

SURVEILLANCE REPORT



Surveillance of seven priority food- and waterborne diseases in the EU/EEA 2010–2012

ECDC SURVEILLANCE REPORT

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2010–2012



This report was commissioned by the European Centre for Disease Prevention and Control (ECDC), coordinated by Taina Niskanen, the Food- and Waterborne Diseases and Zoonoses Programme.

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Summary

This surveillance report on seven priority food- and waterborne diseases is the second dedicated epidemiological report for campylobacteriosis, listeriosis, non-typhoidal salmonellosis, shigellosis, Shiga toxin/verocytotoxin-producing *Escherichia coli* (STEC/VTEC) infections, typhoid and paratyphoid fever, and yersiniosis, offering detailed analyses of these diseases in the European Union (EU) and European Economic Area (EEA) for the years 2010 to 2012. This report is intended for policymakers and health sector leaders, epidemiologists, scientists, food safety professionals and the wider public. It is hoped that readers will find it a useful overview and reference to better understand the present situation in relation to these diseases in Europe.

The surveillance of 21 food- and waterborne diseases and zoonoses is carried out under the auspices of the European Centre for Disease Prevention and Control (ECDC), Programme of Food- and Waterborne Diseases and Zoonoses (FWD). For the seven priority diseases, surveillance has been developed further in close collaboration with nominated disease experts, epidemiologists and microbiologists since 2007. Each year, improvements in the harmonisation of systems, definitions, protocols and data at Member State and at EU/EEA level are observed. Nevertheless, data provided by the EU Member States and EEA reflect differences in ascertainment by national surveillance systems as well as disease incidence, and as such, comparisons of raw numbers and rates cannot be relied upon as a true reflection of differences in epidemiology between countries. In this report, some country-specific data are presented, however the stronger focus is on the overall EU/EEA level trends based on the confirmed data from reporting countries.

Campylobacteriosis continued to be the most commonly reported zoonosis, with 662 521 confirmed cases and an average notification rate of 67 per 100 000 population in 2010–2012. The number of confirmed cases of campylobacteriosis in the EU/EEA has followed an increasing trend in the last five years (2008–2012), with a clear seasonality and peaking of cases in June–August. The majority (about 90%) of *Campylobacter* infections were acquired in EU/EEA countries. Of the two most commonly reported species, *C. jejuni* remained stable, while *C. coli* increased significantly in 2008–2012.

A significant increasing trend in domestically acquired listeriosis cases was reported at EU/EEA level between 2008 and 2012. In 2010–2012, 4 851 listeriosis cases were reported, representing an average rate of 0.35 cases per 100 000 population. Surveillance of listeriosis has a focus on invasive cases and 94% of the cases with available data were hospitalised and a high case fatality rate (16%) was reported during the three-year period described in this report. A total of 517 deaths due to listeriosis were reported in 2010–2012. Infections are almost solely acquired domestically. Less than 2% of the listeriosis cases were travel-related, most often from another EU country. Reported human listeriosis cases in 2010–2012 were most frequently associated with serotypes 1/2a and 4b. There was increase in notification rates of listeriosis in age group older than 65 years.

Reporting of non-typhoidal salmonellosis cases continued decreasing and dropped by 10 013 cases between 2010 and 2012, representing a reduction of 10%. A total of 291 806 confirmed cases were reported in 2010–2012 (average notification rate: 21.5 cases per 100 000 population). A statistically significant decreasing trend was observed over the period 2008–2012. The decrease was particularly noticeable in domestic cases due to the two most common serotypes; *Salmonella* Enteritidis and *S. Typhimurium*. *Salmonella* infections were mostly acquired in the EU/EEA (83% of all cases).

A stable trend in the number of confirmed shigellosis cases was observed from 2008 to 2012. The average notification rate of shigellosis was 1.8 per 100 000 population, with 21 969 reported cases in 2010–2012. Shigellosis is not endemic in the EU/EEA countries, and two thirds of the reported cases between 2010 and 2012 were travel-related from countries outside the EU/EEA. *Shigella sonnei* was the most commonly reported species (56% of total species reported) in 2010–2012, followed by *S. flexneri* (33% of total species reported). The trend in the number of *S. flexneri* cases significantly increased during 2008–2012.

STEC/VTEC infections showed a significantly increasing trend over the five-year surveillance period from 2008–2012. Even without counting the cases reported in the large STEC/VTEC O104:H4 outbreak in Germany in 2011, the STEC/VTEC trend was significantly increasing in 2008–2010 before the outbreak. In 2010–2012, 18 995 confirmed STEC/VTEC cases (1.7 cases per 100 000 population) were reported. The number of cases reported in 2012 increased by 55% (2 037 cases) compared with 2010. An increasing number of reports of confirmed STEC/VTEC cases is possibly an effect of increased awareness and improved capacity in the EU/EEA countries following the outbreak. Of those isolates in which the serogroup was known, most were serogroup O157 (55%). The five most common STEC/VTEC serotypes reported in 2010–2012 were: O157:H7 (26%), O157:H- (10%), O104:H4 (6.1%), O26:H11 (5.8%) and O103:H2 (5.7%). Almost 90% of the STEC/VTEC infections were of domestic origin.

Reporting of typhoid fever cases decreased significantly between 2008 and 2012, with a notification rate of 0.13 cases per 100 000 population (532 reported cases) in 2012. The same was observed for paratyphoid fever, although slightly fewer cases were (N=430) reported in 2012. Typhoid and paratyphoid fever are diseases largely

(> 85%) related to travel to countries outside the EU/EEA. The most frequently reported form of antimicrobial resistance in typhoid and paratyphoid fever infections was against nalidixic acid (>70% strains resistant).

Yersiniosis showed a constant decreasing five-year trend in 2008–2012. The average notification rate in 2010–2012 was 2.1 cases per 100 000 population with 20 477 confirmed cases reported in the EU/EEA in 2010–2012. *Yersinia* infections are almost entirely of domestic origin, with 98% of cases reported as domestically acquired. The reduction in cases was mainly seen in *Y. enterocolitica* infections; the most commonly (> 95%) reported species. The most commonly reported *Y. enterocolitica* serotype in the EU/EEA was O:3 (88%), showing a significant decreasing trend since 2008.

For most of the priority diseases, the case–fatality rate was below 1%, except for listeriosis, for which the average case–fatality rate was 16% between 2010 and 2012. Despite the relatively low number of cases caused by *Listeria*, compared with the number of e.g. campylobacteriosis and salmonellosis cases, listeriosis is considered an important food-borne infection because of the severity of the illness and the high case–fatality rate.

Of special concern are *Listeria* infections among the elderly. Hospital-related outbreaks remain a significant patient safety concern and they underscore the high infection risk related to processed, ready-to-eat (RTE) foods in settings where vulnerable population groups are served, for example in hospitals and homes for the elderly. The trend of listeriosis cases increased sharply among the elderly, particularly in men older than 65 years of age. Awareness should be increased about the listeriosis risk connected to RTE foods in risk groups. Although the proportion of food samples exceeding the legal EU food safety limit for *L. monocytogenes* has been low, the possible presence of the bacteria in food may be still a concern for public health.

1 Campylobacteriosis in the EU/EEA, 2010–2012

Campylobacteriosis

Campylobacteriosis is a diarrhoeal disease caused by bacteria of the genus *Campylobacter*. It is the leading cause of reported gastrointestinal infections in the EU/EEA. In campylobacter infections, the most commonly reported species are *C. jejuni* (93% of cases known data on species), followed by *C. coli* (6%) and *C. lari* (<1%). Adults are the most affected group, but the highest notification rate is seen in young children. Most infections are reported in the summer.

The symptoms of campylobacteriosis usually develop after an incubation period of 2–5 days and are manifested by severe abdominal pain, watery or bloody diarrhoea, and fever. Symptoms last from a few days up to two weeks, and the illness is usually self-limiting. Occasionally, symptoms may persist and require hospital care. Infection has been associated with complications such as joint inflammation (5–10% of cases) and, on rare occasions, Guillain-Barré syndrome, a severe paralysis, which without prompt treatment may result in death.

The infective dose of bacteria is very small and the infection is most commonly acquired through the consumption of contaminated food (especially raw or undercooked poultry, raw milk) or contaminated drinking water. Other risk factors include swimming in natural surface waters and direct contact with farm animals and infected pets.

More information can be found at the ECDC website [23].

Surveillance of campylobacteriosis in the EU/EEA in 2010–2012

ECDC coordinates the European surveillance of campylobacteriosis, in close collaboration with a network of nominated experts, epidemiologists and microbiologists from EU/EEA countries as part of the Food- and Waterborne Diseases and Zoonoses (FWD) Network.

The scope of campylobacteriosis surveillance is determined by the general surveillance objectives for food- and waterborne diseases (see Introduction), in combination with the EU case definition for campylobacteriosis (see Annex H).

After discussions with the European Food- and Waterborne Diseases and Zoonoses Network it was decided to strengthen campylobacteriosis surveillance by:

- reviewing the laboratory culture and diagnostic methods in the EU
- reviewing data reporting and analysis.

The surveillance of campylobacteriosis through TESSy currently features the standard reporting of cases and includes data on species. However, speciation of positive samples is declining due to the increasing use of PCR-based diagnostics, which is reflected in the reporting of species-data. The monitoring of antimicrobial resistance (AMR) has been reviewed and ECDC has launched a new protocol for harmonised monitoring of AMR in human *Campylobacter* and *Salmonella* infections [1]. The human AMR data are published annually together with European Food Safety Agency (EFSA) in a European Summary report and thus no AMR data for *Campylobacter* is included in this report.

The European Surveillance System allows the standard reporting of cases of *Campylobacter* infections with an agreed set of variables. In 2010–2012, the reporting of campylobacteriosis covered 35 variables, 27 of which were common variables for all diseases, and eight were specific to *Campylobacter*. The common variables are presented in Table 1 in the Introduction'. Additional *Campylobacter*-specific variables are presented below in Table 2.1. In 2012, 21 EU/EEA countries had a compulsory reporting system with full population coverage for campylobacteriosis, six countries had a voluntary system and three countries did not report *Campylobacter* infections to TESSy (Table 2.2).

Table 1.1. Enhanced epidemiological dataset collected for campylobacteriosis cases, EU/EEA, 2010–2012

Variable	Description in TESSy
Pathogen	Species or genus of the pathogen which is the cause of the reported disease
SIR_AMC, SIR_AMP, SIR_CIP, SIR_ERY, SIR_GEN, SIR_NAL, SIR_TCY	Susceptibility to seven different antibiotics (amoxicillin/clavulanic acid, ampicillin, ciprofloxacin, erythromycin, gentamicin, nalidixic acid, tetracyclines)

National surveillance systems for campylobacteriosis

Table 1.2. Notification systems for campylobacteriosis cases, EU/EEA, 2012

Country	Reported since	Legal character ^a	Case-based/aggregated ^b	National coverage ^c	Changes in surveillance system in 2010–12
Austria	1947	Cp	C	Y	
Belgium	2000	V	C	N	
Bulgaria	2004	Cp	A	Y	No changes
Cyprus	2005	Cp	C	Y	
Czech Republic	2008	Cp	C	Y	
Denmark	1979	Cp	C	Y	No changes
Estonia	1988	Cp	C	Y	
Finland	1995	Cp	C	Y	
France	2002	V	C	N (population coverage 20%)	
Germany	2001	Cp	C	Y	No changes
Greece	-	-	-	-	- ^d
Hungary	1998	Cp	C	Y	
Ireland	2004	Cp	C	Y	
Italy	1990	V	C	N	
Latvia	1999	Cp	C	Y	No changes
Lithuania	1990	Cp	C	Y	
Luxembourg	2004	V	C	Y	
Malta	Yes	Cp	C	Y	
Netherlands	2002	V	C	N (population coverage 52%)	
Poland	2004	Cp	C	Y	
Portugal	-	-	-	-	-
Romania	yes	Cp	C	Y	
Slovakia	1980	Cp	C	Y	
Slovenia	1987	Cp	C	Y	No changes
Spain	1989	V	C	N (population coverage 25%)	
Sweden	1978	Cp	C	Y	
United Kingdom	No	O	C	Y	
Iceland	Yes	Cp	C	Y	
Liechtenstein	Yes	-	-	-	-
Norway	1991	Cp	C	Y	

^a Legal character: Cp=compulsory, V=voluntary, O=other

^b C=case based, A=aggregated

^c National coverage Y=yes, N=no

^d Not reported/no data provided

Epidemiological situation in 2010–2012

Major findings

- Campylobacteriosis showed a slight increasing trend between 2008 and 2012 in EU/EEA countries
- The average notification rate in the EU/EEA in 2010–2012 was 67 cases per 100 000 population
- 89% of infections were domestically acquired

- 56% of travel-related infections were acquired in non-EU/EEA countries, in particular in Asia and Africa
- *Campylobacter jejuni* and *C. coli* were the two species most commonly reported. Both showed a seasonal peak in summer (June–August)
- The trend of *C. jejuni* remained stable during 2008–2012, while *C. coli* increased significantly
- The highest notification rate was observed in children younger than five years of age (>95 cases per 100 000 in females and > 118 cases per 100 000 in males), thus the notification rates decreased in age group 1–5 years
- Notification rates slightly increased in adults over 64 years. The risk of infection was generally higher in men; especially for men under 15 and over 45 years of age
- About 40% of cases with known hospitalisation data (10% of total cases) required hospital care in 2010–2012
- Campylobacteriosis had a low case–fatality ratio at EU/EEA level, ranging from 0.03% to 0.04%.

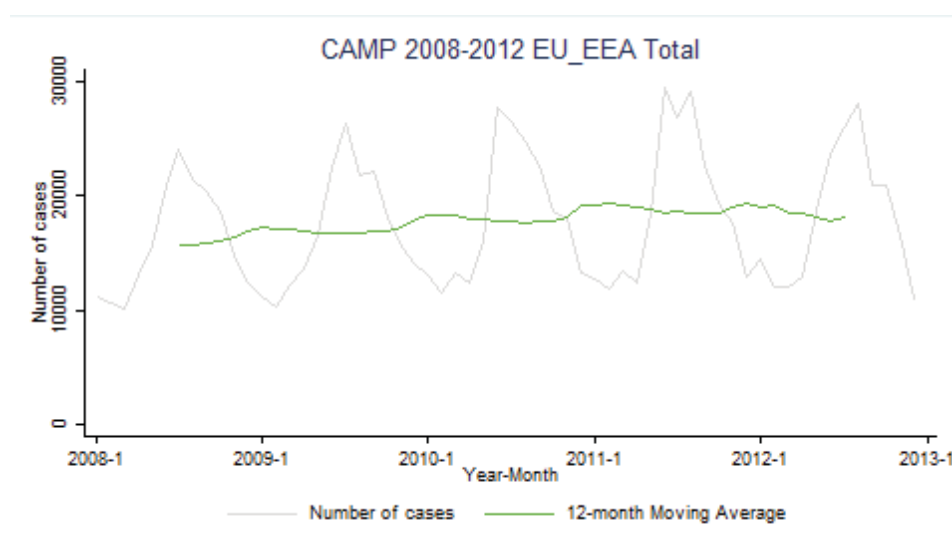
Overview of trends

From 2010 to 2012, 662 521 confirmed cases of campylobacteriosis were reported to TESSy by 25 EU Member States and two EEA countries, excluding Greece, Portugal and Liechtenstein.

At EU/EEA level, a slight increasing trend has been observed since 2008 (Figure 1.1), with the highest number of campylobacteriosis cases (227 126 confirmed cases) reported in 2011 (Figure 1.1, Table 1.3). Between 2011 and 2012, the number of confirmed campylobacteriosis cases in the EU/EEA countries declined by 4.3%, to 217 261 cases (Table 1.3). This was mainly the result of a decrease in the number of campylobacteriosis cases reported by Belgium and Germany.

Between 2010 and 2012, the highest country-specific notification rates were observed in the Czech Republic, followed by Luxembourg and the United Kingdom (>110 cases per 100 000), while the lowest rates were reported in Bulgaria, Latvia, Poland and Romania (less than 2 cases per 100 000) (Table 1.3).

Figure 1.1. Trend in number of confirmed campylobacteriosis cases in EU/EEA countries, 2008–2012 (N=1 060 706)



Source: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom; EEA countries: Iceland and Norway

Table 1.3. Confirmed campylobacteriosis cases and notification rates (per 100 000 population) by country in EU/EEA countries, 2010–2012

Country	2010		2011		2012	
	Cases	Rate	Cases	Rate	Cases	Rate
Austria	4 404	52.6	5 129	61.0	4 710	55.8
Belgium*	6 047	-	7 716	-	6 607	-
Bulgaria^	6	0.1	73	1.0	97	1.3
Cyprus	55	6.7	62	7.4	68	7.9
Czech Republic	21 075	200.6	18 743	178.7	18 287	174.1
Denmark	4 037	72.9	4 060	73.0	3 720	66.7

Country	2010		2011		2012	
	Cases	Rate	Cases	Rate	Cases	Rate
Estonia	197	14.7	214	16.0	268	20.0
Finland	3 944	73.7	4 267	79.4	4 251	78.7
France ^a	4 324	33.5	5 538	42.6	5 079	38.9
Germany	65 110	79.8	70 812	86.8	62 504	76.5
Greece	-	-	-	-	-	-
Hungary	7 180	72.9	6 121	62.4	6 367	65.1
Ireland	1 660	37.2	2 433	53.2	2 391	52.2
Italy [*]	457	-	468	-	774	-
Latvia	1	0.0	7	0.3	8	0.4
Lithuania	1 095	32.9	1 124	36.8	917	30.5
Luxembourg	600	119.5	704	137.5	581	110.7
Malta	204	49.2	220	52.9	214	51.3
Netherlands ^b	4 322	50.1	4 408	50.9	4 248	48.8
Poland	367	1.0	354	0.9	431	1.1
Portugal	-	-	-	-	-	-
Romania	175	0.8	149	0.7	92	0.4
Slovakia	4 476	82.5	4 565	84.7	5 704	105.5
Slovenia	1 022	49.9	998	48.7	983	47.8
Spain ^c	6 340	55.2	5 469	47.4	5 488	47.5
Sweden	8 001	85.7	8 214	87.2	7 901	83.3
United Kingdom~	70 298	114.2	72 150	116.3	72 578	115.3
EU total**	215 397	66.7	223 998	68.9	214 268	65.7
Iceland	55	17.3	123	38.6	60	18.8
Liechtenstein	-	-	-	-	-	-
Norway	2 682	55.2	3 005	61.1	2933	58.8
EU/EEA total**	218 134	66.7	227 126	68.7	217 261	65.6

^{*} Sentinel surveillance. Population coverage unknown so notification rate not calculated

[^] Aggregated reporting

^a Population coverage 20%

^b Population coverage 52%

^c Population coverage 25%

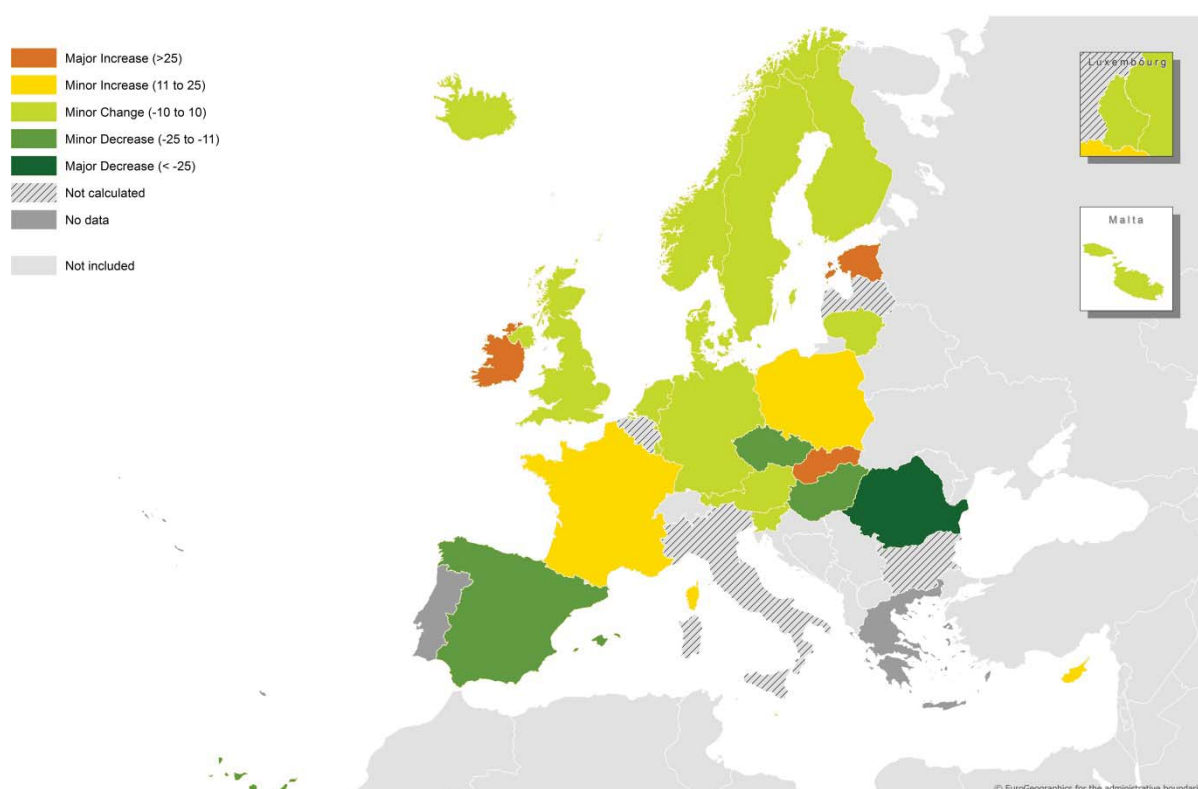
~ There is no single surveillance system in the UK. Data are representative (as submitted by England and Wales, Scotland and Northern Ireland), however surveillance systems might not be identical.

** For each year shown, notification rates were calculated, with the exception of countries with unknown population coverage. Also excluded were populations of countries which did not report data. Populations of countries which reported 0 cases were included.

– Not reported/not calculated.

When comparing data from 2012 to 2010, notification rates nearly halved in Romania, declining from 0.8 to 0.4 cases per 100 000, however, the total number of cases reported was very low (Table 1.3, Figure 1.2). A remarkable decrease in rates was observed in the Czech Republic (from 200.6 to 174.1 cases per 100 000), Hungary (from 72.9 to 65.1 cases per 100 000) and Spain (from 55.2 to 47.5 cases per 100 000). Notification rates slightly decreased also in Germany, from 79.8 cases per 100 000 in 2010 to 76.5 cases per 100 000 in 2012 (Table 1.3, Figure 1.2). Major increases in rates were reported in Ireland (from 37.2 to 52.2 cases per 100 000), Slovakia (from 82.5 to 105.5 cases per 100 000) and Estonia (from 14.7 to 20 cases per 100 000), although in Estonia, the total number of cases reported was very low. Minor but significant increases in notification rates, ranging from 7% to 16.3%, were observed in France, Finland and Norway. The increase in the number of campylobacteriosis cases observed in Italy in 2012 was most likely due to an increase in the number of regional laboratories reporting (Table 1.3, Figure 1.2).

Figure 1.2. Percentage change in notification rates of campylobacteriosis cases in EU/EEA countries, 2010–2012



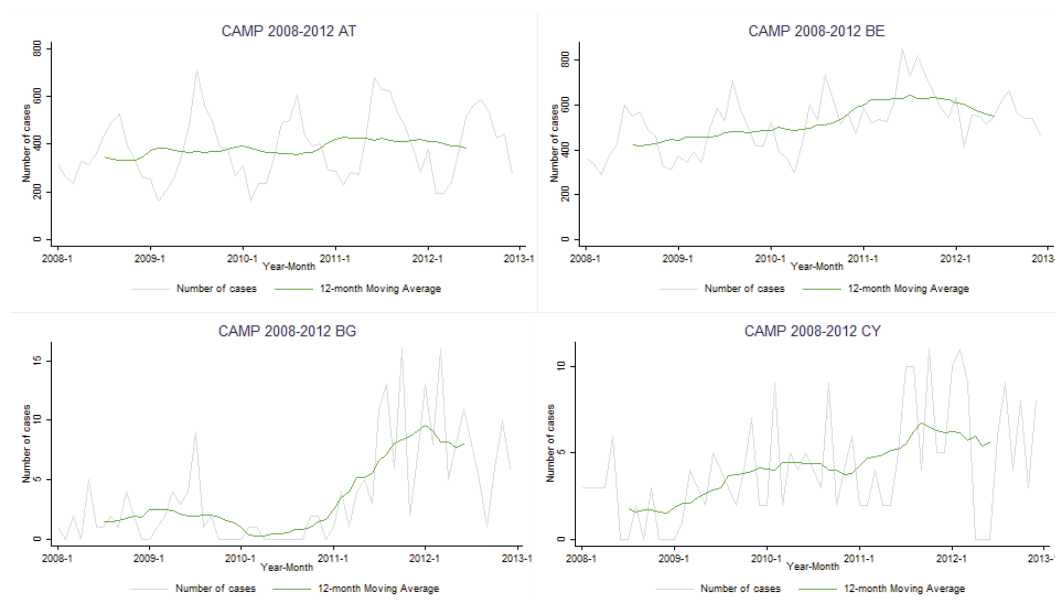
Not calculated: Country-specific percentage changes in notification rates were not calculated if the number of confirmed cases reported for one or more years during 2010–2012 was lower than 25, if sentinel surveillance systems had unknown population coverage, or if there was incomplete reporting for one of the reporting years.

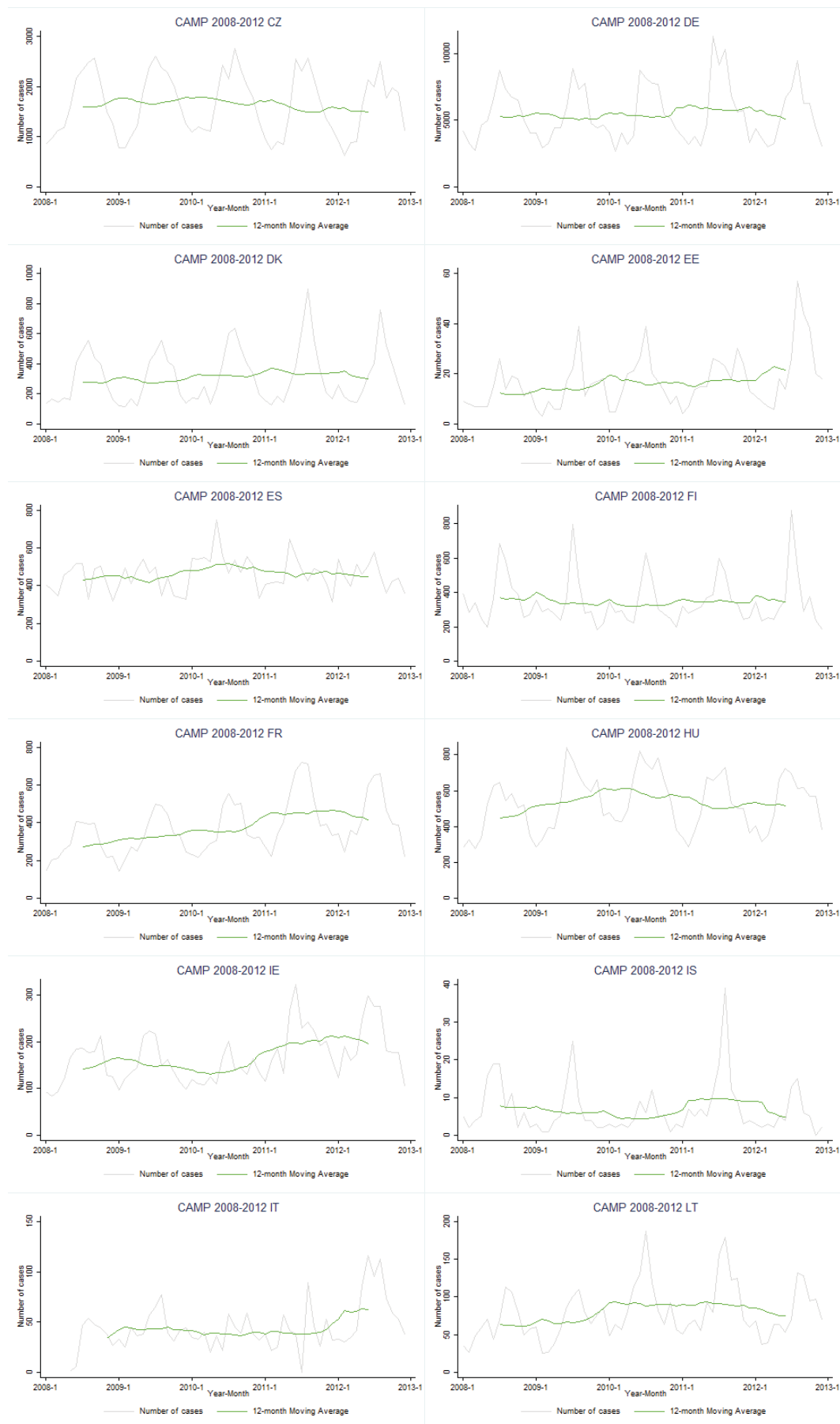
Source: The European Surveillance System (TESSy) data, 2010–2012

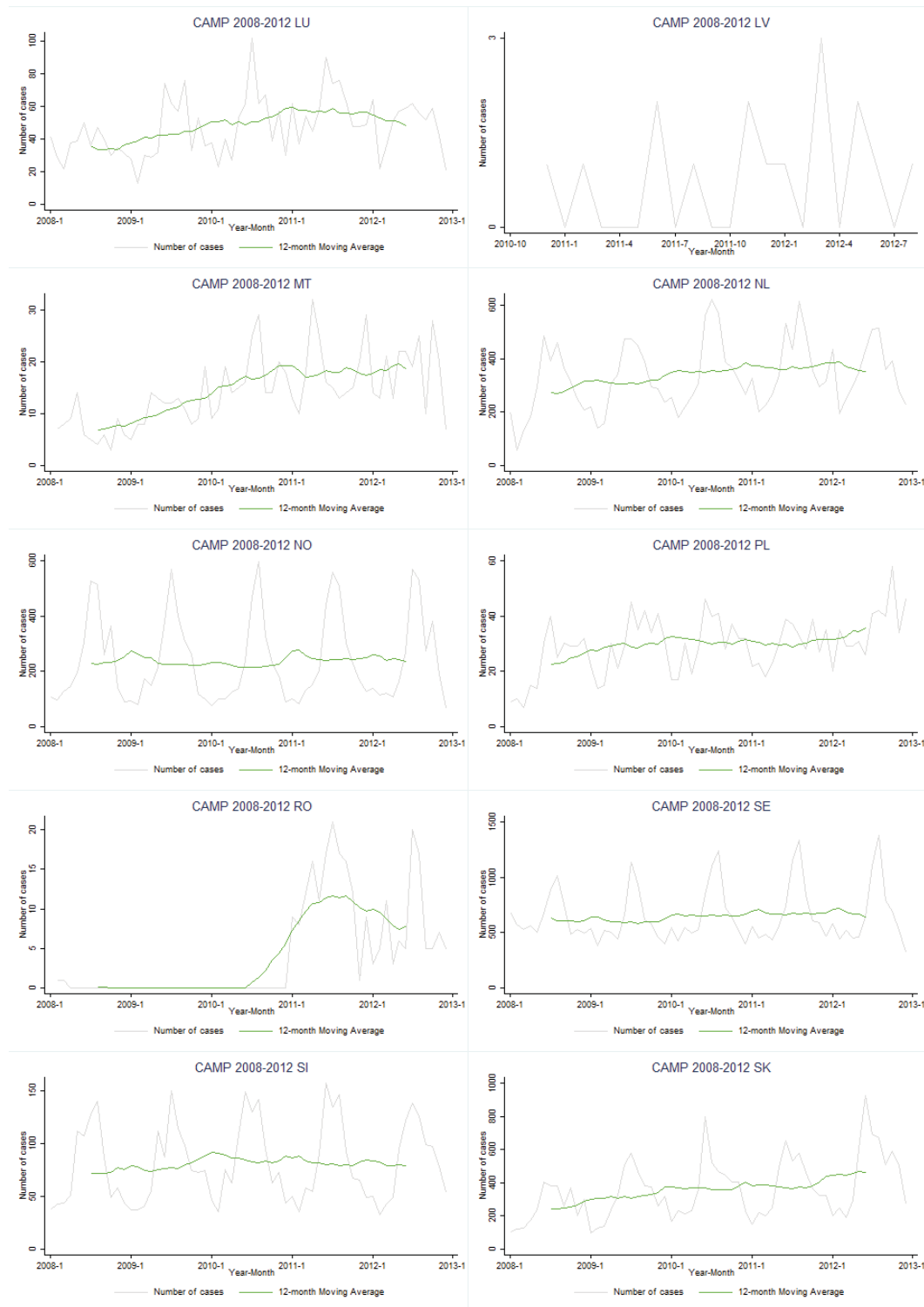
No country showed a statistically significant decrease in campylobacteriosis trends from 2008 to 2012 (significant level $p < 0.05$). Country-specific five-year trends increased in the majority of reporting countries and the most significant rise was observed in Belgium, France, Slovakia and the United Kingdom.

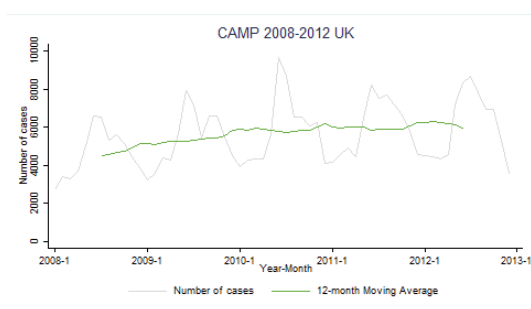
Please note that in a country with a small population, even low numbers of reported cases can lead to a relative overrepresentation.

Figure 1.3. Trend in number of confirmed campylobacteriosis cases by EU/EEA country, 2008–2012









Country codes: see page xiv

Please note that graphs are on different scales.

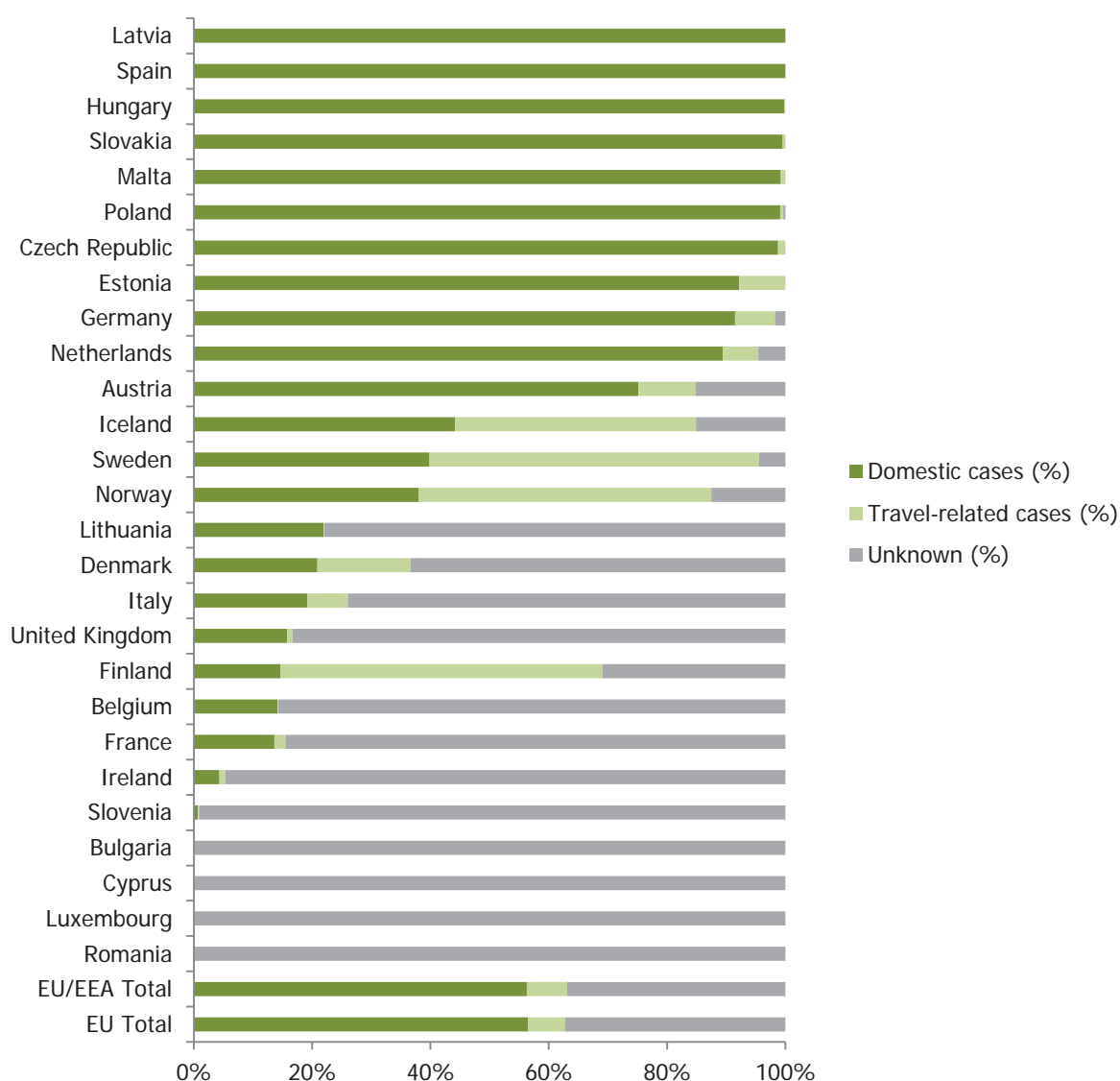
Country-specific trends were not calculated if less than five confirmed cases were reported per month during the period 2008–12.

Origin of the infection

Within the three-year period from 2010 to 2012, 23 out of 27 countries reported data on the origin of infection (domestic/travel-related) for 418 024 confirmed cases (63.1%, pooled data). Four countries reported information only for cases notified in one or two years in 2010–2012. The information on the origin of infection was reported for more than 95% of confirmed cases in 11 countries, while seven countries reported the information for less than 30% of confirmed cases (Figure 1.4; Annex A: Table A1.1).

The proportion of domestic cases versus travel-associated cases varied markedly between countries, with the highest proportion of domestic cases reported in the Czech Republic, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Spain (Figure 1.4; Annex A: Table A1.1). The Nordic countries (Denmark, Finland, Iceland, Norway and Sweden) reported the highest proportion of travel-associated infections compared with other reporting countries (Figure 1.4; Annex A: Table A1.1).

Figure 1.4. Proportion of confirmed campylobacteriosis cases by origin of infection (domestic/travel-related) as reported by EU/EEA countries, 2010–2012 (N=662 521)



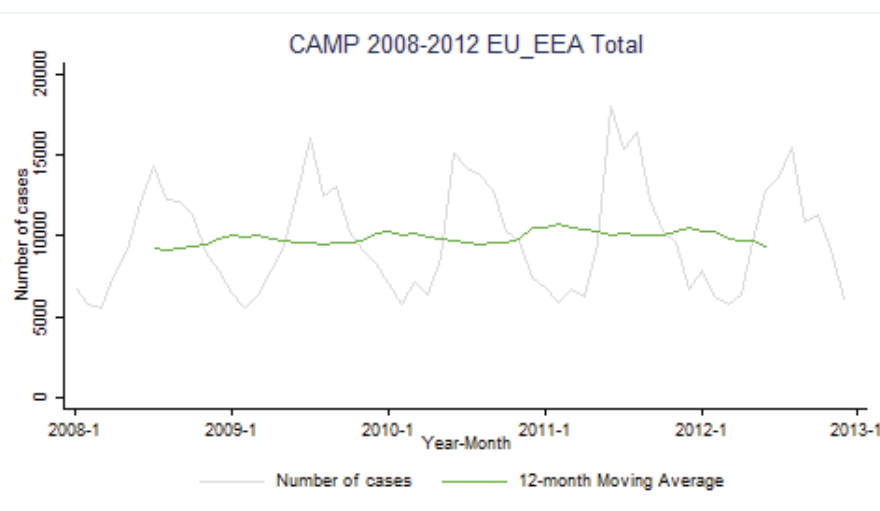
Domestic cases

Among cases for which the information was available ($n=418\,024$, cumulative data 2010–2012), the majority of infections reported at EU/EEA level during 2010–2012 were domestically acquired (89%) (Annex A: Table A1.1), and a stable annual trend in reported domestic campylobacteriosis cases has been observed since 2008 (Figure 1.5; Annex A: Table A1.2).

During 2008–2012, significant increases in the notification of domestic cases were observed in Slovakia, Sweden and the Netherlands ($p\text{-value}<0.01$). Notification rates for domestically acquired *Campylobacter* infections also slightly rose in Estonia, Malta and Poland ($p\text{-value}<0.01$), although the total number of cases reported by those countries was low.

Over the five-year period, the number of reported domestic cases decreased in Ireland and the United Kingdom; however the completeness of the reported information on origin of infection was lower than 20%.

Figure 1.5. Trend and number of confirmed domestic campylobacteriosis cases in EU/EEA countries, 2008–2012 (N=600 711)



Source: Austria, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Ireland, Italy, Latvia, Malta, the Netherlands, Poland, Slovakia, Spain, United Kingdom; EEA countries: Iceland and Norway

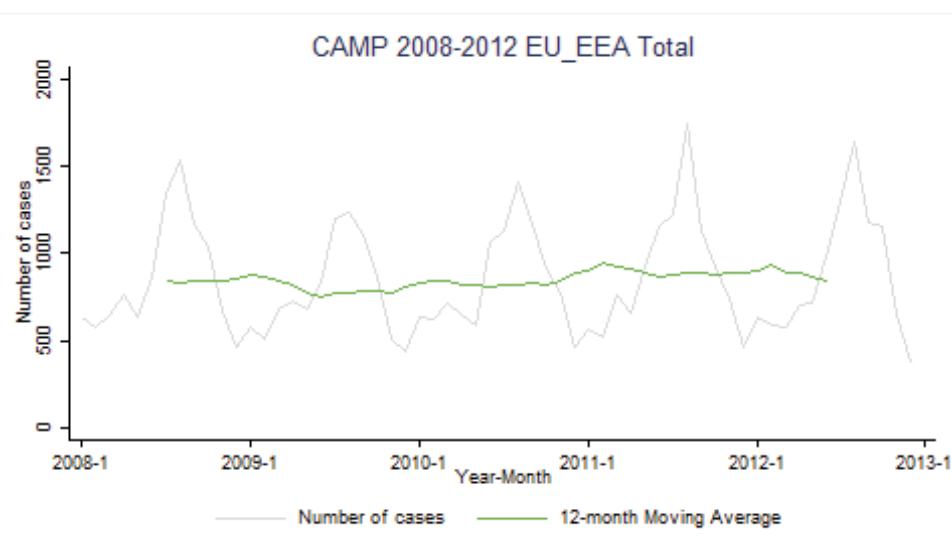
Travel-related cases

The trend in the annual number of confirmed travel-related cases remained quite stable during 2008–2012 (Figure 1.6; Annex A: Table A1.3). However, the number of reported cases decreased by 9.2 % in 2009 and by 1.7% in 2010 compared with 2008.

Over the five-year period country-specific trends in confirmed travel-related cases only decreased significantly in Finland (p-value<0.01), while an increasing trend was observed in the Netherlands (p-value<0.01). Italy and Iceland also reported a slight rise in notifications of travel-related infections, however for Italy the completeness of this variable was low and Iceland reported a low number of confirmed travel-related campylobacteriosis cases (N=128, cumulative data 2008–2012).

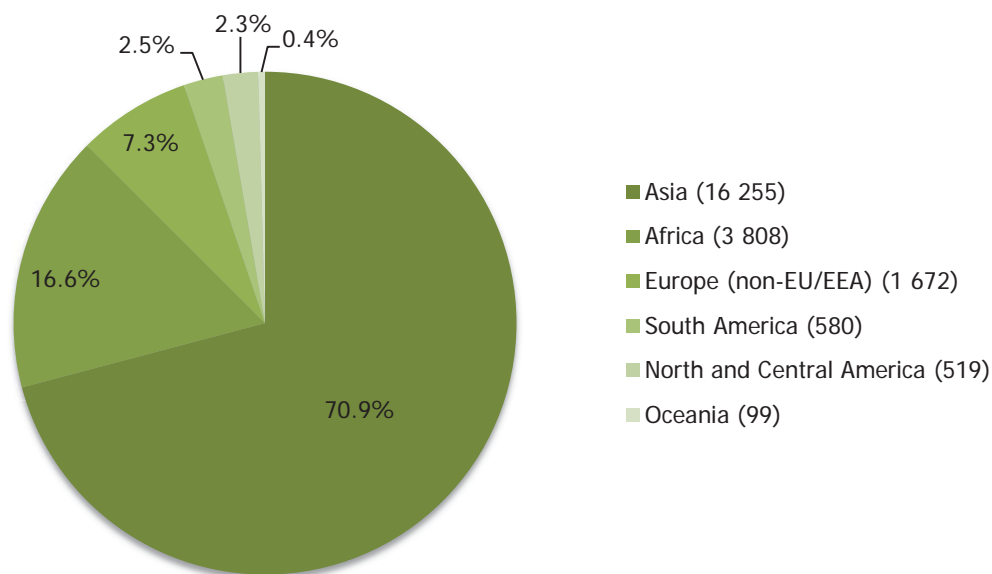
For the 45 239 travel-related infections reported between 2010 and 2012, data on suspected country of infection were available for 90% confirmed cases (N=40 719). Almost half of all travel-related infections were acquired in non-EU countries (56%), in particular in Asia (N=16 255) and Africa (N=3 808) (Figure 1.7). Overall, the most frequently reported countries of infection in travel-related campylobacteriosis cases were Spain, Thailand and Turkey (Figure 1.8).

Figure 1.6. Trend and number of confirmed travel-related campylobacteriosis cases in EU/EEA countries, 2008–2012 (N=70 044)



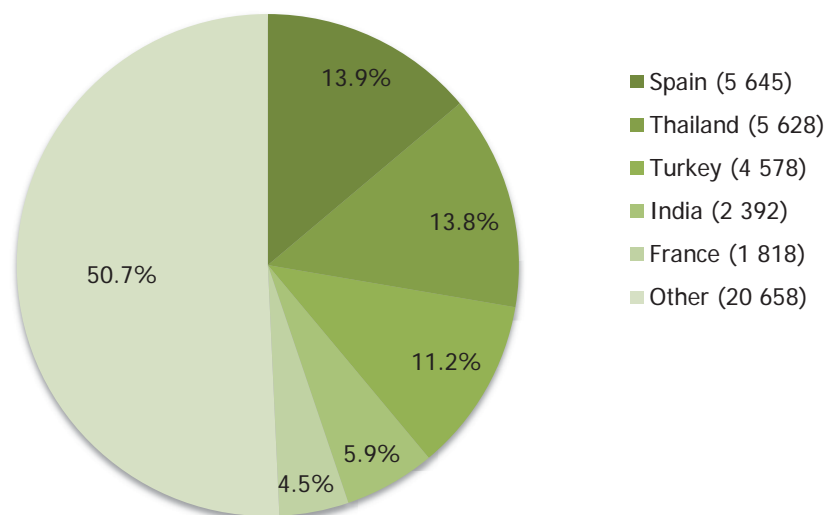
Source: Austria, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Ireland, Italy, Malta, the Netherlands, Poland, Slovakia, United Kingdom; EEA countries: Iceland and Norway

Figure 1.7. Origin of travel-related campylobacteriosis infections acquired in non-EU/EEA countries by geographical regions, EU/EEA countries, 2010–2012



Source: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Ireland, Italy, Lithuania, Malta, Poland, Slovakia, Slovenia, Sweden, United Kingdom; EEA countries: Iceland and Norway

Figure 1.8. Five most frequently reported countries of infection in confirmed travel-related campylobacteriosis cases as reported by EU/EEA countries, 2010–2012



Source: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Ireland, Italy, Lithuania, Malta, Poland, Slovakia, Slovenia, Sweden, United Kingdom; EEA countries: Iceland and Norway

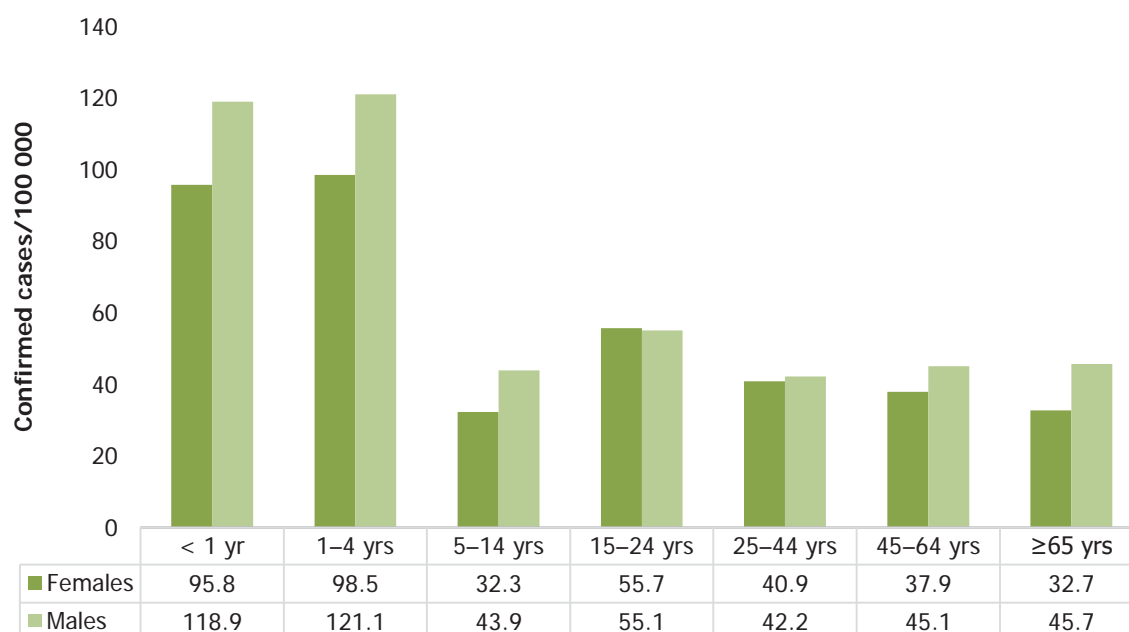
Age and sex

During 2010–2012, data on age and sex were reported for 99% of confirmed campylobacteriosis cases by 26 EU/EEA countries.

Children younger than five years showed the highest notification rate of campylobacteriosis (>95 cases per 100 000), followed by persons aged 15–24 year, while in the older age groups the notification rates were substantially lower (<50 cases per 100 000) (Figure 1.9; Annex A: Table A1.4).

There was a notable difference in notification rates between sexes. Overall, the male-to-female ratio was 1.1:1 and a male predominance was observed in the age groups younger than 15 years and 45 years or older (Figure 1.9; Annex A: Table A1.4). The highest male-to-female ratio (1.4:1) was noted for the age group 5–14 years.

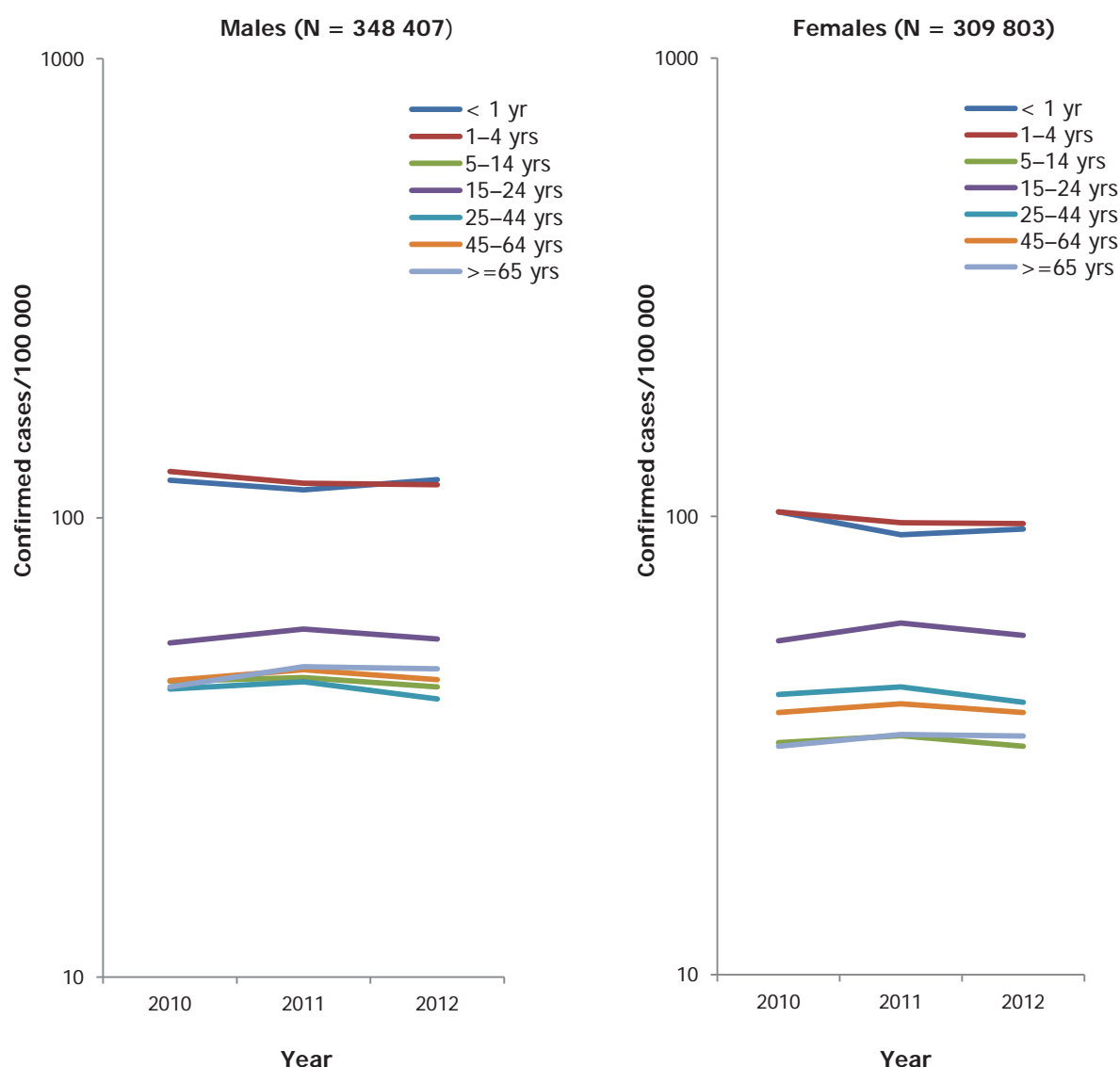
Figure 1.9. Notification rates of confirmed campylobacteriosis cases by age group and sex in EU/EEA countries, 2010–2012 (N=658 210)



Source: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom; EEA countries: Iceland and Norway

Due to the differences in notification rates between age groups in males and females, three-year trends were described by sex (Figure 1.10; Annex A: Table A1.4). During 2010–2012, the notification rate was nearly stable in almost all age groups, with a slight decrease in persons aged 1–4 year, more marked in males than females, and in females younger than one year of age. A minor increase in notification rates was observed in males over 65 years of age (Figure 1.10; Annex A: Table A1.4).

Figure 1.10. Semi-logarithmic graph showing trends in notification rates of confirmed campylobacteriosis cases by age groups and sex in EU/EEA countries, 2010–2012



Source: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom; EEA countries: Iceland and Norway

Campylobacter species

In the three-year period from 2010 to 2012, 26 EU/EEA countries reported information on *Campylobacter* species for 94% of confirmed cases, in particular 40% of all confirmed isolates (n=262 396) were reported with speciation, 46% (n=304 738) were reported as '*Campylobacter* species unspecified' and 8% (n=54 758) were reported as 'Other *Campylobacter* species'.

C. jejuni and *C. coli* were the most commonly reported species (Table 1.4). Among cases with known data on species (N=262 396), *C. jejuni* accounted for 93% and *C. coli* was responsible for 6% of reported infections.

It is noteworthy that more than half of cases were reported without speciation, as '*Campylobacter* spp.' or as '*Campylobacter* other'. The proportion of *Campylobacter* cases without speciation increased gradually from 2010 to 2012, while the number of species reported as 'other' decreased. This was due to reporting almost all cases with *Campylobacter* species unspecified as a *Campylobacter* spp. instead of *Campylobacter* other by the United Kingdom in 2012 (Table 1.4).

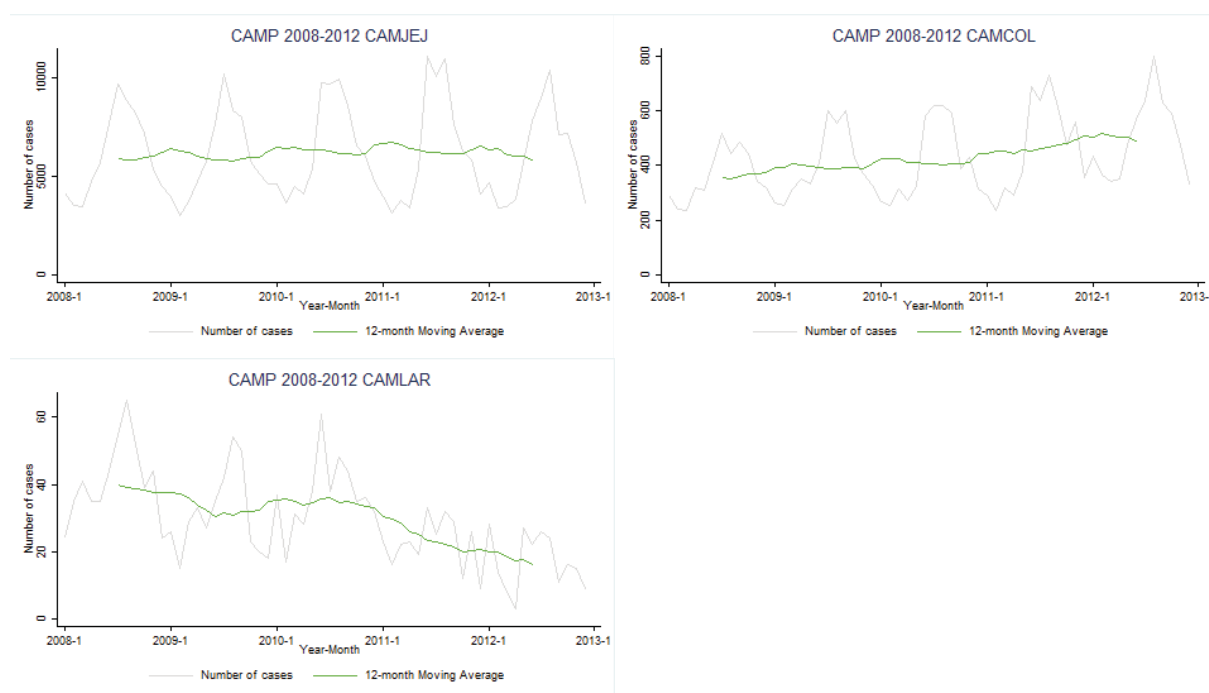
Trends by *Campylobacter* species were calculated over the five-year period, from 2008 to 2012, isolation of *C. jejuni* remained stable, while a significant increase was observed for *C. coli* (p-value<0.01). The trend for *C. lari* showed a slight but significant decrease (Figure 1.11).

Table 1.4. *Campylobacter* species in confirmed campylobacteriosis cases, EU/EEA countries, 2010–2012

Species	2010		2011		2012	
	Cases	Percentage (%)	Cases	Percentage (%)	Cases	Percentage (%)
<i>Campylobacter jejuni</i>	77 604	39.0	85 079	39.2	81 663	39.6
<i>Campylobacter coli</i>	5 014	2.5	5 733	2.6	6 232	3.0
<i>Campylobacter lari</i>	466	0.2	269	0.1	204	0.1
<i>Campylobacter upsaliensis</i>	13	0.01	48	0.02	59	0.03
<i>Campylobacter fetus</i>	-	-	-	-	12	0.01
<i>Campylobacter</i> species unspecified	94 951	47.7	104 518	48.2	105 269	51.1
Other <i>Campylobacter</i> species	20 986	10.5	21 240	9.8	12 532	6.1
Total known	199 034	100.0	216 887	100.0	205 971	100.0
Unknown/missing	19100	8.8	10312	4.5	11 387	5.2
Total reported	218 134		227 199		217 358	

– Not reported/not calculated

Source: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom; EEA countries: Iceland and Norway

Figure 1.11. Trend and number of confirmed *Campylobacter jejuni* (N=369 626), *C. coli* (N=25 725) and *C. lari* (N=1 803) cases in EU/EEA countries, 2008–2012

Source: Austria, Cyprus, Czech Republic, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Romania, Slovenia, Sweden, United Kingdom; EEA countries: Iceland and Norway

Species by age groups

The three most common species (*C. jejuni*, *C. coli* and *C. lari*) are spread over all age groups (Table 1.5).

With the exception of children younger than one year of age, the age distribution between the *C. coli* cases and the *C. lari* cases was very similar and no significant differences were observed (Table 1.5). Conversely, *C. jejuni* cases presented a significantly different age distribution across all groups compared to *C. coli* cases, with a higher proportion of cases in younger age groups (less than 25 years) (Table 1.5).

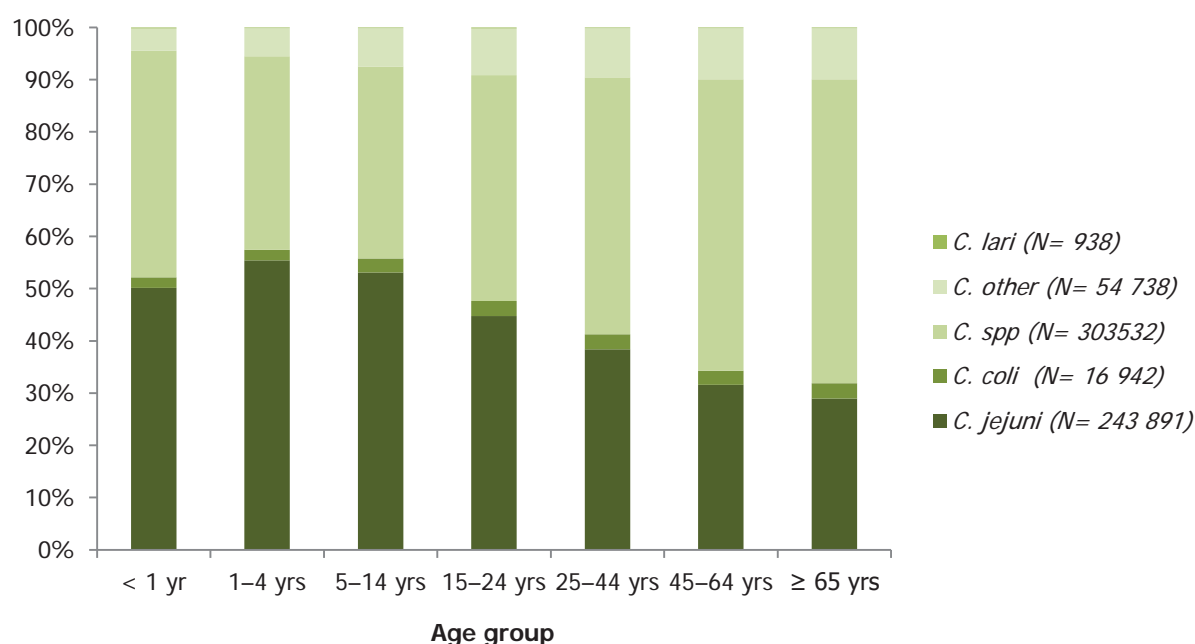
Table 1.5. Age distribution of confirmed campylobacteriosis cases by species, EU/EEA countries, 2010–2012 (N=620 041)

Age groups	<i>Campylobacter jejuni</i>		<i>Campylobacter coli</i>		<i>Campylobacter lari</i>		<i>Campylobacter</i> species unspecified		Other <i>Campylobacter</i> species	
	Cases	Percentage (%)	Cases	Percentage (%)	Cases	Percentage (%)	Cases	Percentage (%)	Cases	Percentage (%)
< 1 yr	7028	2.9	285	1.7	25	2.7	6 077	2.0	602	1.1
1–4 yrs	32 484	13.3	1199	7.1	70	7.5	21 717	7.2	3 191	5.8
5–14 yrs	27 574	11.3	1 401	8.3	74	7.9	19 059	6.3	3 825	7.0
15–24 yrs	40 273	16.5	2 581	15.2	162	17.3	38 893	12.8	8 093	14.8
25–44 yrs	61 635	25.3	4627	27.3	254	27.1	79 042	26.0	15 086	27.6
45–64 yrs	48 356	19.8	4 152	24.5	212	22.6	85 435	28.1	14 980	27.4
≥ 65 yrs	26 541	10.9	2 697	15.9	141	15.0	53 309	17.6	8 961	16.4
Total	243 891	100.0	16942	100.0	938	100.0	303 532	100.0	54 738	100.0

Source: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom; EEA countries: Iceland and Norway

With regard to the relative distribution of reported *Campylobacter* species, the risk of infection by *C. jejuni* was highest in children aged 1–4 years and decreased with the increase of age. On the contrary, the risk of infection by *C. coli* increased with increasing of age (Figure 1.12; Annex A: Table A1.5). *C. lari* was evenly distributed in all age groups (Figure 1.12; Annex A: Table A1.5).

The relative proportion of '*Campylobacter* spp.' and '*Campylobacter* other' also increased with increasing age (Figure 1.12; Annex A: Table A1.5).

Figure 1.12. Relative distribution of confirmed *Campylobacter* isolates by species and age groups as reported by EU/EEA countries, 2010–2012 (N=620 041)

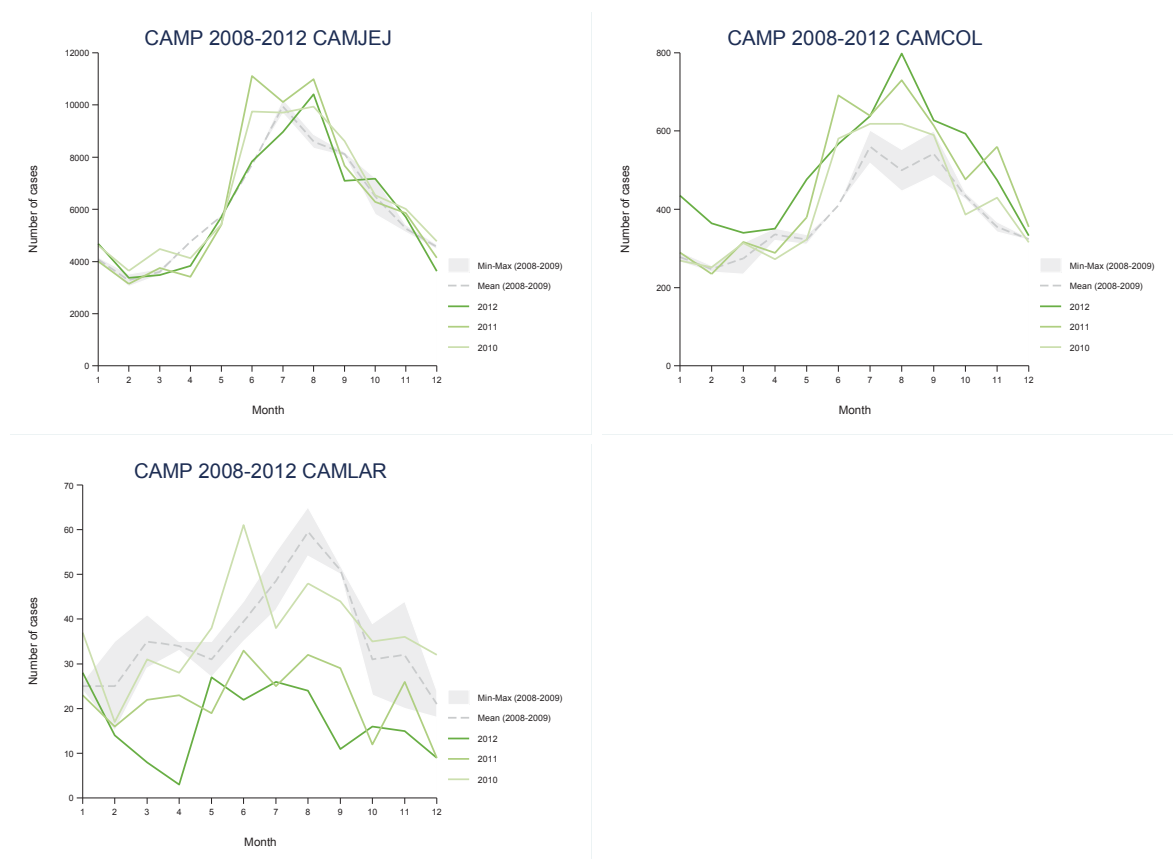
Source: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom; EEA countries: Iceland and Norway

Seasonality by species

Seasonality was analysed for the three most common species, *C. jejuni*, *C. coli* and *C. lari*. During 2010–2012, *C. jejuni* and *C. coli* showed a clear seasonality. The number of cases started a steep increase in April, and peaking in the summer between June and August (Figure 1.13). The lowest number of cases were observed in February. Both species presented a very low variability when compared with data from the previous two years (2008–2009)

(Figure 1.13). The distribution of *C. lari* cases did not show a clear seasonal pattern during 2010–2012 and a high variability was observed when comparing data with the period 2008–2009 (Figure 1.13).

Figure 1.13. Number of confirmed *Campylobacter jejuni* (N=369 626), *C. coli* (N=25 752) and *C. lari* (N=1 803) cases by month, EU/EEA countries, 2008–2012



Source: Austria, Cyprus, Czech Republic, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Romania, Slovenia, Sweden, United Kingdom; EEA countries: Iceland and Norway

Seasonality by species and age group

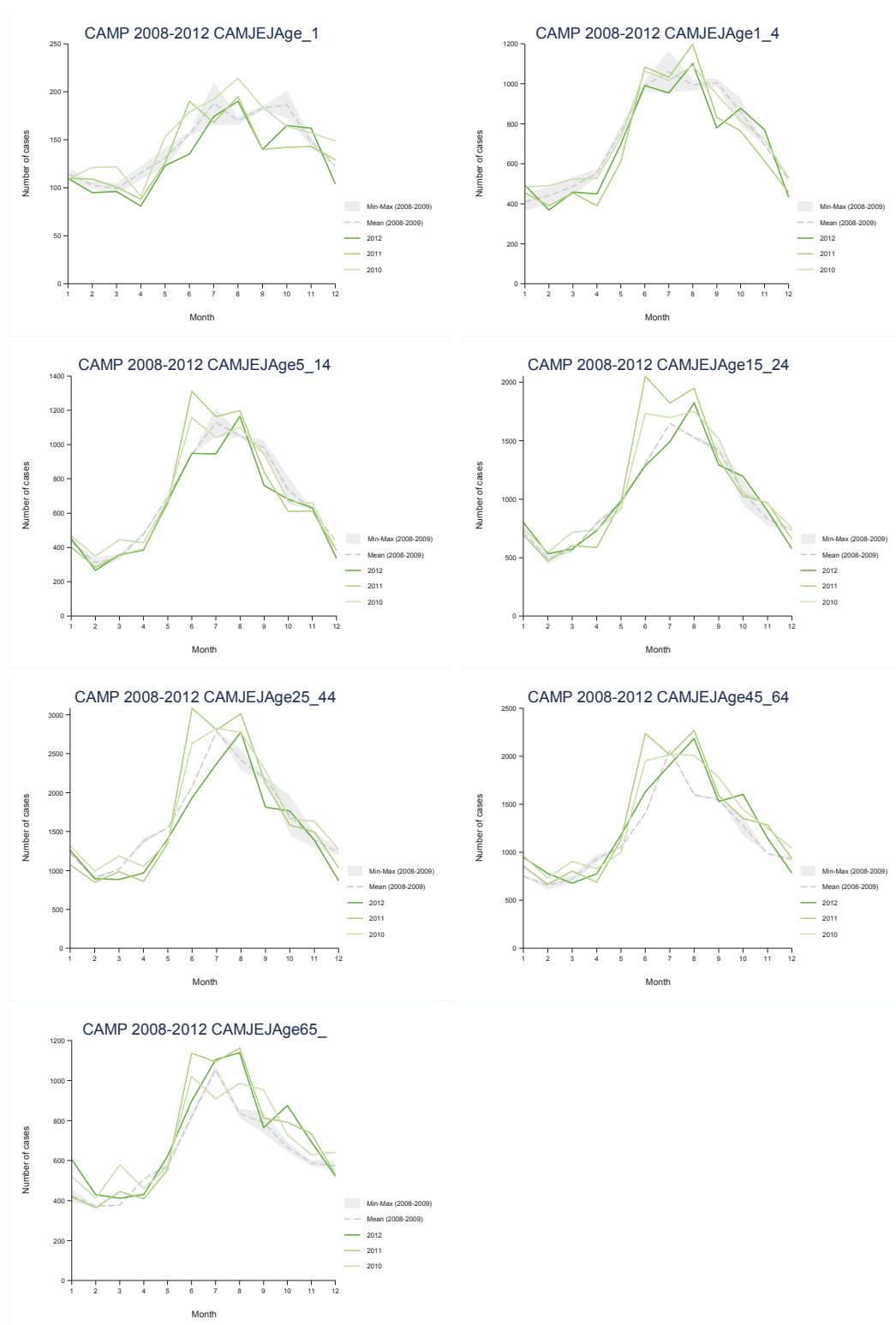
Seasonality by age group was analysed for the two most common species, *C. jejuni* and *C. coli*, and it is shown in figures 1.14 and 1.15, respectively.

A very clear seasonal pattern with a peak in summer was observed for *C. jejuni* cases aged between 5 and 64 years. The number of cases started increasing between March and April, peaked in summer between June and August, with the lowest number of cases was observed in February (Figure 1.14).

A different seasonality characterised *C. jejuni* cases younger than one year of age. Two peaks were recorded, one between June and August and the second between October and November. An increase of cases during the autumn was also observed in 2008-2009, but not in 2010 (Figure 1.14).

In cases aged between 1 and 4 years, and in the age group older than 64 year of age, additionally to the summer peak, a small autumn peak in *C. jejuni* infections was recorded. In both age groups, the increase of cases reported during September/October was more evident in 2012. In children 1–4 years old, the autumn peak was not observed in 2010 (Figure 1.14).

Figure 1.14. Distribution of confirmed *Campylobacter jejuni* (N=369 626) cases by month and age group, EU/EEA countries, 2008–2012



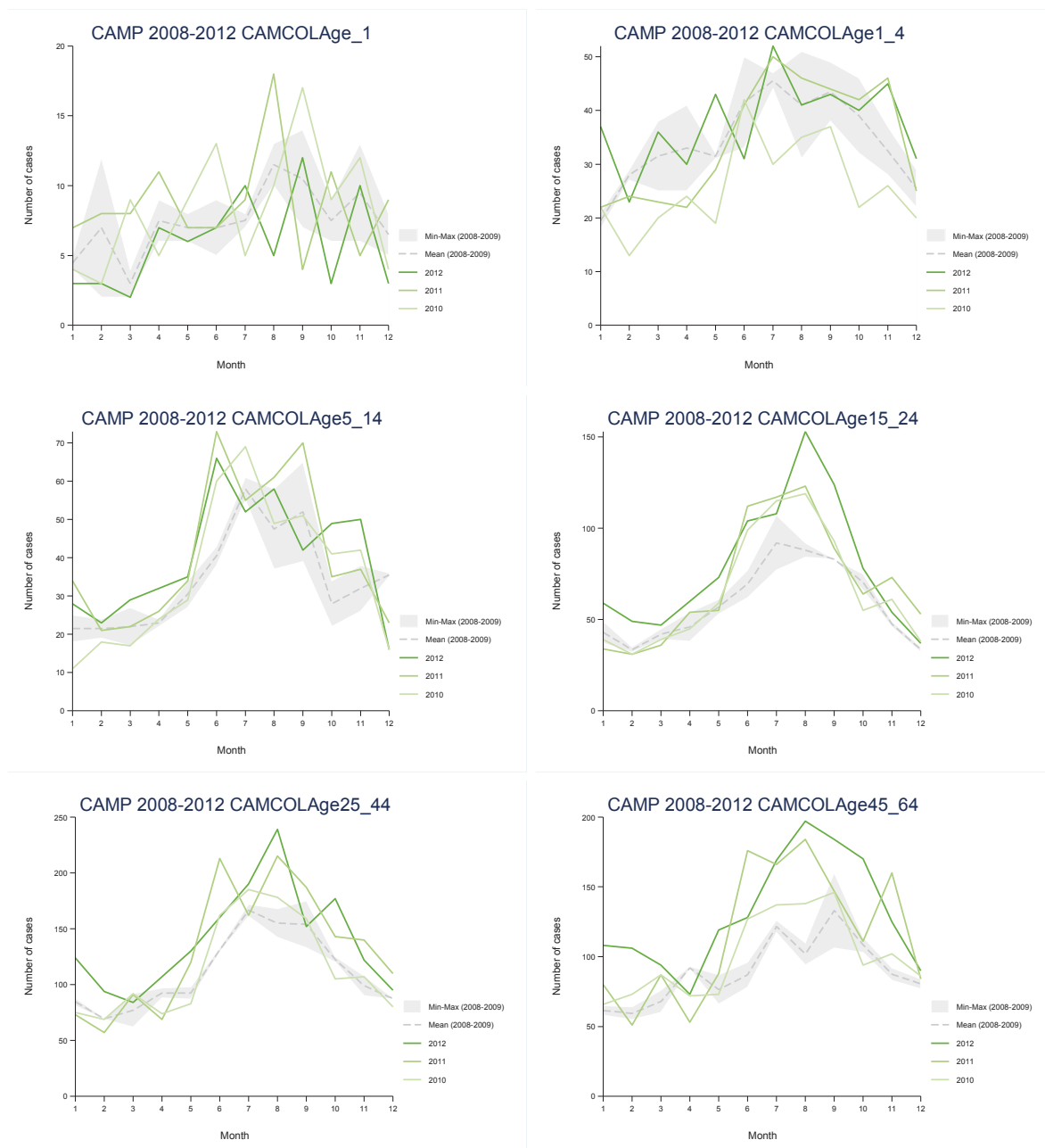
Source: Austria, Cyprus, Czech Republic, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Romania, Slovenia, Sweden, United Kingdom; EEA countries: Iceland and Norway

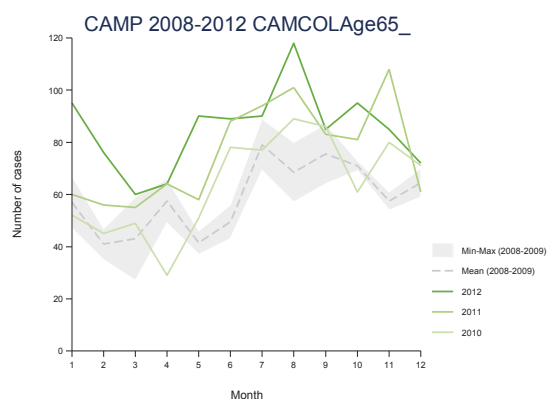
During 2010–2012, *C. coli* cases between 15 and 44 years of age showed a clear seasonality, with the highest number of cases recorded in summertime (June/August) and the lowest in winter (February/March) (Figure 1.15).

A summer seasonal pattern followed by a second increase of cases during autumn (September/November) characterized the age groups 5–14 and 45–64 years and some variability was observed when comparing winter data with the period 2008–2009 (Figure 1.15).

The seasonal distribution of *C. coli* infections in children younger than five years and adults over the age of 64 years did not show a clear pattern during 2010–2012, and a high variability was found when comparing data with the previous two years (2008–2009) (Figure 1.15).

Figure 1.15. Distribution of confirmed *Campylobacter coli* (N=25 752) cases by month and age group, EU/EEA countries, 2008–2012





Source: Austria, Cyprus, Czech Republic, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Romania, Slovenia, Sweden, United Kingdom; EEA countries: Iceland and Norway

Severity

The severity of campylobacteriosis was evaluated by analysing the hospitalisation and the proportion of deaths due to campylobacteriosis (outcome) among all confirmed cases by calculating the case-fatality ratio. Relative confidence intervals (95%CI) were calculated when analysing the hospitalisation ratio and the case-fatality ratio (CFR) and results were described on a country basis (Annex A: Table A1.6, Table A1.7).

Hospitalisation

During 2010–2012, the information on hospitalisation was reported for a very low proportion of confirmed campylobacteriosis cases (9.6%). As expected, the unknown proportion was quite high in 2010, with a slight reduction in following years (Table 1.6). The number of reporting countries increased from 8 in 2010 to 13 in 2012 (Annex A: Table A1.6).

At EU/EEA level, the proportion of hospitalised cases slightly increased in 2012 compared to 2011, from 43.2% (CI 95%: 42.5%–43.8%) to 44.5% (CI 95%: 43.9%–45.2%) (Table 1.6). The dramatic rise in hospitalisations observed between 2010 and 2011 was mainly driven by the United Kingdom, where the hospitalisation ratio rose from 21% (CI 95%: 18%–23%) in 2010 to 83% (CI 95%: 82%–84%) in 2012 (Annex A: Table A1.6), though the proportion of cases with known information on hospitalisation was still very low, only 7.5 %.

The highest hospitalisation ratios (74%–88% of cases hospitalised) were reported in Cyprus, Latvia, Lithuania, Romania and the United Kingdom. Three of these countries also reported among the lowest notification rates of campylobacteriosis, which indicates that the surveillance systems in these countries primarily capture the more severe cases (Annex A: Table A1.6).

Table 1.6. Hospitalisation ratio of confirmed campylobacteriosis cases in EU/EEA countries, 2010–2012

Hospitalisation	Year		
	2010	2011	2012
Number of confirmed cases	218 134	227 126	217 261
Confirmed cases covered (%) ¹	7.6	10.2	10.9
Hospitalised cases	4 575	10 040	10 582
Hospitalisation ratio (%) ² (confidence interval 95%)	27.5 (26.8-28.2)	43.2 (42.5-43.8)	44.5 (43.9-45.2)

¹ The proportion (%) of confirmed cases for which information on hospitalisation was available.

² Calculated as number of hospitalised cases of the confirmed cases for which this information was available.

Source: Austria, Cyprus (from 2012), Estonia, Hungary, Ireland, Latvia (from 2012), Lithuania (from 2012), Malta (from 2011), Poland, Slovenia (from 2011) and United Kingdom; EEA country: Norway

Outcome

Fourteen countries provided data on outcome (alive/dead) since 2010, and one country started reporting the information in 2012 (Annex A: Table A1.7). The proportion of confirmed cases with the information on outcome remained stable during the period 2010–2012, ranging between 54% and 52% (Table 1.7). To estimate the case-fatality ratios, only countries that reported information on outcome for at least one case were included. Only cases with known outcome were considered. Case-fatality ratio was calculated as the number of deaths/number of cases with known outcome.

Based on known data only, the case fatality ratio associated with campylobacteriosis cases at EU/EEA level was low and stable during the three-year period, ranging between 0.03%–0.04% (Table 1.7). During the whole period, only five countries reported deaths among campylobacteriosis cases (Annex A: Table A1.7).

Table 1.7. Number of deaths and case–fatality ratio of confirmed campylobacteriosis cases by year in EU/EEA countries, 2010–2012

Outcome	Year		
	2010	2011	2012
Number of confirmed cases	218 134	227 126	217 261
Confirmed cases covered (%) ¹	53.8	53.1	52.2
Number of deaths	30	45	31
Case–fatality ratio (%) ² (confidence interval 95%)	0.03 (0.02–0.04)	0.04 (0.03–0.05)	0.03 (0.02–0.04)

¹ The proportion (%) of confirmed cases for which information on death was available.

² Calculated as number of fatal cases of the confirmed cases for which this information was available.

Source: Austria, Cyprus, Czech Republic, Estonia, Germany, Hungary, Ireland, Latvia, Lithuania (from 2012), Malta, Poland, Romania, Slovakia and United Kingdom; EEA country: Norway

Discussion

During 2010–2012, *Campylobacter* infections have been the most frequently reported bacterial cause of human gastroenteritis in EU/EEA countries, confirming the steady increasing trend observed in Europe since 2005 [2–5]. However, in 2012, the number of notified cases of *Campylobacter* infection in the EU/EEA decreased by 4.3 % compared with 2011. This was mainly attributable to decrease of reported cases in two countries in 2012. Due to the complex epidemiology of *Campylobacter* species, the reasons for the increasing trend in human cases have not been fully understood yet.

Substantial differences between countries have been observed across Europe (notification rates ranged between <2 cases and >110 cases per 100 000), it may reflect differences in the degree of contamination across the food-chain (pre- and/or post-harvest), in healthcare-seeking, in laboratory practices, in healthcare systems, in completeness of surveillance reporting or differences in humans behaviours and activities. Some country to country variation may also reflect true frequency differences.

Travelling abroad is considered one of the risk factors associated with *Campylobacter* infections in humans [6]. In 2010–2012, the majority of infections reported at the EU/EEA level were acquired domestically and only about 10% of cases had a travel-related origin. Imported infections were mainly acquired in non-EU countries, especially in Asia and Africa. The five year trend of travel-related *Campylobacter* infections in the EU/EEA showed a decrease in 2009–2010. This might reflect the drop of tourism trips of EU residents in 2009 as a result of the worldwide economic recession [7]. The proportion of domestic versus imported cases varied across EU/EEA countries, with the highest proportion of travel-associated infections reported by the Nordic countries (>40%). Differences in the proportion of travel-related campylobacteriosis across European countries have also been described in other studies [8–10]. However, it should be taken into account that at the European level, standardisation of the definition of travel-related campylobacteriosis infections is limited.

The highest risk for *Campylobacter* infection was observed in children younger than five years, followed by young adults. The risk of infection was generally higher in men, and it was especially true for those aged under 15 and over 45 years, that presented about 25% higher rates in men compared with women. These findings are consistent with previous years [2–5] and analogous results have been reported in several studies [10–13]. Currently, it remains unclear why there are more cases in men than in women. During 2010–2012, trends in age-specific notification rates were nearly stable in almost all age groups, with a slight decrease in those aged 1–4 year and a minor increase in persons older than 65 year of age. The increase notified in older patients may be linked to the use of proton pump inhibitors as well as reflect the ageing of populations [11, 14].

The severity of campylobacteriosis was evaluated by looking at the hospitalisation and the case–fatality ratio. Hospitalisation data collected for the first time in 2009 and, as expected, the proportion of cases where the information about hospitalisation was unknown was quite high, with a slight reduction in 2011 and 2012. The highest hospitalisation ratio was observed in 2012 (44.5%). The dramatic rise observed between 2010 and 2011 is explained by the increase in hospitalised cases reported by the United Kingdom, although the completeness of reporting remained low in this country.

At the EU/EEA level, the case fatality ratio for campylobacteriosis cases was generally low, ranging between 0.03% and 0.04%. These figures should be interpreted cautiously as there is no common definition of the point in time at which a fatal outcome is determined. Many Member States have surveillance systems for campylobacteriosis which are based on laboratory notifications and where information on hospitalisation or outcome is not available. In

literature, differences in the severity of campylobacteriosis have been reported in association with the age, presence of comorbidity and the isolated species or strain [11, 15-16].

C. jejuni (93.1%) and *C. coli* (6.5%) were the most commonly reported species throughout the three-year period 2010–12. Both species showed a seasonal peak in summer (June–August), with *C. jejuni* showing a more marked seasonality. The relationship of climatic factors with campylobacteriosis is not clearly assessed yet and diverse results are described in the literature [10-12,17-18]. Apparently, the increase in the number of notified cases during the summer may be more reasonably related to changes in human behaviours or activities and in pathogen-host interactions than to meteorological factors [11, 17]. In contrast to *C. jejuni* and *C. coli*, *C. lari* did not present a clear seasonal pattern and the comparison with previous data (2008–2009 data) was characterised by high variability. This may be due to the low number of reported cases, the presence of medium- and long-term trends or indicate different transmission routes for this species.

A difference between *C. jejuni* and *C. coli* was observed in the age distribution of cases. The risk of infection by *C. jejuni* was highest in children aged 1–4 years and decreased with the increase of age. In contrast, the risk of infection by *C. coli* increased with increasing age. These observations are in line with another study [16]. The increase described for *C. coli* during 2008–2012 may result from an improvement in the reporting or may be a true raise in number of *C. coli* infections. The relative proportion of '*Campylobacter* spp.' and '*Campylobacter* other' increased with increasing age; the decreasing in speciation with increasing age may indicate that more thorough investigations are performed in child patients.

Most campylobacteriosis cases are sporadic with only a small proportion of cases reported in relation to outbreaks, however food-borne outbreaks due to *Campylobacter* are not commonly recorded and there is evidence that outbreaks are more common than thought [10, 19]. Fresh poultry meat and products are considered the most important food-borne source of *Campylobacter* and the handling and consumption of contaminated broiler meat causes about 20–30% of human *Campylobacter* infections [2-5]. All Nordic countries that reported low notification rate of domestic campylobacteriosis cases generally had a low prevalence of *Campylobacter* in broilers, while countries reporting high notification rates for domestic human cases also reported high prevalence of *Campylobacter* in broilers or broiler meat (at retail and slaughter) [3].

Campylobacter is also prone to cause waterborne outbreaks, and water seems to play an important role in the transmission chain [20]. Although consumption of contaminated chicken products, raw milk and unpasteurised dairy products, and drinking water are the most common sources of *Campylobacter* outbreaks, other sources, such as consumption of raw beef products, undercooked seafood, unintentional ingestion of contaminated mud or muddy water and direct contact with animals have also been described [6, 20-22]. Moreover, the person-to-person transmission may play a role in household outbreaks of *Campylobacter* [20].

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Annex A. Campylobacteriosis

Table A1.1. Number and proportion of confirmed campylobacteriosis cases by origin of infection (domestic/travel-related) as reported by EU/EEA countries, 2010–2012

Country	Confirmed cases reported	Domestic cases		Travel-related cases		Unknown	
		N	%	N	%	N	%
Austria	14 243	10 700	75.1	1 385	9.7	2 158	15.2
Belgium	20 370	2 883	14.2	30	0.1	17 457	85.7
Bulgaria [^]	176	0	0.0	0	0.0	176	100.0
Cyprus	185	0	0.0	0	0.0	185	100.0
Czech Republic	58 105	57 389	98.8	716	1.2	0	0.0
Denmark	11 817	2 467	20.9	1 862	15.8	7 488	63.4
Estonia	679	626	92.2	53	7.8	0	0.0
Finland	12 462	1 828	14.7	6 784	54.4	3 850	30.9
France ^a	14 941	2 038	13.6	272	1.8	12 631	84.5
Germany	198 426	181 578	91.5	13 394	6.8	3 454	1.7
Greece	-	-	-	-	-	-	-
Hungary	19 668	19 638	99.8	30	0.2	0	0.0
Ireland	6 484	282	4.3	61	0.9	6 141	94.7
Italy	1 699	327	19.2	115	6.8	1 257	74.0
Latvia	16	16	100.0	0	0.0	0	0.0
Lithuania	3 136	687	21.9	5	0.2	2 444	77.9
Luxembourg	1 885	0	0.0	0	0.0	1 885	100.0
Malta	638	633	99.2	5	0.8	0	0.0
Netherlands ^b	12 978	11 604	89.4	782	6.0	592	4.6
Poland	1 152	1 142	99.1	6	0.5	4	0.3
Portugal	-	-	-	-	-	-	-
Romania	416	0	0.0	0	0.0	416	100.0
Slovakia	14 745	14 676	99.5	69	0.5	0	0.0
Slovenia	3 003	21	0.7	6	0.2	2 976	99.1
Spain ^c	17 297	17 297	100.0	0	0.0	0	0.0
Sweden	24 116	9 603	39.8	13 435	55.7	1 078	4.5
United Kingdom	215 026	33 973	15.8	1 863	0.9	179 190	83.3
EU total	653 663	369 408	56.5	40 873	6.3	243 382	37.2
Iceland	238	105	44.1	97	40.8	36	15.1
Liechtenstein	-	-	-	-	-	-	-
Norway	8 620	3 272	38.0	4 269	49.5	1 079	12.5
EU/EEA total	662 521	372 785	56.3	45 239	6.8	244 497	36.9

[^] Aggregated reporting

^a Population coverage 20%

^b Population coverage 52%

^c Population coverage 25%

– Not reported/not calculated

Table A1.2. Number and notification rates of confirmed domestic campylobacteriosis cases by EU/EEA countries, 2010–2012

Country	2010		2011		2012	
	Cases	Rate	Cases	Rate	Cases	Rate
Austria	3104	37.1	3 716	44.2	3 880	46.0
Belgium*	0	-	2 883	-	0	-
Bulgaria^	-	-	-	-	-	-
Cyprus	-	-	-	-	-	-
Czech Republic	20 865	198.6	18 492	176.3	18 032	171.7
Denmark	1 074	19.4	1 006	18.1	387	6.9
Estonia	178	13.3	195	14.6	253	18.9
Finland	536	10.0	556	10.3	736	13.6
France ^a	877	6.8	1 161	8.9	0	0.0
Germany	57 652	70.6	66 215	81.2	57 711	70.7
Greece	-	-	-	-	-	-
Hungary	7 170	72.8	6 115	62.3	6 353	65.0
Ireland	154	3.4	84	1.8	44	1.0
Italy*	83	-	97	-	147	-
Latvia	1	0.0	7	0.3	8	0.4
Lithuania	0	0.0	0	0.0	687	22.8
Luxembourg	-	-	-	-	-	-
Malta	203	49.0	216	51.9	214	51.3
Netherlands ^b	3 732	43.3	3 887	44.9	3 985	45.8
Poland	364	1.0	350	0.9	428	1.1
Portugal	-	-	-	-	-	-
Romania	-	-	-	-	-	-
Slovakia	4 456	82.2	4 542	84.2	5 678	105.1
Slovenia	0	0.0	0	0.0	21	1.0
Spain ^c	6 340	55.2	5 469	47.4	5 488	47.5
Sweden	3 152	33.7	3 281	34.8	3 170	33.4
United Kingdom~	11 423	18.6	11 552	18.6	10 998	17.5
EU total	121 364	42.9	129 824	44.8	118 220	41.5
Iceland	24	7.6	60	18.8	21	6.6
Liechtenstein	-	-	-	-	-	-
Norway	1007	20.7	1168	23.7	1097	22.0
EU/EEA total	122 395	42.5	131 052	44.4	119 338	41.1

* Sentinel surveillance. Population coverage unknown so notification rate not calculated

^ Aggregated reporting

^a Population coverage 20%

^b Population coverage 52%

^c Population coverage 25%

~ There is no single surveillance system in the UK. Data are representative (as submitted by England and Wales, Scotland and Northern Ireland), however surveillance systems might not be identical.

- Not reported/not calculated

Table A1.3. Number and notification rates of confirmed travel-related campylobacteriosis cases by EU/EEA countries, 2010–2012

Country	2010		2011		2012	
	Cases	Rate	Cases	Rate	Cases	Rate
Austria	424	5.1	483	5.7	478	5.7
Belgium*	0	-	30	-	0	-
Bulgaria^	-	-	-	-	-	-
Cyprus	-	-	-	-	-	-
Czech Republic	210	2.0	251	2.4	255	2.4
Denmark	653	11.8	667	12.0	542	9.7
Estonia	19	1.4	19	1.4	15	1.1
Finland	2 406	45.0	2 402	44.7	1 976	36.6
France ^a	125	1.0	147	1.1	0	0.0

Country	2010		2011		2012	
	Cases	Rate	Cases	Rate	Cases	Rate
Germany	4 004	4.9	4 597	5.6	4 793	5.9
Greece	-	-	-	-	-	-
Hungary	10	0.1	6	0.1	14	0.1
Ireland	46	1.0	7	0.2	8	0.2
Italy*	34	-	28	-	53	-
Latvia	0	0.0	0	0.0	0	0.0
Lithuania	0	0.0	0	0.0	5	0.2
Luxembourg	-	-	-	-	-	-
Malta	1	0.2	4	1.0	0	0.0
Netherlands ^b	251	2.9	268	3.1	263	3.0
Poland	2	0.0	2	0.0	2	0.0
Portugal	-	-	-	-	-	-
Romania	-	-	-	-	-	-
Slovakia	20	0.4	23	0.4	26	0.5
Slovenia	2	0.1	3	0.1	1	0.0
Spain ^c	0	0.0	0	0.0	0	0.0
Sweden	4 466	47.8	4555	48.4	4 414	46.5
United Kingdom~	673	1.1	561	0.9	629	1.0
EU total**	13346	4.7	14 053	4.9	13 474	4.7
Iceland	22	6.9	45	14.1	30	9.4
Liechtenstein	-	-	-	-	-	-
Norway	1376	28.3	1482	30.1	1411	28.3
EU/EEA total**	14 744	5.1	15 580	5.4	14 915	5.1

*Sentinel surveillance. Population coverage unknown so notification rate not calculated

^ Aggregated reporting

^a Population coverage 20%

^b Population coverage 52%

^c Population coverage 25%

~ There is no single surveillance system in the UK. Data are representative (as submitted by England and Wales, Scotland and Northern Ireland), however surveillance systems might not be identical.

** For each year shown, notification rates were calculated, with the exception of countries with unknown population coverage. Also excluded were populations of countries which did not report data. Populations of countries which reported 0 cases were included.

– Not reported/not calculated

Table A1.4. Notification rates of confirmed campylobacteriosis cases by age groups and sex in EU/EEA countries, 2010–2012

Sex	Age group	2010		2011		2012		2010–2012	
		Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Male	< 1 yr	3 167	120.7	3 015	115.0	3 110	121.1	9 292	118.9
	1–4 yrs	13 041	126.2	12 475	119.1	12 453	118.0	37 969	121.1
	5–14 yrs	11 241	44.1	11 447	44.9	10 926	42.8	33 614	43.9
	15–24 yrs	15 827	53.4	16 756	57.3	15 722	54.5	48 305	55.1
	25–44 yrs	28 976	42.4	29 811	43.9	27 233	40.4	86 020	42.2
	45–64 yrs	27 367	44.2	29 434	46.7	28 243	44.4	85 044	45.1
	≥65 yrs	14 789	42.9	16 570	47.4	16 804	46.9	48 163	45.7
	Total	114 408	49.1	119 508	51.1	114 491	48.8	348 407	49.7
Female	< 1 yr	2 549	102.3	2 270	91.1	2 288	93.8	7107	95.8
	1–4 yrs	10 042	102.3	9 648	96.9	9 671	96.4	29 361	98.5
	5–14 yrs	7 781	32.1	8 047	33.2	7 642	31.5	23 470	32.3
	15–24 yrs	15 187	53.5	16 366	58.5	15 200	55.0	46 753	55.7
	25–44 yrs	27 384	40.9	28 244	42.4	26 047	39.3	81 675	40.9
	45–64 yrs	23 942	37.4	25 417	39.0	24 531	37.3	73 890	37.9
	≥ 65 yrs	15 119	31.5	16 143	33.4	16 285	33.2	47 547	32.7
	Total	102 004	41.8	106 135	43.4	101 664	41.4	309 803	42.2

Source: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom; EEA countries: Iceland and Norway

Table A1.5. Number of isolates and relative distribution of reported *Campylobacter* species by age groups, EU/EEA countries, 2010–2012

Age groups	<i>Campylobacter jejuni</i>		<i>Campylobacter coli</i>		<i>Campylobacter lari</i>		<i>Campylobacter</i> species unspecified		Other <i>Campylobacter</i> species		Total 2010–2012	
	Cases	Percentage (%)	Cases	Percentage (%)	Cases	Percentage (%)	Cases	Percentage (%)	Cases	Percentage (%)	Cases	Percentage (%)
< 1 yr	7 028	50.1	285	2.0	25	0.2	6 077	43.4	602	4.3	14 017	100.0
1–4 yrs	32 484	55.4	1 199	2.0	70	0.1	21 717	37.0	3 191	5.4	58 661	100.0
5–14 yrs	27 574	53.1	1 401	2.7	74	0.1	19 059	36.7	3 825	7.4	51 933	100.0
15–24 yrs	40 273	44.7	2 581	2.9	162	0.2	38 893	43.2	8 093	9.0	90 002	100.0
25–44 yrs	61 635	38.4	4 627	2.9	254	0.2	79 042	49.2	15 086	9.4	160 644	100.0
45–64 yrs	48 356	31.6	4 152	2.7	212	0.1	85 435	55.8	14 980	9.8	153 135	100.0
≥ 65 yrs	26 541	29.0	2 697	2.9	141	0.2	53 309	58.2	8 961	9.8	91 649	100.0

Source: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom; EEA countries: Iceland and Norway

Table A1.6. Number of hospitalisation of confirmed campylobacteriosis cases by EU/EEA countries, 2010–2012

Country	2010					2011					2012				
	Cases	Cases covered (%)	Hospitalisation (N)	Hospitalisation ratio (%)	95% CI (%)	Cases	Cases covered (%)	Hospitalisation (N)	Hospitalisation ratio (%)	95% CI (%)	Cases	Cases covered (%)	Hospitalisation (N)	Hospitalisation ratio (%)	95% CI (%)
Austria	4 404	84.7	1 441	38.6	37.1-40.2	5 129	87.1	1 720	38.5	37.1-40	4 710	87.2	1 584	38.5	37.1-40.1
Belgium	6 047	0.0	-	-	-	7 716	0.0	-	-	-	6 607	0.0	-	-	-
Bulgaria	6	0.0	-	-	-	73	0.0	-	-	-	97	0.0	-	-	-
Cyprus	55	0.0	-	-	-	62	0.0	-	-	-	68	55.9	29	76.3	59.8-88.6
Czech Republic	21 075	0.0	-	-	-	18 743	0.0	-	-	-	18 287	0.0	-	-	-
Denmark	4 037	0.0	-	-	-	4 060	0.0	-	-	-	3 720	0.0	-	-	-
Estonia	197	100.0	113	57.4	50.1-64.4	214	100.0	125	58.4	51.5-65.1	268	100.0	144	53.7	47.6-59.8
Finland	3 944	0.0	-	-	-	4 267	0.0	-	-	-	4 251	0.0	-	-	-
France	4 324	0.0	-	-	-	5 538	0.0	-	-	-	5 079	0.0	-	-	-
Germany	65 110	0.0	-	-	-	70 812	0.0	-	-	-	62 504	0.0	-	-	-
Greece	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	7 180	100.0	1 658	23.1	22.1-24.1	6 121	100.0	1 352	22.1	21.1-23.2	6 367	100.0	1 429	22.4	21.4-23.5
Ireland	1 660	78.5	332	25.5	23.1-27.9	2 433	85.7	528	25.3	23.5-27.3	2 391	83.2	580	29.2	27.2-31.2
Italy	457	0.0	-	-	-	468	0.0	-	-	-	774	0.0	-	-	-
Latvia	1	0.0	-	-	-	7	0.0	-	-	-	8	100.0	7	87.5	47.4-99.7
Lithuania	1 095	0.0	-	-	-	1 124	0.0	-	-	-	917	100.0	714	77.9	75-80.5
Luxembourg	600	0.0	-	-	-	704	0.0	-	-	-	581	0.0	-	-	-
Malta	204	0.0	-	-	-	220	100.0	83	37.7	31.3-44.5	214	100.0	43	20.1	14.9-26.1
Netherlands	4 322	0.0	-	-	-	4 408	0.0	-	-	-	4 248	0.0	-	-	-
Poland	367	100.0	203	55.3	50.1-60.5	354	100.0	204	57.6	52.3-62.8	431	100.0	247	57.3	52.5-62
Portugal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Romania	175	94.3	122	73.9	66.5-80.5	149	98.0	87	59.6	51.2-67.6	92	79.3	54	74.0	62.4-83.6
Slovakia	4 476	0.0	-	-	-	4 565	0.0	-	-	-	5 704	0.0	-	-	-
Slovenia	1 022	0.0	-	-	-	998	99.6	561	56.4	53.3-59.6	983	98.3	564	58.4	55.2-61.5
Spain	6 340	0.0	-	-	-	5 469	0.0	-	-	-	5 488	0.0	-	-	-
Sweden	8 001	0.0	-	-	-	8 214	0.0	-	-	-	7 901	0.0	-	-	-
United Kingdom	70 298	1.5	216	20.8	18.3-23.4	72 150	7.9	4 742	83.7	82.7-84.7	72 578	7.5	4 551	83.3	82.3-84.3
EU total	215 397	6.5	4 085	29.2	28.5-30	223 998	9.0	9 402	46.4	45.7-47.1	214 268	9.7	9 946	47.7	47-48.4
Iceland	55	0.0	-	-	-	123	0.0	-	-	-	60	0.0	-	-	-
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	2 682	99.4	490	18.4	16.9-19.9	3 005	99.5	638	21.3	19.9-22.9	2 933	99.7	636	21.8	20.3-23.3
EU/EEA total	218 134	7.6	4 575	27.5	26.8-28.2	227 126	10.2	10 040	43.2	42.5-43.8	217 261	10.9	10 582	44.5	43.9-45.2

– Not reported/not calculated

Table A1.7. Number of deaths and case–fatality rate (CFR) of confirmed campylobacteriosis cases by EU/EEA countries, 2010–2012

Country	2010					2011					2012				
	Cases	Cases covered (%)	Deaths (N)	CFR (%)	95% CI (%)	Cases	Cases covered (%)	Deaths (N)	CFR (%)	95% CI (%)	Cases	Cases covered (%)	Deaths (N)	CFR (%)	95% CI (%)
Austria	4404	100.0	0	0.00	0.00-0.08	5129	100.0	3	0.06	0.01-0.17	4710	100.0	1	0.02	0.00-0.12
Belgium	6047	0.0	-	-	-	7716	0.0	-	-	-	6607	0.0	-	-	-
Bulgaria	6	0.0	-	-	-	73	0.0	-	-	-	97	0.0	-	-	-
Cyprus	55	96.4	0	0.00	0.00-6.72	62	100.0	0	0.00	0.00-5.78	68	100.0	0	0.00	0.00-5.28
Czech Republic	21075	100.0	5	0.02	0.01-0.06	18743	100.0	2	0.01	0.00-0.04	18287	100.0	4	0.02	0.01-0.06
Denmark	4037	0.0	-	-	-	4060	0.0	-	-	-	3720	0.0	-	-	-
Estonia	197	99.5	0	0.00	0.00-1.86	214	100.0	1	0.47	0.01-2.58	268	100.0	0	0.00	0.00-1.37
Finland	3944	0.0	-	-	-	4267	0.0	-	-	-	4251	0.0	-	-	-
France	4324	0.0	-	-	-	5538	0.0	-	-	-	5079	0.0	-	-	-
Germany	65110	99.5	2	0.00	0.00-0.01	70812	99.3	5	0.01	0.00-0.02	62504	99.7	6	0.01	0.00-0.02
Greece	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	7180	99.7	0	0.00	0.00-0.05	6121	100.0	0	0.00	0.00-0.06	6367	100.0	0	0.00	0.00-0.06
Ireland	1660	10.0	0	0.00	0.00-2.2	2433	5.0	0	0.00	0-3	2391	4.1	0	0.00	0.00-3.69
Italy	457	0.0	-	-	-	468	0.0	-	-	-	774	0.0	-	-	-
Latvia	1	100.0	0	0.00	0.00-97.5	7	100.0	0	0.00	0.00-40.9	8	100.0	0	0.00	0.00-36.9
Lithuania	1095	0.0	-	-	-	1124	0.0	-	-	-	917	100.0	0	0.00	0.00-0.40
Luxembourg	600	0.0	-	-	-	704	0.0	-	-	-	581	0.0	-	-	-
Malta	204	100.0	0	0.00	0.00-1.79	220	100.0	0	0.00	0.00-1.66	214	100.0	0	0.00	0.00-1.71
Netherlands	4322	0.0	-	-	-	4408	0.0	-	-	-	4248	0.0	-	-	-
Poland	367	97.3	0	0.00	0.00-1.03	354	99.7	0	0.00	0.00-1.04	431	95.6	0	0.00	0.00-0.89
Portugal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Romania	175	98.3	0	0.00	0.00-2.12	149	97.3	0	0.00	0.00-2.51	92	84.8	0	0.00	0.00-4.62
Slovakia	4476	94.4	0	0.00	0.00-0.09	4565	95.1	0	0.00	0.00-0.08	5704	95.5	0	0.00	0.00-0.07
Slovenia	1022	0.0	-	-	-	998	0.0	-	-	-	983	0.0	-	-	-
Spain	6340	0.0	-	-	-	5469	0.0	-	-	-	5488	0.0	-	-	-
Sweden	8001	0.0	-	-	-	8214	0.0	-	-	-	7901	0.0	-	-	-
United Kingdom	70298	18.1	23	0.18	0.11-0.27	72150	17.8	34	0.27	0.18-0.37	72578	16.9	20	0.16	0.10-0.25
EU total	215397	53.6	30	0.03	0.02-0.03	223998	52.9	45	0.04	0.03-0.05	214268	52.0	31	0.03	0.02-0.04
Iceland	55	0.0	-	-	-	123	0.0	-	-	-	60	0.0	0	-	-
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	2682	69.0	-	0.00	0.00-0.2	3005	67.8	0	0.00	0.00-0.18	2933	67.0	0	0.00	0.00-0.19
EU/EEA total	218134	53.8	30	0.03	0.02-0.04	227126	53.1	45	0.04	0.03-0.05	217261	52.2	31	0.03	0.02-0.04

– Not reported/not calculated