



EPIDEMIOLOGICAL DATA OF SHIGA TOXIN-PRODUCING *E. COLI* INFECTION (STEC)

GREECE, 2004-2024

MANDATORY NOTIFICATION SYSTEM

Main points

- The notification rate of Shiga-toxin producing *E. coli* infection (STEC) in Greece is low.
- During the 2004-2024 period 98 cases were reported.
- In 2020, a waterborne gastroenteritis outbreak of mixed aetiology was notified and investigated. STEC and *E. coli* O157 were detected among other pathogens in clinical samples.
- During the period 2021-2024, an increase in the number of reported cases was noticed, probably due to the revised case definition of the disease and the more frequent use of culture-independent diagnostic tests. During the same period, 92% of the cases were diagnosed with CIDTs, while during 2004-2020, the corresponding percentage was 21%.
- The interpretation of the low notification rate of the disease should consider the surveillance systems' probable under-reporting, the differences of the laboratory capacity for the diagnosis of the disease and the different dietary habits of the populations among countries.

Escherichia coli is a Gram-negative, rod-shaped bacterium that belongs to the Enterobacteriaceae family. The terms “Enterohaemorrhagic *E. coli* (EHEC)”, “Shiga-toxin-producing *E. coli* (STEC)” and “Vero-toxin-producing *E. coli* (VTEC)” have all been used to describe a group of strains which can produce toxins like the one produced by *Shigella*

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dysenteriae (Shiga-toxin). An important characteristic of this serogroup is its inability to ferment sorbitol. There have been identified about 200 different serotypes of STEC, out of which more than 100 have been implicated with the occurrence of disease in humans. Apart from the O157:H7 serovar, which is considered the most clinically important, other serovars, such as O26, O103, O91, O145, O146 and O128 can produce toxins and cause similar clinical conditions [1].

Similarly, the serotype that has been implicated for most outbreaks worldwide is O157:H7 [2]. However, there have been outbreaks caused by different serotypes, like the O104:H4 serotype that was the causative agent of a large outbreak in Germany and the other European countries in May 2011 [3-5]. The STEC infection can cause severe bloody diarrhoea and abdominal cramps. Sometimes, diarrhoea can be non-haemorrhagic or the infection can be subclinical. In some cases, especially in children below five years old and in the elderly, becoming infected can lead to Haemolytic Uraemic Syndrome (HUS), a complication characterized by red cells destruction and probable renal failure [1]. The disease was introduced in the mandatory notification system in Greece in 2004. In 2018, the European case definition for STEC infection changed and the laboratory criteria were updated by the European Commission [6].

Time trend

The mean annual notification rate of STEC infection for the period 2004-2024 was 0.4 cases per 1,000,000 population. In total, 98 cases were reported, 53 (54.1%) of which females. The median age of the cases was 33.7 years (minimum: 0 - maximum: 87). The distribution of the reported cases per year for the period 2004-2024 is presented in **Table 1**.

In 2020, a waterborne gastroenteritis outbreak of mixed aetiology was notified and investigated in the Peloponnese Region. STEC and *E. coli* O157 were detected among other pathogens in clinical samples. In the case-control study conducted, consumption of tap water (OR = 10.9, 95% CI = 3.1-38.0, $p < 0.001$) and ice cubes (OR = 39.3, 95% CI = 10.3-150.9, $p < 0.001$) were independently associated with the onset of gastroenteritis [7].

During the period 2021-2024, an increase in the number of notified cases was noticed. Epidemiological investigation did not reveal a link among the cases. This increase can probably be attributed to the introduction of the revised case definition, in 2021 in the

country and the more frequent use of culture-independent diagnostic tests (CIDTs) in recent years in Greek Health Care Facilities (HCFs). It should be noted that during the period 2021-2024, 92% of the cases were diagnosed with CIDTs, while during the period 2004-2020, the corresponding percentage was 21% (79% of the cases were diagnosed with a clinical sample culture).

In addition, in 2023, the laboratory capacity of diagnosis of STEC infection in the (HCFs) of the Region of Thessaly was enhanced, in the context of prompt response in terms of public health protection, after the floods in the affected area. This fact may also partially explain the increase in the reported incidence of the disease in 2023.

Conclusion

According to the latest data published by the European Centre for Disease Prevention and Control (ECDC), the mean annual notification rate in EU/EEA (European Union/European Economic Area without UK) countries, in 2023, was 32 cases per 1,000,000 population [8]. When interpreting the difference from the notification rate in Greece (2.7 cases per 1,000,000 population in 2024), it should be considered that the surveillance systems' probable under-reporting, the laboratory capacity for the diagnosis of the disease and the dietary habits of the populations may vary among countries [9]. The interpretation of the observed increase in the reported incidence of STEC infection based on the use of CIDTs in the diagnosis of the disease is a finding that has been reported in other countries as well [10].

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Table 1. Annual distribution of notified cases of Shiga-toxin producing *E. coli* (STEC) infection in Greece, Mandatory Notification System, 2004-2024.

Year	Number of reported cases
2004	2
2005	0
2006	1
2007	1
2008	0
2009	0
2010	1
2011	1
2012	0
2013	2
2014	1
2015	1
2016	2
2017	3
2018	1
2019	5
2020	3
2021*	10
2022	14
2023	22
2024	28
Total	98

*A revised case definition was used in 2021

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