Article's History: Received: 28.10.2024; Revised: 03.01.2025; Accepted: 25.02.2025

Bulletin of Medical and Biological Research

Vol. 7, No. 1
2025

DOI: 10.63341/bmbr/1.2025.69

Journal homepage: https://bmbr.com.ua/en

UDC 636.09:616-093/-098(477)

# Epidemiological trends of salmonellosis in the cross-border regions of Ukraine and Poland (2014-2023)

**Oksana Boiko***
PhD in Veterinary, Senior Lecturer
Lesya Ukrainka Volyn National University
43025, 13 Voli Ave., Lutsk, Ukraine
https://orcid.org/0000-0001-8113-9423

**Natalia Yanko**
PhD in Medicine, Director
State Institution "Volyn Oblast Laboratory Centre of the Ministry of Health of Ukraine"
43010, 55 Voli Ave., Lutsk, Ukraine
https://orcid.org/0009-0008-9815-2681

**Taras Pundyak**
PhD in Veterinary, Associate Professor
Lviv National University of Veterinary Medicine and Biotechnology named after S.Z. Gzhytsky
79010, 50 Pekarska Str., Lviv, Ukraine
https://orcid.org/0000-0001-7775-2217

**Abstract.** The epidemiology of salmonellosis, despite being extensively studied, remains a relevant public health concern. The aim of this research was to compare the incidence of salmonellosis in Poland and Ukraine at both the national level and within selected cross-border regions of the two countries during the period 2014-2023. The average annual incidence of salmonellosis over the 10-year period was 15.02 per 100,000 population in Ukraine, with 64,108 confirmed cases; in Poland, the incidence was 22.74 per 100,000, with 86,956 confirmed cases ($p = 0.0025$). In the cross-border regions, the number of confirmed cases and incidence rates (per 100,000) were as follows: Volyn – 1,879 cases / 18.02; Lviv – 3,305 cases/13.18; Lublin Voivodeship – 6,067 cases/27.62; and Podkarpackie – 7,869 cases/37.13 ($p < 0.001$). The study analysed trends in prevalence and the serological profiles of *Salmonella* detected in humans, food products, and other environmental sources. The dominant serotype during outbreaks and isolated cases in the Volyn and Lviv regions was *S. enterica* subsp. *enterica* Serovar Enteritidis, accounting for 87.51 and 77.90% of cases, respectively. The Serovar *S.* Typhimurium was identified in 10.04% of cases in Volyn and in 18.08% in Lviv. The most common transmission vectors of *Salmonella* in the Volyn region were: eggs and egg products (29.51% of all *Salmonella*-positive items), meat and meat products (27.40%), prepared dishes (12.3%), and confectionery (11.0%). In the Lviv region, the most frequently contaminated items were: prepared dishes (27.12%), meat products (17.53%), confectionery (8.49%), and eggs and egg products (7.12%). The findings of this study may serve as a foundation for evidence-based epidemiological practices and support the development of coordinated actions to enhance epidemiological surveillance and control of salmonellosis both in cross-border regions and nationally in each country

**Keywords:** *Salmonella* serovars; incidence; epidemiological analysis; food products

## INTRODUCTION

Human and animal health, food safety, and nutrition are inextricably linked and form a key component of the One Health concept. This approach unites the efforts of specialists from various health-related fields and institutions –

**Suggested Citation**:
Boiko O, Yanko N, Pundyak T. Epidemiological trends of salmonellosis in the cross-border regions of Ukraine and Poland (2014-2023). Bull Med Biol Res. 2025;7(1):69–78. DOI: 10.63341/bmbr/1.2025.69

*Corresponding author

operating at local, national, and global levels – to improve the health of people, domestic animals, wildlife, and plants as integral parts of the environment [1, 2]. The causative agent of salmonellosis remains a pathogen of ongoing significance in medicine, both in terms of its biological properties and its role in the epidemiological process of disease [3]. *Salmonella* species – bacterial pathogens with a broad host range and diverse pathogenicity factors – are characterised by a wide variety of sources, reservoirs, transmission routes, and a high degree of ubiquity, which forms the biological basis for their persistence and resilience [4, 5].

Researchers M. Milczarek *et al*. [6] examined the incidence of salmonellosis in Poland during 2018-2019 and reported that the highest incidence was recorded in the Podkarpackie Voivodeship at 42.2 per 100,000 population, while the lowest was in the Lublin Voivodeship at 9.4 per 100,000. The same group of scientists [7, 8] observing the dynamics of the manifestation of the salmonellosis epidemic process in 2020 and 2021 made the conclusion that COVID-19 pandemic and the related restrictions introduced in Poland, as well as increased hygiene approaches, could had contributed to a decrease in the number of salmonellosis cases registered in Poland in 2020 compared to 2019. In Ukraine, O. Zublenko & T. Petrusevych [9] analysed the structure of acute intestinal infections from 2015 to 2019 and found that the average incidence of salmonellosis was 19.3 per 100,000, ranking second among causative pathogens within this group, with yearly fluctuations in intensity during the observation period. N. Polishchuk *et al*. [10] conducted an epidemiological analysis of non-typhoidal salmonellosis incidence in the Zaporizhia region between 2018 and 2022. They found that regional incidence rates consistently exceeded national averages, ranging from 19.88 per 100,000 in 2020 to 8.24 per 100,000 in 2022. In a study by E. Baharev [11] the long-term (1981-2018) data on *Salmonella* serovars isolated by diagnostic institutions of the North-Western Black Sea region, in particular Odesa, Mykolaiv and Kherson regions was studied. He concluded that the total number of *Salmonella* serovars isolated from humans is on average 10 times higher than the total number of *Salmonella* isolated from animals in this region.

Despite these efforts, the number of scientific studies analysing the epidemiology of salmonellosis in Ukraine remains limited. In particular, within the territory of Western Ukraine, there has been no comprehensive analysis of salmonellosis incidence or of the serovar profile of *Salmonella* strains isolated from patients, carriers, and food products linked to outbreaks. Furthermore, the geographical proximity of two Ukrainian regions (Volyn and Lviv) to each other and to two Polish voivodeships (Lublin and Podkarpackie) presents an opportunity not only for socio-economic collaboration but also for the comparative study of epidemiological patterns of salmonellosis across borders. In this context, the aim of the article was to analyse key aspects of the epidemic process of salmonellosis in four cross-border regions of Ukraine and Poland over the period 2014-2023. To achieve this goal, the following research objectives were set: to compare incidence rates in the four adjacent cross-border regions – Volyn and Lviv (Ukraine) and Lublin and Podkarpackie Voivodeships (Poland) – over a 10-year period; to compare national incidence rates of salmonellosis in Poland, Ukraine, and the European Union; to determine the relative contribution of various categories of food products and environmental objects as transmission factors in the Volyn and Lviv regions between 2014 and 2023.

## MATERIALS AND METHODS

The epidemiological analysis and comparisons were conducted using official statistical data from the State Sanitary Inspectorates of the Lublin and Podkarpackie Voivodeships, as published on the official websites of the State Sanitary Inspectorate of the Ministry of Health of Poland (DSIMOZP) [12, 13]. Annual reports from the regional Public Health Centres (PHCs) of the Ministry of Health of Ukraine (MoH) in the Volyn and Lviv regions from 2014 to 2023 were also collected. These data were obtained directly by the authors and are not publicly accessible. To gather data on morbidity within the European Union, the Surveillance Atlas of Infectious Diseases [14] provided by the European Centre for Disease Prevention and Control (ECDC) was used. The selection of the four analysed regions was based on their geographical proximity: each region shares borders with at least one of the others.

The inclusion criterion for data selection was that the information originated from official state reporting forms of the Central Institutes of Health under the respective Ministries of Health in Ukraine and Poland. In Ukraine, the results of bacteriological investigations are annually summarised in official forms in accordance with current legislation, notably Order of the Ministry of Health of Ukraine No. 132 [15]. In Poland, data on salmonellosis are compiled in standard reporting forms A02.0 and A02.1 and are published annually by the Department of Epidemiology and Surveillance of Infectious Diseases in the report "Infectious diseases and poisonings in Poland" [16].

There was no need to adapt data between countries, as the incidence rate – calculated as the ratio of newly detected cases of disease over a specified period to the average annual population, expressed per 100,000 – is determined using identical methodology in both Ukraine and Poland. Due to the lack of publicly available primary data on the number and serovars of *Salmonella* isolated from patients and food products associated with outbreaks in Poland, only the relevant official data from the Volyn and Lviv regions were included in the analysis. The selection criteria were based on officially registered salmonellosis outbreaks and the *Salmonella* strains isolated, identified, and confirmed by the laboratories of the Central Centre for Disease Control of the Ministry of Health of Ukraine. These procedures were conducted in accordance with the approved outbreak investigation protocol as outlined in Order of the Ministry of Health of Ukraine No. 190 [17] and Law of Ukraine No. 1645-III [18]. Microbiological investigations were performed following the national standard protocol, as established by Order of the Ministry of Health of Ukraine No. 425 [19]. For statistical data processing, Microsoft Excel was used. The primary statistical methods applied included calculation of the arithmetic mean, standard error of the mean, representativeness error, t-value, and confidence probabilities (p). Statistical significance was considered at $p < 0.05$. Relative values were not used in the analysis.

## RESULTS

Between 2014 and 2023, a total of 64,108 cases of salmonellosis were registered in Ukraine, compared to 86,956 cases in Poland. Among the studied cross-border regions, the highest number of confirmed cases was recorded in the Podkarpackie (7,869) and Lublin (6,067) Voivodeships. In the corresponding neighbouring regions of Ukraine – Lviv and Volyn – the number of confirmed cases was 3,305 and 1,879, respectively, which is 2.4 and 3.2 times lower (Table 1).

**Table 1.** Number of confirmed cases of salmonellosis (absolute number) and incidence (per 100 thousand population) in Lviv, Volyn regions and Ukraine; Lublin and Podkarpackie Voivodeships and Poland (2014-2023)

| Years | Lviv* region (Ukraine) | | Volyn* region (Ukraine) | | Ukraine** | | Lublin* Voivodeship (Poland) | | Podkarpackie* Voivodeship (Poland) | | Poland** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of cases | Incidence | Number of cases | Incidence | Number of cases | Incidence | Number of cases | Incidence | Number of cases | Incidence | Number of cases | Incidence |
| 2014 | 299 | 11.85 | 141 | 13.2 | 8,412 | 18.54 | 607 | 28.2 | 588 | 27.6 | 8,392 | 21.83 |
| 2015 | 369 | 15.05 | 231 | 21.66 | 8,350 | 19.46 | 535 | 24.6 | 615 | 28.37 | 8,652 | 22.6 |
| 2016 | 494 | 19.61 | 274 | 26.13 | 8,941 | 20.91 | 794 | 36.5 | 731 | 33.05 | 10,027 | 26.07 |
| 2017 | 369 | 14.61 | 284 | 27.31 | 7,391 | 17.35 | 811 | 28.7 | 775 | 35.86 | 10,000 | 26.03 |
| 2018 | 333 | 13.1 | 269 | 25.91 | 7,713 | 18.18 | 609 | 28.56 | 898 | 41.15 | 9,957 | 25.95 |
| 2019 | 675 | 26.88 | 349 | 33.7 | 8,586 | 20.34 | 830 | 38.48 | 1,172 | 53.83 | 9,243 | 24.1 |
| 2020 | 116 | 4.62 | 79 | 7.65 | 3,758 | 8.95 | 344 | 15.79 | 708 | 32.72 | 5,468 | 14.3 |
| 2021 | 203 | 8.1 | 79 | 7.71 | 3,350 | 8.03 | 417 | 20.0 | 743 | 39.8 | 8,294 | 21.7 |
| 2022 | 225 | 8.98 | 81 | 7.91 | 3,195 | 7.71 | 410 | 20.2 | 550 | 26.4 | 6,575 | 17.4 |
| 2023 | 222 | 8.98 | 92 | 9.01 | 4,412 | 10.76 | 710 | 35.2 | 1,089 | 52.5 | 10,348 | 27.4 |
| Total | 3,305 | | 1,879 | | 64,108 | | 6,067 | | 7,869 | | 86,956 | |

**Notes:** * – for the incidence rates for Ukraine and Poland, the t-value was 3.542 ($p = 0.0025$); ** – for the incidence rates for Volyn, Lviv, Lublin, and Podkarpackie regions, the t-value was 15.366 ($p < 0.001$)
**Source:** compiled by the authors based on personally collected data, as well as taking into account the Annual report "Infectious diseases and poisonings in Poland" [16]

The data obtained show that, across the four adjacent regions of Ukraine and Poland, the average annual incidence of salmonellosis in the population during 2014-2023 was as follows (per 100,000 population): Volyn region – 18.02 ± 3.15; Lviv region – 13.18 ± 2.03; Lublin Voivodeship – 27.62 ± 2.40; and Podkarpackie Voivodeship – 37.13 ± 3.09. During the pre-pandemic period (2014-2019), the incidence rates in these regions were higher: Volyn – 24.65 ± 2.79; Lviv – 16.85 ± 2.08; Lublin – 30.84 ± 2.21; and Podkarpackie – 36.64 ± 4.00. In contrast, during the COVID and post-COVID period (2020-2023), these values declined significantly: Volyn – 8.07 ± 0.32; Lviv – 7.67 ± 1.04; Lublin – 22.08 ± 4.26; and Podkarpackie – 37.86 ± 5.60. These differences in average values between regions were statistically significant ($p < 0.001$). Nationally, the incidence of salmonellosis in Poland remained consistently higher over the 10-year period: the average annual incidence was 22.74 ± 1.32 per 100,000 population, compared to 15.02 ± 1.23 in Ukraine. A notable decline in incidence was observed in both countries during the COVID and post-COVID years (2020-2023). Specifically, during 2014-2019, the average incidence in Poland and Ukraine was 24.43 ± 0.77 and 19.13 ± 0.55, respectively, while in 2020-2023, the incidence declined to 20.2 ± 2.84 in Poland and 8.86 ± 0.68 in Ukraine ($p = 0.0025$).

Across the European Union as a whole, the average annual incidence of salmonellosis ranged from 20.34 ± 0.20 per 100,000 during 2014-2019 to 16.25 ± 0.83 during 2020-2023, with a 10-year average of 18.70 ± 0.74 per 100,000 population ($p < 0.001$). During 2014-2023, a total of 26 outbreaks of salmonellosis were recorded in the Volyn region and 78 in the Lviv region. In all cases, the causative agent was *Salmonella enterica* subsp. *enterica* Serovar Enteritidis. Data on all *Salmonella* serovars isolated from clinically ill patients and carriers in the Volyn region during 2014-2023 are presented in Table 2.

**Table 2.** Data on the number of outbreaks and Salmonella serovars that caused the outbreaks, and Salmonella serovars from clinically ill patients and carriers not associated with outbreaks in the Volyn region (2014-2023)

| Years | Number of foutbreaks | Serovars involved in outbreaks | Serovars isolated from clinically ill patients and carriers not associated with outbreaks, n (%) | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Enteritidis | Enteritidis | Typhimurium | Virchow | Stanley | Muenchen | Derby | Newport | Postdam | Agona | Java | |
| 2014 | 2 | 45 (21.74) | 124 (59.90) | 32 (15.46) | 1 (0.48) | 0 (0.0) | 5 (2.42) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 207 (100.00) |
| 2015 | 3 | 80 (26.76) | 170 (56.86) | 42 (14.05) | 1 (0.33) | 0 (0.0) | 5 (1.67) | 0 (0.0) | 1 (0.33) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 299 (100.00) |
| 2016 | 4 | 64 (18.88) | 229 (67.55) | 40 (11.82) | 0 (0.0) | 0 (0.0) | 3 (0.88) | 1 (0.29) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 2 (0.59) | 339 (100.00) |
| 2017 | 4 | 58 (20.42) | 185 (65.14) | 20 (7.04) | 3 (1.06) | 1 (0.35) | 5 (1.76) | 0 (0.0) | 1 (0.35) | 0 (0,0) | 11 (3.87) | 0 (0.0) | 284 (100.00) |
| 2018 | 4 | 32 (12.45) | 213 (82.88) | 8 (3.11) | 3 (1.17) | 0 (0.0) | 1 (0.39) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 257 (100.00) |
| 2019 | 7 | 112 (32.18) | 112 (64.08) | 12 (3.45) | 0 (0.0) | 0 (0.0) | 1 (0.29) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 348 (100.00) |
| 2020 | 1 | 8 (9.88) | 62 (76.54) | 10 (12.35) | 0 (0.0) | 0 (0.0) | 1 (1.23) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 81 (100.00) |
| 2021 | 1 | 5 (6.10) | 62 (75.61) | 14 (17.07) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (1.22) | 82 (100.00) |
| 2022 | 0 | 0 (0.0) | 72 (84.71) | 12 (14.12) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (1.18) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 85 (100.00) |
| 2023 | 0 | 0 (0.0) | 77 (77.78) | 19 (19.19) | 2 (2.02) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (1.01) | 0 (0.0) | 0 (0.0) | 99 (100.00) |
| Total | 26 | 404 (19.41) | 1,417 (66.98) | 209 (10.04) | 10 (0.48) | 1 (0.05) | 21 (1.01) | 1 (0.05) | 3 (0.14) | 1 (0.05) | 11 (0.53) | 3 (0.14) | 2,081 (100.00) |

**Source:** data provided personally by the authors of the work

The predominant *Salmonella* serovars isolated in the Volyn region during 2014-2023 were as follows: *S.* Enteritidis accounted for the largest proportion, with a total of 1,821 isolates (87.51%); *S.* Typhimurium – 209 isolates (10.04%); and *S.* Muenchen – 21 isolates (1.01%). Other identified serovars – *S.* Virchow, *S.* Stanley, *S.* Derby, *S.* Newport, *S.* Postdam, *S.* Agona, and *S.* Java – each constituted less than 1% of the total isolates. Notably, *S.* Typhi and *S.* Paratyphi were not isolated in the Volyn region during the entire observation period. Data on all *Salmonella* serovars isolated from clinically ill patients and carriers in the Lviv region during 2014-2023 are presented in Table 3.

**Table 3.** Data on the number of outbreaks and Salmonella serovars that caused the outbreaks, and Salmonella serovars from clinically ill patients and carriers not associated with outbreaks in Lviv region (2014-2023)

| Years | Number of outbreaks | Serovars involved in outbreaks | Serovars isolated from clinically ill patients and carriers not associated with outbreaks, n (%) | | | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Enteritidis | Enteritidis | Typhimurium | Infantis | Haifa | Hadar | Tshiongwe | Kottbus | Montevideo | Coeln | Moscow | Java | Anatum | Typhi | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | 17 |
| 2014 | 14 | 35 (9.54) | 273 (74.39) | 43 (11.72) | 8 (2.18) | 0 (0.0) | 1 (0.27) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (0.27) | 1 (0.27) | 3 (0.82) | 0 (0.0) | 2 (0.54) | | 367 (100.00) |
| 2015 | 9 | 64 (18.39) | 203 (58.33) | 72 (20.69) | 4 (1.15) | 1 (0.29) | 0 (0.0) | 0 (0.0) | 1 (0.29) | 0 (0.0) | 0 (0.0) | 3 (0.86) | 0 (0.0) | 0 (0.0) | 0 (0.0) | | 348 (100.00) |
| 2016 | 11 | 78 (19.65) | 210 (52.90) | 80 (20.15) | 16 (4.03) | 1 (0.25) | 0 (0.0) | 1 (0.25) | 0 (0.0) | 1 (0.25) | 8 (2.02) | 0 (0.0) | 1 (0.25) | 1 (0.25) | 0 (0.0) | | 397 (100.00) |
| 2017 | 17 | 98 (28.49) | 131 (38.08) | 104 (30.23) | 7 (2.03) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (0.29) | 1 (0.29) | 0 (0.0) | 1 (0.29) | 0 (0.0) | 0 (0.0) | 1 (0.29) | | 344 (100.00) |

*Table 3. Continued*

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2018 | 7 | 18 (78.26) | 5 (21.71) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 23 (100.00) |
| 2019 | 14 | 94 (83.19) | 14 (12.50) | 3 (2.68) | 1 (0.89) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 112 (100.00) |
| 2020 | 0 | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (100.00) |
| 2021 | 1 | 16 (76.19) | 5 (23.81) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 21 (100.00) |
| 2022 | 2 | 20 (83.33) | 4 (16.67) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 24 (100.00) |
| 2023 | 3 | 18 (52.94) | 15 (44.12) | 0 (0.0) | 1 (2.97) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 34 (100.00) |
| Total | 78 | 441 (26.41) | 860 (51.50) | 302 (18.08) | 37 (2.22) | 2 (0.12) | 1 (1.01) | 1 (0.06) | 2 (0.12) | 2 (0.12) | 9 (0.54) | 5 (0.30) | 4 (0.24) | 1 (0.06) | 3 (0.18) | 2,081 (100.00) |

**Source:** data provided personally by the authors of the work

In the Lviv region, the most prevalent *Salmonella* serovars identified during 2014-2023 were as follows: *S.* Enteritidis – 1,301 isolates (77.90%); *S.* Typhimurium – 302 isolates (18.08%); and *S.* Infantis – 37 isolates (2.22%). Other detected serovars – *S.* Haifa, *S.* Hadar, *S.* Tshiongwe, *S.* Kottbus, *S.* Montevideo, *S.* Coeln, *S.* Moscow, *S.* Java, and *S.* Anatum – each accounted for less than 1% of the total. Notably, three isolates (0.18%) of *S.* Typhi were identified in the Lviv region over the study period. During outbreaks of salmonellosis in the Volyn and Lviv regions between 2014 and 2023, several potential transmission factors were identified. These included food products, drinking water, surface washdowns, wastewater, and soil (Table 4).

**Table 4.** Distribution of Salmonella in food products and other research objects during outbreak investigations in Volyn region in 2014-2023 (n, %)

| Years | Research object, number of positive cases detected (%) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Meat and meat products | Milk and milk products | Eggs and products thereof | Fish and fish products | Vegetables, fruits | Confectionery | Culinary products | Drinking water | Water from open bodies of water | Wastewater | Soil | Swab samples | Total |
| 2014 | 3 (33.33) | 0 | 1 (11.11) | 0 | 0 | 3 (33.33) | 0 | 0 | 0 | 0 | 0 | 2 (22.22) | 9 (100.0) |
| 2015 | 4 (33.33) | 1.00 (8.33) | 2 (16.67) | 4 (33.33) | 0 | 0 | 0 | 1 (8.33) | 0 | 0 | 0 | 0 | 12 (100.0) |
| 2016 | 2 (22.22) | 0 | 0 | 1 (11.11) | 0 | 2 (22.22) | 4 (44.44) | 0 | 0 | 0 | 0 | 0 | 9 (100.0) |
| 2017 | 1 (10.00) | 1 (10.00) | 6 (60.00) | 0 | 0 | 1,00 (10.00) | 1 (10.00) | 0 | 0 | 0 | 0 | 0 | 10 (100.0) |
| 2010 | 1 (16.67) | 0 | 2 (33.33) | 1 (16.67) | 0 | 1 (16.67) | 1 (16.67) | 0 | 0 | 0 | 0 | 0 | 6 (100.0) |
| 2019 | 3 (25.00) | 0 | 6 (50.00) | 1 (8.33) | 0 | 0 | 2 (16.67) | 0 | 0 | 0 | 0 | 0 | 12 (100.0) |
| 2020 | 1 (50.00 | 0 | 1 (50.00) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 (100.0) |
| 2020 | 0 | 1.00 (100.0) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 (100.0) |
| 2022 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| 2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| **Total** | 15 (24.59) | 3 (4.92) | 18 (29.51) | 7 (11.48) | 0 | 7 (11.48) | 8 (13.11) | 1 (1.64) | 0 | 0 | 0 | 2 (3.28) | 61 (100.0) |

**Source:** data provided personally by the authors of the work

As shown in Table 4, in the Volyn region the largest proportion of *Salmonella*-positive samples was attributed to eggs and egg products, with 18 samples (29.51%) identified. This was followed by meat products with 15 positive samples (24.59%) and culinary products with 8 samples (13.11%). Additionally, fish and fish products, as well as confectionery, each accounted for 7 positive samples (11.48%). In total, 61 *Salmonella*-positive samples were detected in Volyn between 2014 and 2023 during the investigation of food products, water, and other objects associated with salmonellosis outbreaks. No positive samples were identified in the "vegetables and fruits" category.

A somewhat different pattern was observed in the Lviv region (Table 5). Over the same period, a total of 365 *Salmonella*-positive samples linked to outbreaks were identified – 5.98 times more than in Volyn. Notably, in Lviv, positive cases were recorded across all tested categories. The most frequently identified transmission vectors were culinary products (99 samples, 27.12%), meat products (64 samples, 17.53%), and confectionery products (31 samples, 8.49%). Other categories included milk and dairy products (22 samples, 6.03%), eggs (26 samples, 7.12%), fish (17 samples, 4.66%), vegetables and fruits (7 samples, 1.92%), and drinking water (8 samples, 2.19%).

**Table 5.** Distribution of *Salmonella* in food products and other research objects during outbreak investigations in Lviv region in 2014-2023 (n, %)

| Years | Research object, number of positive cases detected (%) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Meat and meat products | Milk and milk products | Eggs and products thereof | Fish and fish products | Vegetables, fruits | Confectionery | Culinary products | Drinking water | Water from open water sources | Wastewater | Soil | Swab samples | Total |
| 2014 | 14 (20.90) | 4 (5.97) | 6 (8.96) | 3 (4.48) | 2 (2.99) | 7 (10.45) | 15 (22.39) | 1 (1.49) | 1 (1.49) | 5 (7.46) | 0 | 9 (13.43) | 67 (100.0) |
| 2015 | 12 (18.18) | 6 (9.09) | 7 (10.61) | 4 (6.06) | 1 (1.52) | 6 (9.09) | 13 (19.70) | 0 | 3 (4.55) | 4 (6.06) | 1 (1.52) | 9 (13.64) | 66 (100.0) |
| 2016 | 10 (15.38) | 5 (7.69) | 5 (7.69) | 1 (1.54) | 1 (1.54). | 9 (13.85) | 16 (24.62) | 2 (3.08) | 2 (3.08) | 6 (9.23) | 0 | 8 (12.31) | 65 (100.0) |
| 2017 | 13 (15.85) | 7 (8.54) | 8 (9.76) | 5 (6.10) | 3 (3.66) | 8 (9.76) | 17 (20.73) | 2 (2.44) | 2 (2.44) | 8 (9.76) | 2 (2.44) | 7 (8.54) | 82 (100.0) |
| 2010 | 7 (20.59) | 0 | 0 | 3 (8.82) | 0 | 0 | 10 (29.41) | 0 | 0 | 0 | 0 | 14 (41.18) | 34 (100.0) |
| 2019 | 7 (17.95) | 0 | 0 | 1 (2.56) | 0 | 1 (2.56) | 22 (56.41) | 1 (2.56) | 0 | 0 | 0 | 7 (17.95) | 39 (100.0) |
| 2020 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2022 | 0 | 0 | **0** | 0 | 0 | 0 | 0 | 0 | 3 (100.0) | 0 | 0 | 0 | 3 (100.0) |
| 2023 | 1 (11.11) | 0 | 0 | 0 | 0 | 0 | 6 (66.67) | 2 (22.22) | 0 | 0 | 0 | 0 | 9 (100.0) |
| Total | 64 (17.53) | 22 (6.03) | 26 (7.12) | 17 (4.66) | 7 (1.92) | 31 (8.49) | 99 (27.12) | 8 (2.19) | 11 (3.01) | 23 (6.30) | 3 (0.82) | 54 (14.79) | 365 (100.0) |

**Source:** data provided personally by the authors of the work

Thus, the significantly higher incidence rates observed in the neighbouring Podkarpackie and Lublin Voivodeships, compared to the Volyn and Lviv regions, are more likely indicative of a higher level of diagnostic capacity and the consistent application of a unified methodological approach to data collection and reporting across all administrative levels in Poland. These findings highlight the need for strengthened cooperation between state diagnostic institutions within the cross-border region. Such collaboration would enable more effective management of salmonellosis incidence and its underlying causes, thereby enhancing the overall quality of epidemiological surveillance and public health response.

## DISCUSSION

In the countries of the European Union, epidemiological surveillance of salmonellosis plays a vital role, as this infection remains one of the two leading causes of foodborne toxicoinfections in terms of incidence and confirmed outbreaks during the period 2018-2022 [20, 21]. EU member states utilise standardised tools for data exchange, collection, and risk assessment when recording outbreaks and identifying contamination in food products as a reservoir or source of transmission for various infectious diseases, including salmonellosis [22, 23]. Given Ukraine's orientation toward European Union membership, an attempt was made to compare salmonellosis incidence across four adjacent regions of Poland and Ukraine, as well as to compare national incidence rates with those of the EU.

It was found that the average annual incidence of salmonellosis during 2014-2023 was 1.5 times higher in Poland (22.74 per 100,000 population) compared to Ukraine (15.02 per 100,000) ($p = 0.0025$). A similar pattern was observed in neighbouring cross-border regions: the incidence in Lublin Voivodeship (27.62) was 1.5 times higher than in the Volyn region (18.02), while the incidence in Podkarpackie Voivodeship (37.13) was 2.8 times higher than in the Lviv region (13.18) ($p < 0.001$). Notably, the COVID-19 pandemic led to a clear division in the epidemic dynamics of salmonellosis, creating two distinct subperiods: 2014-2019 and 2020-2023. In both Ukraine and Poland, incidence rates were consistently lower during the second subperiod. Specifically, incidence in Ukraine decreased by 2.3 times, and in Poland by 1.2 times. In the Volyn and Lviv regions, incidence declined by 3.1 and 2.2 times, respectively. In contrast, incidence rates in Podkarpackie and Lublin Voivodeships did not show a significant decrease. These findings are consistent with the results of studies

by M. Milczarek *et al*. [7, 8], which reported a marked reduction – exceeding 69% – in salmonellosis incidence in Poland during 2020 and 2021 compared to 2019. Similarly, N. Polishchuk *et al*. [10], in their study of the Zaporizhia region, observed a significant decline in incidence during 2020-2023 compared to 2018-2019.

An analysis of the seroprofile of *Salmonella* strains isolated from patients and carriers revealed that all identified serovars – 1,670 in the Lviv region and 2,081 in the Volyn region – belonged to the species *Salmonella enterica* subsp. *enterica*. When comparing serovars detected during epidemiological investigations of salmonellosis outbreaks (78 outbreaks in Lviv region and 26 in Volyn region), it was found that in all cases, the sole etiological agent was *S.* Enteritidis. A comparable analysis conducted in the Zaporizhia region by N. Polishchuk *et al*. [10] during 2018-2022 found that the most frequently isolated serovars were *S.* Enteritidis (40%), *S.* Blegdam (28%), and *S.* Typhimurium (18%) ($p < 0.05$). According to M. Milczarek *et al*. [8], an analysis of the seroprofile of dominant *Salmonella* serovars in 2021 in the voivodeships showed that in the Lublin Voivodeship, the following serovars prevailed: *S.* Enteritidis – 325 isolates; *S.* Typhimurium – 12; *S.* Infantis – 3; and *S.* Virchow and *S.* Derby – 1 each. In comparison, in the neighbouring Volyn region that same year, the dominant serovars were: *S.* Enteritidis – 67 isolates; *S.* Typhimurium – 14; and *S.* Java – 1. In the Podkarpackie Voivodeship in 2021, the following serovars were isolated: *S.* Enteritidis – 726; *S.* Typhimurium – 45; *S.* Infantis – 4; *S.* Virchow – 27; *S.* Schleissheim – 2; *S.* Virginia – 3; *S.* Agona – 2; and *S.* Kottbus and *S.* Hadar – 1 each. In the adjacent Lviv region, 21 *S.* Enteritidis isolates were recorded during the same year.

From the perspective of the evolutionary dynamics of *Salmonella* pathogenicity, the data confirm the continued dominance of specific serovars – primarily *S.* Enteritidis and *S.* Typhimurium – across the cross-border regions of Ukraine, central regions such as Zaporizhia, and in the studied areas of Poland, a trend that has persisted since the early 2000s [10, 24]. This observation aligns with the findings of M. Canning *et al*. [25] and H. Sun *et al*. [26]. With regard to reservoirs and transmission factors of *Salmonella* in the Volyn region, the largest proportion was attributed to eggs and egg products, followed by meat products, then culinary products, and subsequently fish and fish products alongside confectionery. In the Lviv region, the primary transmission sources over the study period were culinary products, meat products, and confectionery. *Salmonella* was isolated less frequently from eggs, milk, and dairy products. This pattern is consistent with the findings of P. Polański *et al*. [27], who reported that between 2018 and 2020 in Poland, the main categories of food products responsible for foodborne salmonellosis were eggs and egg-based products (36.01%), confectionery (18.6%), and meat and meat products (9.3%).

In previous studies conducted by the authors, an analysis was performed using official reporting data from laboratories affiliated with the State Sanitary and Epidemiological Service of Ukraine for the period 2012-2023 [5]. A significant volume of data was collected concerning the contamination of food products with *Salmonella*, as well as the serovars responsible. It was found that meat and meat products were the most frequently contaminated, accounting for 78.13% of all cases, followed by eggs and egg-based products (11.76%), dairy products (3.32%), and fish products (2.71%) ($p < 0.05$).

It is important to note certain structural differences in the vertical organisation of salmonellosis monitoring systems in Poland and Ukraine. In Poland, the State Sanitary and Epidemiological Service is subordinate to the Ministry of Health and operates regional departments in each voivodeship. Laboratory testing is conducted by the following accredited institutions: Regional branches of the National Research Institute "National Institute of Public Health – National Institute of Hygiene" (NIZP-PZH); The State Sanitary Inspectorate; The Sanitary Inspectorate of the Ministry of Internal Affairs and Administration; The Military Sanitary Inspectorate; as well as other accredited laboratories under agreements with these bodies [28]. This structure has been in continuous operation since 1985 [29]. The assessment of the epidemiological situation in Poland is based on data submitted by the aforementioned laboratories to the Department of Epidemiology of Infectious Diseases and monitored by sanitary-epidemiological stations. This data is processed using the System of Epidemiological Registration of Cases (SRWE) and the Register of Epidemic Outbreaks (ROE), and subsequently summarised in publicly available annual reports published online [16].

In Ukraine, a similar vertically integrated system existed from 1994 to 2017. However, following a governmental reform in 2017, the Cabinet of Ministers of Ukraine dissolved the State Sanitary and Epidemiological Service. Its responsibilities were redistributed among three entities: The State Service of Ukraine on Food Safety and Consumer Protection (subordinate to the Cabinet of Ministers since 2015 and to the Ministry of Agrarian Policy and Food since 2021); The Ministry of Health of Ukraine; The Ministry of Social Policy of Ukraine [30, 31]. Each of these bodies maintains its own network of authorised and accredited laboratories. However, unlike in Poland, Ukraine lacks a centralised institution for unified data collection and processing, such as Poland's National Institute of Public Health – National Institute of Hygiene (NIZP-PZH). Consequently, the present study relied solely on data collected by the regional Central Laboratory of the Ministry of Health and those gathered directly by the authors.

## CONCLUSIONS

The intensity of the epidemic situation concerning salmonellosis in EU countries – particularly Poland – and in Ukraine, as measured by confirmed cases and incidence rates, has been characterised by overall stability and a downward trend over the period 2014-2023. At the regional level, the highest average annual incidence rates were recorded in the Podkarpackie (37.13 per 100,000) and Lublin (27.62) Voivodeships, while significantly lower rates were observed in the Volyn (18.02) and Lviv (13.18) regions. During and following the COVID-19 pandemic (2020-2023), incidence rates declined across all regions compared to the pre-pandemic period (2014-2019): by 1.2 times in Poland and by 2.3 times in Ukraine ($p = 0.0025$). Regionally, incidence decreased by 3.2 times in Volyn, 2.1 times in Lviv, 1.4 times in Lublin, and only slightly in Podkarpackie by 0.97 times ($p < 0.001$).

The dominant serovar in all outbreak cases and isolated salmonellosis cases in both the Volyn and Lviv regions was *Salmonella enterica* subsp. *enterica* Serovar Enteritidis, accounting for 87.51 and 77.90% of isolates, respectively. The Serovar *S.* Typhimurium was detected 8.7 and 4.2 times less frequently, comprising 10.04% of isolates in Volyn and 18.08% in Lviv. During the observation period, three isolates (0.18%) of *S.* Typhi were identified in the Lviv region, while no typhoid group serovars were detected in the Volyn region. The most common sources of *Salmonella* transmission in the Volyn region included eggs and egg products (29.51% of *Salmonella*-positive items), followed by meat and meat products (27.40%), culinary products (12.3%), and confectionery products (11.0%). In the Lviv region, the most frequently identified sources were culinary products (27.12%), meat products (17.53%), swab samples (14.79%), confectionery products (8.49%), and eggs (7.12%).

In Ukraine, research into salmonellosis is conducted by accredited laboratories under the Ministry of Health. However, a significant portion of food safety monitoring, particularly related to outbreaks, is carried out by authorised laboratories of the State Service for Food Safety and Consumer Protection, which is subordinate to a different governmental agency. The absence of unified systems or tools that facilitate the integration and comparison of data across agencies imposes limitations on the ability to utilise comprehensive datasets for analysis. A key prospect for further research involves the collection and processing of larger, unified datasets on salmonellosis in Ukraine. This would enable the development of effective risk assessment tools for the disease and enhance the availability of epidemiological data for the global scientific community.

## ACKNOWLEDGEMENTS

The authors express their sincere gratitude to all physicians, laboratory technicians, and bacteriology laboratory nurses in Ukraine, Poland, and around the world, whose skilled, meticulous, and selfless daily work lays the foundation for scientific advancement and the progress of humanity.

## FUNDING

None.

## CONFLICT OF INTEREST

None.

## REFERENCES

[1] Lee H, Yoon Y. Etiological agents implicated in foodborne illness world wide. Food Sci Anim Resour. 2021;41(1):1–7. DOI: 10.5851/kosfa.2020.e75

[2] Ehuwa O, Jaiswal AK, Jaiswal S. *Salmonella*, food safety and food handling practices. Foods. 2021;10(5):907. DOI: 10.3390/foods10050907

[3] Criscuolo A, Issenhuth-Jeanjean S, Didelot X, Thorell K, Hale J, Parkhill J, et al. The speciation and hybridization history of the genus *Salmonella*. Microb Genom. 2019;5(8):284. DOI: 10.1099/mgen.0.000284

[4] Konishi N, Obata H, Yokoyama K, Sadamasu K, Kai A. Comparison of the serovars and characteristics of *Salmonella* isolated from human feces and foods in the 1990s and 2010s in Tokyo. Jpn J Infect Dis. 2023;76(1):14–9. DOI: 10.7883/yoken.JJID.2022.174

[5] Boiko O, Garkavenko T, Musiiets I, Nedosekov V, Kozytska T. Salmonellosis in Ukraine: An analysis of food products contamination, *Salmonella* transmission, and serovar diversity during 2012-2023. Ger J Vet Res. 2024;4(2):65–74. DOI: 10.51585/gjvr.2024.2.0085

[6] Milczarek M, Sadkowska-Todys M, Czarkowski MP. Salmonellosis in Poland in 2018 and 2019. Epidemiol Rev. 2021;75(4):665–8. DOI: 10.32394/pe.75.62

[7] Milczarek M, Czarkowski MP, Sadkowska-Todys M. Salmonellosis in Poland in 2020. Epidemiol Rev. 2022;76(4):574–90. DOI: 10.32394/pe.76.53

[8] Milczarek M, Czarkowski MP, Sadkowska-Todys M. Salmonellosis in Poland in 2021. Epidemiol Rev. 2023;77(4):504–19. DOI: 10.32394/pe.77.41

[9] Zublenko O, Petrusevych T. Incidence of intestinal infections in Ukraine. In: Materials of the scientific and practical conference with international participation "Ecological and hygienic problems of the sphere of human life". Kyiv: Bogomolets National Medical University; 2021.

[10] Polishchuck N, Kolycheva N, Dehen A, Melnikova O, Kryazheva N. Epidemical process and aetiological structure of salmonelloses in the Zaporizhzhia region. Curr Issues Pharm Med Sci Pract. 2023;16(3):260–4. DOI: 10.14739/2409-2932.2023.3.285476

[11] Baharev E. The ecological structure of the zoogen tanks of *Salmonella* and their epidemic potential on the territory of the north-west Black Sea. Young Scientist. 2019;10(74):372–80. DOI: 10.32839/2304-5809/2019-10-74-81

[12] Provincial Sanitary and Epidemiological Station in Lublin. Assessment of the sanitary condition of the voivodeship [Internet]. [cited 2024 October 19]. Available from: https://www.gov.pl/web/wsse-lublin/ocena-stanu-sanitarnego-wojewodztwa

[13] Voivodship Sanitary and Epidemiological Station in Rzeszów. Sanitary and Hygienic Status of Podkarpackie Voivodeship [Internet]. [cited 2024 October 19]. Available from: https://www.gov.pl/web/wsse-rzeszow/stan-sanitarno---higieniczny-wojewodztwa-podkarpackiego

[14] Surveillance Atlas of Infectious Diseases [Internet]. [cited 2024 October 19]. Available from: https://atlas.ecdc.europa.eu/public/index.aspx

[15] Order of the Ministry of Health of Ukraine No. 132. On Approval of Sectoral Statistical Reporting Form N 40-health [Internet]. 2001 April 4 [cited 2024 October 19]. Available from: https://ips.ligazakon.net/document/MOZ1370

[16] Annual report “Infectious diseases and poisonings in Poland” [Internet]. 2023 [cited 2024 October 19]. Available from: https://wwwold.pzh.gov.pl/oldpage/epimeld/index_a.html
[17] Order of the Ministry of Health of Ukraine No. 190. On Improving the System of Operational Information of the Ministry of Health of Ukraine [Internet]. 2011 April 5 [cited 2024 October 19]. Available from: https://zakon.rada.gov.ua/rada/show/v0190282-11#Text
[18] Law of Ukraine No. 1645-III. On Protecting the Population from Infectious Diseases [Internet]. 2000 April 6 [cited 2024 October 19]. Available from: https://zakon.rada.gov.ua/laws/show/1645-14#Text
[19] Order of the Ministry of Health of Ukraine No. 425. On Approval of the Methodological Recommendations “Methods of *Salmonella* Isolation and Identification” [Internet]. 2013 May 24 [cited 2024 October 19]. Available from: https://zakononline.com.ua/documents/show/53036__53036
[20] European Food Safety Authority (EFSA), European Centre for Disease Prevention and Control (ECDC). The European Union one health 2022 zoonoses report. EFSA J. 2023;21(12):e8442. DOI: 10.2903/j.efsa.2023.8442
[21] Mkangara M. Prevention and control of human *Salmonella enterica* infections: An implication in food safety. Int J Food Sci. 2023;2023(1):8899596. DOI: 10.1155/2023/8899596
[22] Kasza G, Izsó T, Langsrud S, Vrbos D, Veflen N, Ueland Ø, et al. Institutional food safety risk communication – a self-evaluation tool and its interpretation. Trends Food Sci Technol. 2024;150:104594. DOI: 10.1016/j.tifs.2024.104594
[23] Teklemariam AD, Al-Hindi RR, Albiheyri RS, Alharbi MG, Alghamdi MA, Filimban AAR, et al. Human Salmonellosis: A continuous global threat in the farm-to-fork food safety continuum. Foods. 2023;12(9):1756. DOI: 10.3390/foods12091756
[24] European Food Safety Authority, European Centre for Disease Prevention and Control. The European Union one health 2019 zoonoses report. EFSA J. 2021;19(2):e06406. DOI: 10.2903/j.efsa.2021.6406
[25] Canning M, Birhane MG, Dewey-Mattia D, Lawinger H, Cote A, Gieraltowski L, et al. *Salmonella* outbreaks linked to beef, United States, 2012-2019. J Food Prot. 2023;86(5):100071. DOI: 10.1016/j.jfp.2023.100071
[26] Sun H, Wan Y, Du P, Bai L. The epidemiology of monophasic *Salmonella* Typhimurium. Foodborne Pathog Dis. 2020;17(2):87–97. DOI: 10.1089/fpd.2019.2676
[27] Polański P, Sadkowska-Todys M, Księżak E, Nowacka Z. Foodborne infections and intoxications in Poland in the years 2018-2020. Epidemiol Rev. 2022;76(4):626–40. DOI: 10.32394/pe.76.57
[28] Announcement by the Speaker of the Sejm of the Republic of Poland Dz. U. 2022 Item 1657. On the Announcement of the Uniform Text of the Act on the Prevention and Combating of Infections and Infectious Diseases in Humans [Internet]. 2022 June 6 [cited 2024 October 19]. Available from: https://isap.sejm.gov.pl/isap.nsf/download.xsp/WDU20220001657/T/D20221657L.pdf
[29] Act of the Sejm of the Republic of Poland Dz. U. 1985 No. 12 Item 49. On the State Sanitary Inspectorate. 1985 March 14 [cited 2024 October 19]. Available from: https://isap.sejm.gov.pl/isap.nsf/download.xsp/WDU19850120049/U/D19850049Lj.pdf
[30] Resolution of the Cabinet of Ministers of Ukraine No. 124. Some Issues of Central Executive Authorities. 2021 February 17 [cited 2024 October 19]. Available from: https://www.kmu.gov.ua/npas/deyaki-pitannya-diyalnosti-centralnih-organiv-vikonavchoyi-vladi-i170221-124
[31] Resolution of the Cabinet of Ministers of Ukraine No. 667. On Approval of the Regulation on the State Service of Ukraine on Food Safety and Consumer Protection. 2015 September 2 [cited 2024 October 19]. Available from: https://zakon.rada.gov.ua/laws/show/667-2015-%D0%BF#Text

# Епідемічний процес сальмонельозу у транскордонних областях України та Польщі (2014-2023 рр.)

**Оксана Бойко**

Кандидат ветеринарних наук, старший викладач
Волинський національний університет імені Лесі Українки
43025, просп. Волі, 13, м. Луцьк, Україна
https://orcid.org/0000-0001-8113-9423

**Наталія Янко**

Кандидат медичних наук, директор
Державна установа «Волинський обласний лабораторний центр Міністерства охорони здоров'я України»
43010, просп. Волі, 55, м. Луцьк, Україна
https://orcid.org/0009-0008-9815-2681

**Тарас Пундяк**

Кандидат ветеринарних наук, доцент
Львівський національний університет ветеринарної медицини та біотехнологій імені С. З. Ґжицького
79010, вул. Пекарська, 50, м. Львів, Україна
https://orcid.org/0000-0001-7775-2217

**Анотація.** Епідеміологія сальмонельозу, незважаючи на тривалу історію вивчення, як один із аспектів забезпечення здоров'я, залишається актуальною. Метою досліджень було порівняти захворюваність сальмонельозу Польщі та України на національному рівні та на рівні деяких суміжних транскордонних областей обох країн протягом 2014-2023 рр. Середньорічні показники захворюваності людей на сальмонельоз за 10-річний період становили в Україні 15,02/100 тис., кількість підтверджених випадків сальмонельозу – 64108; у Польщі ці показники становили – 22,74/100 тис. та 86956 випадків відповідно ($p = 0,0025$). Кількість підтверджених випадків та захворюваність (на 100 тис.) у транскордонних областях становили: Волинська – 1879/18,02; Львівська – 3305/13,18; Люблінське воєводство – 6067/27,62; Підкарпатське – 7869/37,13 ($p < 0.001$). Вивчено тенденції поширеності та серологічний профіль сальмонел, ідентифікованих у людей і в харчових продуктах та інших об'єктах. Домінуючими серотипами під час спалахів та ідентифікованих випадках сальмонельозу та сальмонелоносійства у Волинській та у Львівській областях був вид *S. enterica* subsp. *enterica* var. Enteritidis (87,51 % та 77,90 % відповідно). Серовар *S.* Typhimurium, як етіологічний фактор, було ідентифіковано на Волині у 10,04 % випадках, на Львівщині – у 18,08 %. Встановлено, що найчастіше факторами передачі сальмонел у Волинській області були: яйця та яєчні продукти, які становили 29,51 % з усіх категорій сальмонела-позитивних об'єктів, м'ясо та м'ясні продукти – 27,40 %, кулінарні – 12,3 %, та кондитерські вироби – 11,0 %. У Львівській області найчастіше контамінованими виявлялися такі категорії: кулінарні вироби – 27,12 %; м'ясні продути – 17,53 %; кондитерські вироби – 8,49 %; яйця та яєчні продукти – 7,12 %. Результати цього дослідження можуть бути використані як основа доказової епідеміології, а також для реалізації спільних кроків щодо підвищення ефективності епідеміологічного нагляду і контролю за напруженістю епідемічної ситуації щодо сальмонельозу у транскордонних регіонах та в цілому у кожній країні

**Ключові слова:** серовари сальмонели; захворюваність; епідеміологічний аналіз; харчові продукти