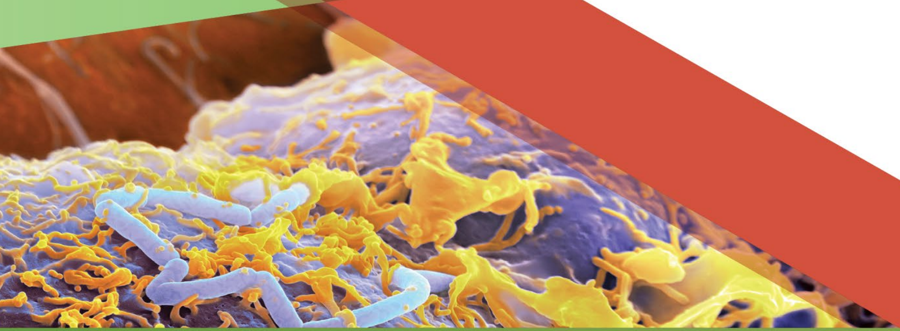


SURVEILLANCE REPORT

Listeriosis

Annual Epidemiological Report for 2019

Key facts

- In 2019, 30 countries reported 2 652 confirmed listeriosis cases in the EU/EEA.
- The age-standardised EU/EEA notification rate was 0.40 cases per 100 000 population.
- The highest rate was detected among elderly people over 64 years of age (1.6 cases per 100 000 population).
- The trend in the number of confirmed listeriosis cases in the EU/EEA remained stable.

Methods

This report is based on data for 2019 retrieved from The European Surveillance System (TESSy) on 5 October 2020. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases.

For a detailed description of methods used to produce this report, please refer to the 'Methods' chapter in the 'Introduction to the Annual Epidemiological Report' [1]. 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].

In most EU Member States, as well as Iceland and Norway, the notification of listeriosis in humans is mandatory. In three EU Member States (Belgium, Luxembourg and the United Kingdom) notification is voluntary. In 2019, 30 EU/EEA Member States reported listeriosis data. The surveillance systems for listeriosis have full national coverage in all Member States except Belgium and Spain. Since 2015, the population coverage is estimated to be 80% in Belgium. Nine of the 30 Member States used the EU case definition from 2018, nine used the one from 2012 and six the one from 2008; five Member States used another case definition and one did not specify which case definition was used. The majority of Member States (26 of 30) conducted passive surveillance and in 23 countries, cases were reported by both laboratories and physicians and/or hospitals. Twenty-nine of the 30 Member States reported case-based data.

In March 2019, ECDC initiated EU/EEA-wide whole-genome-sequencing-(WGS)-enhanced surveillance of listeriosis through isolate-based data collection. The objectives of this activity are set out below.

In the short term:

- early detection and delineation of multi-country listeriosis outbreaks and/or dispersed clusters to trigger outbreak investigations and contribute to food trace-back and trace-forward investigations so that appropriate control and preventive measures can be implemented in the food chain.

In the medium term:

- detection of the (re-)emergence of *Listeria monocytogenes* and monitoring the spread of strains;
- identification of persistent *L. monocytogenes* strains causing human infections in the EU/EEA which probably originate from continuous sources;
- identification of transmission chains, new risk factors for infection and severity of disease.

Suggested citation: European Centre for Disease Prevention and Control. Listeriosis. In: ECDC. Annual epidemiological report for 2019. Stockholm: ECDC; 2023.

Stockholm, January 2023

In the long term:

- monitoring of EU/EEA trends using selected indicators.

For cluster detection, raw reads or assemblies were submitted by the participating Member States. Sequences were analysed at ECDC with BioNumerics version 7.6.3 (Applied-Maths, Sint-Martens-Latem, Belgium). The analysis of raw reads included trimming using the default Bionumerics 7.6.3 settings; *de novo* assembly using SPAdes v.3.7.1; post-assembly optimisation by mapping reads back onto the assembly and keeping the consensus (using MismatchCorrector implemented in SPAdes v3.7.1). The default settings of BLAST parameters were used for allele calling. Core genome multi-locus sequence typing (cgMLST) analysis was performed using assembly-based allele calling according to the Institut Pasteur scheme [4] in BioNumerics. Isolates were retained in the analysis if at least 1 574 (90%) of the 1 748 core loci were detected.

A multi-country core cluster of *L. monocytogenes* was defined as at least two different countries reporting at least one isolate, each with a maximum of four differing alleles in cgMLST (single-linkage analysis). To further investigate the detected clusters, a threshold of seven core genome alleles was used to search for possible epidemiologically-linked isolates.

In addition to the WGS data submitted by the Member States for the listeriosis cluster detection, ECDC also collects and centrally analyses sequence data during multi-country outbreak investigations.

Epidemiology

In 2019, 2 652 confirmed cases of listeriosis were reported by 30 EU/EEA countries, with an overall notification rate of 0.46 per 100 000 population. Germany, Spain and France had the highest numbers of reported cases (571, 504 and 373, respectively), corresponding to 54.6% of all cases reported in the EU/EEA. The highest incidence rates were observed in Estonia and Iceland. Figure 1 illustrates the country-specific age-standardised rates per 100 000 population.

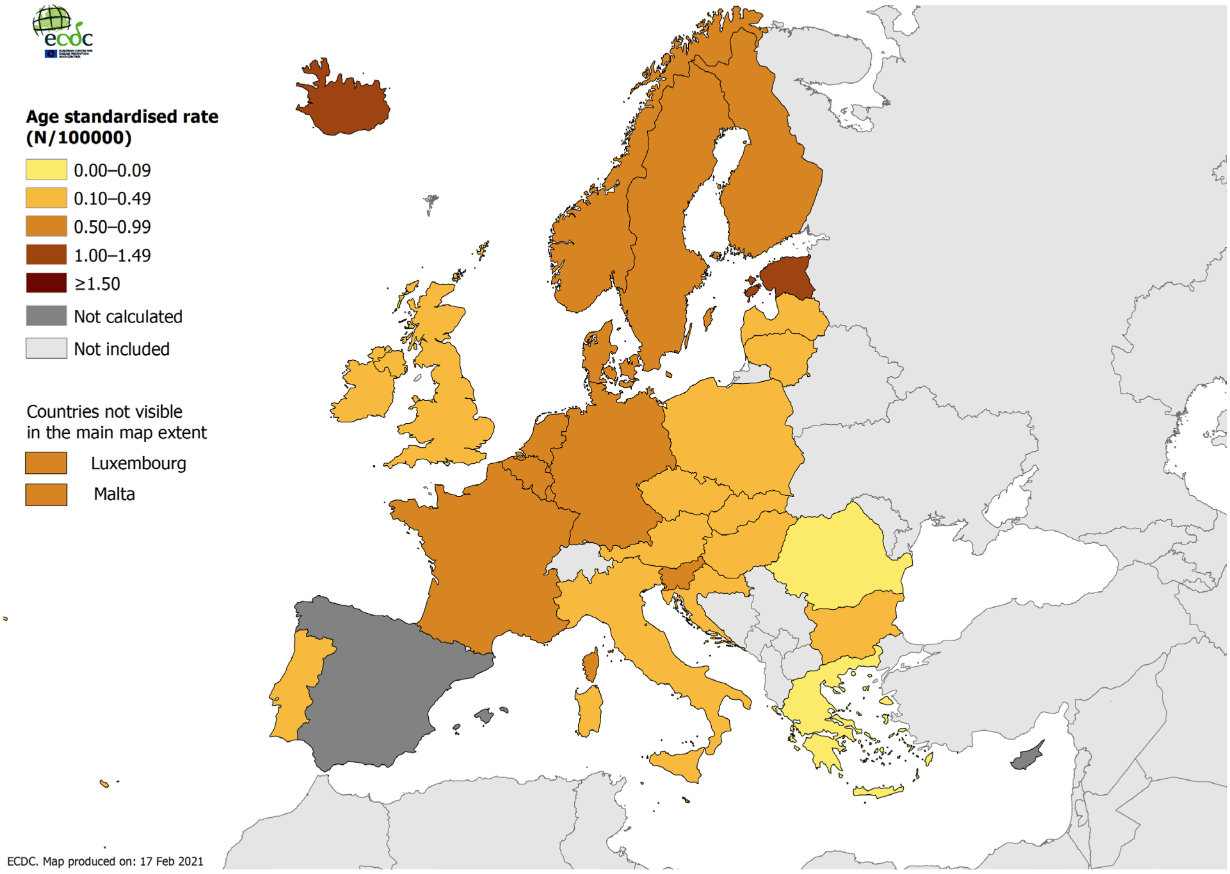
Table 1. Distribution of confirmed listeriosis cases and rates per 100 000 population by country and year, EU/EEA, 2015–2019

Country	2015		2016		2017		2018		2019		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Austria	38	0.44	46	0.53	32	0.36	27	0.31	38	0.43	0.39
Belgium	83	0.92	103	1.14	73	0.80	74	0.81	66	0.72	0.65
Bulgaria	5	0.07	5	0.07	13	0.18	9	0.13	13	0.19	0.18
Croatia	2	0.05	4	0.10	8	0.19	4	0.10	6	0.15	0.13
Cyprus	0	0.00	0	0.00	0	0.00	1	0.12	1	0.11	-
Czechia	36	0.34	47	0.45	30	0.28	31	0.29	27	0.25	0.23
Denmark	44	0.78	40	0.70	58	1.01	49	0.85	61	1.05	0.93
Estonia	11	0.84	9	0.68	4	0.30	27	2.05	21	1.59	1.39
Finland	46	0.84	67	1.22	89	1.62	80	1.45	50	0.91	0.74
France	412	0.62	375	0.56	370	0.55	338	0.50	373	0.56	0.49
Germany	557	0.69	662	0.81	721	0.87	679	0.82	570	0.69	0.55
Greece	31	0.29	20	0.19	20	0.19	19	0.18	10	0.09	0.09
Hungary	37	0.38	25	0.25	36	0.37	24	0.25	39	0.40	0.37
Iceland	0	0.00	0	0.00	6	1.77	2	0.57	4	1.12	1.19
Ireland	19	0.41	13	0.28	14	0.29	21	0.43	17	0.35	0.37
Italy	153	0.25	179	0.30	164	0.27	178	0.29	202	0.33	0.27
Latvia	8	0.40	6	0.30	3	0.15	15	0.78	6	0.31	0.26
Liechtenstein	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lithuania	5	0.17	10	0.35	9	0.32	20	0.71	6	0.21	0.18
Luxembourg	0	0.00	2	0.35	5	0.85	5	0.83	3	0.49	0.56
Malta	4	0.91	1	0.22	0	0.00	1	0.21	5	1.01	0.94
Netherlands	71	0.42	89	0.52	108	0.63	69	0.40	103	0.60	0.52
Norway	18	0.35	19	0.36	16	0.30	24	0.45	27	0.51	0.49
Poland	70	0.18	101	0.27	116	0.31	128	0.34	121	0.32	0.30
Portugal	28	0.27	31	0.30	42	0.41	64	0.62	56	0.54	0.47
Romania	12	0.06	9	0.05	10	0.05	28	0.14	17	0.09	0.08
Slovakia	18	0.33	10	0.18	12	0.22	17	0.31	18	0.33	0.33

Country	2015		2016		2017		2018		2019		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Slovenia	13	0.63	15	0.73	13	0.63	10	0.48	20	0.96	0.83
Spain	206	NR	362	NR	284	NR	370	NR	505	NR	NR
Sweden	88	0.90	68	0.69	81	0.81	89	0.88	113	1.10	0.98
UK	186	0.29	201	0.31	160	0.24	168	0.25	154	0.23	0.22
EU-EEA	**2 201**	**0.43**	**2 519**	**0.47**	**2 497**	**0.47**	**2 571**	**0.47**	**2 652**	**0.46**	**0.40**

Source: Country reports.
ASR: age-standardised rate.
ND: no data reported.
NR: no rate calculated.

Figure 1. Distribution of confirmed listeriosis cases per 100 000 population by country, EU/EEA, 2019



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

Listeriosis cases from countries reporting consistently from 2015 to 2019 show a stable trend (Figure 2).

In 2019, cases of listeriosis peaked in the summer more notably than in previous years. Typically, listeriosis cases peak during the summer months and again, less obviously, during the winter, and this was also seen in 2019.

Figure 2. Distribution of confirmed listeriosis cases by month, EU/EEA, 2015–2019

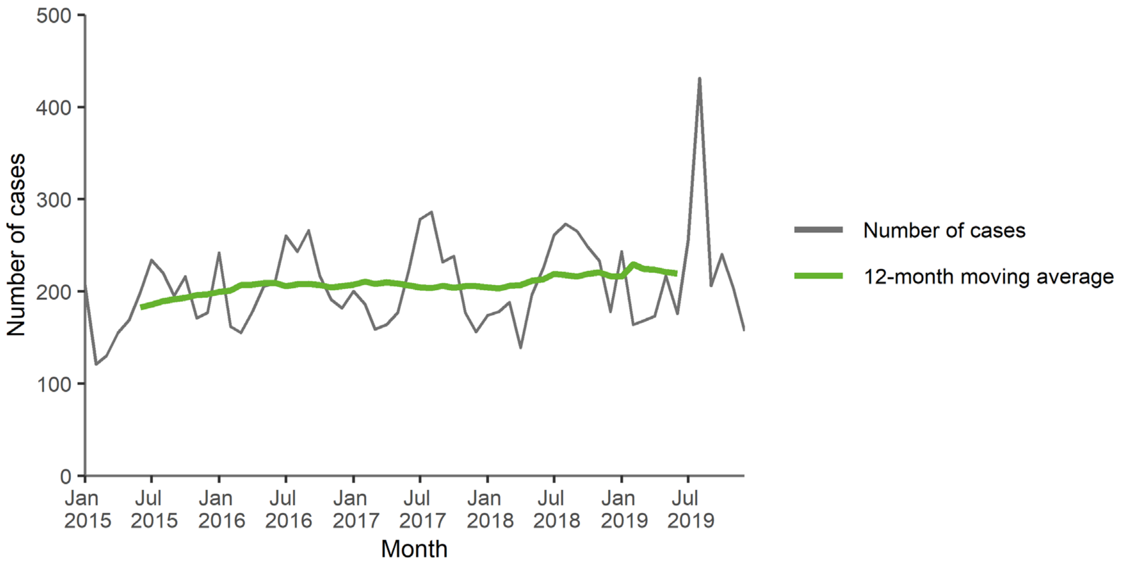
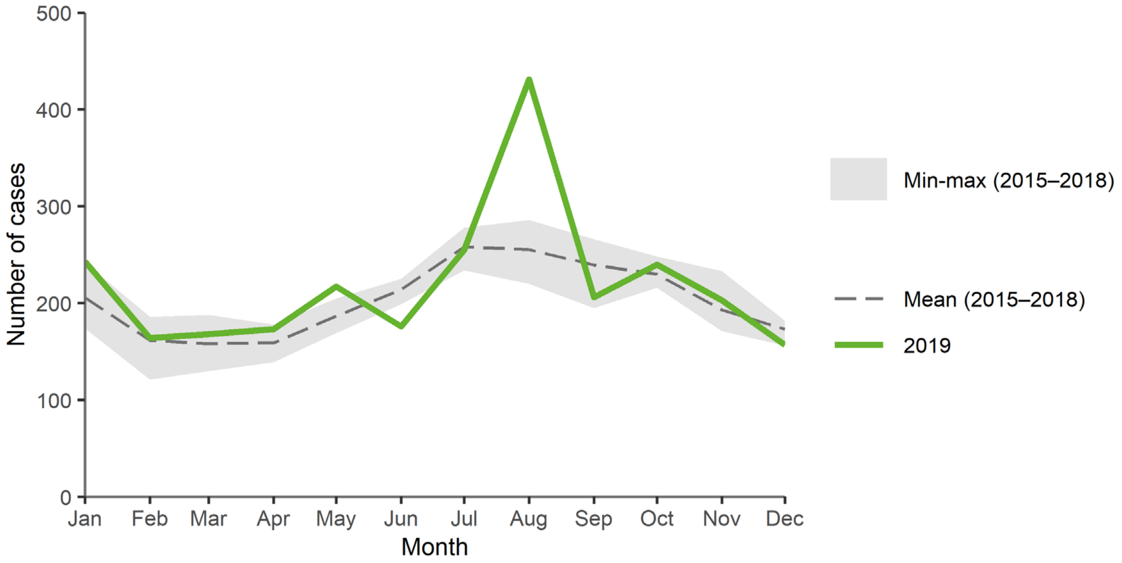


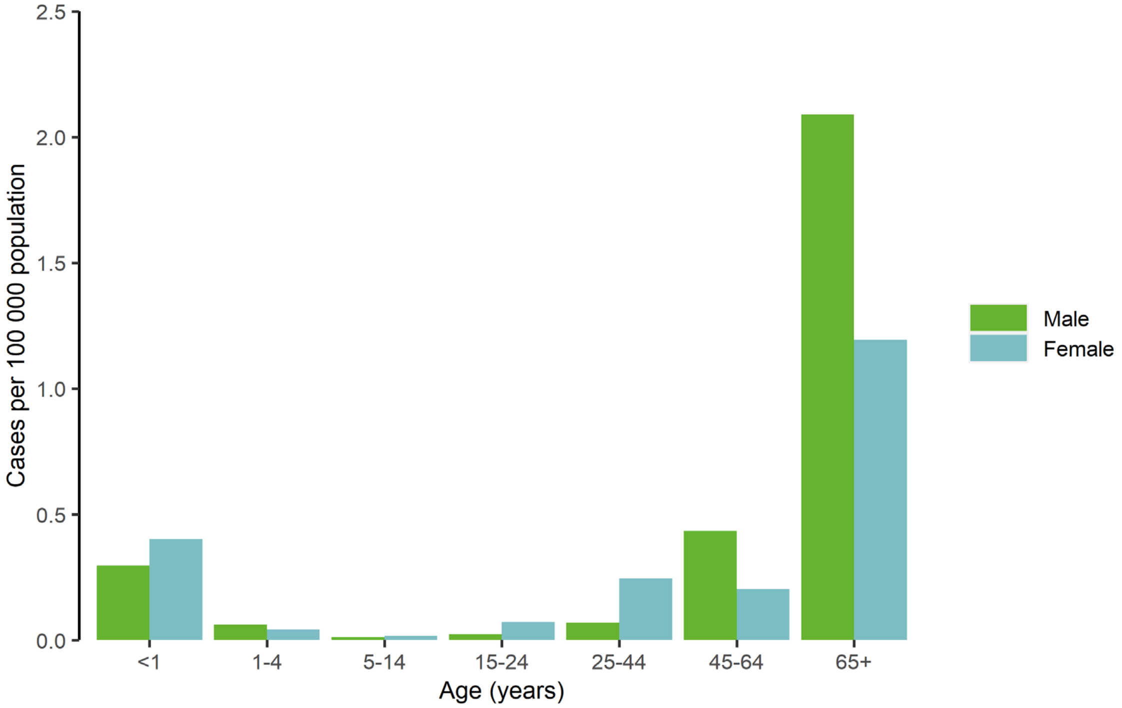
Figure 3. Distribution of confirmed listeriosis cases by month, EU/EEA, 2015–2018 and 2019



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

Of the confirmed listeriosis cases with known sex (N=2 650), 54.9% were in males and 45.1% in females, corresponding to a male-to-female ratio of 1.2:1. Those aged 64 years and over were the most affected age group (1 703 cases; 64.5%, notification rate: 1.6 per 100 000 population). In total, 112 cases of pregnancy-associated listeriosis were reported in 2019. Of these, 25 resulted in miscarriage or a fatal outcome for the new-born (pregnancy outcome reported for 58% of pregnancy-associated cases).

Figure 4. Distribution of confirmed listeriosis cases per 100 000 population, by age and gender, EU/EEA, 2019



Whole genome sequencing-enhanced surveillance

In 2019, the first year of EU/EEA-wide WGS-enhanced listeriosis surveillance, seven Member States submitted *L. monocytogenes* WGS data to TESSy for 408 isolates. In addition, 23 countries submitted sequence data to contribute to ongoing multi-country outbreak investigations for 512 isolates. From the data, and other retrospective (i.e. prior to 2019) background sequence data including study projects [5], 128 multi-country clusters were detected involving a total of 890 isolates. This involved a median of three isolates per cluster (range 2–87), and a median of two countries (range 2–10). The median cluster duration (time from oldest to newest isolate) was 2.2 years (range from 0 days to 14.8 years) for the 106 clusters, with date information available for first and last isolate.

Outbreaks and other threats

In 2019, 20 urgent inquiries on listeriosis were launched in EPIS by twelve different EU/EEA Member States and one non-EU/EEA country. For twelve of these, no multi-country aspect was identified. For the eight multi-country clusters, a probable source was found for five.

Two rapid outbreak assessments related to listeriosis were published in 2019, one of them linked to an urgent inquiry launched in 2017 by Denmark [6]. At the time it seemed like a national outbreak, but by 2019 four other Member States had reported microbiologically linked cases, and cold-smoked fish products were identified through WGS as the source in four EU Member States. The second rapid outbreak assessment was linked to an urgent inquiry launched in 2019 by the Netherlands involving a Dutch ready-to-eat meat producer. Cases were reported by the Netherlands and Belgium [7]. In addition, ECDC published an epidemiological update regarding a microbiological cluster with cases from five Member States [8].

In 2019, Spain recorded their largest ever listeriosis outbreak, with over 200 cases and an unusually high survival rate [9]. The source turned out to be chilled roasted pork meat. The outbreak was largely limited to Spain and no ECDC outputs were published, although the event was closely monitored through EPIS.

Discussion

Listeriosis is a relatively uncommon disease, but it is one of the most severe food- and waterborne diseases under EU surveillance [10]. The EU/EEA surveillance of listeriosis focuses on severe, invasive forms of the disease, for which the risk groups are mainly the elderly and immunocompromised individuals, pregnant women and infants. In the majority of the EU/EEA Member States notification of listeriosis cases in humans is compulsory. Listeriosis can also manifest in milder forms, causing gastrointestinal symptoms, but these cases are usually not notified at country-level and do not come within the scope of the EU/EEA-level surveillance.

In 2015−2019, the EU trend in confirmed listeriosis cases remained stable after a long period of increase. On the other hand, in 2019 the number of outbreaks caused by *L. monocytogenes* (n = 21) was 50% higher than 2018 (n = 14) and the related illnesses multiplied from an annual average of 83.4 cases reported at EU level in 2010−2018 to 349 cases. This increase was mainly due to outbreaks in Spain (three reported), involving 225 cases, 131 hospitalisations and three deaths, compared with zero reported in 2018. Overall, *L. monocytogenes* was identified as the causative agent by ten EU Member States in nine strong-evidence and 12 weak-evidence food-borne outbreaks that affected 349 people (207 of whom were in Spain), with 236 hospitalised and 31 deaths, as reported to the European Food Safety Authority (EFSA). Of the nine strong-evidence outbreaks, three were caused by 'meat and meat products' (one reported with additional information 'cold cuts'), two by 'broiler meat and products thereof' (with additional information 'RTE meat products' and 'chicken mayo sandwich') and one by each of the categories 'bovine meat and products thereof' ('potted beef'), 'pig meat and products thereof' (no additional information), 'mixed food' ('hummus and salads prepared in a small establishment') and 'vegetables and juices and other products thereof' ('black olives and other delicatessen products') [10].

WGS-based methods show a superior discriminatory power compared to traditional typing methods such as PFGE and have quickly become the default method used for international outbreak investigations [4,5,11]. In general, the production of raw reads is fairly simple to standardise, whereas the subsequent bioinformatics analyses can be performed in a multitude of different ways. The set-up of pipelines and types of analyses performed can vary between laboratories, but during multi-country outbreak investigations it is important that similar conclusions are drawn from the data regardless of the methods used, and international WGS validation studies are needed to ascertain this. In 2018, ECDC coordinated a proficiency test for *L. monocytogenes* whole genome assembly [12]. A total of 16 organisations participated, including 14 EU/EEA public health national reference laboratories, EFSA and the EU Reference Laboratory for *L. monocytogenes*, providing results for 29 different assembly pipelines. Ten of 14 public health national reference laboratories had at least one pipeline that was concordant with the reference assembly pipeline.

In March 2019, EU/EEA-wide WGS-enhanced listeriosis surveillance was started at ECDC. Only a quarter of the EU/EEA Member States submitted data proactively during the first year, whereas a larger number of countries submitted sequences for centralised analysis in relation to ongoing international outbreak investigations. Microbiological clusters detected from this non-comprehensive dataset show that although the multi-country clusters tend to be small and affect only a few countries, they often persist for several years, even decades. This indicates that microbiological cluster detection efforts combined with other relevant data, such as sequences from food isolates and exposure data, could help locate sources of the pathogen and allow setting control measures to reduce the EU/EEA burden of this severe disease.

Public health implications

Despite the stabilisation of the trend in the number of listeriosis cases in the EU/EEA, the severity and increasing trend in numbers of cases during the preceding years is still worrying. More attention should be placed on the prevention and control of the disease. It is important to raise awareness of listeriosis and related high-risk foods, particularly for risk groups such as the elderly, where the majority of cases occur, and pregnant women. In addition, supranational cross-sectorial collaboration is essential to address the occurrence of persistent *L. monocytogenes* strains in humans.

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