

SUMMARY REPORT OF ZOOSES,
ALIMENTARY AND WATER-BORNE
INFECTIONS IN THE SLOVAK REPUBLIC
IN 2019



MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT
OF THE SLOVAK REPUBLIC

Summary Report of Zoonoses, Alimentary and Water-Borne Infections in the Slovak Republic in 2019

1. *Salmonella* spp.

Salmonellosis is one of the zoonoses with the highest morbidity in the Slovak Republic. 5,236 cases of salmonellosis and were reported in Slovakia in 2019, which gives an morbidity of 96.07 cases per 100,000

population. Incidence was 27 % lower than in 2018 and 8 % below its five-year average.

Cases were reported from every region of the Slovak Republic, with the highest morbidity being in the regions of Banská Bystrica and Trnava. The lowest morbidity was recorded in the Trenčín region.

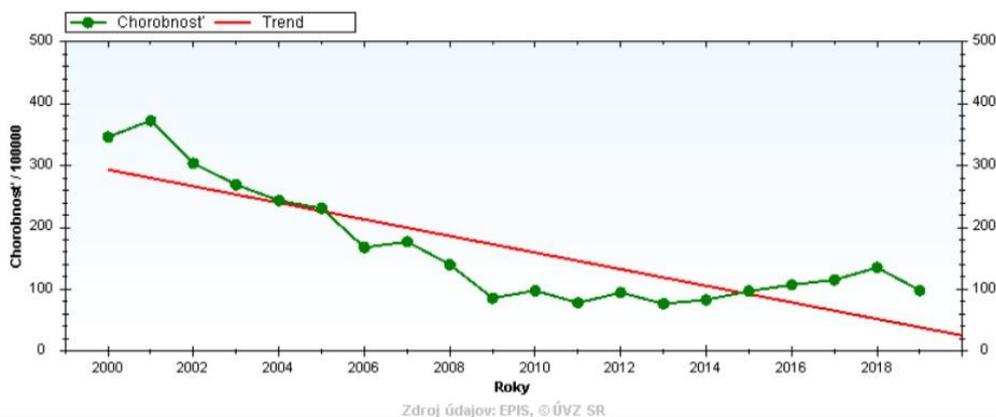


Fig. 1 Salmonella infections in humans – 20-Year Trend

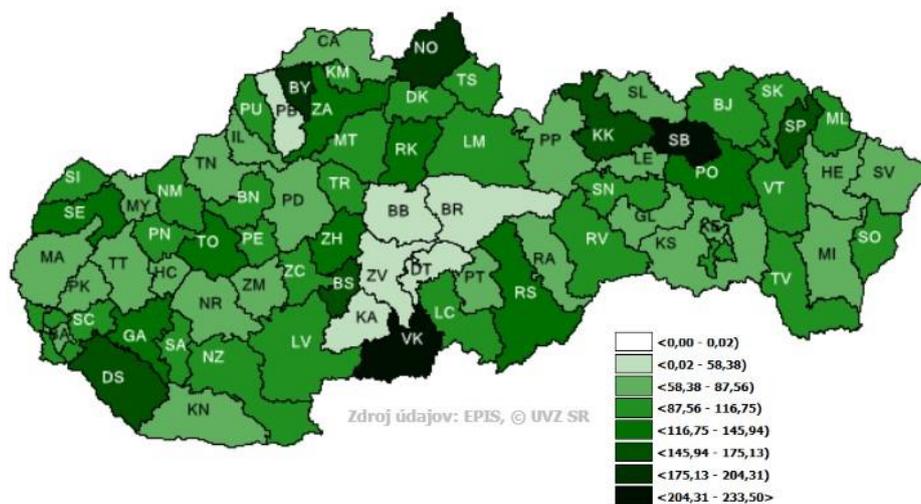


Fig. 2 Salmonellosis Incidence by District in 2019

Cases were reported in every age group and the highest age-specific morbidity was in children from 1 to 4 years of age. As in the previous year, the lowest morbidity was in the 35-44 age group. The most infections occurred in September. *S. Enteritidis* occurred most frequently in disease aetiology (81.5 %) and carriers (74.3 %), just as in 2018. The following also occurred in aetiology: *S. Typhimurium* in 3.5 %, *S. non specified* 2.4 % and *S. Infantis* in 2.0 % of cases. Imported infections were reported in 4 cases as carriers and in 60 cases in the form of the actual disease. There were 378 outbreaks of salmonellosis. *S. Enteritidis* was the dominant aetiological agent just as in the previous years. The most frequent transmission factors were home eggs (12 outbreaks) and eggs from retail chains (6 outbreaks).

A total of 12,470 foodstuffs were tested in 2019. The percentage of positive samples decreased from 1.24 % to 0.4 %. The most frequently detected serovars in foodstuffs were *S. Enteritidis* (35.3 %), *S. Infantis* (33.3 %), and other serovars occurred sporadically. As in previous years, positive samples were found most frequently in broiler meat and meat products. Compared to the previous year, the rate of positive finds increased from 7.5 % to 10.4 %. Of 142 examined samples of eggs and egg products, 9.2 % were positive, with *S. Enteritidis* being isolated in all samples.

A total of 1,325 breeding flocks were tested in 2019. *S. Enteritidis* was isolated in droppings in three flocks. Samples were collected from 258 laying hens and day-old chickens in productive flocks of laying hens. Testing of samples from 558 flocks of adult laying hens isolated serovars in 5 flocks (0.61 %), of which 4 had *S. Enteritidis* (0.49 %) and 1 had *S. Braenderup*.

For broilers, samples were tested from 71 flocks with day-old chickens and gave positive results in 3 flocks (4.23 %), with finds of *S. Enteritidis* in 2 flocks and *S. Infantis* in 1 flock. *Salmonella* was found in 49 of 3,050 (1.61 %) flocks tested before slaughter. The dominant serovar in broilers was *S. Infantis*, which infected 31 positive flocks (1.02 %), followed by *S. Enteritidis*, which was present in 15 flocks (0.49 %), which represents morbidity not significantly changed from the previous year (0.30 %).

In turkeys, No salmonella was found in samples from 368 breeding flocks while it was found in 4 of 61 tested fattening flocks (6.56 %). The isolated serovars were *S. Coeln*, *S. Hadar*, *S. Kentucky* and *S. 4.12:-:1.7*

S. Infantis dominated in other species of birds and *S. Enteritidis* and *S. Infantis* were most prominent among the other animal species.

In farm animals, 234 samples from cattle were tested and salmonella was found in 7 samples (3.0 %) No salmonella was found in sheep or goats (112 tested samples) or in pigs (47 tested samples). Among pet animals, samples were examined mainly from dogs (2.2 % positive) and cats (4.1 % positive). Among other animals, the most positive finds were from reptiles – snakes and lizards. There were also a few finds of salmonella in samples from zoo animals, exotic birds kept as pets, pheasants, pigeons and birds of prey.

A total of 571 fodder samples were examined in 2019, of which 0.88 % were positive. *S. Infantis* was isolated in chicken feed, *S. Newport* and *S. Typhimurium Monophasic* were isolated in dog food, and *S. Kentucky* and *S. Kingston* were isolated in other animal products (compost).

In 2019 the laboratories of the PHA SR, WMRI and SVFI examined 19,265 samples from the external environment and water. *Salmonella* spp. was confirmed in 28 samples.

The susceptibility of salmonella isolates from pig carcasses was tested in 2019. The analysis was based on 9 isolates acquired by official inspections: 9x *S. Derby*, 2x *S. Typhimurium Monophasic*, 1x *S. enterica* subspecies *enterica*, 1x *S. Enteritidis* and 1x *S. Dublin*. Both isolates of *S. Typhimurium Monophasic* and the isolate of *S. enterica* subspecies *enterica* showed resistance to ampicillin, sulfamethoxazole and tetracycline.

2. *Escherichia coli*

A total of 369 diseases caused by *E. coli* were reported in Slovakia in 2019 (morb. 6.81/100,000) which is 74 fewer than in the previous year.

A total of 4,679 food samples were tested in 2019, with *E. coli* being found to be present in 5.5 %. Finds were highest in percentage terms in raw milk, cheeses made from raw milk and *bryndza* cheese, but the bacteria were also found in confectionary and prepared and semi-prepared meals.

No animal feed sample tested positive for *E. coli*.

A total of 19,578 water samples were examined in 2019. The presence of *E. coli* was confirmed in 1,382 samples (7 %), which is the same as in 2018. The limit for *E. coli* in

water for human consumption is 0 KTJ/100 ml and if the limit is exceeded, it cannot be offered as drinking water. Testing in this regard examined 12,759 samples, of which 6.5 % did not meet the requirements. This represents a significant increase in positive samples in wells and springs compared to 2018, in contrast to drinking water from public sources, where there was a decrease by more than a percentage point.

A total of 28,965 samples from the environment were tested for *E. coli*. with positive results in 2.1 % of samples,

Monitoring of antibiotic resistance in *E. coli*. was carried in environmental bacteria isolates from inpatient facilities in Slovakia, where the tested *E. coli*. strains showed mainly resistance to ampicillin, amoxicillin and cefuroxime. As part of the harmonised monitoring of microbial resistance in holdings and flocks of farm animals and their food commodities in 2019, 150 samples from pig carcasses were analysed for the presence or absence of commensal *E. coli* and *E. coli*. that produce ESBL, AmpC- and carbapenemase. None of the isolates showed resistance to tigecycline, meropenem, colistin, ceftazidime, cefotaxime and azithromycin. Low levels of resistance to aminoglycoside, quinolone and fluoroquinolone antimicrobials was observed. A higher level, though still below 50 % or close to 50 % was observed in the case of chloramphenicol and sulphonamides. There was a high level of resistance to ampicillin and tetracycline. *E. coli* producing ESBL, AmpC and carbapenemases were identified in 53 % of the samples. Additionally, 150 samples of pork and 150 samples of beef were analysed for the presence or absence of *E. coli* producing enzymes such as ESBL, AmpC and carbapenemase, and such bacteria were found in 17 of the pork samples and 10 of the beef samples. The presence of overall and resistant strains of *E. coli* was also studied in 61 samples from water, sediments and foodstuffs.

3. *Yersinia* spp.

Yersiniosis-related morbidity in Slovakia has been above EU average morbidity since 2009. A total of 259 cases were reported in 2019 (morb. 4.75/100,000), which is 4% less than last year but 23% above the 5-year average.

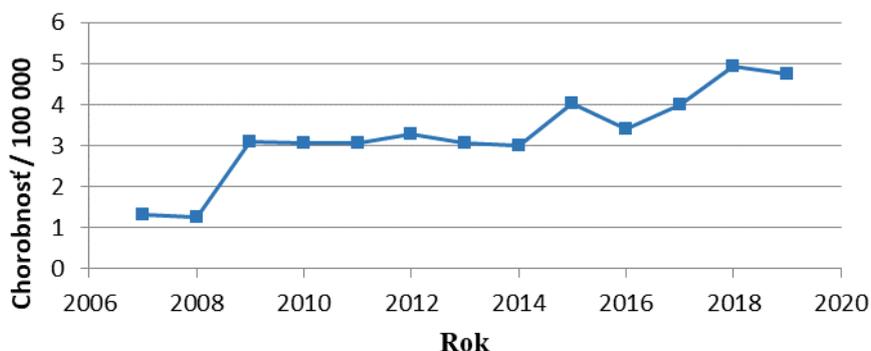


Fig. 3 Incidence of Human Yersiniosis in the Slovakia from 2007

Cases were reported from every region of the Slovak Republic, with the highest morbidity being recorded in the Banská Bystrica region and the lowest in the Žilina region. The highest morbidity was in children aged 1-4 years and in the first year of life. The months with the most cases were March and August. Eight family outbreaks were reported.

Monitoring of *Yersinia* spp. in pork was carried out in 2019. Culture results confirmed contamination of meat with *Yersinia* spp. in 41 % of samples. PCR analysis classified 35 % of isolates as *Yersinia enterocolitica*. In general, no presence of DNA specific for pathogenic strains of *Yersinia enterocolitica* was detected, which was consistent with bio-typing based on phenotype; all isolates were classified as biotype 1A, a non-pathogenic biotype.

A total of 23 samples of faeces from dogs, cats and zoo animals with enteritis were examined. Positive findings of *Y. enterocolitica* were recorded in 1 antelope and 1 monkey.

4. *Cronobacter* spp.

No cases of human diseases were recorded in 2019. A total of 692 samples of first infant formula and follow-on formulas were specifically examined but the presence of *Cronobacter* spp was not confirmed.

5. *Shigella* spp.

This caused disease with a morbidity of 2.77/100,000 population in Slovakia in 2019. Cases were reported in every age group, whereas the highest age-specific morbidity was in children under one year of age and children from 1 to 4 years of age. The highest morbidity was recorded in the Košice region. Disease occurred throughout the year with the highest incidence in August (15.9 %). Five cases of carriage were recorded. Three minor outbreaks were recorded. Two cases of infection were imported.

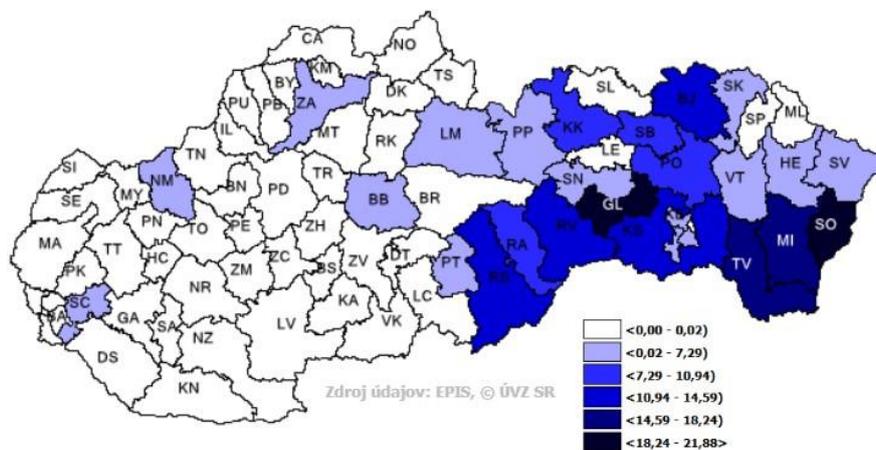


Fig. 4 Incidence of Dysentery by District

Food and water were not tested for the presence of *Shigella* spp.

6. *Plesiomonas shigelloides*

Samples of surface water and the environment were not specifically tested for the presence of *Plesiomonas shigelloides* in 2019, though this agent was sporadically isolated in examinations of water targeting the presence of other microorganisms. *Plesiomonas* was detected in investigations of water targeting the presence of *Vibrio* spp. – 7 strains from swimming pool water, 2 strains from pool wall swabs and 4 strains from natural water used for bathing.

7. *Legionella* spp.

Legionnaire's disease (LD) is on the increase in Slovakia. In 2019, the largest ever number of cases of LD (87) were detected in Slovakia. It was 2.6-times more likely to affect men. The average age of a patient was 55 years. The higher reported incidence (15.9/million) is a more faithful reflection of incidence and is approaching the EU average incidence (22.2/million). In children and adolescents, there were 7 confirmed cases in 77 children aged 9-16 years (9.1 %) which is in line with the existing trend to underreport the incidence LD in children. LD was found to be a potential causal factor in 6 adult patients out of 9 patient deaths. LD clusters were reported in the case of 8 patients, with family transmission in 6 cases. The slow growth in evidence of the non-pneumonic form of legionellosis (Pontiac

fever) also points to the ubiquity of legionella in water and the environment. Disease analysis indicates the need to include LD in the diagnosis of atypical pneumonias and hospital-acquired infections of older persons with other chronic conditions, the clients of social care homes, and travellers.

Over 770 water samples in community conditions were tested for the presence of legionella in the environment and 139 strains of legionella bacteria were isolated (18.05 %). Legionella was isolated in 49 of 92 samples from health care facilities (53.26 %). The isolates included a diverse range of serogroups of *L. pneumophila* and strains of serogroup 1 *L. pneumophila* made up only around a third. Investigation confirmed the ubiquity of legionella in the water supply network of public buildings and health care facilities and the need for rigorous primary prevention of colonisation.

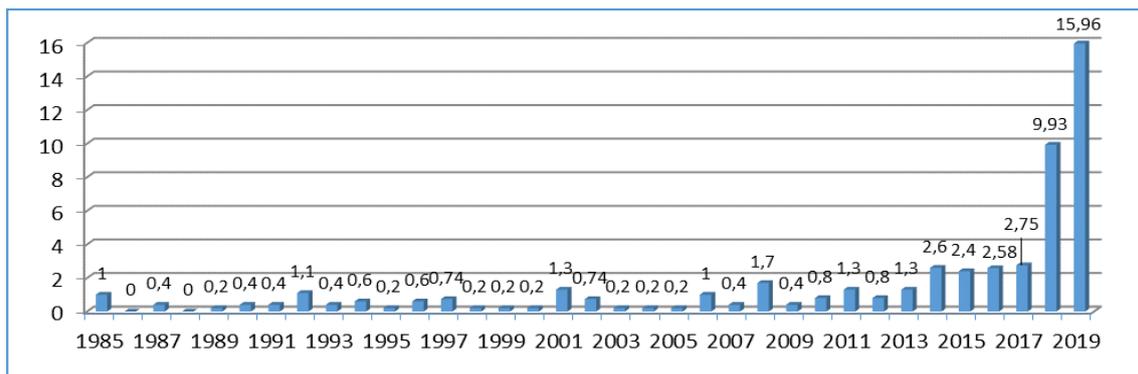


Fig. 5 Incidence of Legionnaire's Disease per Million Population 1985 – 2019

8. *Vibrio* spp.

As in previous years, no cases of cholera were reported in 2019. One case of food poisoning involving *Vibrio parahaemolyticus* was reported (import from Turkey – frequent consumption of seafood on holiday). *Vibrio* bacteria were not detected by official food inspections in 2019. They were detected only as part of epidemiological examinations.

The specialised microbiological analysis laboratory of the RPHA in Poprad conducted an analysis of 12 samples of frozen fish (12 indicators, 179 analyses) and the NRC for Vibrionaceae tested another 4 samples of frozen fish. In 2019, *V. alginolyticus* was detected in 2 samples from food (sea fish) and *V. metschnikovii* was detected in one sample.

A finding that can be considered important is several types of *Vibrio* bacteria in mineralised pool waters and surface waters used for bathing. In 2019, the NRC for Vibrionaceae isolated 233 strains of *Vibrio* bacteria in 731 samples of pool and surface waters and swabs from pools. In Slovakia a total of 243 *Vibrio* strains were isolated from samples in food, water, the environment and clinical material. The most common was *V. cholerae* non O1 non O139. In the case of 50 isolated strains, identification on the species level was not possible with the available methods.

9. *Aeromonas* spp.

In 2019, a total of 138 *Aeromonas* strains were identified in the investigation of various materials by the laboratories of the PHA SR, the RPHAs in Slovakia and the VFI DK. More than half of the isolates were identified at genus level only. To distinguish between species with pathological potential and non-pathological aquatic saprophytes, more accurate identification is needed. In Slovakia, the NRC for *Vibrionaceae* at the RPHA in Komárno provides species or biovar level identification of *Aeromonas* bacteria using classical biochemical methods.

10. *Campylobacter* spp.

There were 7,829 reported cases 2019 (morbidity of 143.64/100,000), which represents a 7% decrease in comparison with 2018 and is approximately equal to the 5-year average. The most frequent isolates were *C. jejuni* – 53.4 % and *C. coli* – 5.4 %. The highest morbidity was recorded in the regions of Prešov and Bratislava. The lowest morbidity was recorded in the Banská Bystrica region. Cases were reported in every age group whereas the highest age-specific morbidity was in children under one year of age and lowest in adults aged 45-54 years. Disease occurred throughout the year with the highest incidence in June and July. This period included 24.9 % of all campylobacteriosis. The infection was imported in 55 cases. Of 223 outbreaks, 4 were larger outbreaks involving 5 to 7 ill people (*C. jejuni* 4x). The aetiological agents in outbreaks were *C. jejuni* x199, *C. coli* x12 and an unspecified species of *C. spp.* x8 . Transmission factors in the larger outbreaks included chicken meat (x2) and mixed food (x1); in one case the transmission factor was unknown.

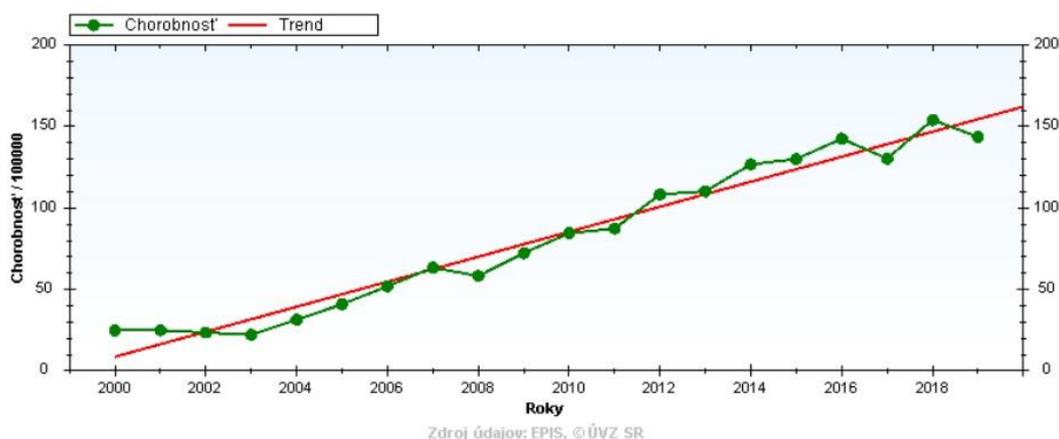


Fig. 6 Incidence of Human Campylobacterioses in Slovakia from 1997 to 2019

Laboratories of RPHAs and the VFI Dolný Kubín investigated 1,285 food samples in 2019. All the samples investigated were negative.

Of 934 of examined animals, 3.3 % were positive. This indicates that farm animals are the main reservoir of thermotolerant *Campylobacter* spp. A higher level is observed in pig holdings – around 20.0 %.

Higher resistance to tetracycline, ciprofloxacin and nalidixic acid shows a stable trend in isolates from animals. Human isolates in Slovakia also show a higher level of resistance to ciprofloxacin and tetracycline, which correlates with the data from other EU Member States.

11. *Brucella* spp.

Brucellosis-related morbidity in Slovakia is lower than the average morbidity in the EU (0.09/100,000). In 2019, 1 case of disease (morb. 0.02/100,000) was reported from the district of Detva. Slovakia is officially free of the incidence of bovine, ovine and caprine brucellosis. In order to maintain this status, 53,528 serological tests of cattle and 19,858 serological tests of sheep and goats were carried out in 2019.

12. *Anaplasma phagocytophilum*

No cases of human granulocytic anaplasmosis (hga) were reported in 2019 although the causative agent of anaplasmosis was detected in human blood samples analysed by the IoPa SAS with a prevalence of 4.2 %. The overall prevalence of *A. phagocytophilum* in ticks that bite humans was 6.3 %. The prevalence of *A. phagocytophilum* in animals was 1.5 % in the case of shelter dogs and 2.3 % in the case of stray cats.

13. *Coxiella burnetii*

Two cases of Q fever were reported in 2019. The BMC Institute of Virology SAS tested samples from 75 patients. Values for the presence of antibodies against *Coxiella burnetii* phase II indicate that 10 of the tested patients had had Q fever in the past.

A total of 2,210 samples of bovine animals, goats, sheep, wild hares and zoo animals were tested. Positive serological findings were found only in 4.07 % of cattle.

No survey of the prevalence of *C. burnetii* in ticks was carried out in 2019.

14. *Francisella tularensis*

The incidence of tularaemia in humans in Slovakia has been on a downward trend since an outbreak in 2002 and there were 20 reported cases of disease in 2019 (morb. 0.40/100,000), which is more than three times higher than in 2018 and 127 % of the 5-year average. It affected 12 men and 8 women (male: female ratio 1.5: 1) and the highest morbidity was in the 45-54 age group (morb. 0.94 / 100,000). Regarding the seasonality of its incidence, it occurred mainly in the second and third quarters and had its highest incidence in June.

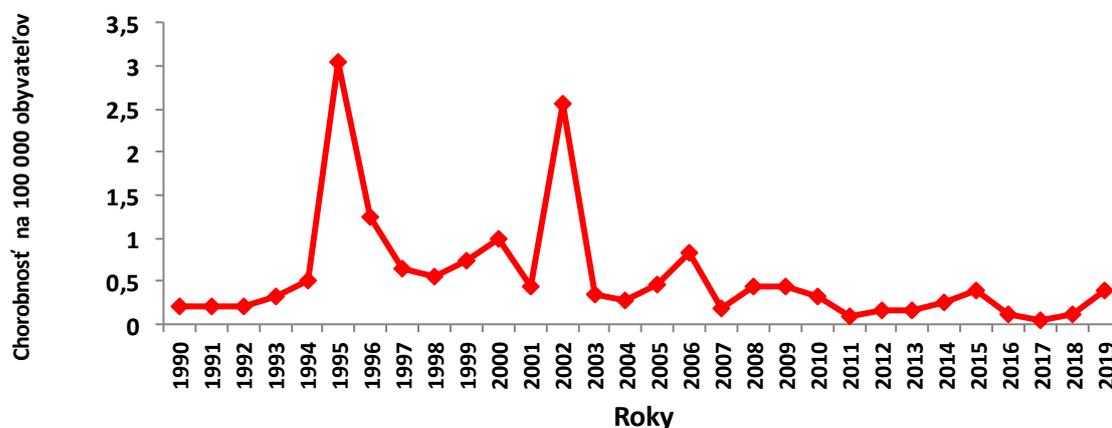


Fig. 7 Incidence of Human Tularaemia in Slovakia from 1990 to 2019

The disease occurred mainly in western Slovakia, with the Nitra region having 15 cases (morb. 2.22/100,000) in 6 districts, the Trnava region have 2 cases in the Skalica district, the Bratislava region having 1 case in the Malacky district, the Banská Bystrica region having 1 case in the Krupina district and the Prešov region having 1 case in the Stará Ľubovňa district. The most frequently diagnosed forms were ulceroglandular, glandular and pulmonary forms of tularaemia, and pharyngeal, febrile, septic and unspecified forms occurred in a lesser extent. It was transmitted via ticks, insect stings, contact with wild and domesticated animals and exposure to an environment with high prevalence of small rodents.

One outbreak of hare tularaemia was detected in the Nitra district in the Nitra region in 2019. agglutination antibodies were found in 1 sample of 57 taken from European hares during approved hunts at 9 sites – 1.75 % positivity. Testing of 1,251 horses from 4 regions in Western Slovakia showed an overall seropositivity of 23.50 %. The surveillance results show the persistence of natural reservoirs of tularaemia and the circulation of *F. tularensis* in the endemic area of Western Slovakia with the possibility of its further spreading and a risk of infection.

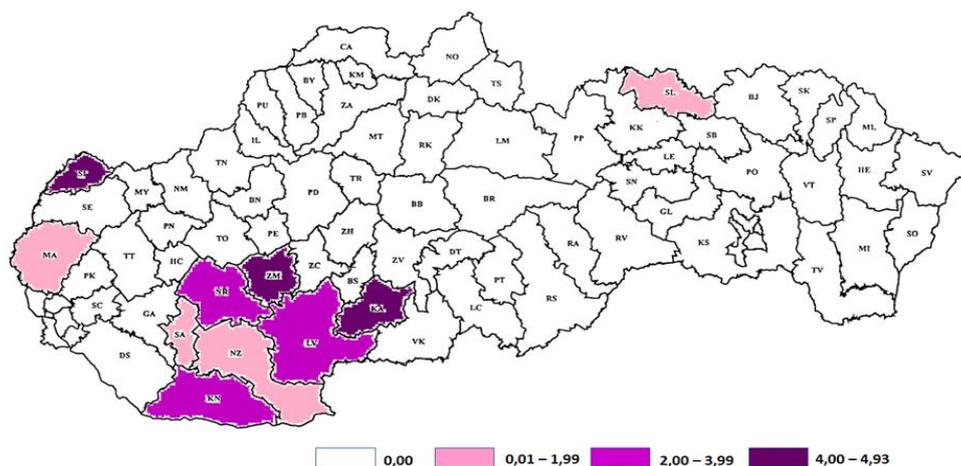


Fig. 8 Incidence of Human Tularaemia by District in Slovakia in 2019, Incidence per 100,000

15. *Leptospira* spp.

In 2019, three patients with leptospirosis were reported in Slovakia, one woman in the Trenčín Region and two men in the Trnava Region (morb. 0.05/100,000). The diseases were caused by the *Leptospira* serovar Grippotyphosa and *Leptospira* serovar groups Sejroe and Australis. Occupational exposure is considered unlikely as the patients were a pensioner, a person without work and a car mechanic. The infection was probably transmitted during outdoor leisure activity or pet care, during which the patient may have been exposed to reservoir animals or their excretions. The diseases were moderately severe, one case was icteric and two were febrile. The diseases occurred during the warm months of the year, which is in line with the typical seasonal character of leptospirosis.

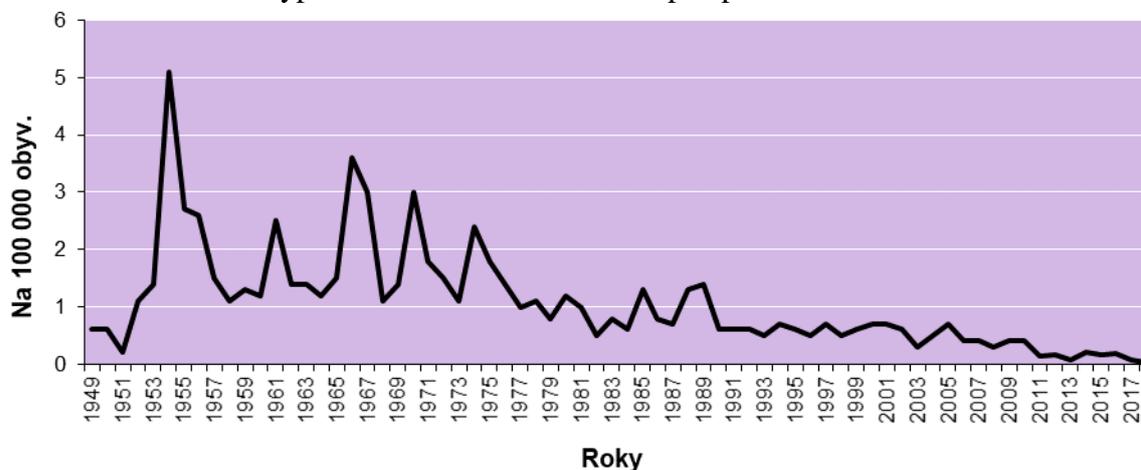


Fig. 9 Human Leptospirosis Morbidity in Slovakia from 1949 to 2019

A total of 2,421 animals were tested in 2019, of which 8.9 % were positive. The percentage of positivity was higher than in recent years, particularly in dogs (up from 13 % to 18.9 %) and in cattle (up from 8.99 % to 9.35 %). Similar to the previous years, the dominant *Leptospira* serovar in cattle was Sejroe, while the dominant serovar in pigs was Pomona.

16. *Borrelia* spp.

A total of 764 cases were reported in 2019 (morb. 14.02/100,000), which is 22% less than in 2018 but 16% above the 5-year average. Cases of disease were reported in all regions, with the highest morbidity in the Žilina, Trenčín and Banská Bystrica regions.

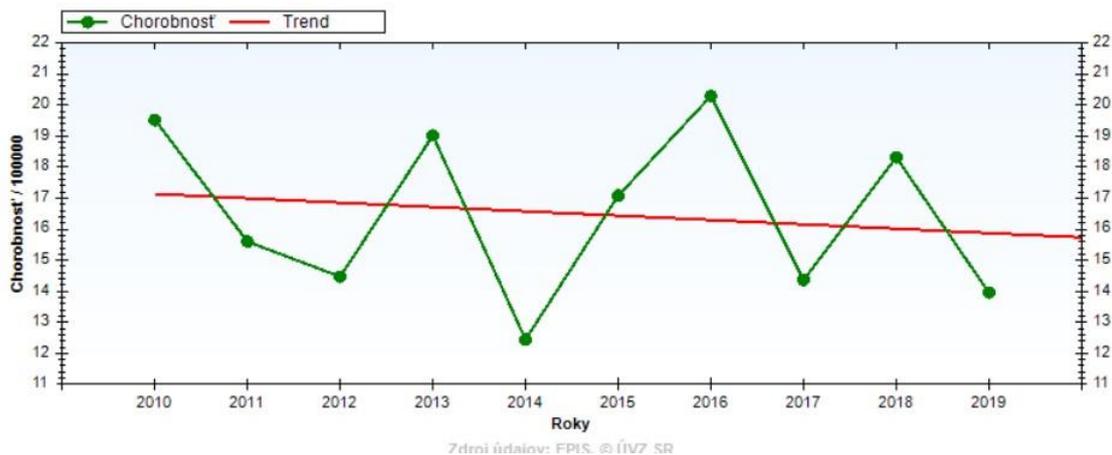


Fig. 10 Incidence of Human Lyme Disease in 2019

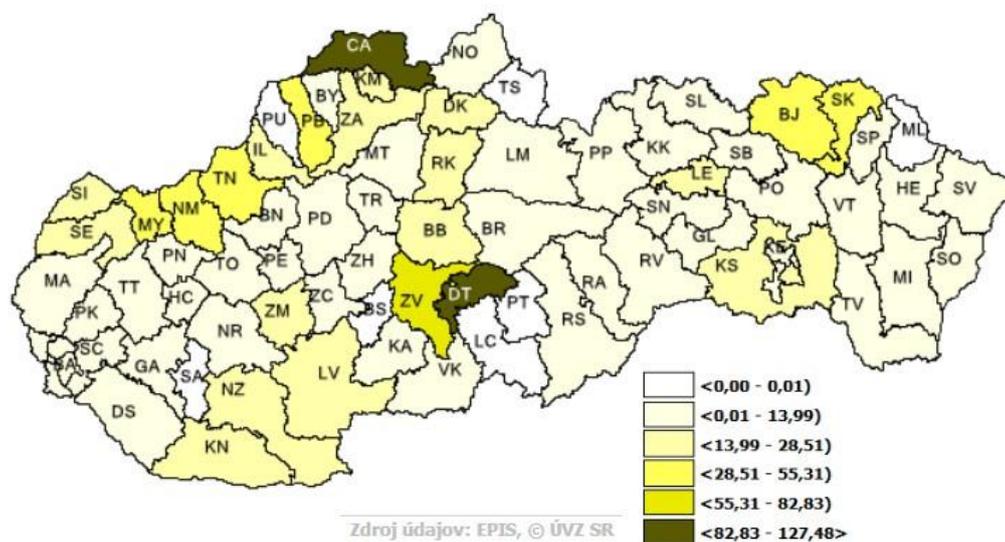


Fig. 11 Incidence of Human Lyme Disease by District in Slovakia in 2019

Reports by diagnosis: A 69.2 (Erythema chronicum migrans) in 582 cases of disease, M 01.2 (arthritis) in 132 cases of disease and G 63.0 (neurological form) in 50 cases of disease. Disease occurred throughout the year with the highest incidence in July. The epidemiological case histories are: transmission mechanism unknown – 180 cases, tick bite – 421 cases, insect sting – 159 cases. Two cases of A69.2 were imported from the Czech Republic and Hungary. Data from epidemiological case histories indicate tick bites in 583 cases, insect stings in 210 cases and an unknown transmission mechanism in 186 cases.

In 2019 the MI of the FoM CU and UHB in Bratislava conducted 217 serological tests on human blood samples. Of these, 102 samples (47 %) had antibodies against *Borrelia* bacteria. The dominant clinical diagnoses included rheumatoid arthritis, Lyme disease, dermatitis and scleroderma.

Positive results were also reported for 8 of 34 samples of dog blood (23 %).

Tests of 223 ticks that bite humans found 42 that were positive for *B. burgdorferi* s.l. (18.8 %).

17. Chlamydia

No cases of mammal chlamydiosis or ornithosis (psittacosis) in humans were reported in 2019. This was probably because differential diagnostics were not conducted and many infections were mistaken for a different diagnosis. Of 2,605 animal serum samples tested for

the presence of chlamydia antibodies, 4.18 % tested positive. Just as in the previous years, the highest seropositivity rate was detected in sheep (particularly after miscarriage or with reproduction disorders), whereas between 2016 and 2019 positivity has dropped slightly from 22.89 % to 17.85 %.

18. *Mycobacterium* spp.

There were 214 reported cases of human tuberculosis in 2019, which is 67 cases more than in 2018. As in the previous years, the highest morbidity was recorded in Eastern Slovakia.

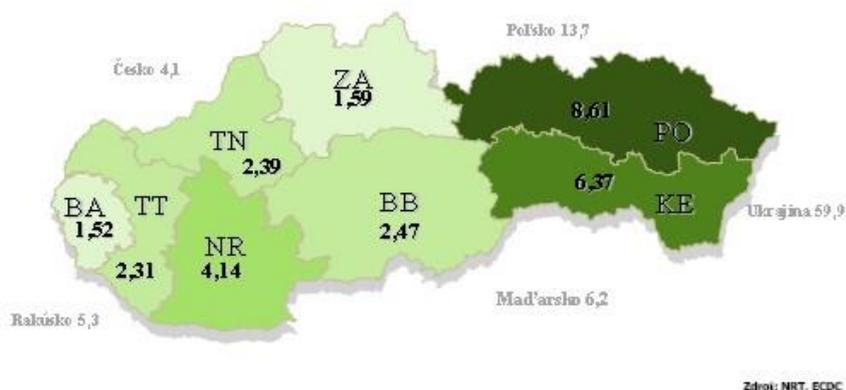


Fig. 12 Incidence of Human Tuberculosis in Slovakia and Surrounding Countries in 2019

In terms of animal health, Slovakia continues to be free of incidence of bovine tuberculosis; in order to maintain this status, 50,553 tuberculin tests were carried out in cattle.

19. *Listeria* spp.

A total of 18 listeriosis cases and 4 deaths were reported in 2019 (morb. 14.02/100,000) which is 1 case of disease less than in 2018 but 6% above the 5-year average. There were reports of disease in all regions except the Košice region. The highest morbidity was recorded in the Nitra region. First symptoms of disease were most frequently reported in October (4 cases)

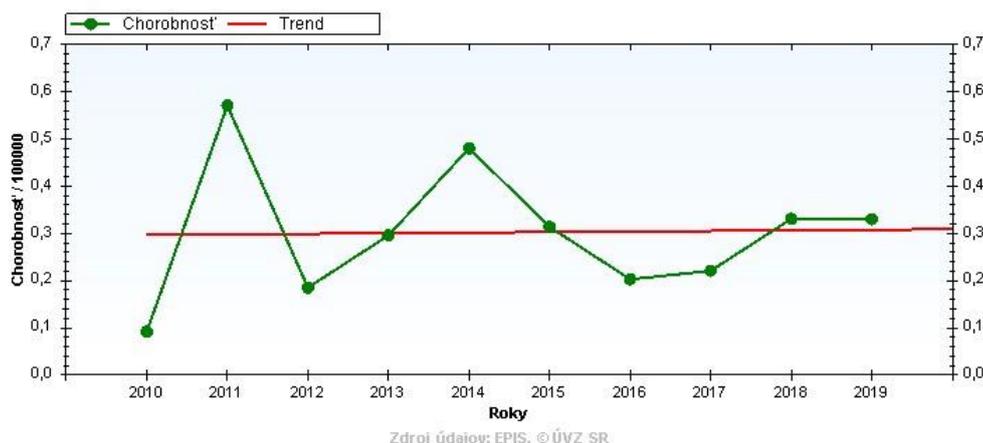


Fig. 13 Incidence of Human Listeriosis in Slovakia – 10-Year Trend

Tests of 4,761 samples of 31 types of food were carried out in 2019. The percentage of positive samples grew from 0.81 % to 1.30 % in comparison with 2018. As in 2018, there was a higher percentage of positive results in raw sheep's milk and raw meat.

Between 2016 and 2019, the rate of positive samples in animals grew from 5.25 % to 12.63 %. Sheep and cattle had the highest incidence of positive results.

Tests of 3,094 swabs for the presence of listeria returned a positive result in 23 cases. The percentage of positive results in animals grew from 0.04 % in 2018 to 0.74 % in 2019.

Of all isolated strains, the most frequently isolated serotype was 1/2a, as in the previous years.

20. *Bacillus anthracis*

The last case of animal anthrax in the Slovak Republic was recorded in 2014 and the last case of human anthrax was recorded in 2003. Laboratory testing of animals is indicated only in suspect cases; in 2019, one animal sample was tested with a negative outcome. All 21 tested samples of raw material from the leather industry had negative results and none of 21 suspect samples revealed *B. anthracis* spores.

21. *Clostridium* spp.

In 2019, *Cl. botulinum* (A 05.1) did not cause any disease in Slovakia. No cases of diarrhoea caused by *Cl. perfringens* were reported. *Cl. difficile* (A 04.7) was identified as the cause of 4,201 cases of disease (morb. 77.08/100,000), which is 24% more than in 2018 and is twice as high as the 5-year average. There were deaths in 8 cases. Most cases of disease (3,343 – 79.6 %) were acquired in hospital.

Out of 1,625 food samples that were tested for the presence of *Cl. perfringens*, only 1 sample of freshly cooked meals was positive (0.06 %). Out of 4,351 food samples tested for *sulphite-reducing clostridia*, only 0.05 % were positive. Out of 1,318 samples of clinically ill or deceased animals that were tested for clostridia, 56.8 % tested positive. Out of 112 fodder samples tested for *Clostridium* spp. only 2.7 % tested positive. Tests of 989 samples of drinking water, mineral waters and other water for *Cl. perfringens* yielded positive results for drinking water (2.4 %) and waste water (97 %).

22. *Staphylococcus aureus* (coagulase positive staphylococci and their toxins)

There were no reports of intestinal infections caused by *S. aureus* in 2019.

Tests of 12,550 food items for the presence of CPS returned positive results in 1.10 % of cases. The category with the most positive samples was the “milk and dairy products” group. Staphylococcal enterotoxin was detected in 7 breast milk samples. Enterotoxin production was also demonstrated in 30.88 % of isolates of CPS and CNS from food, mostly again in breast milk (9 isolates).

The presence of CPS was confirmed in 1.12 % of the 35,128 tested water and environment samples. This type of sample also yielded 67 toxin-producing isolates among a total of 195 tested CPS and CNS isolates in all the studied categories. The RPHAs did not detect MRSA in samples of food, water, clinical material or swabs from food establishments. On the other hand, 5 hospital-derived isolates of *S. aureus* and 4 isolates from the air showed methicillin resistance.

S. aureus was detected in 18.89 % of 1,811 samples of clinically ill animals. The VFI DK did not confirm a resistance to cefoxitin in any of 72 isolates of *S. aureus* originating from animals, i.e. no MRSA isolates were detected. Methicillin resistance was detected in three isolates tested by the UVMPH and the NAFC – ARI.

23. *Enterococcus* spp.

No case of disease from this cause was reported in 2019.

Testing of 71 samples of food found positive results in 39.4 % of samples, the categories with the highest percentage of positive samples were the sheep’s milk drink *žinčica* and chilled fishery products intended for further processing.

Of 18,604 water samples, 5.9 % were above the limit or positive.

Of 24,513 samples from the environment, 2.1 % showed the presence of the genus *Enterococcus* spp.; the most positive samples were from sandpits.

Antibiotic-resistant enterococci were present in sushi and poké samples. Resistance to ampicillin and vancomycin (sushi only) predominated.

24. Lyssavirus

The last case of human rabies was recorded in Slovakia in 1990. There were 803 reports of people at risk of rabies after contact with an animal with rabies or suspected of having rabies. Vaccinations against rabies were given to 745 persons at risk of rabies, of whom 637 received full vaccination and 108 received partial vaccination.

Rabies in animals was diagnosed for the last time in 2015. Tests were carried out for 877 animals in 2019, all of which were negative. As part of the eradication programme, 667,550 vaccination doses were laid for the oral vaccination of foxes.

25. Influenza virus

A total of 177,815 persons became ill with influenza and influenza-like diseases (ILDs) in 2019 (morbidity 7,007.31 per 100,000 people in the care of reporting physicians, making up 9.4 % of the total number of ARDs). The highest age-specific morbidity for ILDs was recorded in the age group of 15- 19-year-old youths (morb. 20,019.72 / 100,000). The lowest morbidity was recorded in persons over 60 years of age (disease 2,164 / 100,000). Regarding the cause of influenza diseases, the influenza A virus predominated over the influenza B virus. The most frequent isolate of influenza virus was A(H1N1)pdm09-like.

In 2019, the VI Zvolen carried out serological tests of 2,034 blood samples from 107 poultry farming holdings without any positive results. The method for the detection of avian influenza was used to test 45 samples from wild birds and 13 samples from home farming poultry, all with negative results.

26. Tick-borne encephalitis virus

In 2019, 161 cases of disease (morb. 2.95 / 100,000) were reported as *Central European tick-borne encephalitis*, which is comparable to 2018 and an increase of 33% compared to the 5-year average. The highest morbidity was in the Žilina region – 6.80, the Banská Bystrica region – 6.48 and the Trenčín region – 5.64. Four outbreaks of disease caused by the Central European tick-borne encephalitis virus were reported in 2019.

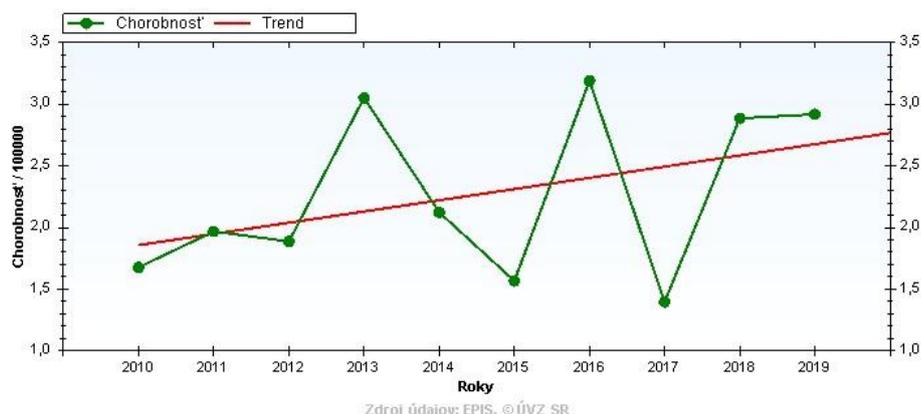


Fig. 14 Incidence of Human Tick-Borne Encephalitis in Slovakia – 20-Year Trend

A total of 745 milk samples were tested with 1.61 % positivity in 2019. Outbreaks of TBEV were detected in 7 herds. Tests for the presence of the tick-borne encephalitis were carried out on 696 pool samples of goat's and sheep's milk as part of the CS 391 targeted inspection, and found 1.29 % positivity. Tests of 49 pool samples of goat's and sheep's milk

were carried out within breeders' own inspections and where infection was suspected. They reported positive results in 6.12 % of cases.

Antibody tests were carried out on 383 serum samples from sheep and goats and reported positive results in 8.36 % of cases. An RT-PCR test for TBEV RNA was carried out with a venous uncoagulated blood sample from a sheep without a positive finding.

The BMC IoVi SAS tested 745 tick samples (in 127 pools) collected directly from vegetation. There were positive results in 3.15 % of cases. The UVMPH tested 873 tick samples, all of which gave a negative result.

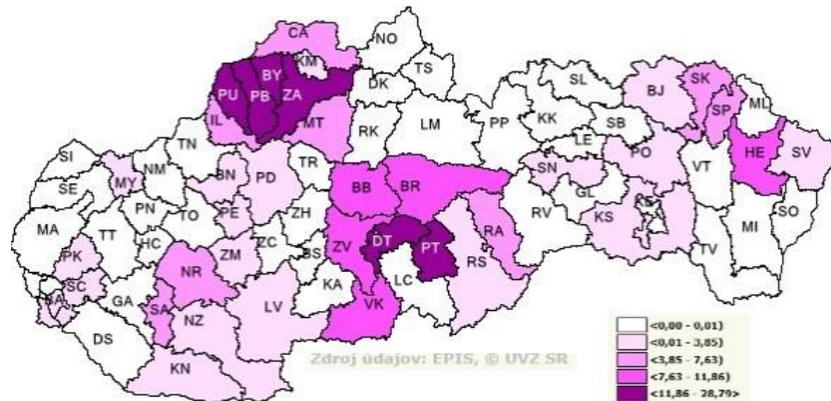


Fig. 15 Incidence of Human Tick-borne Encephalitis by District in Slovakia in 2019

27. West Nile virus

In 2019, 1 case of disease (morb. 0.02/100,000) was reported as dg. A 92.3 West Nile Virus. The previous year there was likewise 1 case imported from Hungary.

No acute WNV infection in horses was reported in 2019. The virus's RNA was confirmed in the brain of one hawk which showed clinical symptoms. The virus has been detected in vectors in western and eastern Slovakia. Findings indicate that WNV circulates in mosquitoes and birds and point to a need for active surveillance in populations that are potentially vectors, reservoirs and hosts.

28. Dengue virus

In 2019, 6 case of disease (morb. 0.11/100,000) were reported compared to 7 in the previous year. All cases of disease were imported: 4 cases from Thailand, 1 case from Vietnam and 1 case from Indonesia. In terms of age, there were 3 cases in the 25-34 age group and 3 cases in the 45-54 age group. Patients came from the Bratislava region (5 patients) and the Trenčín region (1 patient). Clinical form. Febrile 6x. Transmission mechanism: insect stings 4x, unknown 2x. Rapid chromatographic test – positive for dengue fever virus 6x (subtype 1 – 3x).

29. Hantaan virus

91 cases of haemorrhagic fever with renal syndrome were reported in 2019, which represents 3 fewer cases than in 2018. Cases were reported from all regions, but up to 74 % of cases occurred in eastern Slovakia. The disease was imported in 4 cases – from Sri Lanka, Italy, China and Papua New Guinea. Two deaths were reported in 2019 – one in the Nitra district and the other in the Košice III district.

30. Norwalk virus

The number of reported viral intestinal infections caused by NoV in humans was 3 % lower in 2019 than in 2018. A total of 101 outbreaks were recorded, of which 30 were larger outbreaks (5 or more cases). Nosocomial infection was reported in 516 cases. Five samples of small frozen berries were tested for the presence of NoV with a negative outcome.

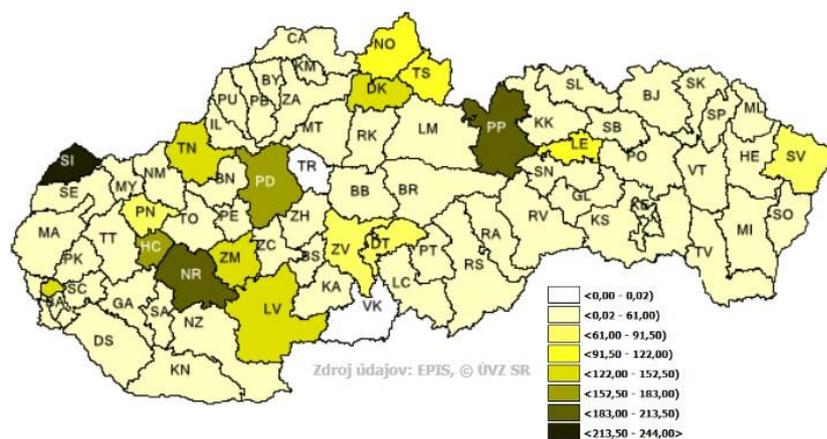


Fig. 16 Incidence of Human Norovirus-associated Intestinal Infections by District in Slovakia in 2019

31. Rotavirus

A total of 4,496 cases of rotavirus intestinal infections were reported in Slovakia in 2019. A total of 196 outbreaks were recorded, of which 24 were of a larger size. 22 cases were imported, the largest number being from Croatia. No deaths were recorded.

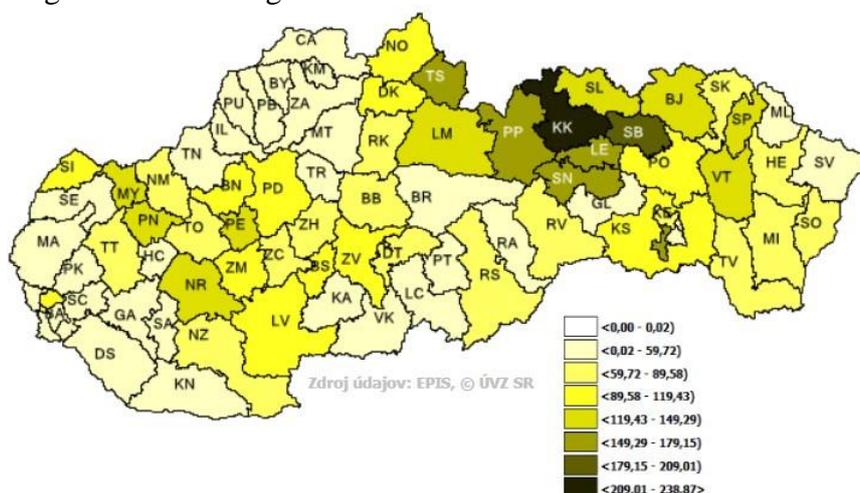


Fig. 17 Incidence of Rotavirus Diarrhoea Infections by District in Slovakia in 2019

Food and water samples were not tested for rotavirus in 2019.

32. Hepatitis A virus – HAV

A total of 99 cases of HAV were reported in 2019 (morb. 1.82/100,000), which represents a 42.8% decrease in comparison with 2018 and an 87% decrease in comparison with the 5-year average. The long-term trend is stable and has the typical character of an infection not influenced by general vaccination, which recurs on a 4-5 year cycle. The highest morbidity was in the Bratislava and Trnava regions. The age groups with the highest morbidity were 20-24 years, 15-19 years and 5-9 years. Ten cases were imported in 2019.

No food samples were tested for the presence of HAV in 2019.

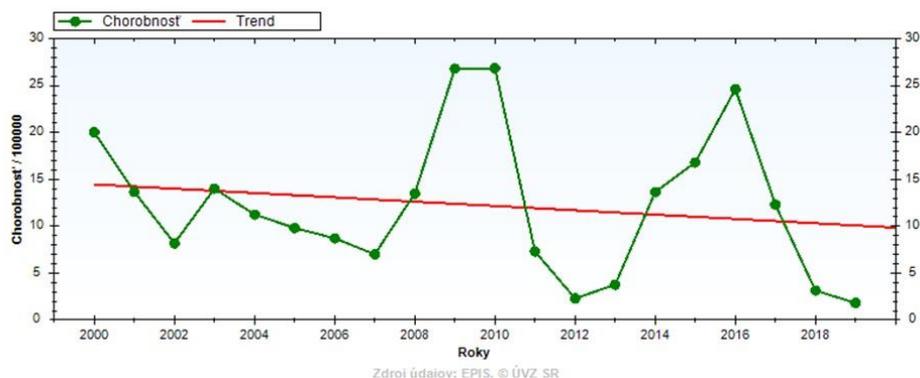


Fig. 18 Incidence of Acute Human HAV in Slovakia – 20-Year Trend

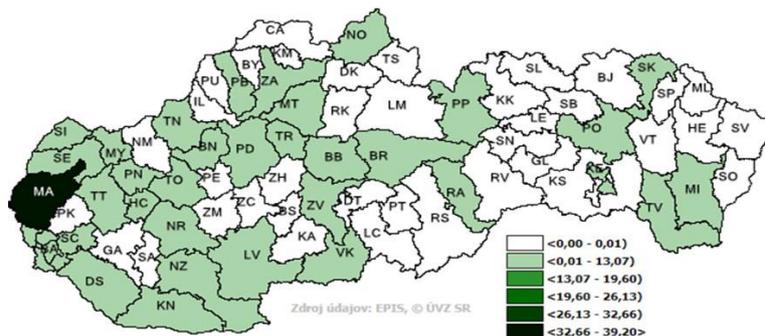


Fig. 19 Incidence of Acute Human HAV by Region in Slovakia in 2019

33. Hepatitis E virus – HEV

In 2019, 124 cases of disease were recorded (morb. 2.28/100,000), which represents an increase of 37.8% compared to 2018. All 8 regions reported illnesses. The Banská Bystrica region had the largest number of cases (40 cases) followed by Nitra (24 cases), Košice (20 cases), Trnava and Žilina (each 12 cases). Disease was imported in 10 cases from 7 countries, where patients had consumed various meat dishes.

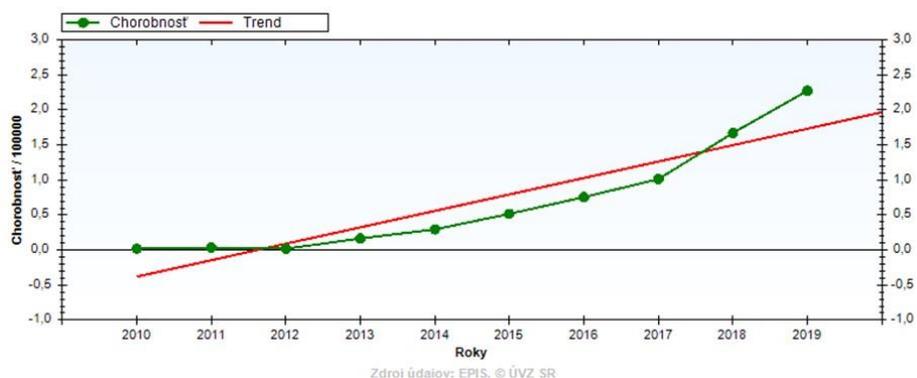


Fig. 20 Incidence of Human HEV in Slovakia – 10-Year Trend

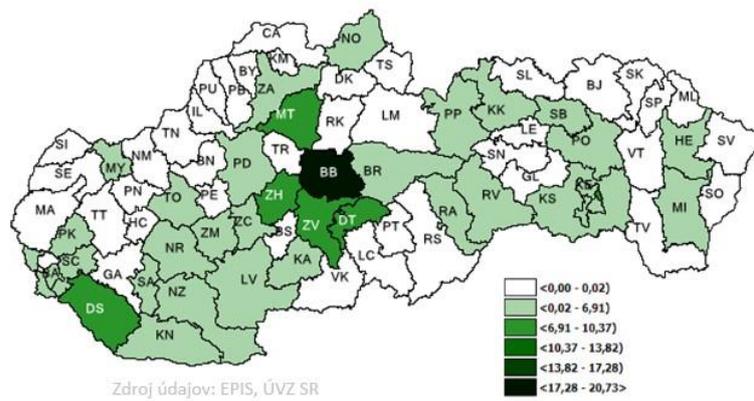


Fig. 21 Incidence of Human HEV by District in Slovakia in 2019

No food and water samples were tested for the presence of HEV in 2019. UVMPH Košice tested 40 samples from domestic pigs for the presence of HEV. The virus was not detected in any samples.

34. Prions

In 2019, CJD was confirmed in 16 of 240 suspected cases, with highest incidence being in the Žilina and Banská Bystrica regions. The 1st case of GSS with a mutation of the P102L prion gene was confirmed in the Nitra region. Morbidity in Slovakia has been stable over the last 10 years except for 2013 and 2016. Tests for BSE were carried out on 9,719 samples from bovine animals with negative findings. Tests for scrapie were carried out on 14,438 samples from sheep and goats; the positivity of sheep was 0.03 % (atypical form of scrapie), and in case of goats no positive cases were recorded, as in previous years. Although the last recorded case of BSE positivity in Slovakia was diagnosed in 2010, scrapie continues to occur in sheep populations, though with a continuous decline since 2016. The most recent cases of classical scrapie in Slovakia were recorded in 2017.

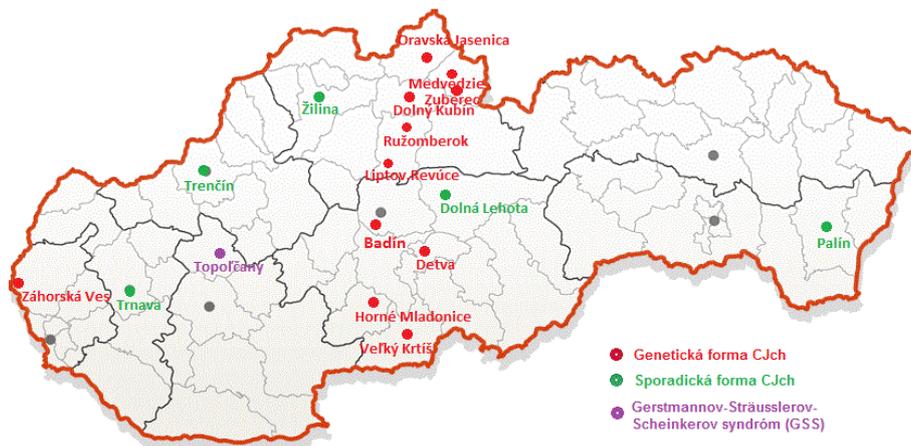


Fig. 22 Geographic distribution of prion diseases in Slovakia in 2019

35. *Toxoplasma gondii*

A total of 95 cases were reported in 2019 (morb. 1.74/100,000), which represents a 12% decrease in comparison with 2018 and a 35% decrease in comparison with the 5-year average. The highest morbidity was in the Banská Bystrica region – 4.32 and the Žilina region – 3.18. The congenital form of toxoplasmosis (P37.1) was not recorded.

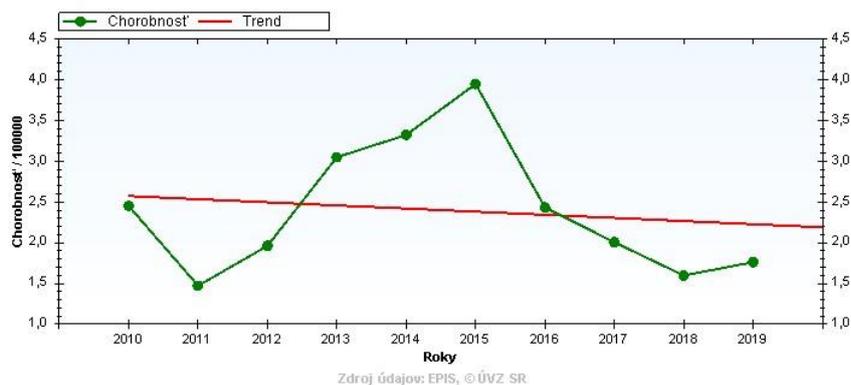


Fig. 23 Incidence of Human Toxoplasmosis in Slovakia –20-Year Trend

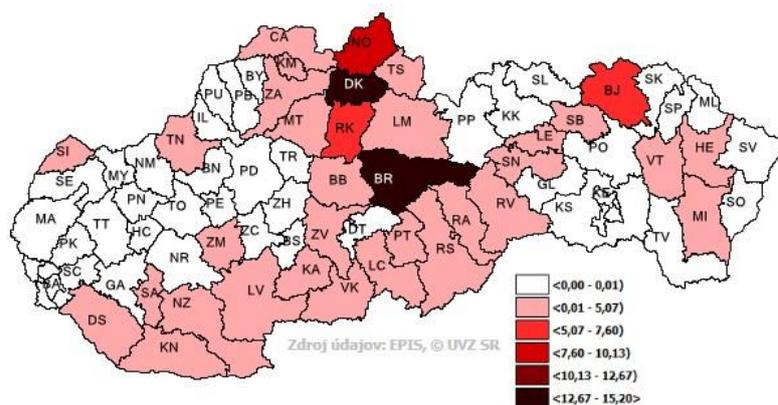


Fig. 24 Incidence of Human Toxoplasmosis by District in Slovakia in 2019

Tests for the presence of specific *T. gondii* antibodies in meat juices from various types of meat of Slovak origin were conducted on 367 samples between October 2016 to March 2019, of which 22.1 % were positive. The highest number of positive cases were found in sheep, goat and wild hog meat (61.1 %, 45.5 % and 43.6 % respectively).

In 2019, the SVFI tested 860 samples of cat faeces, feline carnivore faeces and animal blood. There positive results in 3.7 % of all examined samples. Tests of cat and other feline faeces returned positive results in 3 out of 753 samples (0.4 %).

36. *Plasmodium* spp.

The last patient to have acquired malaria in Slovakia was reported in 1959 and malaria was declared eradicated from Slovakia in 1963. At present, all cases of malaria in Slovakia are imported. A total of 6 cases were reported in 2019 (morb. 0.11/100,000), which is 3 cases more than in the previous year. All cases were reported as nonspecific malaria caused by *Plasmodium falciparum* (dg. B 50.9).

37. *Babesia* spp.

In 2019, 1 case of disease (morb. 0.02/100,000) was reported from the district of Malacky. Tests for the presence of *Babesia* spp. DNA were conducted on 14 *Ixodes ricinus* ticks taken from people. All the ticks were negative.

Of 105 of tested animals, 6.67 % were positive.

Tests of dog blood samples conducted between 2002 and 2019 returned a positive results for *Babesia* spp. in 170 of 779 samples. In 2019, the PCR method was used to test for and prove the presence *Babesia* spp. in the blood of 3 calves and *Babesia equi* in the blood of a horse. The greatest share of positive findings comprised samples from dogs which resided in or had access to areas close to the River Danube and the River Morava, while dogs from the surroundings of Košice also made up a high share of positive cases. The number of positive

cases associated with rivers and their surroundings reflects the relationship between the parasite and its water-loving vector, the tick *Dermacentor reticulatus*.

38. *Echinococcus* spp.

A total of 11 cases of disease were reported in 2019 (morbidity of 0.21/100,000), which is 1 case more than in 2018. Disease was linked to *E. granulosus* in 3 cases and *E. multilocularis* in 8 cases. Four cases of disease were reported in the Prešov region, three each in Nitra and Žilina and one case in the Banská Bystrica region. The IoPa SAS confirmed alveolar echinococcosis in 6 patients and cystic echinococcosis in 1 patient in 2019. Molecular analysis confirmed that the infection was caused by *E. granulosus* s. s. genotype G1.

Tests for the presence of echinococci were carried out on 112 foxes in 2019. The percentage of positivity decreased to 16.07 % after increasing to 26.90 % in the previous year. The fluctuation of positivity is strongly affected by a significant decrease in the number of samples tested. We consider the current conditions of echinococcosis monitoring – testing of foxes in specified areas of Slovakia affected by oral vaccination (the Žilina and Prešov regions), insufficient to determine the prevalence and potential further spread of *Echinococcus multilocularis*. It is highly probable that infection is much more widespread and includes areas of Slovakia that will not be included in monitoring in the future. Notably, in recent years we recorded new finds of *E. multilocularis* in foxes in the regions of southwestern Slovakia.

The fact that reported positive findings of *E. granulosus* in animals from slaughterhouses were based only on visual inspection, without microscopic proof and paradoxically almost no laboratory detection of this species in definitive canine hosts suggests that they may be false positives. Tests on dogs in 2018 and 2019 found only the eggs of *Echinococcus multilocularis*.

39. *Taenia* spp.

While there were 2 reports of disease in humans in 2018 (morb. 0.04 / 100,000), no cases of disease were reported during 2019.

The cysticerci are detected at slaughterhouses for pigs and cattle relatively rarely. While no cysticercus was reported in 2018, there were 10 reports of cysticerci in pigs in 2019.

40. *Toxocara* spp.

Six cases of toxocariasis were reported in 2019 (morb. 0.11/100,000), which is 5.3 times less than in the previous year. In the last 10 years, the largest number of cases have occurred in the Nitra region. The most frequent transmission methods are contact with a domestic pet/animal and via ingestion.

In 2019, a total of 146 persons suspected to have larval toxocariasis were tested for the presence of antibodies against *Toxocara* spp. by the IoPa of the Slovak Academy of Sciences. Antibodies were detected in 4 persons (2.7 %)

In 2019, a total of 2,832 samples of droppings and the intestinal content of definitive hosts of roundworms of genus *Toxocara* and *Toxascaris* were tested. Roundworms or their eggs were found in 275 samples (9.82 %), which is approximately the same percentage as in the previous year. There was an increase in positivity in cats (from 11.25 % to 14.21 %).

41. *Trichinella* spp.

No cases of human diseases were recorded in 2019. The IoPa SAS conducted tests for trichinellosis on 133 blood samples from patients in whom differential diagnostics indicated suspected tissue helminthiasis. The presence of antibodies against *Trichinella* spp. was

confirmed in one patient (0.8 %). 723,194 animals were tested for the presence of *Trichinella* spp., with a positive find of larvae in 9 samples. In comparison with 2017, when the prevalence of trichinosis among foxes dropped to a record low level of 2.8 %, the prevalence grew again in 2018 to a level similar to the earlier period 2012-2016, when it fluctuated in the range 8-11 %. In 2019 there was a return to a slight decrease in the prevalence of trichinella in foxes. Since 2009 there have been no positive cases reported among farm animals and positive cases are reported only among wild animals, mainly foxes (66.7 % of all positive samples in 2019). As in previous years, the dominant species in Slovakia is *Trichinella britovi*.

42. *Anisakis* spp.

In 2019, just as in the previous years, no cases of human disease caused by *Anisakis simplex* roundworms were recorded.

A total of 25 samples of fish, fish products and marine invertebrates were tested for the presence of larvae of the *Anisakidae* family in 2019. A live larva of the roundworm *Pseudoterranova decipiens*, which belongs to the *Anisakidae* family, was found by customers in a sample of chilled cod.

43. *Thelazia* spp.

The first cases of ocular thelaziasis caused by the parasitic nematode *Thelazia callipaeda* were confirmed in the territory of Slovakia in 2016 and 2017. By the end of 2019, a total of 944 tests were conducted in suspect or potential hosts (dogs, cats, foxes, badgers, bears, racoons), and the presence of the parasite was diagnosed only in dogs, red foxes and in one cat. While up to 2017 only 16 positive cases were reported in dogs and foxes, in 2018 and 2019 another 44 positive cases of thelaziasis in animals were reported. The majority of cases occurred in the Bratislava and Košice regions.

A growing trend in the incidence of ocular thelaziasis was recorded in the Košice region as well in 2019. Thelaziasis is not a notifiable disease; after initial uncertainty, many veterinarians have learned to recognise it and do not send samples for laboratory diagnosis. It is therefore certain that the incidence and numbers of positive cases will be greater than the above indicates. To date, no human cases of this infection have been recorded in Slovakia.

44. *Dirofilaria* spp.

In 2019 the IoPa SAS confirmed human dirofilariasis in 4 patients. Three patients came from eastern Slovakia and one from Bratislava. All cases involved the subcutaneous form. Between Slovakia's first recorded case in 2007 and the end of 2019 there were a total of 20 recorded cases of human dirofilariasis and its incidence is on the rise.

Dog blood samples have been tested for the presence of dirofilariasis since 2005. In 2019 the largest number of samples was tested (470) and monitoring covered 11 districts. The prevalence of the disease continues to rise significantly compared to previous years. *Dirofilaria repens* causing the subcutaneous or eye form of the disease is the dominant type in our territory. *D. repens* is also the cause of all heretofore diagnosed cases of human dirofilariasis in Slovakia. There are however an increasing number of cases of mixed infections in dogs involving both species and especially *D. immitis*, which causes heartworm in dogs.

Annex 1

List of Cooperating Organisations

Ministry of Agriculture and Rural Development of the Slovak Republic – National Contact Point for Scientific and Technical Cooperation with the EFSA
National Agricultural and Food Centre – Agriculture Research Institute
National Institute of Tuberculosis, Pulmonary Diseases and Thoracic Surgery, Vyšné Hágy
Regional Public Health Authority, Banská Bystrica
Regional Public Health Authority, Komárno
Regional Public Health Authority, Košice
Regional Public Health Authority, Trenčín
Slovak Academy of Sciences – Institute of Parasitology, Košice
Slovak Academy of Sciences – BMC Institute of Virology, Bratislava
Slovak University of Technology, Faculty of Chemical and Food Technology
Slovak Medical University
State Veterinary and Food Administration of the Slovak Republic
State Veterinary and Food Institute – Veterinary and Food Institute, Bratislava
State Veterinary and Food Institute – Veterinary and Food Institute, Dolný Kubín
State Veterinary and Food Institute – Veterinary and Food Institute, Dolný Kubín, TL Prešov
State Veterinary and Food Institute – Veterinary and Food Institute, Košice
State Veterinary and Food Institute – Veterinary Institute, Zvolen
Trnava University, Faculty of Health Sciences and Social Work, Trnava
Comenius University, Faculty of Medicine, Bratislava
University of Matej Bel, Faculty of Natural Sciences, Banská Bystrica
University of Pavol Jozef Šafárik, Faculty of Medicine, Košice
University of Veterinary Medicine and Pharmacy in Košice
Public Health Authority of the Slovak Republic
Water Management Research Institute, Bratislava

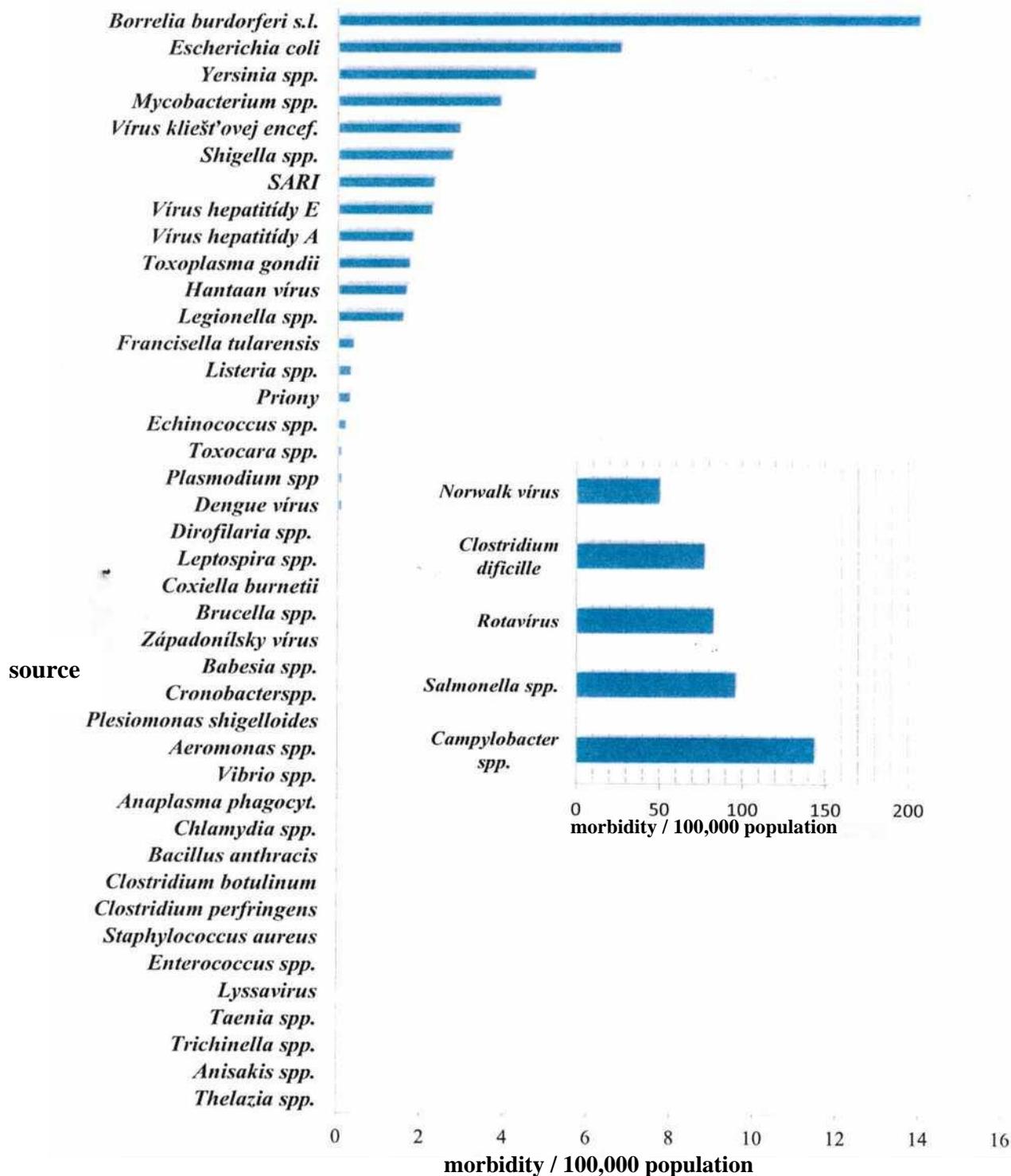
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Morbidity per 100,000 population in Slovakia in 2019



Annex 4

List of Abbreviations

AHAW	– EFSA Animal Health and Welfare Network
ARD	– acute respiratory disease
BMC	– Biomedicinal Centre
BSE	– bovine spongiform encephalopathy
CJD	– Creutzfeldt-Jacob Disease
WTP	– wastewater treatment plant
DSS	– social care home (<i>domov sociálnych služieb</i>)
EEA	– European Economic Area
EFSA	– European Food Safety Authority
EFTA	– European Free Trade Association
EREN	– EFSA Emerging Risks Exchange Network
EU	– European Union
FChFT	– Faculty of Chemical and Food Technology
HAV	– Hepatitis A virus
HEV	– Hepatitis E virus
HUS	– haemolytic uremic syndrome
morb.	– morbidity
ILD	– influenza-like disease
ISBN	– International Standard Book Number
FoM CU	– Faculty of Medicine of Comenius University in Bratislava
CNS	– coagulase negative staphylococci
CPS	– coagulase positive staphylococci
LD	– Legionnaire’s disease
MI	– Microbiology Institute
MRA	– EFSA Network on Microbiological Risk Assessment
MRSA	– Methicillin-resistant <i>Staphylococcus aureus</i>
NCP	– National Contact Point for Scientific and Technical Cooperation with the EFSA
NoV	– Norwalk virus
NAFC – ARI	– National Agricultural and Food Centre – Agriculture Research Institute
NRC	– National Reference Centre
NICD	– National Institute of Children’s Diseases Bratislava
IoPa SAS	– Institute of Parasitology of the Slovak Academy of Sciences
RPHA	– Regional Public Health Authority
SARI	– Severe Acute Respiratory Infection
SAS	– Slovak Academy of Sciences
TL	– Test Laboratory
s.l.	– <i>Borrelia burgdorferi sensu lato</i> complex
SR	– Slovak Republic
SUT	– Slovak University of Technology
SVFI	State Veterinary and Food Institute
TBC	– tuberculosis
TBEV	– Tick-borne encephalitis virus
IoE	– Institute of epidemiology
TSE	– transmissible spongiform encephalopathy
DHW	– domestic hot water

UHB	– University Hospital Bratislava
CCTIA	– Central Control and Testing Institute in Agriculture
UVMPH	– University of Veterinary Medicine and Pharmacy in Košice
PHA SR	– Public Health Authority of the Slovak Republic
IoZ SAS	– Institute of Zoology of the Slovak Academy of Sciences
IoVi SAS	– Institute of Virology of the Slovak Academy of Sciences
VFI	– Veterinary and Food Institute
VI	– Veterinary Institute
VTEC/STEC	– <i>E.coli</i> producing verotoxin/Shiga toxin
FRI	– Food Research Institute
– WMRI	– Water Management Research Institute
WHO	– World Health Organisation
WNV	– West Nile virus



**SUMMARY REPORT OF ZONOSSES, ALIMENTARY AND WATER-
BORNE INFECTIONS IN THE SLOVAK REPUBLIC IN 2019**

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