

Summary Report of Zoonoses, Alimentary and Water-Borne Infections in the Slovak Republic in 2020

1. *Salmonella* spp.

Salmonellosis is one of the zoonoses with the highest morbidity in the Slovak Republic. There were 3,478 reported cases of salmonellosis in Slovakia in 2020, which gives a morbidity of 63.81 cases per 100,000 inhabitants. Incidence was 34 % lower than in 2018 and 8 % below its five-year average.

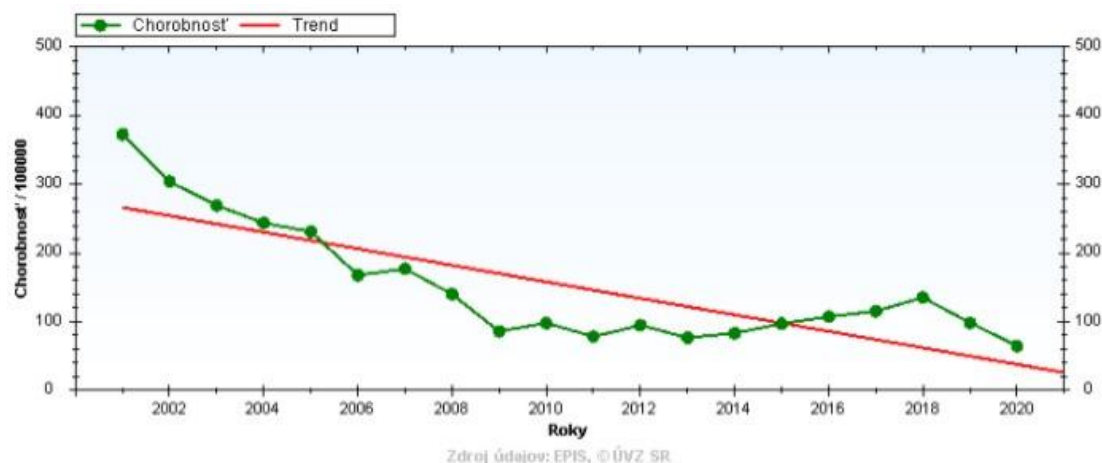


Fig. 1 Salmonella Infections in Humans – 20-Year Trend

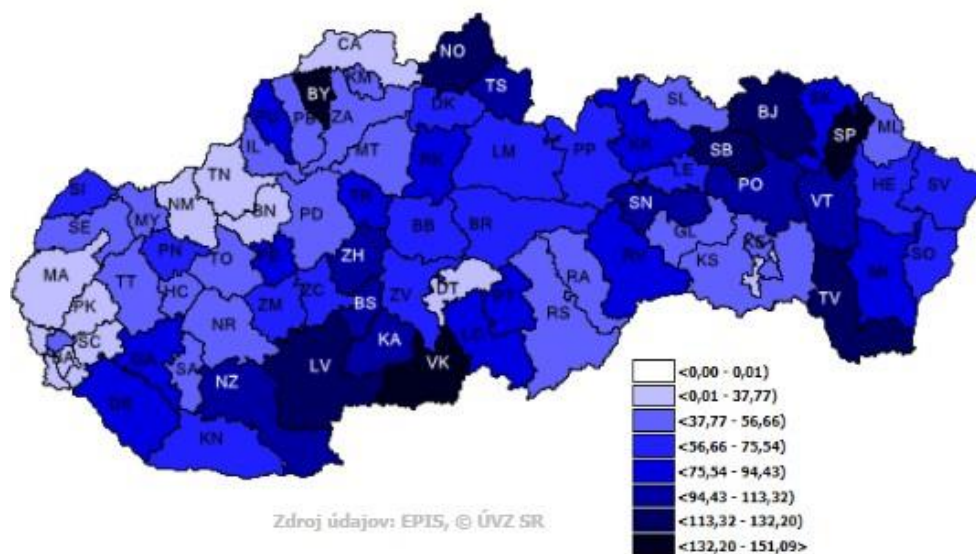


Fig. 2 Salmonellosis Incidence by District in 2020

Cases were reported in every age group and the highest age-specific morbidity was, as in the previous year, in children from 1 to 4 years of age – 376.69. Likewise as in the previous year, the lowest morbidity was in the 35-44 age group – 22.67. The largest numbers of cases were in July (460) and in August (458). Imported infections were reported in 9 cases as salmonella enteritidis (Hungary 5 cases, Czechia 2 cases, Cambodia 1 case, Cyprus 1 case). The most common transmission factor was meat (3 epidemics), whereas the transmission factor was unknown in another 3 epidemics. There were a total of 215 salmonella epidemics in 2020. In 2017, the most frequent transmission factors were home-laid eggs (14 epidemics) and mixed food (9 epidemics); in 2018, they were mixed foods (15 epidemics), home-laid eggs (12

epidemics) and eggs from retail chains (12 epidemics); in 2019, they were home-laid eggs (12 epidemics) and eggs from retail chains (6 epidemics) No deaths were recorded.

A total of 9,937 food samples were tested in 2020. The percentage of positive samples increased from 0.4 % to 0.67 %. As in previous years, positive samples were found most frequently in broiler meat and meat products, whereas this category's share of positive samples grew from 10.4% to 20.13%. In total, 124 egg and egg-product samples were examined with no positive find. *Salmonella* was found sporadically in other foodstuffs. The most frequent serovars were *S. Infantis* (41.8 %), and *S. Enteritidis* (20.9 %).

Tests of live animals were carried out in 6,347 poultry flocks, finding a positivity rate of 1.12 % dominated by *S. Infantis* and *S. Enteritidis*. Other species in which salmonella was most frequently detected were snakes and lizards, dogs and cats.

A total of 261 fodder samples were examined in 2020, of which 1.53 % were positive.

Laboratories examined a total of 5,435 samples from the external environment and water in 2020. *Salmonella* spp. was confirmed in 3 samples from children's sandpits, 7 samples of surface water, 4 samples of water from turtle aquariums and 1 sample of agama droppings, a swab from an aquarium and a swab from a turtle.

Microbial resistance profiles were determined for 319 isolates of *Salmonella* spp. obtained by the national control programmes for salmonella infections in chicken (*Gallus gallus*) and turkey flocks. The most frequently detected serovars were *Salmonella* *Infantis* (140 isolates), *S. Enteritidis* (90x), and *S. Newport* (18x). None of the analysed isolates showed any resistance to meropenem, azithromycin, tigecycline, colistin or gentamicin.

No isolates of *Salmonella* spp. producing broad spectrum β -lactamases were confirmed in farm animals, pets, foodstuffs or feeds. An elevated level of resistance, below 50 % was detected for the classes of sulphonamides, tetracyclines and penicillins. More than 50 % of isolates were resistant to quinolones (62 % nalidixic acid) and fluoroquinolones (63 % ciprofloxacin).

The trend of microbial resistance in *Salmonella* spp. isolates in various matrices has long been stable, with a higher minimum inhibitory concentration for antimicrobials that are tetracyclines, quinolones or their derivatives. The finds correlated with data from neighbouring European countries.

2. *Escherichia coli*

In 2020, there were 208 reports of illness caused by *E. coli* in Slovakia (morbidity 3.82/100 000), which is 161 fewer than in the previous year. The disease aetiology was broken down as: A04.0 Infection with enteropathogenic *Escherichia coli* – 205 cases, A04.1 Infection caused by enterotoxigenic *Escherichia coli* – 1 case, A04.3 Infection by *Escherichia coli* – 2 cases. Ten cases of healthcare-associated infection with A04.0 were reported. The National Reference Laboratory for *E. coli* at the PHA SR investigated 12 samples taken from clinical material (stool, rectal swab) for HUS diagnosis in 2020. STEC/VTEC was confirmed in one case in a child patient. Three child patients were also found to have enteroinvasive *E.coli* (EIEC). Pathogenic species were not confirmed in the other samples.

Laboratories of the PHA SR, the RPHAs, FChFT SUT, WMRI and FRI investigated 32,201 samples from foodstuffs, animal feed, water and the environment. This represents a significant decrease in the total number of samples examined for the detection and identification of *E.coli* in the territory of the Slovak Republic since 2019. *E.coli* was demonstrated to be present in 1,937 samples, which is around 18 %.

E. coli was proven in 6 % of 4,930 tested food samples. VTEC was isolated and confirmed in 1 sample of vegetable sprouts from a total of 16 samples studied. Three grain samples tested positive for *E. coli*. A total of 14,601 samples of various types of water were tested and *E. coli* was confirmed in more than 8 % of the samples. As regards drinking water, 7.3 % of 10,032 tested samples fell short of requirements. Out of 3,342 samples of water for recreational use,

10 % were unsatisfactory. A total of 12,667 samples from the environment were tested for *E. coli*. with positive findings in 3.6 % of cases.

Resistant isolates of *Escherichia coli* from animals and foodstuffs were monitored and then analysed in the National Reference Laboratory for Microbial Resistance at the Food Research Institute in Dolný Kubín. Microbial resistance profiles were identified in 621 *Escherichia coli* isolates obtained through harmonised monitoring of microbial resistance in the Slovak Republic managed by the SVFA SR. The presence of overall and resistant strains of *E. coli* was also studied in 89 samples from water, sediments and foodstuffs.

3. *Yersinia* spp.

A total of 259 cases were reported in Slovakia in 2020, which is 36 % less than in the previous year but still 23 % above the five-year average.

Cases were reported from every region of the Slovak Republic, with the highest morbidity being recorded in the Prešov Region and the lowest in the Bratislava Region. The months with the most cases were November (26) and January (21). No imported cases were recorded. One small epidemic was reported with two cases of disease.

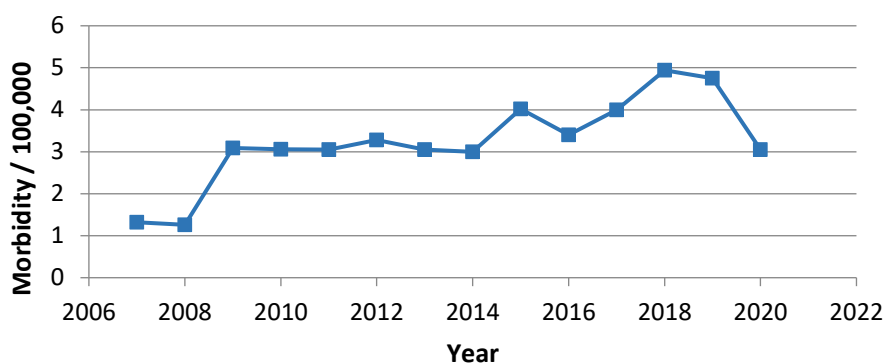


Fig. 3 Incidence of Human Yersiniosis in Slovakia from 2007

The Slovak Republic monitored Pork and poultry meat for *Yersinia* spp. in 2020 in accordance with the national action plan on antimicrobial resistance. Culture results confirmed contamination with *Yersinia enterocolitica* in 52 % of pork samples and 44 % of poultry samples.

A total of 15 clinical samples were examined, all with a negative results for *Yersinia enterocolitica*. The samples were taken from the faeces of pets (cats, dogs) with enteritis. The national action plan of the Slovak Republic on antimicrobial resistance also included monitoring for *Yersinia* spp. in the cecum of pigs and confirmed the presence of *Yersinia enterocolitica* in 21 % of samples.

4. *Cronobacter* spp.

No cases of human disease were recorded in 2020. A total of 681 samples of first infant formula milk and follow-on formula milk were examined in targeted monitoring, but the presence of *Cronobacter* spp was not confirmed.

5. *Shigella* spp.

A total of 107 cases were reported in 2020 (morbidity 1.93/100,000), which represents a 30% decrease in comparison with 2019 and is 47% below the five-year average. Additionally, two people were found to be carrying the bacteria without disease. As in the previous year, the highest morbidity was recorded in the Košice Region – 5.99. The highest age-specific morbidity was reported in in children under one year of age (41.07) and children aged one to four (16.3).

Disease occurred throughout the year with the highest incidence in July (18.7 %). No imported infections were recorded. Infections occurred sporadically or in families but there were also epidemics. Two small epidemics were reported (two ill persons, 3x *S. flexneri*). Healthcare-associated infections were reported in the case of three patients under dg. A031.

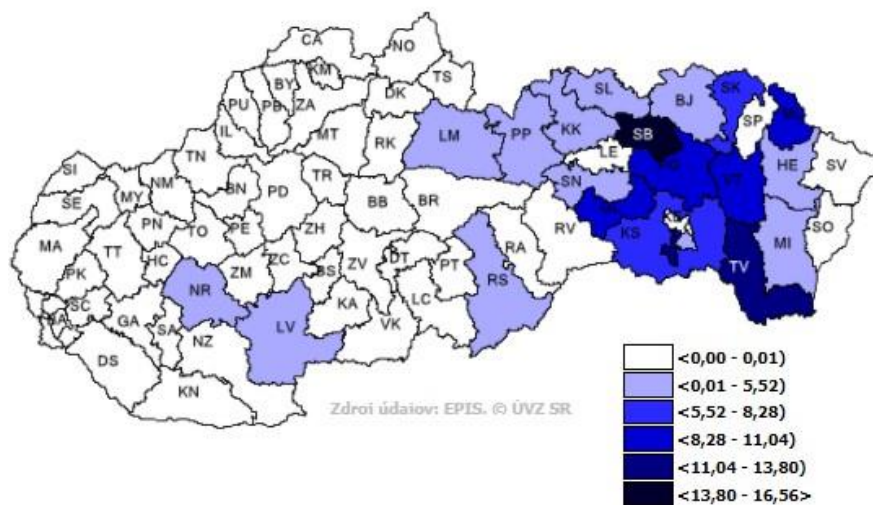


Fig. 4 Incidence of Dysentery by District

Food and water were not tested for the presence of *Shigella* spp. in 2020.

6. *Plesiomonas shigelloides*

Samples from surface water and the environment were not specifically tested for the presence of *Plesiomonas shigelloides* in 2020, though this agent was sporadically isolated in examinations of water targeting the presence of other microorganisms, and in the case of fish.

7. *Legionella* spp.

In Slovakia, there is a rising trend in diagnoses of legionellosis, its pneumonic form – Legionnaires’ disease (LD), and Pontiac fever. In 2020, Slovakia recorded a total of 104 LD cases, which is the highest since it began keeping records of this disease in 1985. The higher reported incidence (19.1/million) is a more faithful reflection of actual incidence and is approaching the EU/EEA average. The average age of patients with LD was 59 (median 65.5, mode 68). Disease had 2.3-fold higher incidence in men than in women. Coinfection with the SARS-Cov-2 virus was recorded in 16 patients. The fatality rate for LD was 11.5%, which increased to 12.5% when coinfecting with SARS-Cov-2. Risk factors for fatal cases of LD were higher age and comorbidities.

We are also seeing an increase in non-pneumonic Pontiac fever (24 cases) with a much lower average age of patient than in LD (44 years, median 40, mode 32 and 42).

Five cases of LD have been confirmed in children (4.8 %) aged 3 – 13 (average age 9.3) and two children (11 and 13) had Pontiac fever.

A total of 682 samples from water, swabs and the air taken in the community and in healthcare facilities were tested for legionella. The samples with the largest number of legionella-contaminated samples were from hospitals (35.5 %), domestic hot water (33.8 %), swabs from water installations (36 %) and samples of drinking water (28.6 %). The epidemiologically most significant strain of legionella, *L. pneumophila* serogroup 1, which is responsible for the most severe infections in the world, was present in fewer samples than in the past (only 12.6 %). *L. pneumophila* serogroups 6, 9, 3 had representations of 19 – 14 % and the related species *L. micdadei* was present in 4.5 %. The lowest levels of legionella

contamination were detected in water from swimming pools (2.9 %), which suggests that these facilities are taking good precautions.

It is necessary to pay heightened attention to cases of legionellosis because Legionnaires' Disease can often be severe and even fatal for high-risk patients. Diagnostics for legionellosis is also important in the present time because it can cooccur with COVID-19. The risk of exposure to legionella from water is due to the ubiquity of legionella and the frequent absence of preventive measures in the community and even in healthcare settings (the risk of healthcare-associated legionellosis).

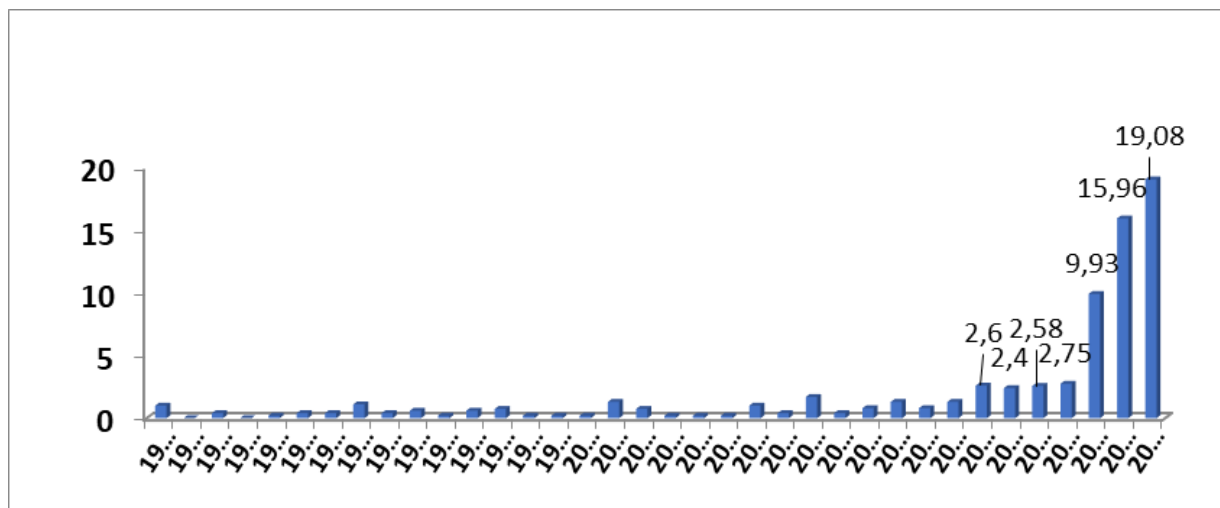


Fig. 5 Incidence of Legionnaire's Disease / million inhabitants of Slovakia 1985 – 2020

8. *Vibrio* spp.

As in previous years, no cases of cholera were reported in 2020. *Vibrio* bacteria were not detected during routine food inspections in 2020. All finds results from epidemiological investigations and a project.

A total of 75 strains of *vibrio* were isolated in foodstuffs in 2020. Most of these were non-pathological aquatic saprophytes. *V. cholerae* was detected in 8 cases and *V. parahaemolyticus* in 4 cases.

A finding that can be considered important is the occurrence of several species of *vibrio* bacteria in mineralised swimming pool waters and surface waters used for bathing. The most important of these are *V. cholerae* and the increasing number of isolates of *V. fluvialis* and *V. furnissii*, which are major pathogens in coastal areas and are probably starting to appear in Slovak waters due to the warming of the climate. One infection with *V. fluvialis* and two infections with *V. furnissii* were recorded in 2020 and no other pathogen was confirmed in the patients.

9. *Aeromonas* spp.

In 2020, a total of 184 *Aeromonas* strains were identified in the investigation of various materials by the laboratories of the PHA SR, the RPHAs in Slovakia. Sixty of them were identified only at the genus level. 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. An important development is the capture of 57 *Aeromonas* strains in stool samples from 57 patients with diarrhoea, in which no other pathogen or potential pathogen was found. The VFI in Dolný Kubín examined 27 fish samples for the presence of *Aeromonas* spp. Sixteen of the samples were *Aeromonas*-positive. The most common species was *Aeromonas hydrophila* (a pathogen for fish) followed by *Aeromonas sobria* (a conditional pathogen for fish).

10. *Campylobacter* spp.

There were 4,961 reported cases of illness in 2020 (morbidity of 91.02/100,000), which represents a 37% decrease in comparison with 2019 and is approximately equal to the five-year average. Cases were reported from every region of the Slovak Republic, with the highest morbidity being in the Nitra (118.67) and Prešov (115.15) Regions. The lowest morbidity was recorded in the Banská Bystrica Region (47.85). Cases were reported in every age group, whereas the highest age-specific morbidity was in children under one year of age (1042,01) and lowest in adults aged 45–54 (26.30). Disease occurred throughout the year with the highest incidence in June (840), July (797) and August (623). There were 5 imported cases (1 from Czechia and 4 from Hungary). Healthcare-associated infections were reported in 6 cases. Infections occurred sporadically or in families but there were also epidemics. There were 88 small epidemics affecting 2 – 4 people. The aetiological agents in outbreaks were *C. jejuni* (82 cases), *C. coli* (2 cases) and an unspecified species of *C. spp.* (4 cases).

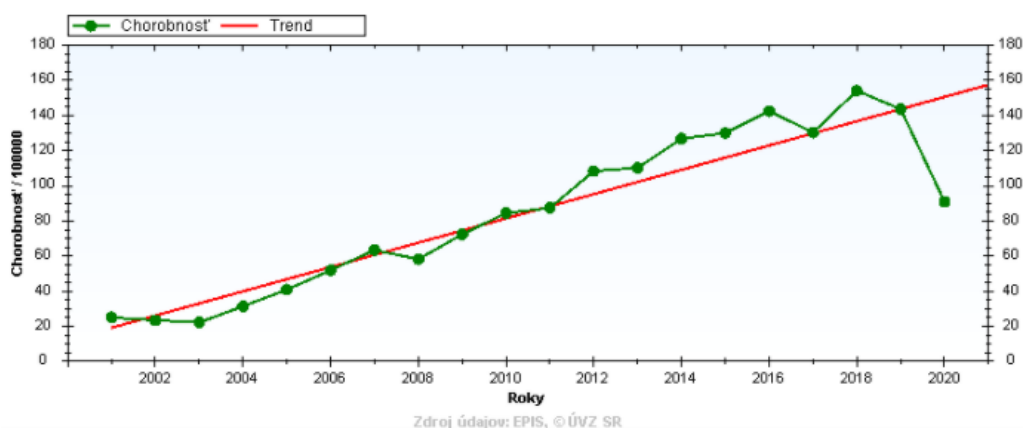


Fig. 6 Incidence of Human Campylobacteriosis in Slovakia from 1997 to 2020

The laboratories of the RPHAs and the VFI in Dolný Kubín tested 903 samples of food for *Campylobacter* spp. and confirmed it in 28 samples, a 3 %-positivity rate.

Of 1,614 tested animals, 18 % were positive. This indicates that farm animals are the main reservoir of thermotolerant *Campylobacter* spp.

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 below the EU average (0.09/100,000). In 2020, one case of disease was reported from the district of Detva (0.02/100,000). Slovakia is officially free of the incidence of bovine, ovine and caprine brucellosis. To maintain this status, 41,679 serological tests of cattle and 17,847 serological tests of sheep and goats were carried out in 2020.

12. *Anaplasma phagocytophilum*

No cases of human granulocytic anaplasmosis (hga) were reported in 2020 although the causative agent of anaplasmosis was detected in human blood samples analysed by the BMC Institute of Virology SAS and IoPa SAS with a prevalence of 1.6 %, The overall prevalence of *A. phagocytophilum* in ticks that bite humans was 7.0 %. All blood samples taken from dogs tested negative.

13. *Coxiella burnetii*

Fives cases of Q fever in people were reported in 2020. The BMC Institute of Virology SAS tested samples from 108 patients. Values for the presence of antibodies against *Coxiella burnetii* phase II indicate a case of Q fever in the past in 43 serum samples and the presence of acute Q fever in 5 tested patients. Tests were carried out on 1,555 samples from cattle, goats, sheep and rabbits. There were positive serological results only in 1.19 % of cattle. No survey of the prevalence of *C. burnetii* in ticks was carried out in 2020.

14. *Francisella tularensis*

The incidence of tularaemia in humans in Slovakia has been on a downward trend since an epidemic in 2002 and there were 12 reported cases of disease in 2020 (morbidity 0.22/100,000), which is 45 % less than in the previous year and 5 % below the five-year average. It caused illness 9 men and 3 women (male : female ratio 3:1) and the highest morbidity was in the 35-44 age group (0.56 / 100,000). In terms of seasonal characteristics, incidence was highest in the third quarter (3 cases), with the peak in August (3 cases). The same number of cases were recorded in January but one patient had already had clinical symptoms in December.

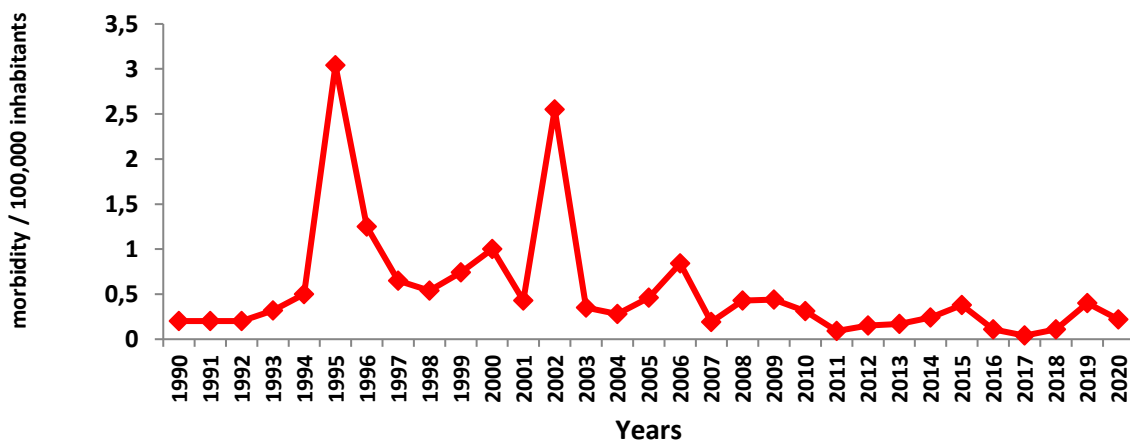


Fig. 7 Incidence of Human Tularaemia in Slovakia from 1990 to 2020

Cases of disease occurred only in western Slovakia, all in the Nitra Region (regional morbidity 1.79 / 100,000) in a total of five districts, of which the Nitra district had 6 cases, the districts of Levice and Šaľa had 2 cases each and the districts of Topoľčany and Zlaté Moravce had 1 case each. The most frequently diagnosed form of disease was ulceroglandular tularaemia, and other forms observed included pulmonary tularaemia, oralnoglandular tularaemia and glandular tularaemia with lymphadenopathy of neck and inguinal region. It was transmitted via ticks, contact with wild and domesticated animals and exposure to an environment with a high prevalence of small rodents.

No reservoir of tularaemia in hares was found in 2020. There was, however, a case of disease after contact with a hare in Šaľa district. Tests of samples from 2 hares and 1 wild rabbit from 3 locations returned negative results for the pathogens of tularaemia. Tests on 411 horses in 4 western Slovak regions found overall seropositivity of 50.61 %, which is more than double the level of 2019 (23.50 %). The highest rate of positivity was in the Nitra Region (61.54 %). Higher prevalence levels than in the previous year were found in all four regions.

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 spreading to new areas and a risk of infection.

15. *Leptospira* spp.

In 2020, four patients with leptospirosis were reported in Slovakia (incidence 0.07 / 100,000). The disease was caused by bacteria of the genus *Leptospira* in the *Grippotyphosa* and *Pomona* serovars. In one case the causative serovar was not identified. The cases involved mild or moderate illness, with a febrile form in three cases and a respiratory form in one case.

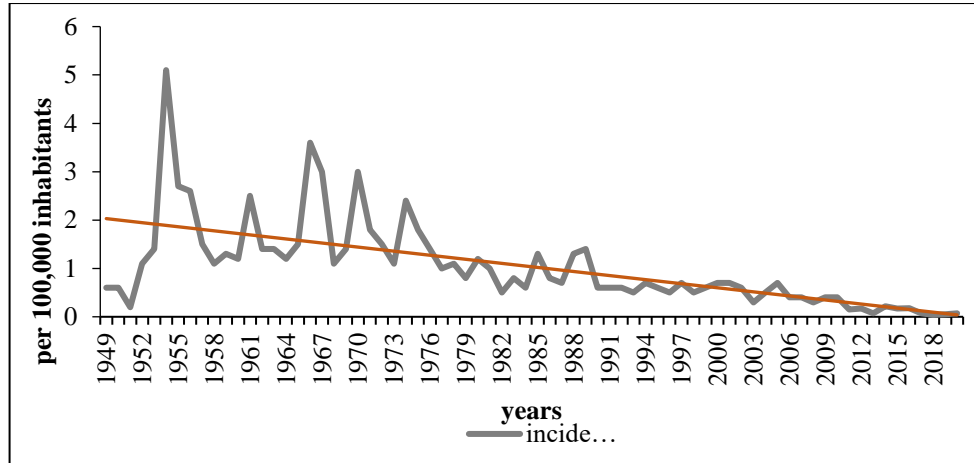


Fig. 8 Human Leptospirosis Morbidity in Slovakia from 1949 to 2020

Tests were carried out on 2,646 animals in 2019, of which 8.9 % were positive. Compared to previous years, the positivity rate decreased in cattle from 9.4 % in 2019 to 4 %, in dogs from 18.9 % to 8.3 % and in pigs from 8.1 % to 2.4 %. Similar to the previous years, the dominant *Leptospira* strains in cattle belonged to the *Sejroe* group, whereas the dominant serovar in dogs was *Canicola*.

16. *Borrelia* spp.

A total of 961 cases were reported in 2020 (morbidity 14.02/100,000), which is 26 % more than in 2019 and 3.4 % above the five-year average. Cases of disease were reported in all regions, with the highest morbidity in the Trnava (40.1) and Žilina (29.1) Regions. The epidemiological case histories are: transmission mechanism unknown – 190 cases, tick bite – 654 cases, insect sting – 202 cases.

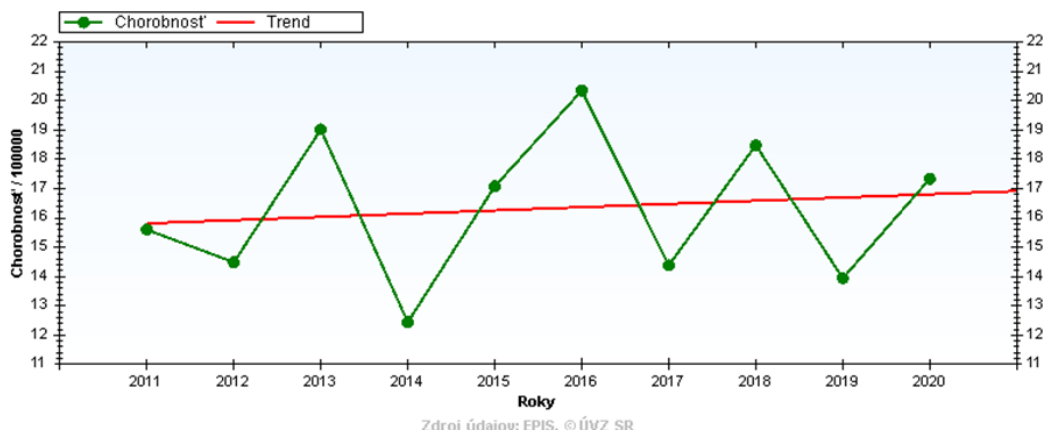


Fig. 9 Incidence of Human Lyme Disease in 2020

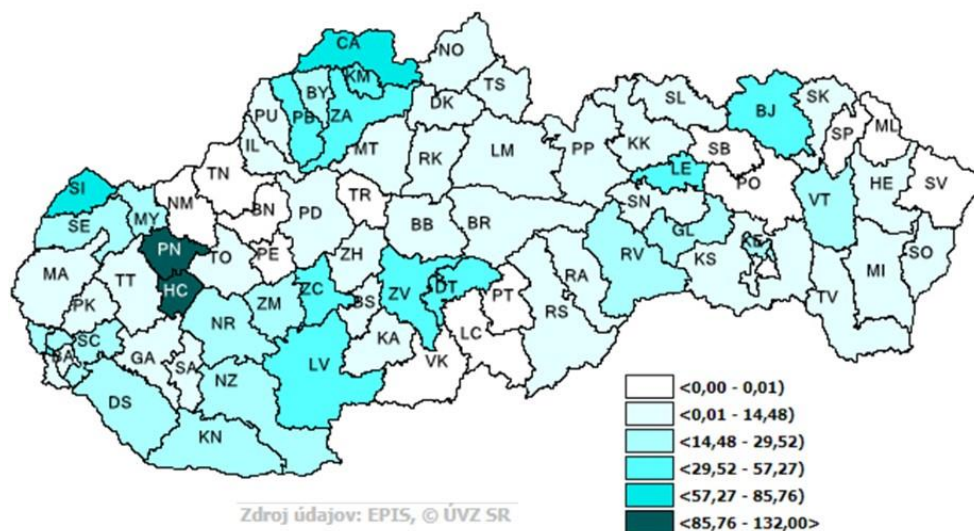


Fig. 10 Incidence of Human Lyme Disease by District in Slovakia in 2020

In 2020, the MI of the FoM CU carried out ELISA serological analysis of 166 samples from patients suspected to have Lyme disease. Dual analysis (ELISA/WB) was carried out for 59 of the samples. WB analysis confirmed the positive finding in 32 (54 %) of the studied samples. The result was evaluated as negative in 10 samples (16.94 %). The most frequent diagnoses were rheumatoid arthritis, Lyme disease, cervical, sacral and lumbar nerve damage, scleroderma and dermatitis.

Tests were also carried out on 23 samples from animals, of which 1 sample was positive and 1 sample was dubious. Tests of 427 ticks that bite humans found 116 that were positive for *B. burgdorferi* s.l. (27.2 %).

17. Chlamydia

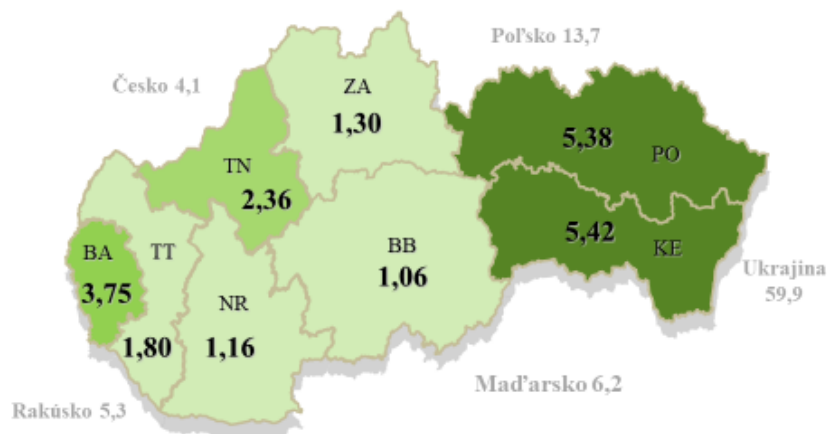
No cases of mammal chlamydiosis or ornithosis (psittacosis) in humans were reported in 2020. This was probably because differential diagnostics was not conducted and many infections were mistaken for another diagnosis. Tests for the presence of chlamydia antibodies were carried out on 1,871 animal serum samples, with a 4.33 % positivity rate, and on 7 eye swabs from cats, 3 of which were positive. Just as in the previous years, the animals with the highest seropositivity rate were sheep (particularly after miscarriage or with reproduction disorders), whereas between 2017 and 2020 positivity has dropped slightly from 19.23 % to 17.89 %.

18. *Mycobacterium* spp.

There were 158 reported cases of human tuberculosis in 2020, which is 56 cases more than in 2019. As in the previous years, the highest morbidity was recorded in eastern Slovakia. In terms of animal health, the Slovak Republic continues to have an official bovine tuberculosis-free status; to protect this status, 39,626 tuberculin tests were carried out in cattle.

Výskyt tuberkulózy na Slovensku v r. 2020 podľa krajov

(počet prípadov na 100 tis. obyvateľov)



Zdroj: NRT, ECDC

Fig. 11 Incidence of Human Tuberculosis in Slovakia and Surrounding Countries in 2020

19. *Listeria* spp.

A total of 7 cases were reported in 2020 (morbidity 0.13/100,000), which is 22% less than in 2019 and 54 % of the 5-year average. Cases of illness were reported in the Trnava (1), Nitra (1), Banská Bystrica (2) and Košice Regions.

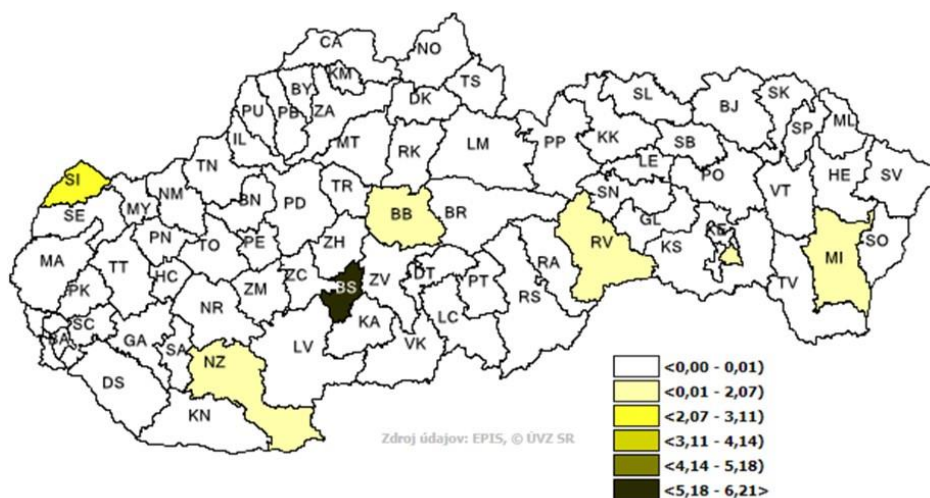


Fig. 12 Listeriosis incidence in Slovakia in 2020

Tests of 4,900 samples of 28 types of food were carried out in 2019. The positivity rate was on the same level as in 2019 (1.31 %). As in 2018 and 2019, there was a higher positivity rate 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 %. In 2020, the positivity rate decreased to 11.76 %.

Tests of 1,851 swabs for the presence of listeria returned a positive result in 31 cases. The percentage of positive results in animals grew from 0.74 % in 2019 to 1.67 % in 2020.

The serotypes identified most frequently in 2020 were 1/2a in food and 4b in animals.

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

for suspected cases; in 2020, five organ samples from animals were tested with a negative outcome. All 16 samples of raw material from the leather industry tested negative. The presence of *B. anthracis* spores was not proven in any of the 9 suspicious packages delivered through the integrated emergency management system to public healthcare laboratories.

21. *Clostridium* spp.

In 2020, *Cl. botulinum* (A 05.1) did not cause any disease in Slovakia. There were likewise no reports of diarrhoea caused by *Cl. perfringens*. There were a total of 3,569 cases of disease caused by *Cl. difficile* (A 04.7) (morbidity 65.48/100,000), which is 15 % lower than in 2019 (when 4,201 cases were reported) and is double the 5-year average. Cases of illness were reported in every region. The highest morbidity was in the Bratislava Region (126.44) and the lowest was in the Trenčín Region (32.60). Death was the outcome in 7 cases. Most cases of disease (2,861 – 79.6 %) were acquired through healthcare-associated infection.

Tests for *Cl. perfringens* were carried out on 1,165 food samples and tests for *sulphite-reducing clostridia* were carried out on 1,447 food samples. All test results were negative.

Out of 1,605 samples of clinically ill or deceased animals that were tested for clostridia, 55.4 % tested positive. Out of 119 fodder samples tested for *Clostridium* spp. only 1.7 % tested positive.

Tests of 965 samples of drinking water, mineral waters and other water for *Cl. perfringens* yielded positive results for drinking water (1.54 %) and waste water (5.4 %). Tests of 266 water samples for *sulphite-reducing clostridia* yielded 53 positive results (19.92 %). The most affected category was surface waters, for which the positivity rate was 76.2 %.

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

In 2020 there were 2 reported cases of unspecified bacterial intestinal infection caused by *S. aureus*.

Tests of 11,336 food items for the presence of CPS returned above threshold values in 1.26 % of cases. The category with the most above threshold results was “milk and dairy products”. Staphylococcal enterotoxin was detected in one food sample in the category “milk and dairy products”. Enterotoxin production was also demonstrated in 26.2 % of isolates of CPS and CNS from food, mostly in samples from frozen creams and ice creams.

The presence of CPS was confirmed in 1.33 % of 17,243 tested water and environment samples. This type of sample also yielded 24 toxin-producing isolates among a total of 88 tested CPS and CNS isolates, mainly in the category “swabs from hospital environments”. The PHA detected 3 positive finds of MRSA in water samples and swabs from the hospital environment and the VFI in Dolný Kubín captured 13 MRSA isolates in the category “meat and meat products”.

S. aureus was detected in 18.05 % of 2,028 samples of clinically ill animals. In 16 isolates of *S. aureus* taken from animals (pigs), the VFI in Dolný Kubín confirmed resistance to cefoxitin and detected the *mecA* gene. Methicillin resistance was detected in six isolates tested by the UVMPH.

23. *Enterococcus* spp.

No cases of human diseases were recorded in 2020.

Tests carried out on 108 food samples had a positivity rate of 46.3 %, mainly in foodstuffs of an unspecified character, additives and sushi / poké intended for immediate consumption.

Of 14,618 water samples, 5.4 % were above the limit or positive.

Of 11,696 samples from the environment, 2.1 % showed the presence of the genus *Enterococcus* spp.; the most positive samples were from stable manure.

Antibiotic-resistant enterococci were present in samples of waste water, stabilised sludge, and sushi / poké. The main resistance types were to ampicillin, gentamicin and ciprofloxacin.

24. Lyssavirus

The last case of human rabies in Slovakia was recorded in 1990. There were 417 reports of people at risk of rabies after contact with an animal with rabies or suspected of having rabies (morbidity 7.65/100,000), which is 48 % fewer than the previous year and 53 % below the five-year average.

Rabies in animals was diagnosed most recently in 2015. Tests were carried out for 883 animals in 2020, all of which were negative. As part of the eradication programme, 735,176 vaccination doses were laid for the oral vaccination of foxes.

25. Influenza virus

In 2020 there were 95,185 reported cases of influenza and influenza-like diseases (ILD) (morbidity 4,287.6/100,000 inhabitants in the care of reporting physicians. Age-specific ILD morbidity was highest in children under five years of age and lowest in people over the age of sixty. In 27 cases, SARI resulted in death. Out of 2,043 samples of human biological material tested in 2020, a positive result was returned for 368 samples (18.01 %). Strains of influenza virus were isolated in 310 cases, which is 84.2 % of the overall positive cases. In samples that tested positive for influenza in 2020, the influenza A virus predominated, accounting for 268 samples (86.5 %), whereas the influenza B virus was identified in 42 positive samples (13.5 %).

The VI Zvolen carried out serological tests of 2,086 blood samples from 128 poultry farming holdings in 2020 without any positive results. The method for the detection of avian influenza was used to test 97 samples from wild birds and 142 samples from home farming poultry. The tests returned a positive result for 15 samples from domestic poultry and zoo birds.

26. Tick-borne encephalitis virus

During 2020 there were 185 reported cases of disease with the diagnosis A84.1 Central European tick-borne encephalitis (morbidity 3.39/100,000), which is 14 % more than in 2019 and 42 % above the five-year average. Cases of disease were reported in every region, with the highest morbidity in the Banská Bystrica Region (11.42/100,000) and the Žilina Region (8.39/100,000). Five outbreaks of disease caused by the Central European tick-borne encephalitis virus were reported in 2020. There was one import from Czechia and one death in 2020.

A total of 129 basin milk samples were tested with a 0.77 % positivity rate in 2020. One reservoir of TBEV was also identified.

Three samples of native goat blood and one organ sample were tested for TBEV RNA using RT PCR. The results were negative.

The BMC IoVi SAS tested 994 samples (in 132 pools) of ticks collected directly from vegetation. The positivity rate was 24.24 %. The UVMPH tested 51 tick samples, all of which gave a negative result.

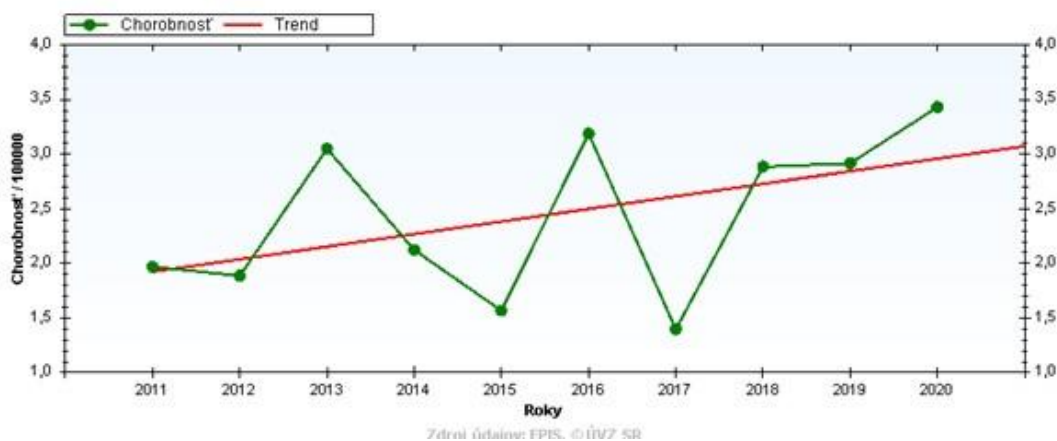


Fig. 13 Incidence of Human Tick-Borne Encephalitis in Slovakia – 20-Year Trend

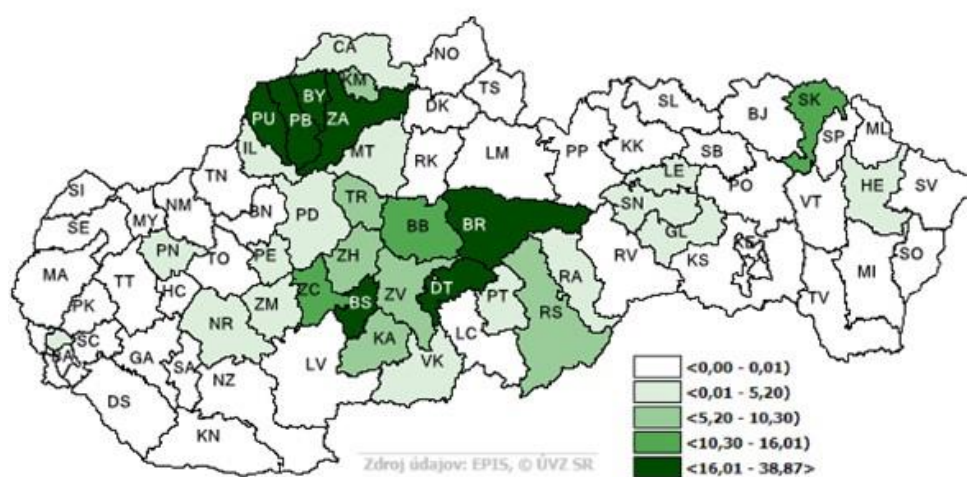


Fig. 14 Incidence of Human Tick-borne Encephalitis by District in Slovakia in 2020

27. West Nile virus

In 2020, no cases of West Nile fever were reported in humans, nor was there any acute infection of a horse with WNV. Tests of mosquitos for the virus were also negative.

28. Dengue virus

In 2020, 1 case of disease was reported (morbidity 0.02/100,000), compared to 6 in the previous year. The case was imported from Singapore and affected a woman from the Bratislava Region in the 45 – 54 age group. Clinical symptoms – headache, temperature around 40°C, chills, shivering. Epidemiological history – unknown. Blood - rapid chromatographic test – positive for Dengue virus.

29. Hantaan virus

There were 50 reported cases of haemorrhagic fever with renal syndrome in 2020, which represents 45 % fewer cases than in 2019, when 91 cases were reported. No deaths were reported.

30. Norwalk virus

The number of reported viral intestinal infections caused by NoV in humans was 875 (morbidity 16.07/100,000). A total of 21 outbreaks were recorded, of which 7 were larger

outbreaks (7 or more cases). Healthcare-associated infection was reported in 104 cases. Four samples of small frozen berries were tested for the presence of NoV with a negative result.

31. Rotavirus

There were 1,982 reported cases of rotavirus intestinal infections in Slovakia in 2020 (morbidity 36.35/100,000). A total of 48 outbreaks were recorded, of which 8 were of a larger size. No deaths were recorded.

Food and water samples were not tested for rotavirus in 2020.

32. Hepatitis A virus – HAV

There was a significant decrease in the incidence of HAV in Slovakia in 2020 and no outbreaks were recorded. There were 11 reported cases of HAV (morbidity 0.2/100,000), which is a 9-fold reduction compared to 2019. 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. Cases of disease were recorded in all regions of Slovakia except for the Trenčín Region, with 1-2 cases per region. The given situation can be credited to the strong campaign for disinfection of hands to prevent COVID-19 caused by the novel coronavirus SARS CoV 2.

No food samples were tested for the presence of HAV in 2020.

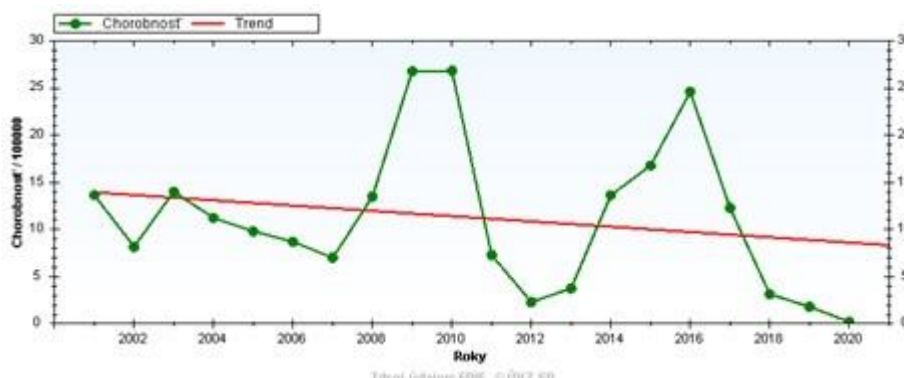


Fig. 15 Incidence of Acute Human HAV in Slovakia – 20-Year Trend

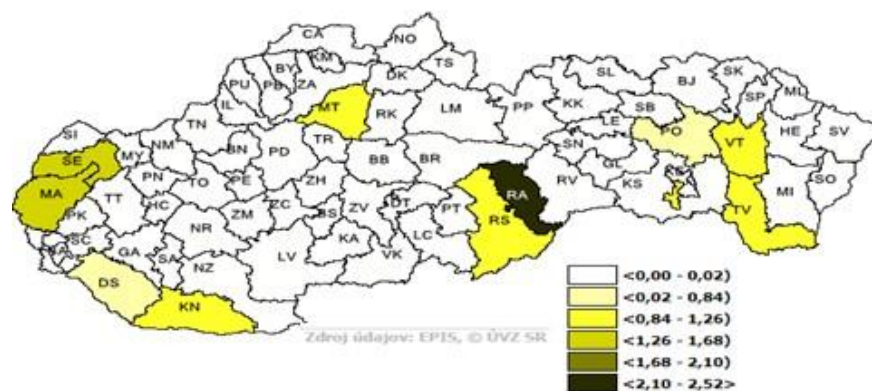


Fig. 16 Incidence of Acute Human HAV by Region in Slovakia in 2020

33. Hepatitis E virus – HEV

In 2020 there were 55 recorded cases of HEV disease (morbidity 1.01/100,000), which was 55.6 % less than in 2019.

The UVMPH in Košice analysed 273 liver samples from wild animals (wild boar, deer, roe deer, mouflon, fallow deer) for HEV. In the total number of samples (mostly wild boar), the positivity rate was 14.96 %.

The VFI in Dolný Kubín examined 10 samples of pork liver using an experimental method to detect hepatitis E virus RNA. The virus was not present in any of the samples.

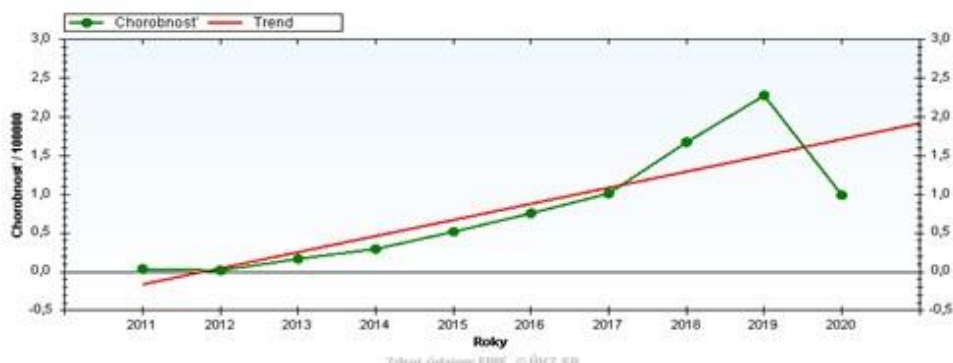


Fig. 17 Incidence of Human HEV in Slovakia – 10-Year Trend

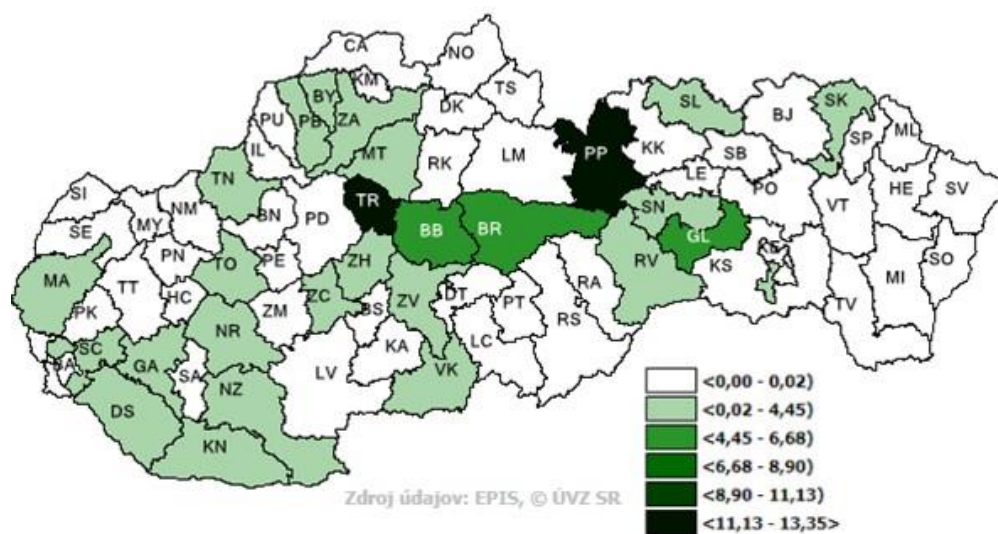


Fig. 18 Incidence of Human HEV by District in Slovakia in 2020

34. Prions

In 2020, there were 14 confirmed cases of CJD, which represents a return to the incidence of CJD in 2017. The largest numbers of cases were recorded in the Banská Bystrica, Bratislava and Košice Regions. The youngest patient with the genetic form was 46 years old.

Tests for BSE were carried out on 9,833 samples from bovine animals with negative findings. Tests for scrapie were carried out on 14,717 samples from sheep and goats; the positivity rate for sheep was 0.04 % (atypical form of scrapie), and in the case of goats, no positive cases were recorded, continuing the trend of previous years. The last positive case of BSE in Slovakia was diagnosed in 2010. The last recorded case of the classical form of scrapie in Slovakia was in 2017 but the atypical form of scrapie has been on approximately the same level in the sheep population since 2018.



Fig. 19 Geographic distribution of prion diseases in Slovakia in 2020

35. *Toxoplasma gondii*

A total of 74 cases were reported in 2020 (morbidity 1.36/100,000), which represents a 22% decrease in comparison with 2019 and it is 42 % below the five-year average. There was one case of the congenital form of toxoplasmosis (P37.1). The highest morbidity was recorded in the Banská Bystrica Region (3.24).

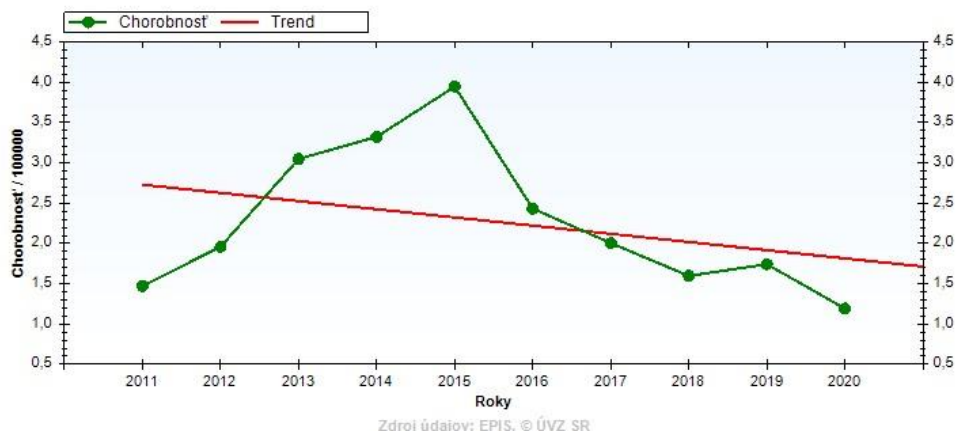


Fig. 20 Incidence of Human Toxoplasmosis in Slovakia –20-Year Trend

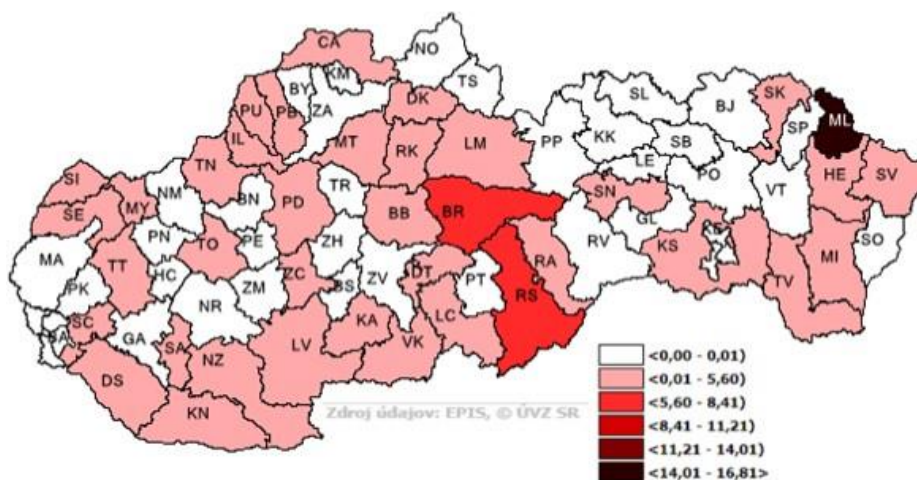


Fig. 21 Incidence of Human Toxoplasmosis by District in Slovakia in 2020

The SVFI and the RL for toxoplasmosis investigated a total 804 samples of animal droppings and blood in 2020. The overall positivity rate was 2.4 %. Tests of cat and other feline faeces returned positive results in 6 out of 754 samples (0.8 %) and tests of 50 animal blood samples produced a positivity rate of 26.0 %. The highest seropositivity was detected in dogs and goats, where it reached the level of 50 %, though this finding may have been affected by the low numbers of samples in these categories of animal.

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. There were 2 reported cases in 2020 (morbidity 0.04/100,000), which is 4 cases fewer than in 2019. Both cases were reported as unspecified malaria caused by *Plasmodium falciparum* (dg. B 50.9).

37. *Babesia* spp.

No cases of human diseases were recorded in 2020. Tests carried out on 108 samples of dog blood had a positivity rate of 42.6 %, with the predominant species being *Babesia gibsoni*. Besides dogs, four cats were tested but no case of babesiosis was confirmed.

Tests of dog blood samples conducted between 2002 and 2020 returned a positive results for *Babesia* spp. in 216 of 887 samples. 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.

Three cases of disease were reported in 2020 (morbidity 0.06/100,000). They affected two adult women and one child. The number of cases was 8 less than in 2019. The illnesses were caused by the species *Echinococcus multilocularis* (x2) and *E. granulosus* (x1). The patients came from the Žilina, Nitra and Prešov Regions. The IoPa SAS confirmed alveolar echinococcosis, a disease caused by the tapeworm *Echinococcus multilocularis*, using molecular methods in four patients.

Tests for the presence of echinococci were carried out on 79 foxes in 2020. The positivity rate was significantly lower than in the previous year, but it must be noted that much fewer foxes were 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* and we recommend that procedures should be changed. It is highly probable that there are many more reservoirs of infection, including in areas of Slovakia that are not currently monitored. For example, there have been sporadic new finds of *E. multilocularis* in foxes in southwestern Slovakia.

The fact that the 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.

In 2020, as in 2019, there were no reported cases of taeniasis in people.

Taenia cysticerci are sporadically detected at slaughterhouses for pigs and cattle. Whereas there were 10 reports of cysticerci in pigs in 2019, only 4 finds were reported in 2020.

40. *Toxocara* spp.

There were 5 reported cases of disease in 2020 (morbidity 0.09/100,000), which is 1 case less than the year before. In the last 10 years, the largest number of cases have occurred in the Nitra Region. The most frequent transmission method is contact with a domestic pet/animal.

In 2020, a total of 86 persons suspected to have larval toxocariasis were tested for the presence of antibodies against *Toxocara* spp. by the IoPa SAS. Antibodies were detected in 1 person (1.2 %)

Tests were carried out on a total of 3,900 samples of droppings and the intestinal content of definitive hosts of roundworms of genus *Toxocara* and *Toxascaris* in 2020. Roundworms or their eggs were present in 256 samples (10.54 %), which is the highest result in the last 6 years. The increase in the positivity rate was highest in zoo carnivores (from 7.69 % to 24.71 %) and in dogs (from 8.15 % to 10.20 %).

41. *Trichinella* spp.

No cases of human trichinosis were recorded in 2020. The IoPa SAS conducted tests for trichinosis on 76 blood samples from patients in whom differential diagnostics indicated suspected tissue helminthiasis. The presence of antibodies against *Trichinella* spp. was confirmed in one patient (1.3 %).

Tests for the presence of *Trichinella* spp. were carried out on 701,660 animals and larvae were detected in 7 samples. The prevalence in foxes in recent years has been in the range 5 – 11 % but in 2020, there was no positive find in any of the foxes tested. On the other hand, the number of foxes tested in 2020 was the lowest in 12 years. Since 2009 there have been no positive finds reported in farm animals and positive cases are reported only in wild animals, mainly foxes (in previous years) and wild boars. As in previous years, the dominant species in Slovakia is *Trichinella britovi*.

42. *Anisakis* spp.

In 2020, just as in the previous years, no cases of human disease caused by *Anisakis simplex* roundworms were recorded.

A total of 57 samples of fish and seafood products were tested for the presence of larvae of the *Anisakidae* family in 2020. In two cases, larvae of roundworms belonging to the *Anisakidae* family were found in samples of cod liver from Iceland.

43. *Thelazia callipaeda*

Previous research indicates that *T. callipaeda* has a tendency to create areas where it is strongly endemic, as can be seen in Italy, which is considered a source of infections for continental Europe. The creation of endemic areas may be related to climatic and other ecological factors that are probably responsible for the geographical distribution and abundance of suitable vectors. Although further ecological and epidemiological studies are still needed, it is already clear that most infections occur in the spring or early autumn, which indicates a link to increased incidence and activity of the vector. Previous research carried out in Slovakia indicates that an endemic area for the circulation of *T. callipaeda* has formed in the south-east of the country, in the Košice Region, which is the source of the first autochthonous cases of canine thelaziasis. A retrospective study is currently ongoing to determine the dynamic of the development of thelaziasis in the dog population and identify the endemic areas in which the parasite circulates. The results of this study will become available in 2021.

44. *Dirofilaria* spp.

The IoPa SAS confirmed human dirofilariasis in four patients: three men and one woman. In all cases, the infection was caused by the species *Dirofilaria repens*. Between Slovakia's

first recorded case in 2007 and the end of 2020 there were a total of 25 recorded cases of human dirofilariasis and its incidence is on the rise.

Dog blood samples have been tested for the presence of dirofilaria since 2005. In 2019, the largest number of samples was tested (470) and monitoring covered 11 districts. In 2020, tests were carried out on 408 samples and monitoring was extended to additional districts, so the samples came from 17 districts. The trend of infection prevalence remains higher than in recent years. The dominant species in Slovakia is *Dirofilaria repens*, which causes the subcutaneous or eye form of the disease. *D. repens* is also the cause of all heretofore diagnosed cases of human dirofilariasis in Slovakia. There is a significant rise in the number of cases of mixed infections in dogs involving both species and especially *D. immitis*. There has also been a rise in the number of dogs with clinical symptoms of infection leading to heart failure, and a fatal case of the disease was recorded at the turn of 2019 and 2020.

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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

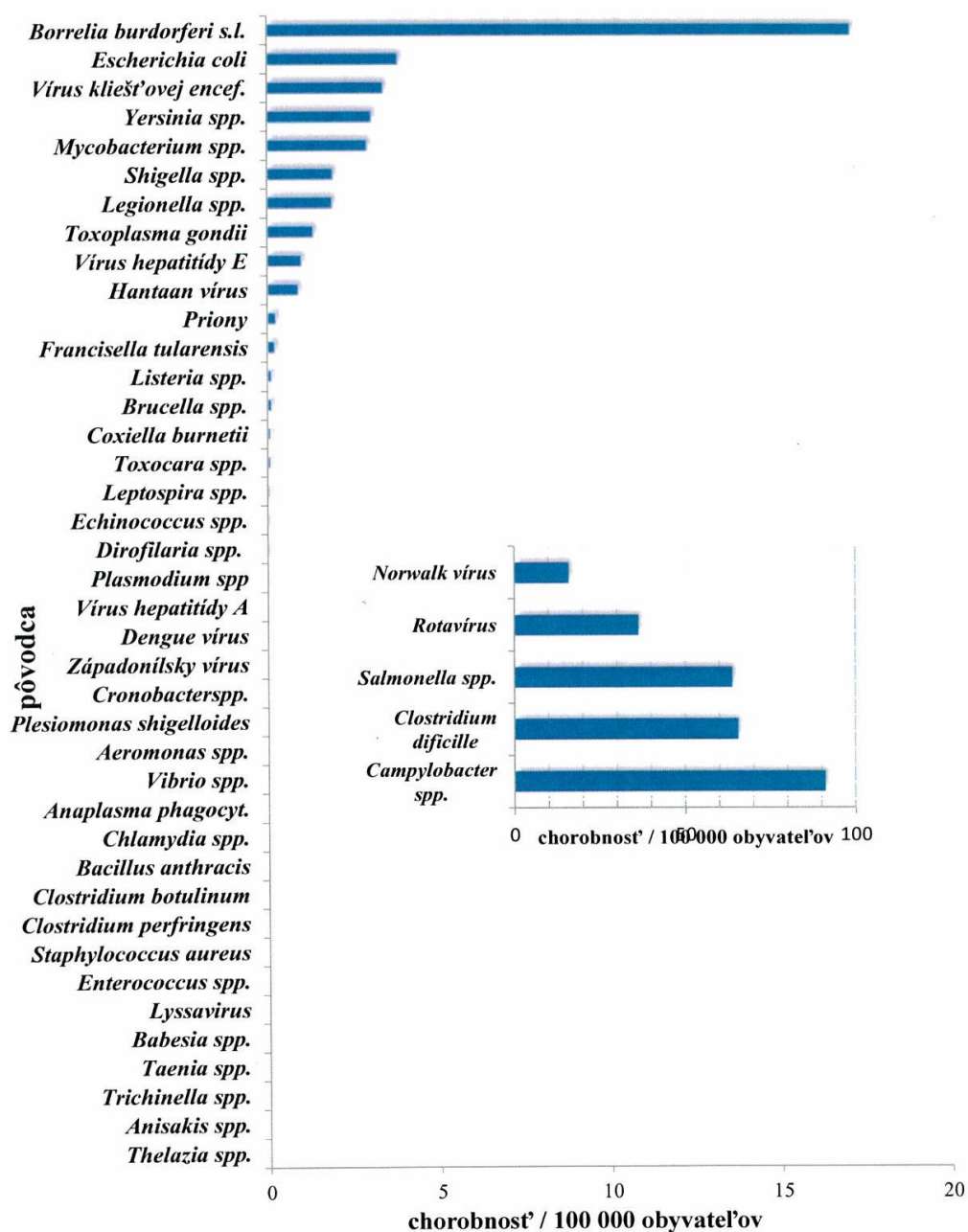
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Chorobnosť na 100 000 obyvateľov v SR za rok 2020



List of Abbreviations

Annex 4

AHAW	EFSA Animal Health and Welfare Network
ARD	acute respiratory disease
BMC	Biomedical Centre
BSE	bovine spongiform encephalopathy
CJD	Creutzfeldt-Jacob Disease
WTP	wastewater treatment plant
DSS	retirement home
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
LB	Lyme borreliosis
LD	Legionnaires' disease
MI	Microbiology Institute
MRA	EFSA Network on Microbiological Risk Assessment
MRSA	Methicillin-resistant <i>Staphylococcus aureus</i>
unsp.	unspecified
NCP	National Contact Point for Scientific and Technical Cooperation with the EFSA
NoV	Norwalk virus
NAFC – FRI	National Agricultural and Food Centre – Food Research Institute
	National Reference Centre
NRC	National Institute of Children's Diseases Bratislava
NICD	
IoPa SAS	Institute of Parasitology of the Slovak Academy of Sciences
ca.	case
RL	reference laboratory
RNA	ribonucleic acid
RT PCR	Real time PCR - polymerase chain reaction with reverse transcription
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	Slovakia
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

LPUH	L. Pasteur University Hospital in Košice
CCTIA	Central Control and Testing Institute in Agriculture
UVMPH KE	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
WB	Western Blot
WHO	World Health Organisation
WNV	West Nile virus

SUMMARY REPORT OF ZOOSES, ALIMENTARY AND WATER-BORNE
INFECTIONS IN THE SLOVAK REPUBLIC IN 2020

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