



## SURVEILLANCE REPORT

Annual Epidemiological Report for 2015

# Shigatoxin/verocytotoxin-producing *Escherichia coli* (STEC/VTEC) infection

### Key facts

- In 2015, 6 151 confirmed cases of infections with Shigatoxin/verocytotoxin-producing *Escherichia coli* (STEC/VTEC) were reported in the EU/EEA.
- The EU/EEA notification rate was 1.5 cases per 100 000 population.
- The highest confirmed case rates were observed in 0–4-year-old children (7.8 cases per 100 000 population).
- The EU/EEA rate per 100 000 population increased during 2011 but has stabilised since 2012.
- The highest notification rates were reported in Ireland, Sweden, the Netherlands and Denmark.

### Methods

This report is based on data for 2015 retrieved from The European Surveillance System (TESSy) on 1 May 2017 and additional information from epidemic intelligence. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases. EU Member States and EEA countries contribute to the system by uploading their infectious disease surveillance data at regular intervals [1].

An overview of the national surveillance systems is available online [2].

A subset of the data used for this report is available through the interactive *Surveillance atlas of infectious diseases* [3].

In 2015, 30 EU/EEA countries reported data on STEC/VTEC infections. Fourteen of the 30 countries used the latest case definition (EU 2012), nine countries reported in accordance with the previous case definition (EU 2008), and seven countries reported using other definitions or did not specify which case definition they used.

The notification of STEC/VTEC infections is mandatory in most EU/EEA countries except for six Member States where notification is either voluntary (Belgium, France, Italy, Luxembourg and Spain) or based on another type of system (United Kingdom). The surveillance systems for STEC/VTEC infections have full national coverage in all EU/EEA countries except for Belgium, France and Italy. The majority of EU/EEA countries (24 of 30) have a passive surveillance system, and in 21 countries cases were reported by both laboratories and physicians and/or hospitals. Five countries have only laboratory-based reporting. In France, the STEC/VTEC surveillance is centred on paediatric haemolytic-uraemic syndrome (HUS) surveillance, and in Italy it is primarily based on the national registry of HUS [2]. Twenty-nine EU/EEA countries reported case-based data, and one country reported aggregated data.

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In addition to case-based surveillance, ECDC coordinates molecular surveillance of STEC/VTEC through isolate-based data collection. A typing-based multi-country cluster of STEC/VTEC is defined as at least two countries reporting at least one isolate each with matching XbaI pulsotypes, with reports a maximum of eight weeks apart.

## Epidemiology

For 2015, 6 246 cases of STEC/VTEC infections were reported by 30 EU/EEA countries. Of these cases, 6 151 were confirmed. Twenty-four countries reported at least one confirmed case, and six countries reported zero cases. The EU/EEA notification rate was 1.5 cases per 100 000 population, which is at the same level as in the previous three years.

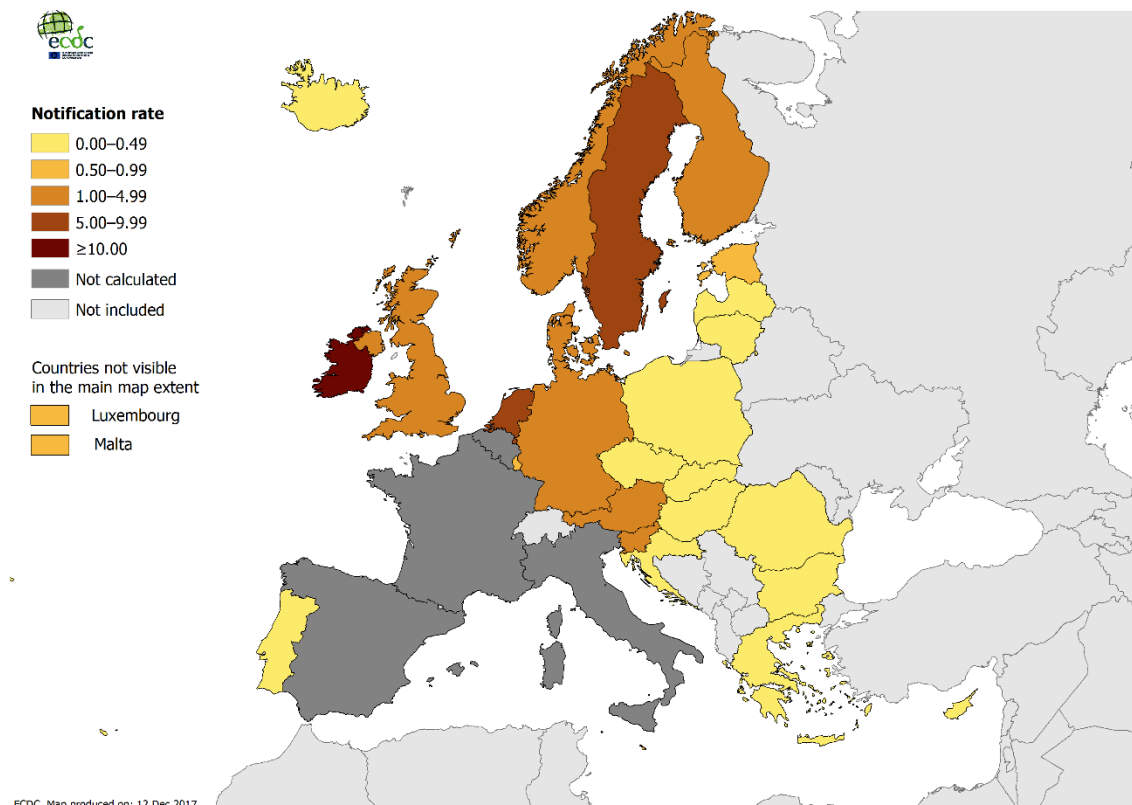
The highest country-specific notification rates were observed in Ireland, Sweden, the Netherlands and Denmark, with 12.9, 5.7, 5.1, and 3.6 cases per 100 000 population, respectively (Table 1 and Figure 1). Nine countries reported  $\leq 0.1$  cases per 100 000 population.

**Table 1. Distribution of confirmed cases of confirmed STEC/VTEC cases, EU/EEA, 2011–2015**

Country	2011		2012		2013		2014		National coverage	Reported cases	2015		
	Confirmed cases		Confirmed cases		Confirmed cases		Confirmed cases				Confirmed cases		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate			Number	Rate	ASR
Austria	120	1.4	130	1.5	130	1.5	131	1.5	Y	107	107	1.2	1.3
Belgium	100	-	105	-	117	-	0	-	N	100	100	-	-
Bulgaria	1	0.0	0	0.0	1	0.0	0	0.0	Y	0	0	0.0	0.0
Croatia	.	.	0	0.0	0	0.0	4	0.1	Y	0	0	0.0	0.0
Cyprus	0	0.0	0	0.0	0	0.0	0	0.0	Y	0	0	0.0	0.0
Czech Republic	7	0.1	9	0.1	17	0.2	29	0.3	Y	26	26	0.2	0.2
Denmark	215	3.9	199	3.6	191	3.4	226	4.0	Y	229	201	3.6	3.5
Estonia	4	0.3	3	0.2	8	0.6	6	0.5	Y	8	8	0.6	0.6
Finland	27	0.5	32	0.6	98	1.8	64	1.2	Y	74	74	1.4	1.4
France	221	-	208	-	218	-	221	-	N	262	262	-	-
Germany	5558	6.9	1573	2.0	1639	2.0	1663	2.1	Y	1647	1616	2.0	2.2
Greece	1	0.0	0	0.0	2	0.0	1	0.0	Y	1	1	0.0	0.0
Hungary	11	0.1	3	0.0	13	0.1	18	0.2	Y	15	15	0.2	0.2
Ireland	275	6.0	412	9.0	564	12.3	572	12.4	Y	625	598	12.9	11.5
Italy	51	-	50	-	64	-	68	-	N	68	59	-	-
Latvia	0	0.0	0	0.0	0	0.0	0	0.0	Y	4	4	0.2	0.2
Lithuania	0	0.0	2	0.1	6	0.2	1	0.0	Y	3	3	0.1	0.1
Luxembourg	14	2.7	21	4.0	10	1.9	3	0.5	Y	4	4	0.7	0.8
Malta	2	0.5	1	0.2	2	0.5	5	1.2	Y	4	4	0.9	0.9
Netherlands	845	5.1	1049	6.3	1184	7.1	919	5.5	Y	858	858	5.1	5.1
Poland	5	0.0	3	0.0	5	0.0	5	0.0	Y	0	0	0.0	0.0
Portugal	.	.	.	.	.	.	.	.	Y	0	0	0.0	0.0
Romania	2	0.0	1	0.0	6	0.0	2	0.0	Y	0	0	0.0	0.0
Slovakia	5	0.1	9	0.2	7	0.1	2	0.0	Y	1	1	0.0	0.0
Slovenia	25	1.2	29	1.4	17	0.8	29	1.4	Y	23	23	1.1	1.2
Spain	20	0.0	32	0.1	28	0.1	50	0.1	Y	86	86	0.2	0.2
Sweden	477	5.1	472	5.0	551	5.8	472	4.9	Y	551	551	5.7	5.6
United Kingdom	1501	2.4	1337	2.1	1164	1.8	1324	2.1	Y	1328	1328	2.0	2.0
EU	9487	2.6	5680	1.5	6042	1.6	5815	1.5	.	6024	5929	1.5	1.5
Iceland	2	0.6	1	0.3	3	0.9	3	0.9	Y	1	1	0.3	0.2
Liechtenstein	.	.	.	.	.	.	.	.	.	.	.	.	.
Norway	47	1.0	75	1.5	103	2.0	151	3.0	Y	221	221	4.3	4.2
EU/EEA	9536	2.6	5756	1.5	6148	1.6	5969	1.6	.	6246	6151	1.5	1.5

Source: Country reports. Legend: Y = yes, . = no data reported, ASR = age-standardised rate, - = no notification rate calculated

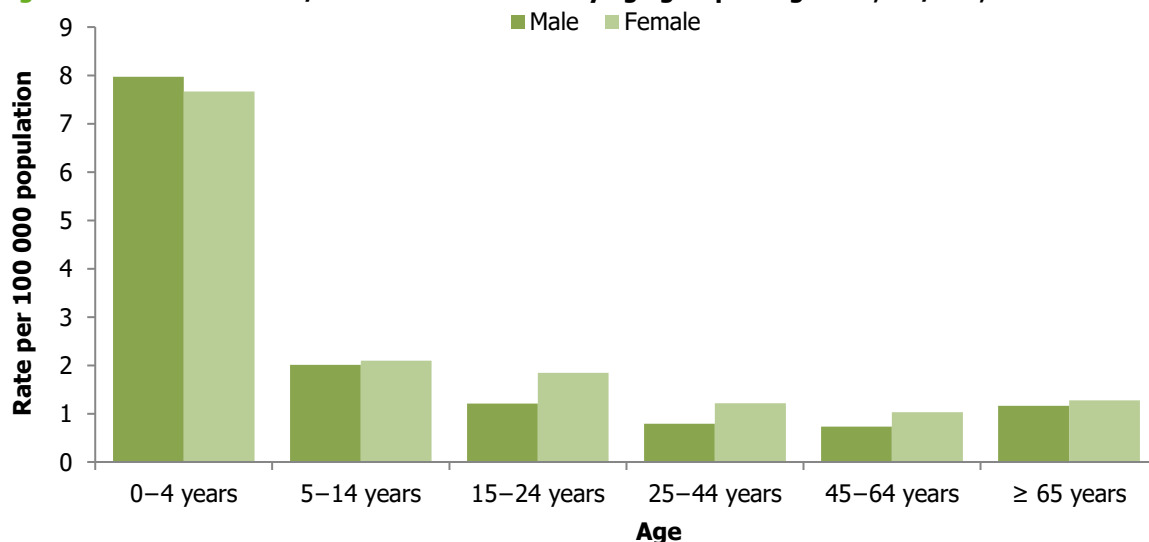
**Figure 1. Distribution of confirmed STEC/VTEC infection cases, EU/EEA, 2015**



Source: Country reports from Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

Of 6 139 confirmed cases with known gender in 2015, 55% were female. The male-to-female ratio was 0.8:1. The highest rate of confirmed cases was reported in the age group 0–4 years for both genders (7.8 cases per 100 000 population), and particularly in males (8.0 cases per 100 000 population). The notification rate in the age-group 0–4 years is four to nine times higher than rate in the older age groups (Figure 2).

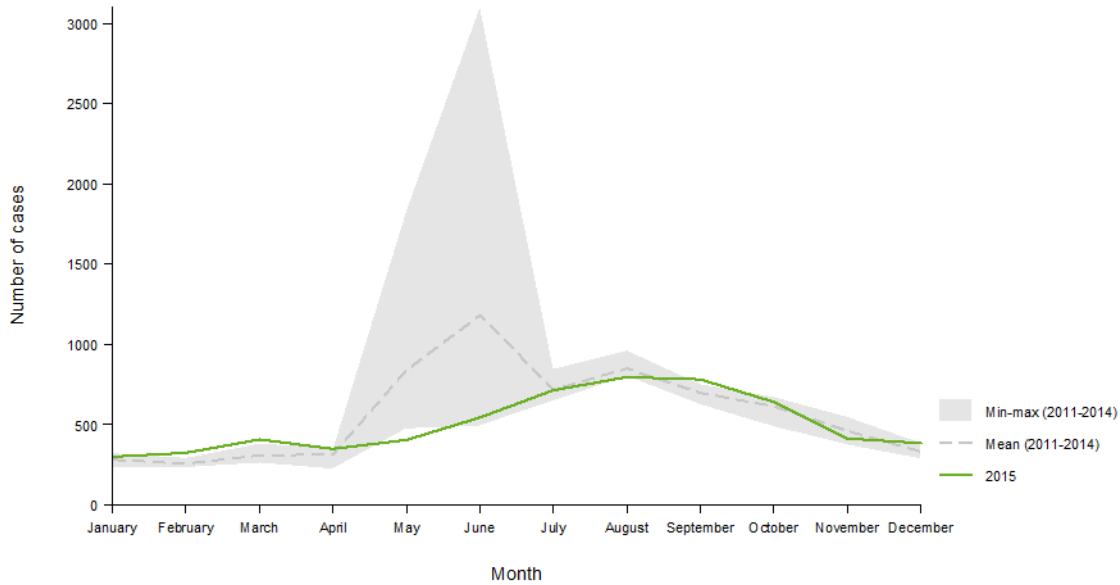
**Figure 2. Confirmed STEC/VTEC infection cases by age group and gender, EU/EEA, 2015**



Source: Country reports from Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

A clear seasonal trend in confirmed STEC/VTEC cases was reported in the EU/EEA between 2011 and 2015, with more cases reported during the summer months (Figure 3).

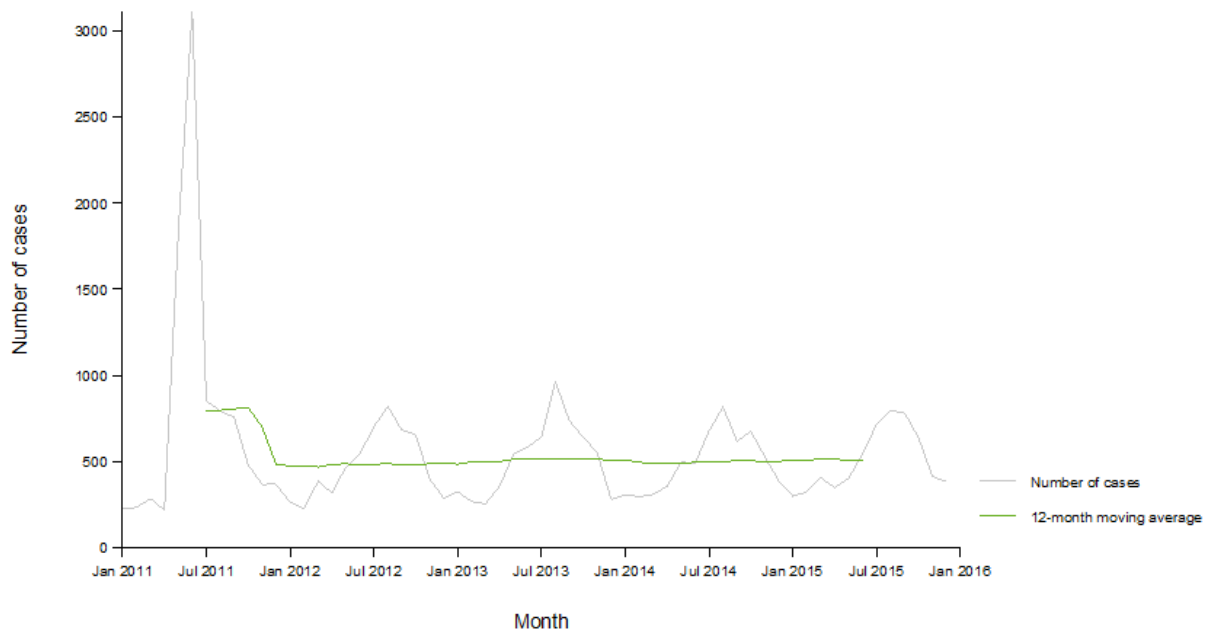
**Figure 3. Confirmed STEC/VTEC infection cases by month, EU/EEA, 2015 compared with 2011–2014**



Source: Country reports from Belgium, Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

The prominent peak of STEC/VTEC cases (Figure 4) in the summer of 2011 was due to the large STEC O104:H4 outbreak affecting more than 3 800 people in Germany alone, with additional cases in 15 other countries [4]. There was a clear increase in the trend in 2012 compared with the situation before the outbreak in 2010, but the trend stabilised in 2012–2015.

**Figure 4. Reported confirmed STEC/VTEC infection cases: trend and case numbers, EU/EEA, 2011–2015**



Source: Country reports from Belgium, Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

## Molecular typing – enhanced surveillance

In 2015, nine countries submitted STEC/VTEC typing data to ECDC. Two small multi-country clusters involving rare STEC/VTEC PFGE types were detected. One of these two, with three isolates from two Member States, was caused by VTEC O157 PFGE XbaI type 0129.

## Threats description for 2015

No STEC/VTEC-related multi-country threats were detected by event-based surveillance in 2015.

## Discussion

In 2015, STEC/VTEC was the fourth most commonly reported zoonosis in the EU [5]. From 2007 to 2010, the EU/EEA notification rate was below 1.0 STEC/VTEC cases per 100 000 population. In the summer of 2011, a large enteroaggregative Shiga toxin-producing *E. coli* (STEC) O104:H4 outbreak was associated with the consumption of contaminated raw sprouted fenugreek seeds. More than 3 800 persons in Germany were affected, with linked cases in another 15 countries [4]. In 2012, a 1.8-fold increase in the EU/EEA notification rate was observed compared with the years before the outbreak, partly due to increased awareness, increased use of PCR for the detection of VTEC in stool samples, and an increasing number of laboratories testing for serogroups other than O157 [6]. The EU/EEA notification rate for human STEC/VTEC infections has since stabilised.

Surveillance of STEC/VTEC infections is mandatory and covers the whole population in most EU/EEA countries. In two countries, however, surveillance only covers cases of haemolytic-uraemic syndrome (HUS), which mainly affects children and is characterised by acute kidney failure and requires hospital care.

The STEC/VTEC serogroups most frequently found in food samples are those most commonly reported in human infections, with serotype O157 representing about half of the cases [5-7]. Most human cases are sporadic. In 2015, STEC/VTEC was reported as the causative agent in four outbreaks with known food source, accounting for 1.2% of all the foodborne outbreaks reported at the EU level [5]. Three of these outbreaks were caused by STEC/VTEC O157. The food vehicles implicated were 'mixed leaf lettuce and raw minced lamb' (one outbreak), 'chicken burgers and beef burgers' (one outbreak) and 'various meat products' (one outbreak).

In 2015, the average proportion of hospitalised STEC/VTEC cases was relatively high (40%) [5]. The highest proportions of hospitalised cases were reported in a Member State with a HUS-focused surveillance system and in countries reporting the lowest notification rates, indicating that several countries – in addition to the two countries for which this is known – seem to focus on the surveillance of the most severe cases. The age group affected the most by STEC/VTEC were infants and children up to 4 years of age, who accounted for almost one-third of all confirmed cases in 2015. This was also seen in the HUS cases, where two thirds of the cases were reported in patients who were 0–4 years old [5].

## Public health implications

As STEC/VTEC infection is mainly acquired by contact with animals and/or their faeces and by consuming contaminated food, good hygiene practices in premises dealing with animals and food processing can decrease the risk of infection. In 2015, no STEC/VTEC-positive samples were reported for sprouted seeds, the sole food category for which microbiological criteria for STEC/VTEC have been established in the EU after the 2011 outbreak [2]. Adequate cooking of food, particularly beef, and the use of pasteurised milk further reduce the risk of foodborne STEC/VTEC infections.

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