenson I. Enteric fever in a UK regional infectious diseases unit: a 10-year retrospective review. J Infect. 2010;60(2):91-98.

4. Gil R, Alvarez JL,Gomez C, Alvaro A, Gil A. Epidemiology of typhoid and paratyphoid fever hospitalizations in Spain (1997-2005). Hum Vaccin. 2009;5(6):420-424.

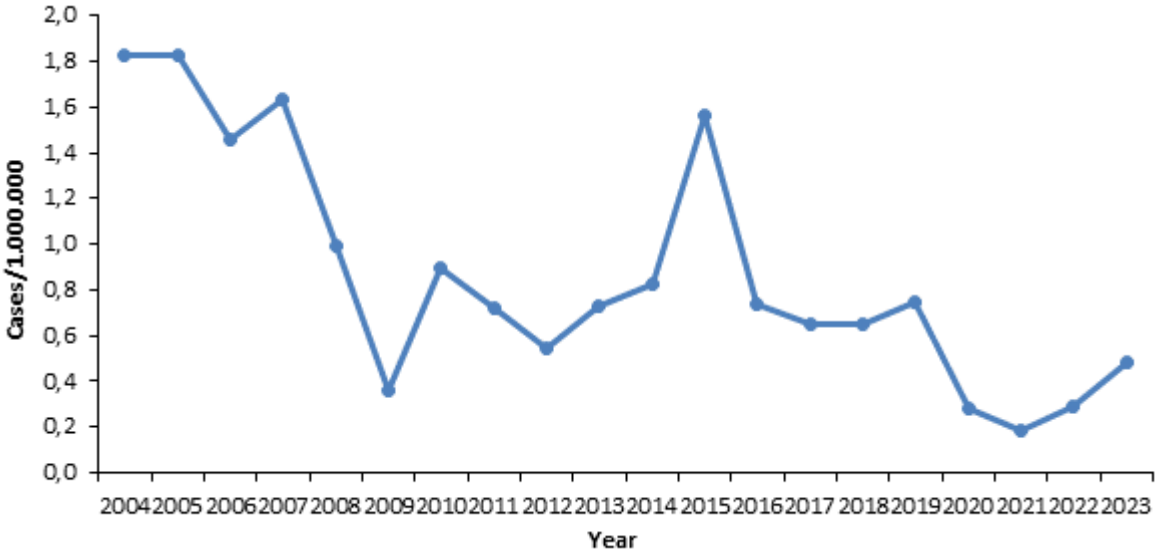
5. Keller A, Frey M, Schmid H, Steff en R, Walker T, Schlagenhauf P. Imported typhoid fever in Switzerland, 1993 to 2004. J Travel Med. 2008;15(4):248-251.

6. Maltezou HC, Patrinos S, Veneti L, Gkolfinopoulou K, Pavli A, Mellou K, Sideroglou T, Spilioti A, Georgakopoulou T. Hepatitis A and enteric fever in Greece, 2004-2011: a cross-sectional analysis. Travel Med Infect Dis 2014 Mar-Apr;12(2):143-8.

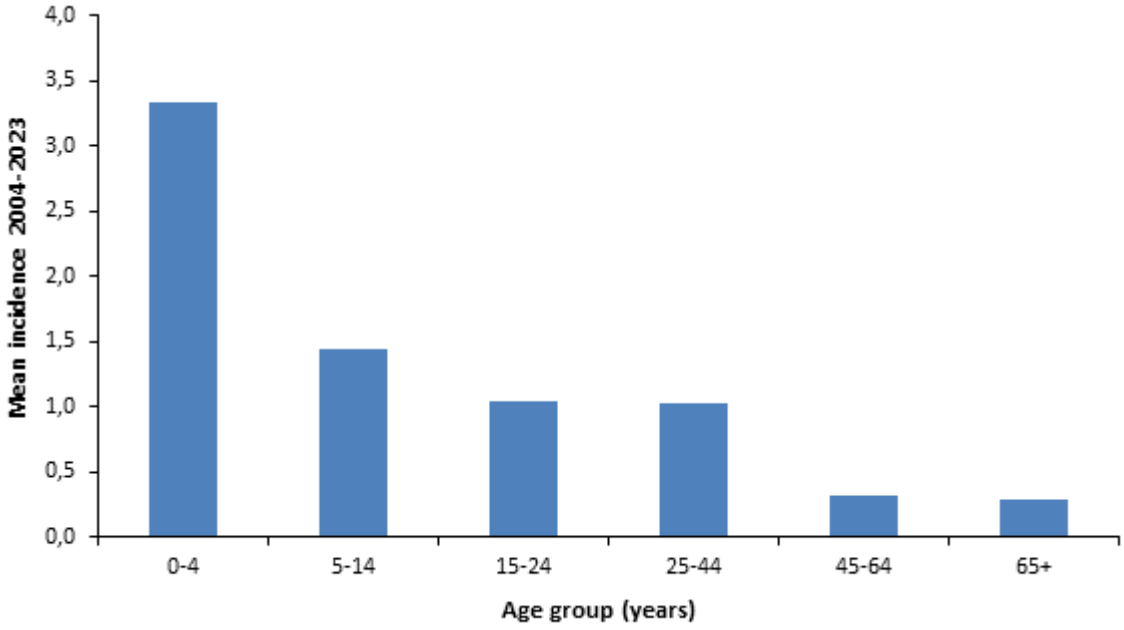
Table 1. Number of reported cases of typhoid/paratyphoid fever, Mandatory Notification System, Greece, 2004-2023.

Year	Number of cases		Total
	Typhoid fever	Paratyphoid fever	
2004	14	6	20
2005	15	5	20
2006	10	6	16
2007	6	12	18
2008	8	3	11
2009	4	0	4
2010	6	4	10
2011	5	3	8
2012	4	2	6
2013	5	3	8
2014	3	6	9
2015	3	14	17
2016	4	4	8
2017	3	4	7
2018	7	0	7
2019	7	1	8
2020	2	1	3
2021	1	1	3

2022	2	1	3
2023	4	1	5
Total	**113**	**77**	**190**



Graph 1. Time trend of typhoid/paratyphoid fever notification rate (number of cases/1,000,000 population) in Greece, Mandatory Notification System, 2004-2023.

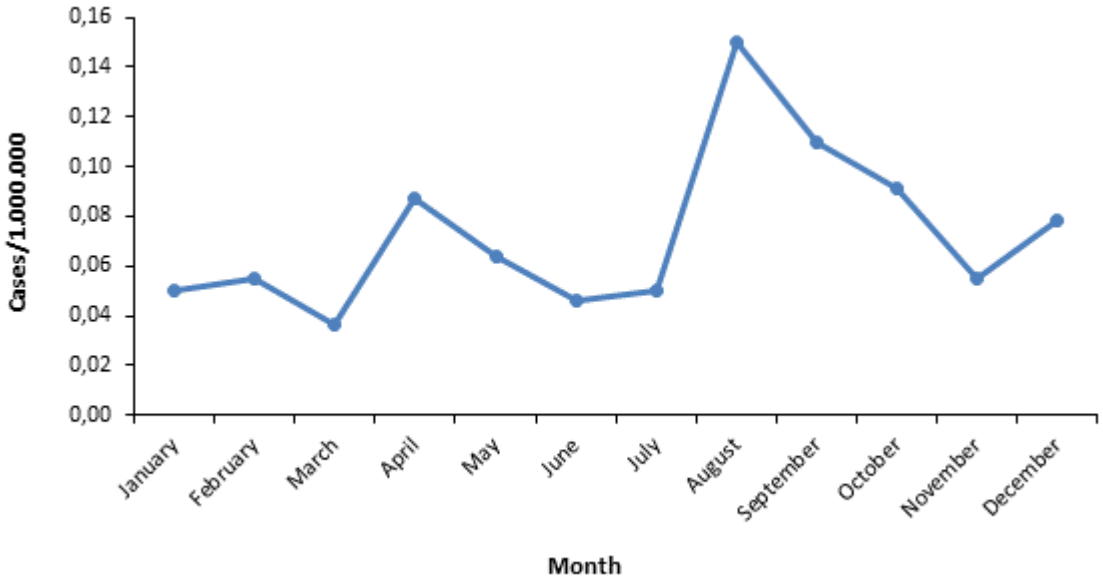


Graph 2. Mean notification rate of typhoid/paratyphoid fever (number of cases/1,000,000 population) in Greece by age group, Mandatory Notification System, 2004-2023.

Table 2. Distribution of typhoid/paratyphoid fever cases by age and gender in Greeks and people of foreign nationality, Mandatory Notification System, Greece, 2004-2023.

	Greeks n (%)*	Foreigners n (%)*	Total n (%)*
Gender			
Male	45 (50.0%)	80 (83.33%)	125 (66.84%)
Female	45 (50.0%)	16 (16.67%)	61 (32.62%)
Age groups (years)†			
0-4	22 (24.7%)	12 (12.6%)	34 (18.5%)
5-14	20 (22.5%)	11 (11.6%)	31 (16.8%)
15-24	10 (11.2%)	16 (16.8%)	26 (14.1%)
25-44	15 (16.9%)	49 (51.6%)	64 (34.8%)
45-64	10 (12.4%)	7 (7.4%)	18 (9.8%)
65+	11 (12.4%)	0 (0.0%)	11 (6.0%)

*n = number of cases. %= percentage
†for the cases that the respective information was available



Graph 3. Mean notification rate of typhoid/paratyphoid fever (number of cases/1,000,000 population) by month, Mandatory Notification System, Greece, 2004-2023.

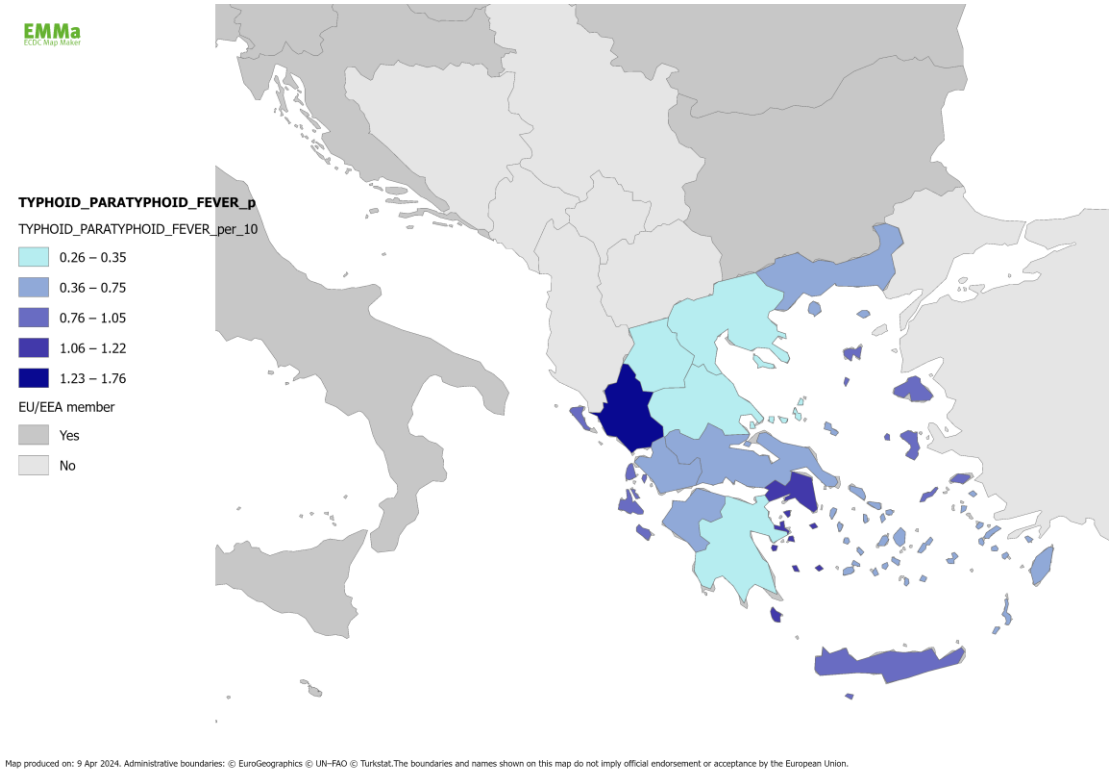


Figure 1. Mean annual notification rate (cases/1,000,000 population) of typhoid/paratyphoid fever by region, Mandatory Notification System, Greece, 2004-2023.

Table 3. Distribution of travel-related typhoid/paratyphoid fever cases by country of destination among Greeks and people of foreign nationality, Mandatory Notification System, Greece, 2004-2023.

Country	Foreigners n (%) *	Greeks n (%) *
Pakistan	28 (46.7)	1 (11.1)
India	16 (26.7)	4 (44.4)
Turkey	4 (6.7)	0 (0)
Bangladesh	5 (8.3)	0 (0)
Afghanistan	2 (3.3)	0 (0)
Nigeria	1 (1.7)	0 (0)
Nepal	1 (1.7)	1 (11.1)
Panama	1 (1.7)	0 (0)
Anguilla	1 (1.7)	0 (0)
Israel	1 (1.7)	0 (0)
Swaziland	0 (0)	1 (11.1)

Bulgaria	0 (0)	1 (11.1)
Peru	0 (0)	1 (11.1)
Total	**60 (100)**	**9 (100)**

*n = number of cases, % = percentage

Last updated: April 2024