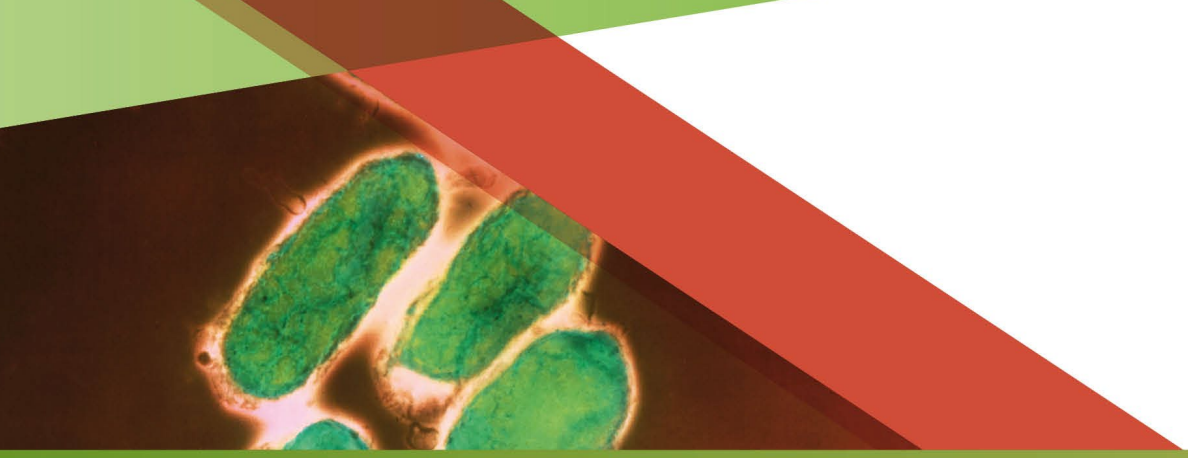

SURVEILLANCE REPORT

Yersiniosis

Annual Epidemiological Report for 2020

Key facts

- Yersiniosis is the third most commonly reported gastrointestinal infection in the EU/EEA after campylobacteriosis and salmonellosis.
- For 2020, 28 countries reported 5 744 confirmed cases of yersiniosis in the EU/EEA.
- The overall notification rate was 1.7 cases per 100 000 population and remained stable from 2016 to 2020.
- The highest rate was detected in children (in the 0–4 age group), with 7.2 cases per 100 000 population for males and 6.8 cases per 100 000 population for females.

Introduction

Yersiniosis is an enteric infection caused primarily by *Yersinia enterocolitica* and rarely by *Yersinia pseudotuberculosis.* Pigs are the most common reservoir of *Y. enterocolitica*. Human infections are regularly related to the consumption of undercooked pork or cross-contamination of other food items during the handling of raw pork.

Both domestic and wild animals are natural reservoirs of *Y. pseudotuberculosis*. Human infections are mostly caused by the consumption of contaminated vegetables. Symptoms of yersiniosis include fever and abdominal pain in the right lower part of the abdomen and may be confused with appendicitis. Children can also have (bloody) diarrhoea.

Methods

This report is based on data for 2020 retrieved from The European Surveillance System (TESSy) on 5 November 2021. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases. For a detailed description of the 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].

This surveillance report is based on yersiniosis surveillance data collected by the European Food- and Waterborne Diseases and Zoonoses Network (FWD-Net). For 2020, yersiniosis data were reported by 28 EU/EEA countries. The notification of yersiniosis is mandatory for 23 Member States of the EU/EEA, except five Member States where notification is voluntary (Belgium, France, Greece, Italy and Luxembourg). No yersiniosis surveillance system exists in the Netherlands.

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Stockholm, September 2022

The surveillance systems for yersiniosis infections have national coverage in all reporting countries except for France, Italy and Spain. No estimates for population coverage were provided by these three countries, so notification rates were not calculated.

Greece reported data on laboratory-confirmed cases of yersiniosis collected from public hospitals from 2018 onwards. For 2020, Spain did not receive data from all the regions that usually report cases, and therefore, the case numbers are lower than expected.

Eight countries used the latest (EU 2018) case definition, while ten countries used the 2012 case definition, and five countries used the 2008 case definition. Four countries reported cases using another case definition, and one country did not specify the definition it used.

The majority of countries (24) undertook passive surveillance of yersiniosis and in 20 countries had surveillance systems that integrated laboratory and epidemiological data from physicians and/or hospitals. All countries provided case-based data except Belgium, Bulgaria and Greece, which reported aggregated data. No data for 2020 were reported by the United Kingdom due to their withdrawal from the EU on 30 January 2020.

Epidemiology

For 2020, 5 744 confirmed cases of yersiniosis (caused by *Y. enterocolitica* and *Y. pseudotuberculosis*) were reported by 28 EU/EEA countries with an overall notification rate of 1.7 cases per 100 000 population. As in previous years, Germany accounted for the highest number of cases followed by France. These two countries accounted for 50% of all confirmed cases of yersiniosis in the EU/EEA. Denmark had the highest rate of 7.1 cases per 100 000 population, followed by Finland with 7.0 cases per 100 000 population (Table 1 and Figure 1).

Out of 1 293 cases of yersiniosis with known information, 29% were hospitalised. Two of 3 122 cases with known outcomes were reported to have died, which accounts for a case fatality rate of 0.06%. Both cases were male in the above-85 age group.

Ninety-eight percent of 5 193 cases with known information on species were *Y. enterocolitica*, and 2% were *Y. pseudotuberculosis.* Seven countries reported 94 cases of *Y. pseudotuberculosis*; France and Finland accounted for over 70% of these cases.

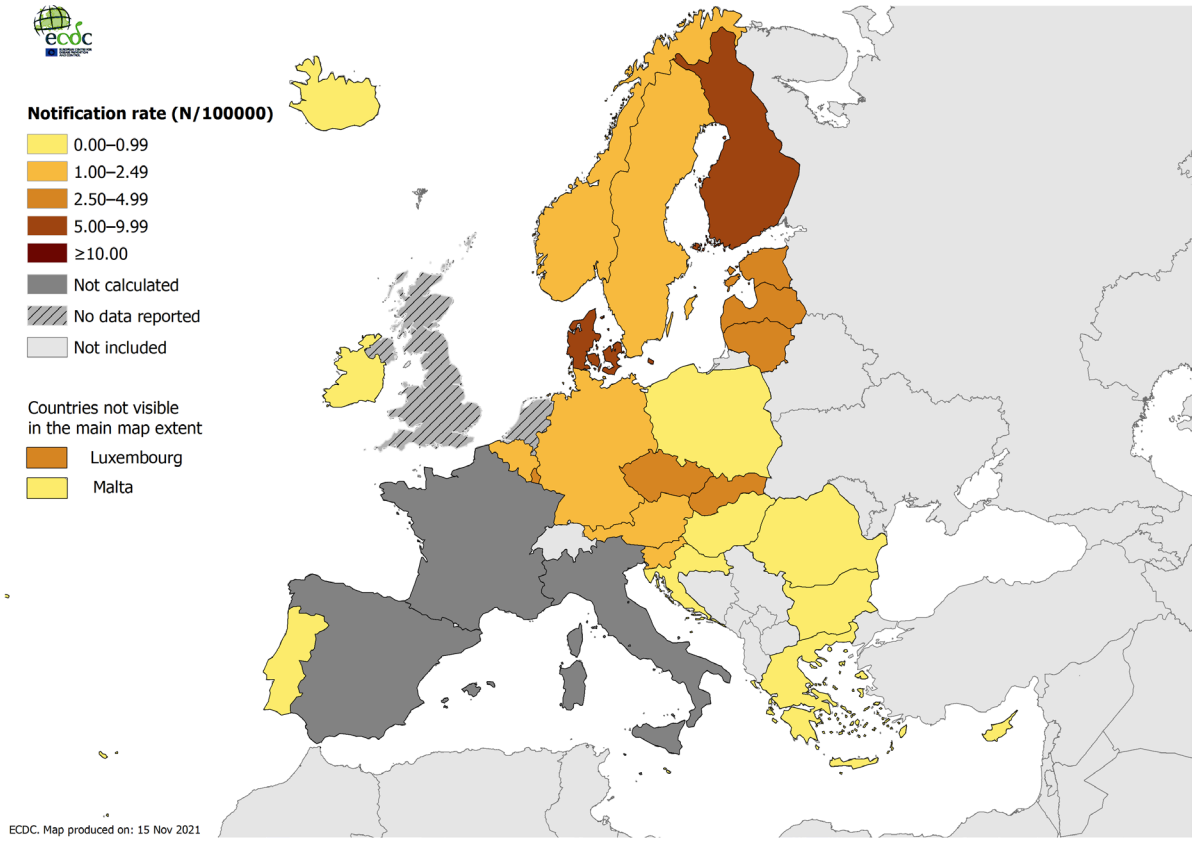
Table 1. Distribution of confirmed yersiniosis cases and rates per 100 000 population by country and year, EU/EEA, 2016–2020

Country	2016		2017		2018		2019		2020		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Austria	86	1.0	95	1.1	136	1.5	112	1.3	128	1.4	1.5
Belgium	355	3.1	317	2.8	392	3.4	406	3.5	260	2.3	2.2
Bulgaria	10	0.1	17	0.2	9	0.1	11	0.2	4	0.1	0.1
Croatia	22	0.5	29	0.7	20	0.5	12	0.3	11	0.3	0.3
Cyprus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Czechia	608	5.8	611	5.8	622	5.9	618	5.8	437	4.1	4.3
Denmark	278	4.9	206	3.6	282	4.9	221	3.8	413	7.1	7.3
Estonia	45	3.4	43	3.3	63	4.8	42	3.2	44	3.3	3.4
Finland	407	7.4	423	7.7	529	9.6	406	7.4	386	7.0	7.3
France	735	-	738	-	929	-	1135	-	988	-	-
Germany	2763	3.4	2581	3.1	2193	2.6	2164	2.6	1860	2.2	2.5
Greece	-	-	-	-	21	0.2	13	0.1	3	0.0	-
Hungary	70	0.7	30	0.3	36	0.4	38	0.4	25	0.3	0.3
Iceland	1	0.3	0	0.0	2	0.6	2	0.6	3	0.8	0.8

Country	2016		2017		2018		2019		2020		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Ireland	3	0.1	6	0.1	8	0.2	9	0.2	13	0.3	0.3
Italy	9	-	8	-	14	-	12	-	21	-	-
Latvia	47	2.4	47	2.4	68	3.5	60	3.1	88	4.6	4.9
Liechtenstein	.	.	.	.	.	.	.	.	.	.	.
Lithuania	155	5.4	174	6.1	139	4.9	181	6.5	123	4.4	-
Luxembourg	12	2.1	15	2.5	16	2.7	18	2.9	26	4.2	4.2
Malta	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Netherlands	.	.	.	.	.	.	.	.	.	.	.
Norway	57	1.1	67	1.3	105	2.0	85	1.6	83	1.5	1.6
Poland	167	0.4	191	0.5	170	0.4	196	0.5	87	0.2	0.2
Portugal	14	0.1	35	0.3	30	0.3	29	0.3	25	0.2	0.3
Romania	40	0.2	36	0.2	22	0.1	36	0.2	6	0.0	0.0
Slovakia	200	3.7	242	4.5	259	4.8	255	4.7	168	3.1	3.1
Slovenia	31	1.5	18	0.9	32	1.5	28	1.3	26	1.2	1.4
Spain	514	-	585	-	549	-	409	-	296	-	-
Sweden	230	2.3	236	2.4	278	2.7	393	3.8	220	2.1	2.1
United Kingdom	87	0.1	142	0.2	198	0.3	163	0.2	-	-	-
EUEEA	**6946**	**1.8**	**6892**	**1.8**	**7122**	**1.7**	**7054**	**1.7**	**5744**	**1.7**	**1.8**

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

Figure 1. Distribution of confirmed yersiniosis cases per 100 000 population by country, EU/EEA, 2020

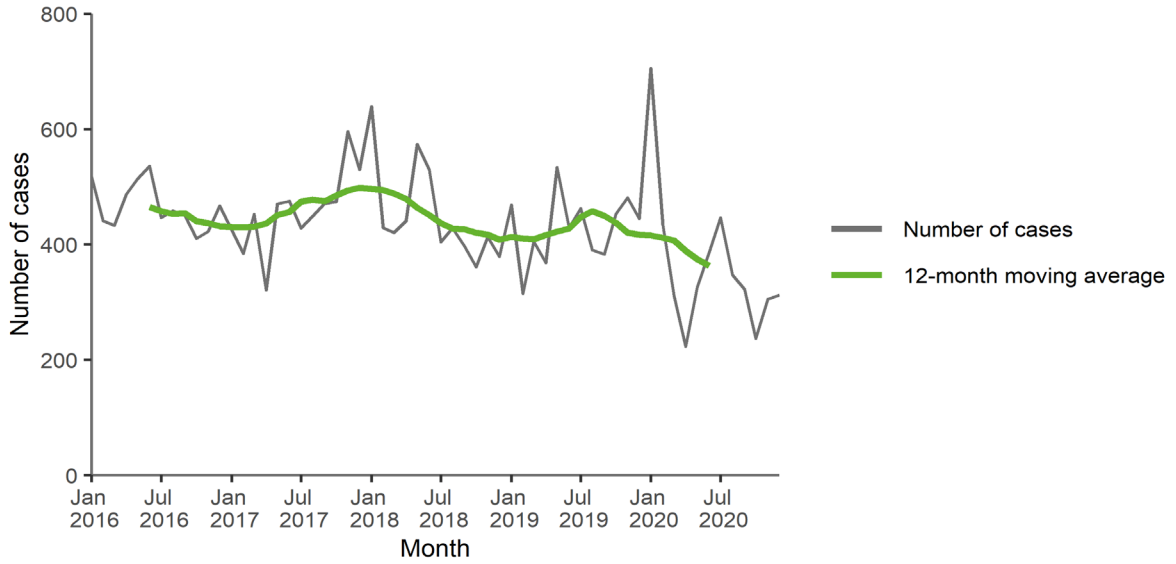


Source: Country reports from Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, Germany, Greece, Hungary, Iceland, Ireland, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia and Sweden.

The EU/EEA trend for confirmed cases of yersiniosis remained stable from 2016to 2019 but decreased in 2020 (Table 1 and Figure 2).

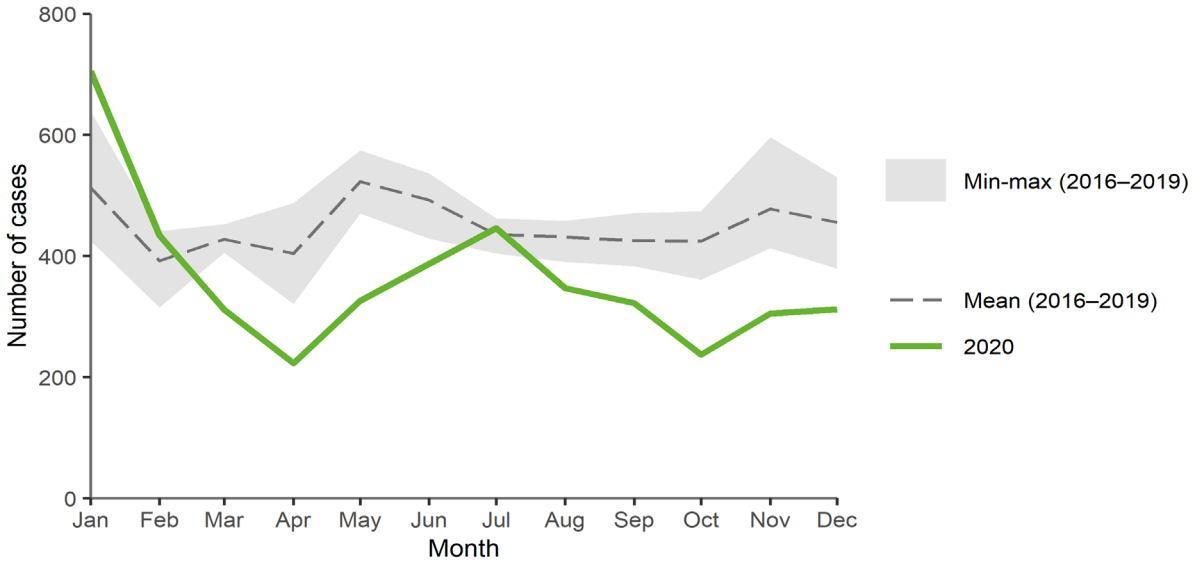
As in previous years, cases of yersiniosis did not show a clear seasonal pattern in 2020. The highest number of cases were reported in January, with case numbers higher than the average compared to the same month in 2016–2019. From March to December, reported cases were lower than average except in July (Figure 3).

Figure 2. Distribution of confirmed yersiniosis cases by month, EU/EEA, 2016–2020



Source: Country reports from Austria, Cyprus, Czechia, Denmark, Estonia, Finland, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.

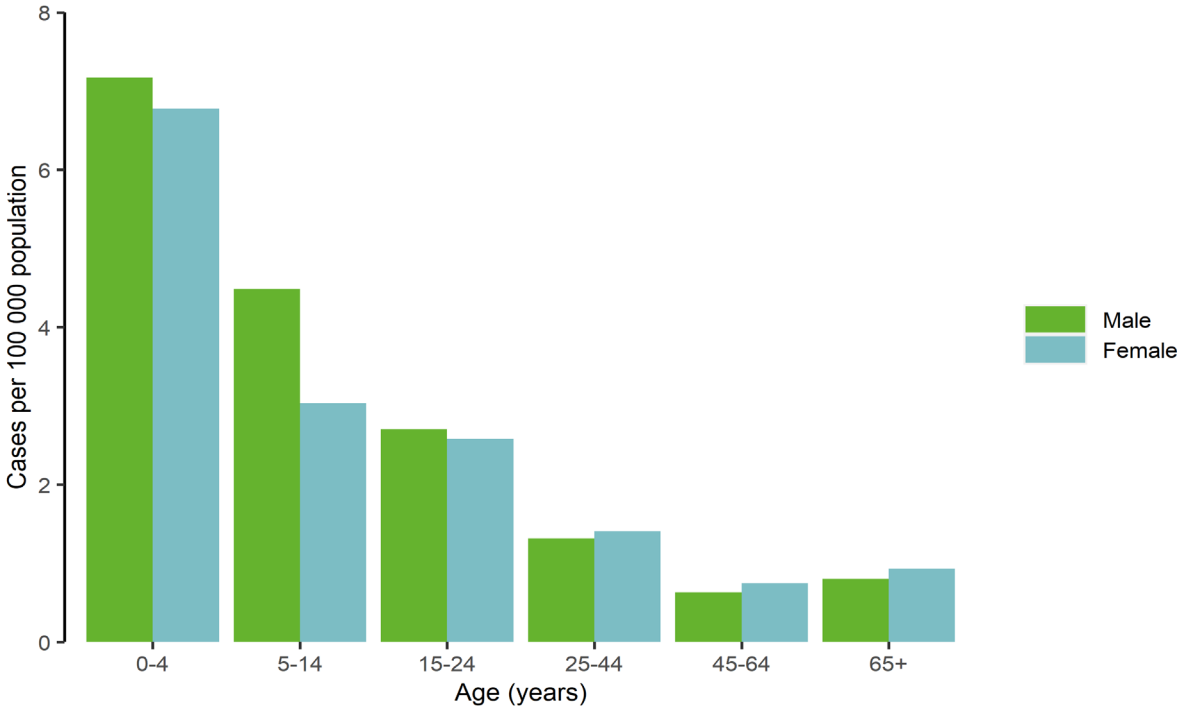
Figure 3. Distribution of confirmed yersiniosis cases by month, EU/EEA, 2020 and 2016–2019



Source: Country reports from Austria, Cyprus, Czechia, Denmark, Estonia, Finland, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.

Among the 5 734 cases of yersiniosis for which the sex was reported, 53% were males and 47% were females, with a male-to-female ratio of 1.1:1. The highest notification rate per 100 000 population was detected in children (in the 0–4 age group) with 7.2 cases for males and 6.8 cases for females. This age group accounted for 1 317 (23%) of the 5 616 cases with information on age. The notification rate decreased with age and was the lowest in 45–64 years age group: 0.6 cases in males and 0.8 cases in females per 100 000 population (Figure 4).

Figure 4. Distribution of confirmed yersiniosis cases by 100 000 population, by age and sex, EU/EEA, 2020



Outbreaks and other threats

Two urgent inquiries on *Y. enterocolitica* serotype O3-infection were launched through ECDC's Epidemic Intelligence Information System for Food- and Waterborne Diseases and Zoonoses (EPIS-FWD) in 2020. Neither of those were multi-country outbreaks.

Discussion

In 2020, yersiniosis was the third most commonly reported foodborne zoonotic disease in the EU/EEA after campylobacteriosis and salmonellosis [3, 4]. The overall EU/EEA trend of reported cases of yersiniosis remained stable from 2016 to 2019 but decreased notably in 2020, which was most likely an effect of the pandemic. However, the EU/EEA notification rate in 2020, remained comparable with the previous years owing to the withdrawal of the United Kingdom (UK) from the EU. In the recent years, the UK had reported a low number of cases relative to its population size. [4].

In 2020, 16 yersiniosis outbreaks were reported to the European Food Safety Authority (EFSA) within the annual zoonoses data reporting period [4]. These outbreaks involved 246 cases in six countries. The number of cases were slightly higher than in 2019. *Y. enterocolitica* was the species identified as the causative agent in all the outbreaks, except in one (unspecified). The only 'strong-evidence outbreak' with a known vehicle of infection was notified by Denmark. This outbreak involved 200 people who had been exposed to *Y. enterocolitica* through the consumption of a contaminated pasta-based dish at a picnic. This outbreak almost doubled the cases of yersiniosis normally reported by Denmark.

Among the two pathogenic *Yersinia* species that are notified at the EU/EEA level, *Y. enterocolitica* caused the majority of human infections followed by *Y. pseudotuberculosis*. The main reservoir for *Y. enterocolitica* is the domestic pig, and the pathogenic *Y. enterocolitica* bioserotypes which are most commonly reported in human infections are frequently found in pork products. The *Y. pseudotuberculosis* reservoir comprises both domestic and wild animals (e.g. pigs, deer, wild birds and rodents). The ability of the *Yersinia* bacteria to survive and grow at low temperatures has considerable significance in food hygiene. Refrigeration temperatures are generally not sufficient to efficiently suppress the growth of these bacteria.

All *Y. pseudotuberculosis* serotypes are considered pathogenic to humans. *Y. pseudotuberculosis* is a rare cause of human foodborne infections, but it typically causes outbreaks. Contaminated vegetables have been the major vehicles of these outbreaks, particularly root vegetables with a long period of cold storage [5]. In recent years, *Y. enterocolitica* outbreaks from vegetables have been reported as well [6, 7], suggesting that sources other than pork may play a role.

Biotype information, which is crucial for evaluating the pathogenicity of *Y. enterocolitica* isolates, was provided only by five countries. This accounts for 22% of the reported *Y. enterocolitica* cases in 2020. This might be partly due to the fact that phenotyping methods are laborious and the interpretation of biotype reactions can be subjective. More susceptible analytical techniques are needed for surveillance and outbreak investigations. Multiple-locus variable-number tandem-repeat analysis (MLVA) and single-nucleotide polymorphism (SNP) analysis have demonstrated an acceptable discriminatory power for *Y. enterocolitica*. Both methods were able to cluster epidemiologically associated isolates [8]. As for the majority of food- and waterborne pathogens, whole genome sequencing (WGS) is also increasingly used to subtype pathogenic *Yersinia* isolates in outbreak investigations [6, 9]. Benefits of WGS include the possibility of performing highly discriminatory analyses as well as retrieving results for various characterisation and genetic analyses from the same raw data. The use of WGS for typing of *Yersinia* isolates in animals and humans will facilitate monitoring animal-to-human transmission of these pathogens and improve public health surveillance of the pathogenic lineages [10].

Public health implications

Pigs are the most common sources of *Y. enterocolitica* infections and many cases are seen to be related to the consumption of undercooked contaminated pork or cross-contamination of other food items during the handling and preparation of raw pork. Pork should be consumed only after adequate cooking, especially when given to young children. Proper kitchen hygiene is required to avoid cross-contamination. Prolonged cold storage of contaminated food allows the survival and growth of *Yersinia*.

Outbreaks of *Y. pseudotuberculosis* have almost exclusively been linked to raw vegetables and ready-to-eat vegetable products such as lettuce and carrots with long periods of cold storage.

In the recent years, increasing number of *Y. enterocolitica* outbreaks have also been linked to vegetables in addition to pork products. Good agricultural and hygiene practices in food storage and processing as well as proper washing and peeling of vegetables in home kitchens can decrease the risk of contamination of fresh produce and prevent further infections.

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