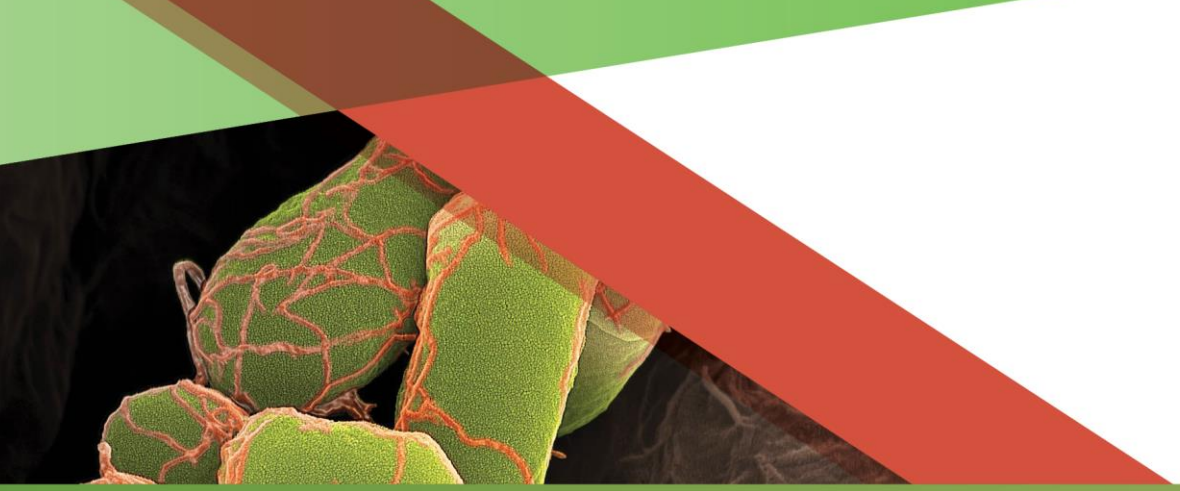

SURVEILLANCE REPORT

Shiga toxin/verocytotoxin-producing *Escherichia coli* (STEC/VTEC) infection

Annual Epidemiological Report for 2018

Key facts

- For 2018, 30 EU/EEA countries reported 8 658 confirmed cases of infection with Shiga toxin/verocytotoxin-producing *Escherichia coli* (STEC/VTEC).
- The overall notification rate was 2.4 cases per 100 000 population.
- After a stable period from 2014 to 2017, the notification rate increased by 41% in 2018.
- The highest notification rates were reported in Denmark, Ireland, Malta, Norway and Sweden.
- The highest rate of confirmed cases was observed in 0–4-year-old children (11.5 cases per 100 000 population).

Methods

This report is based on data for 2018 retrieved from The European Surveillance System (TESSy) on 17 September 2019. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases. An overview of the national surveillance systems is available online [2].

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

This surveillance report is based on STEC/VTEC surveillance data collected by the European Food and Waterborne and Zoonoses (FWD) Network. In 2018, 30 EU/EEA countries reported data on STEC/VTEC infections. The notification of STEC/VTEC infections is mandatory in most EU/EEA countries except for four Member States where notification is either voluntary (France and Luxembourg) or based on another type of system (Italy and the United Kingdom). One Member State used the latest case definition (EU 2018), 14 used the previous case definition from 2012, nine reported in accordance with the one from 2008 and seven reported using other definitions or did not specify which case definition they used. The surveillance systems for STEC/VTEC infections have national coverage in all EU/EEA countries except for three: France, Italy and Spain. No estimate for population coverage was provided, therefore no notification rates could be calculated for these three countries. In Belgium, full national coverage was established in 2015; rates before this date are not shown. The majority of EU/EEA countries (25 out of 30) have a passive surveillance system. In 21 of these 25 countries, cases were reported by both laboratories and physicians and/or hospitals. Five countries have only laboratory-based reporting. In France, STEC/VTEC surveillance is based on paediatric haemolytic-uraemic syndrome (HUS) surveillance, and in Italy it is primarily

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Stockholm, April 2020

based on the national registry for HUS [2]. Twenty-nine EU/EEA countries reported case-based data, and one country (Bulgaria) reported aggregated data.

In addition to case-based surveillance, ECDC coordinates molecular typing for the surveillance of STEC/VTEC through isolate-based pulsed field gel electrophoresis (PFGE) 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. Whole genome sequencing is becoming increasingly common in outbreak investigations, as documented by a growing number of urgent inquiries to ECDC's Epidemic intelligence Information System for Food- and Waterborne Diseases (EPIS-FWD).

Epidemiology

For 2018, 8 811 cases of STEC/VTEC infection were reported by 30 EU/EEA countries (Table 1). Of these cases, 8 658 (98%) were confirmed. Twenty-seven countries reported at least one confirmed case, and three countries reported no cases. The EU/EEA notification rate was 2.4 cases per 100 000 population, which is 41% higher than in 2017.

The highest number of confirmed cases was reported by Germany and the United Kingdom, which together accounted for 47% of all reported cases in the EU/EEA. The highest country-specific notification rates were observed in Ireland, Norway, Sweden, Malta and Denmark, with 20.0, 9.3, 8.8, 8.6 and 8.4 cases per 100 000 population, respectively. A total of twelve southern and eastern EU/EEA countries reported ≤0.2 cases per 100 000 population (Table 1, Figure 1).

Thirty-six percent of 3 536 STEC/VTEC cases were hospitalised (cases with known information on hospitalisation). Eleven of 5 254 cases with known outcome were reported to have died, resulting in a case fatality of 0.2%. The majority (83.2%) of 6 546 STEC/VTEC cases with information regarding the country of infection were domestically acquired.

In 2018, the five most commonly reported serogroups were O157, O26, O103, O91 and O145.

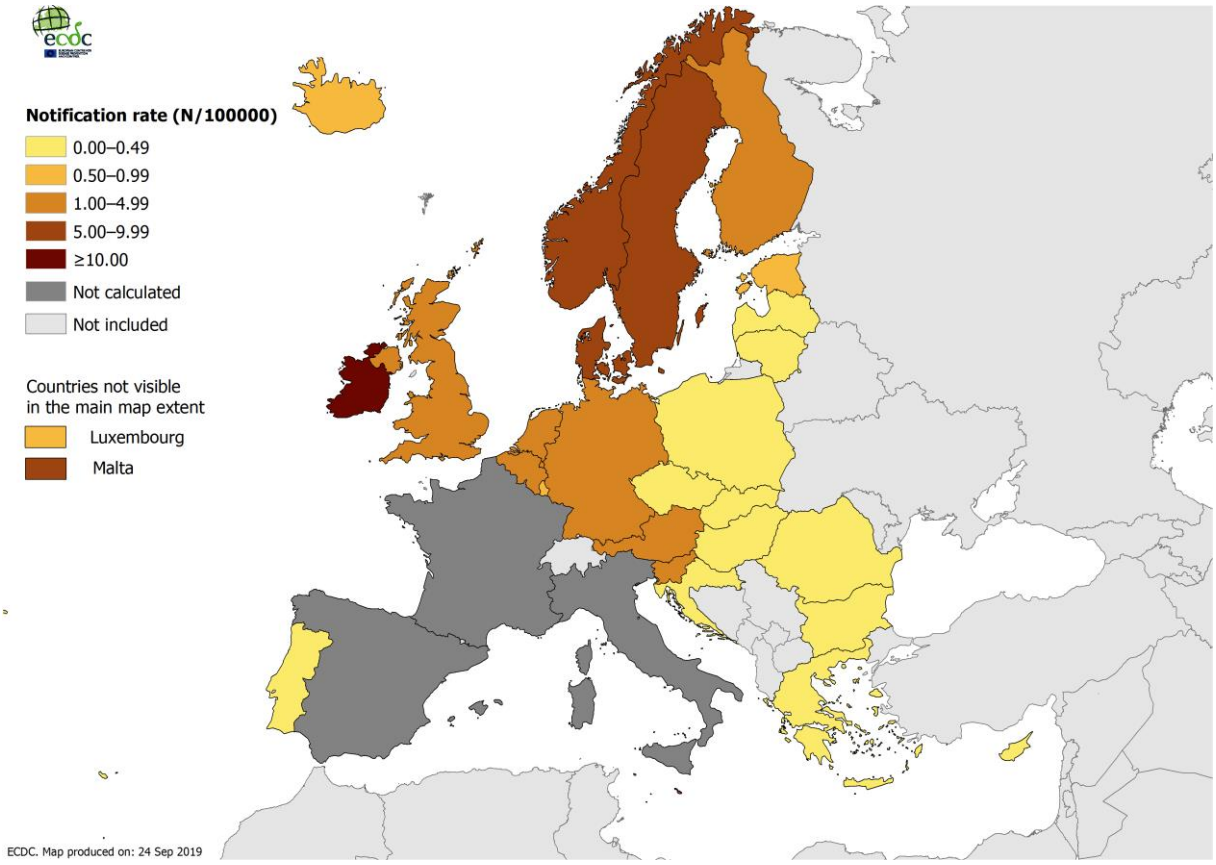
Table 1. Distribution of confirmed STEC/VTEC infection cases and rates per 100 000 population by country and year, EU/EEA, 2014–2018

Country	2014		2015		2016		2017		2018			
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Confirmed cases	Rate	ASR	Reported cases
Austria	131	1.5	107	1.2	177	2.0	250	2.8	305	3.5	3.5	305
Belgium	85	-	100	0.9	119	1.1	9	0.1	114	1.0	1.0	114
Bulgaria	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0	0
Croatia	4	0.1	0	0.0	9	0.2	7	0.2	10	0.2	0.3	10
Cyprus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0	0
Czechia	29	0.3	26	0.2	28	0.3	37	0.3	26	0.2	0.2	26
Denmark	227	4.0	201	3.6	210	3.7	263	4.6	486	8.4	8.4	491
Estonia	6	0.5	8	0.6	5	0.4	3	0.2	7	0.5	0.5	7
Finland	64	1.2	74	1.4	139	2.5	123	2.2	210	3.8	3.9	213
France	221	-	262	-	302	-	260	-	259	-	-	303
Germany	1663	2.1	1616	2.0	1843	2.2	2065	2.5	2226	2.7	2.8	2275
Greece	1	0.0	1	0.0	2	0.0	3	0.0	1	0.0	0.0	1
Hungary	18	0.2	15	0.2	12	0.1	12	0.1	14	0.1	0.1	14
Iceland	3	0.9	1	0.3	3	0.9	3	0.9	3	0.9	0.9	3
Ireland	572	12.3	598	12.8	737	15.6	795	16.6	966	20.0	19.1	983
Italy	68	-	59	-	78	-	93	-	73	-	-	104
Latvia	0	0.0	4	0.2	1	0.1	1	0.1	3	0.2	0.2	3
Liechtenstein	.	.	.	.	.	.	.	.	.	.	.	.
Lithuania	1	0.0	3	0.1	4	0.1	0	0.0	0	0.0	0.0	0
Luxembourg	3	0.5	4	0.7	4	0.7	1	0.2	3	0.5	0.5	3
Malta	5	1.2	4	0.9	4	0.9	9	2.0	41	8.6	8.6	41
Netherlands	919	5.5	858	5.1	665	3.9	392	2.3	488	2.8	2.9	488
Norway	151	3.0	221	4.3	239	4.6	381	7.2	494	9.3	9.3	494
Poland	5	0.0	0	0.0	4	0.0	4	0.0	5	0.0	0.0	8
Portugal	-	-	0	0.0	0	0.0	1	0.0	2	0.0	0.0	2
Romania	2	0.0	0	0.0	29	0.1	11	0.1	20	0.1	0.1	20

Country	2014		2015		2016		2017		2018			
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Confirmed cases	Rate	ASR	Reported cases
Slovakia	2	0.0	1	0.0	2	0.0	3	0.1	12	0.2	0.2	12
Slovenia	29	1.4	23	1.1	26	1.3	33	1.6	32	1.5	1.6	32
Spain	50	-	86	-	69	-	86	-	126	-	-	127
Sweden	472	4.9	551	5.7	638	6.5	504	5.0	892	8.8	8.8	892
United Kingdom	1324	2.1	1328	2.0	1367	2.1	993	1.5	1840	2.8	2.8	1840
EU/EEA	**6055**	**1.8**	**6151**	**1.7**	**6716**	**1.8**	**6342**	**1.7**	**8658**	**2.4**	**2.4**	**8811**

Source: country reports.
ASR: age-standardised rate
.: no data reported
-: no rate calculated.

Figure 1. Distribution of confirmed STEC/VTEC infection cases per 100 000 population by country, EU/EEA, 2018

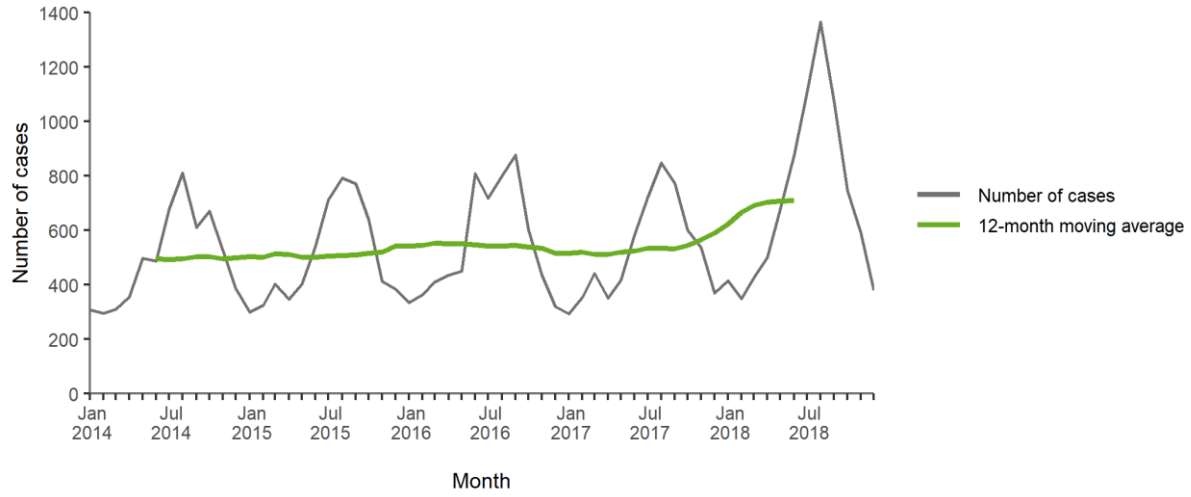


Source: Country reports from Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, Germany, Greece, Hungary, Iceland, Ireland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden, and the United Kingdom.

The number of reported confirmed STEC/VTEC cases remained stable at the EU/EEA level between 2014 and 2017 but increased in 2018 (Figure 2).

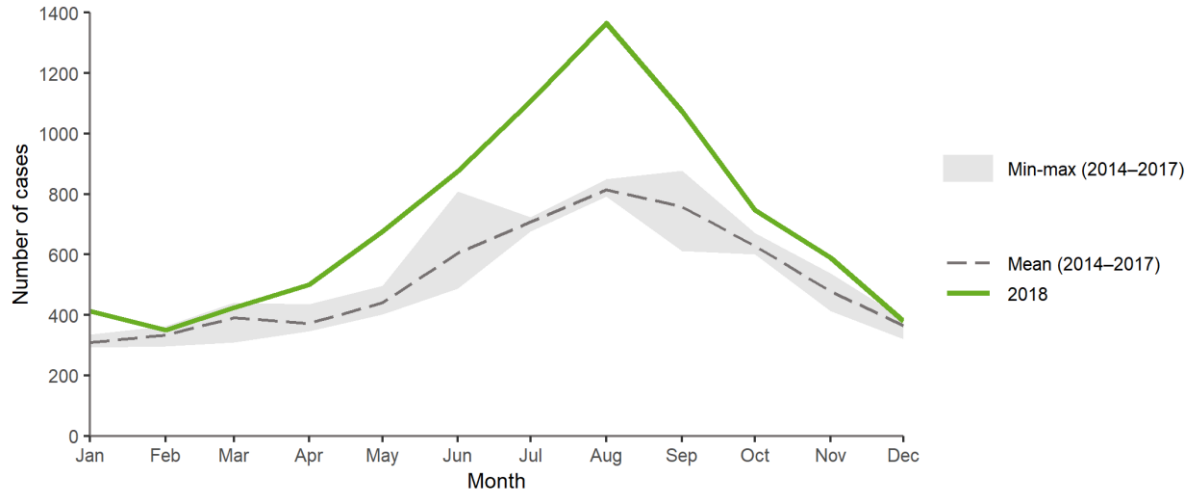
A clear seasonal trend in the number of confirmed STEC/VTEC cases was observed in the EU/EEA between 2014 and 2018, with more cases reported during the summer months from June–September (Figure 3).

Figure 2. Distribution of confirmed STEC/VTEC infection cases by month, EU/EEA, 2014–2018



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

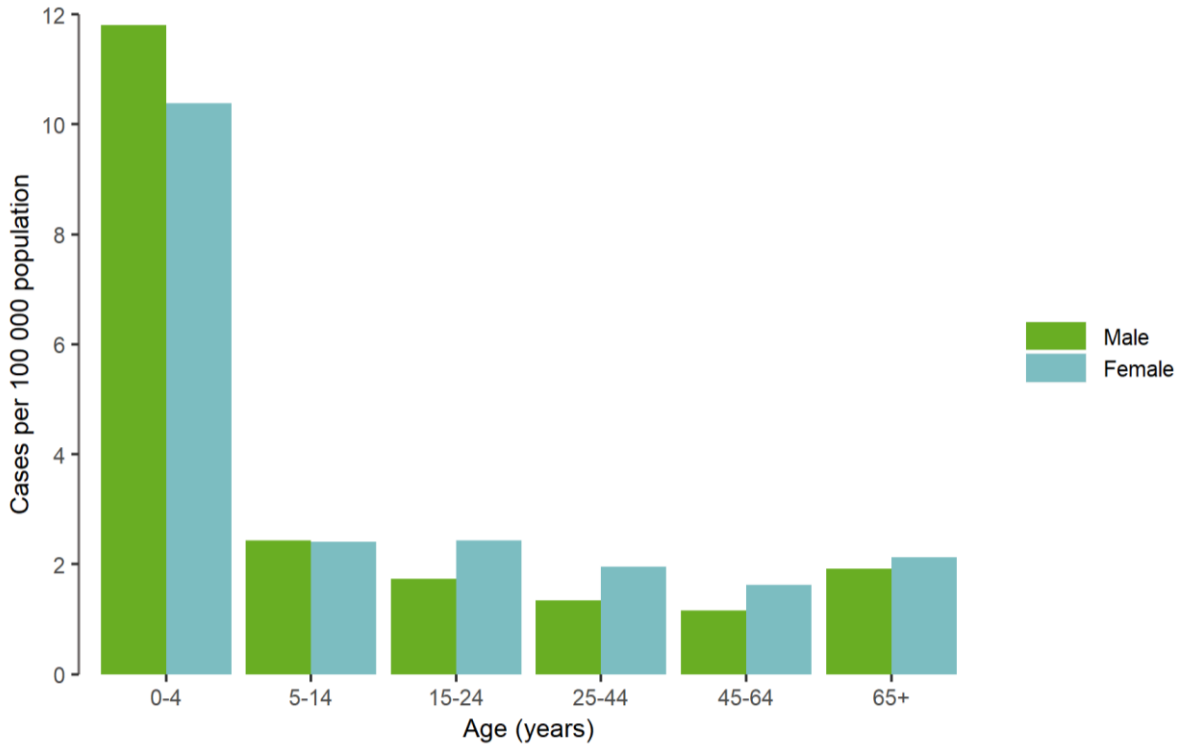
Figure 2. Distribution of confirmed STEC/VTEC infection cases by month, EU/EEA, 2018 and 2014–2017



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

Among the 8 257 confirmed STEC/VTEC cases for which gender was reported, 46% were males and 54% were females, with a male-to-female ratio of 0.9:1. The highest notification rate per 100 000 population was observed in the age group 0–4-years (11.8 for males and 10.4 for females). This age group accounted for 2 274 (26.3%) of the cases for whom information on age was available. The notification rate decreased with age and was lowest in both genders in the age group of 45–64-years (1.2 for males and 1.6 for females) (Figure 4).

Figure 4. Distribution of confirmed STEC/VTEC infection cases per 100 000 population, by age and gender, EU/EEA, 2018



Outbreaks and other threats

In 2018, eight urgent inquiries on STEC/VTEC infection were launched through EPIS-FWD. No multi-country outbreaks were detected/investigated.

Discussion

In 2018, a large increase of STEC/VTEC cases was reported, which made STEC/VTEC the third most commonly reported zoonosis in the EU/EEA after campylobacteriosis and salmonellosis. A contributing factor may be the shift from culture to culture-independent diagnostic methods, with PCR more commonly used to diagnose cases [4]. The overall trend for STEC/VTEC infections showed an increase between 2009 and 2017. The number of reported cases increased immediately after a large multi-country outbreak in 2011, but remained stable from 2012 to 2017.

The increase observed after 2011 can partially be explained by improved clinical awareness following the outbreak. As in previous years, serogroup O157 was the most commonly reported serogroup in 2018 and accounted for the majority of the observed increase. The proportion of non-O157 serogroups has been increasing over the years as more laboratories are testing for serogroups other than O157 [4]. As in 2016, serogroup O26 was a more common cause of HUS than serogroup O157 [4]. A high proportion of HUS cases due to non-O157 serogroups points towards an emerging risk of severe infections and the potential for large outbreaks [5,6].

In most EU/EEA countries, surveillance of STEC/VTEC infections is mandatory and covers the whole population. In two countries (France and Italy), however, surveillance only covers cases of HUS, which mainly affects small children and is characterised by acute kidney failure requiring hospital care. In 2018, the average proportion of hospitalised STEC/VTEC cases was relatively high (36%). The highest proportions of hospitalised cases were reported in the countries only reporting HUS cases and having the lowest numbers of cases/notification rates, indicating that their surveillance systems focus only on the most severe cases.

The age group most affected by STEC/VTEC were infants and children up to four years of age, who accounted for more than one-quarter of all confirmed cases in 2018. An even larger proportion of children was seen among the HUS cases, where two-thirds of the cases were reported in 0–4-year-olds [4].

Ruminants are the main natural reservoir of STEC/VTEC. Undercooked ground beef or other meats were found to be a significant risk factor for acquiring sporadic foodborne STEC infection, most often caused by serogroup O157 [7]. In recent analyses, beef and fresh produce (fruit and vegetables) were incriminated as the most important sources of STEC infections in Europe, each estimated to be associated with 30% of illnesses [8].

Reported outbreaks highlight a risk of infection associated with raw milk and cheese made from unpasteurised milk [4,9]. Annual zoonoses data reported to the European Food Safety Authority (EFSA) in 2018 indicate that almost 60% of STEC isolates from food belonged to the top-10 STEC/VTEC serogroups reported in human infections between 2015 and 2018 [4]. In 2018, 48 STEC outbreaks were reported to EFSA, involving 381 cases in 10 countries, accounting for 0.9% of all food- and waterborne outbreaks and for 7% of the reported domestic STEC/VTEC cases at the EU level. Five of the outbreaks were waterborne, and five of the 43 strong-evidence foodborne outbreaks were reported with a known food vehicle: two outbreaks were caused by cheese, one by milk, one by red meat, and one by vegetables. The majority (88%) of the 25 outbreaks reported with known serogroup data were caused by the top-10 STEC/VTEC serogroups [4].

Public health implications

STEC/VTEC infection is mainly acquired through consuming contaminated food and contact with animals and/or their faeces. Good handling practices in premises dealing with animals, guidance on hand hygiene for visitors in open/pet farms, and good hygiene practices in food processing can decrease the risk of infections and further outbreaks. Adequate cooking of food, particularly beef, and the use of pasteurised milk may reduce the risk of foodborne STEC/VTEC infections. The STEC/VTEC serogroups most frequently found in food samples are those most commonly reported in human infections, highlighting the role of contaminated food as a source of human infections. Raw meat and unpasteurised milk and dairy products are well known potential sources of STEC/VTEC infections. Even though rarely reported, these products were repeatedly implicated in multi-country outbreaks.

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