

*Joanna Ostrek, Anna Baumann-Popczyk, Małgorzata Sadkowska-Todys*

## FOODBORNE INFECTIONS AND INTOXICATIONS IN POLAND IN 2011

Department of Epidemiology, National Institute of Public Health  
- National Institute of Hygiene in Warsaw

### ABSTRACT

**THE PURPOSE OF THE STUDY.** To assess the epidemiological situation of food poisoning and infections in Poland in 2011.

**MATERIALS AND METHODS.** The assessment was based on information from the forms of the epidemiological investigations in outbreaks of foodborne poisoning and infections, sent by the sanitary-epidemiological stations to the Department of Epidemiology, NIPH-NIH (NIZP-PZH) and the results of the analysis of annual bulletins (Czarkowski MP et al. "Infectious diseases and poisonings in Poland" – 2005 - 2011. Warsaw, NIZP-PZH and GIS).

**RESULTS.** In 2011 it was observed decrease in the number of infections and food poisoning of bacterial etiology and steady marked increase in the incidence of those of viral etiology, classified as "viral and other intestinal infections."

In 2011 there were registered 490 outbreaks of poisoning / infection of food, which had affected 6 386 people, including 1,718 children under 14. Among them 1364 people required hospitalization. The predominant etiologic factor in outbreaks were viruses - 36.5% of outbreaks and 40.6% of cases then zoonotic Salmonella types - 35.5% of outbreaks and 27.8% of cases. In 22.2% of outbreaks etiologic factor was not established. Most of the outbreaks occurred in households - 235 and in hospital – 118. As in previous years, the most common carrier of infection was food prepared from milk and eggs -11.4% of outbreaks and egg only dishes - 9.8%. In more than 61% of outbreaks etiologic factor has not been established. In 2011, there were five outbreaks, in which got ill 100 people or more.

**CONCLUSION.** Since the seasonality of outbreaks of unknown etiologic factor is similar to outbreaks of viral etiology; they occur in the autumn and winter, one should pay special attention to the testing samples taken for viral agents.

**Keywords:** *foodborne poisoning and infections, outbreaks of food poisoning and infections, epidemiology, Poland, 2011*

Register of outbreaks of foodborne poisoning and infections caused by foodborne pathogens is carried out in Poland at the National Institute of Public Health – NIZP-PZH since 1988. Data collected in the registry is used to assess the epidemiological situation of food-borne diseases, including tracking changes in the number of outbreaks in each year and changes in the etiologic agents that cause them. In 2004, there has been a change in the definition of an outbreak and since then two or more cases to occur, under certain conditions, fulfill its definition.

### MATERIAL AND METHODS

The assessment of the epidemiological situation of outbreaks of foodborne poisoning and infections in Poland in 2011, was based on analysis of data from the annual newsletters (Czarkowski MP et al. "Infectious diseases and poisonings in Poland" – 2005- 2011. Warsaw, NIPH-NIH and GIS ), and data from the forms of outbreaks of poisoning/gastrointestinal tract infection sent to the Department of Epidemiology, NIZP-PZH by the Sanitary-Epidemiological Stations from all over the country.

## RESULTS

Detailed data on the number of registered cases and incidence of food poisoning and infections in the years 2005 - 2011 with respect to their etiology are summarized in Table I. In 2011, in a group of food poisoning and infections caused by bacterial agents for the majority of diseases the number of cases and incidence were at the same level as in 2010 and it was much lower than the median for the years 2005-2009. In 2011, in a group of so-called. "Bacterial food poisoning" (caused by zoonotic *Salmonella* types - A02.0, staphylococci - A05.0, *Clostridium botulinum* - A05.1, *C. perfringens* - A05.2, and certain other bacteria, including *Vibrio parahaemolyticus* and *Bacillus cereus* - A05.3-A05.8, and the factors unspecified - A05.9) it was registered 10 847 cases (incidence 28.2/100 000). The number of such cases is steadily declining and it was comparable with 2009 and lower than in 2010 and much lower than the median of cases from the years 2005 - 2009 (15 249 cases). In most provinces the incidence was less than 30 per 100 thousand.

In the four provinces it was above this value and the highest incidence was in Mazowieckie and Zachodniopomorskie (Table IIA). The incidence of bacterial food poisoning and infection in 2011 was slightly higher in the cities compared to the incidence in the country, respectively, 29.4 and 26.2. Cases, like in previous years,

were most common in the age group 0-4 and it accounted for 39.6% of all registered cases. (Table III). Only in the age group of "0" and in people over 50 years of age the incidence was higher in rural areas than in urban areas. The incidence among women and men was very similar respectively 28/100 000 and 28,4 /100 000. However, in boys up to 10 years of age it was slightly higher and above this age slightly lower than in females (Table IIIB).

Number of cases and incidence of foodborne infections of viral etiology that are classified as "viral and other intestinal infections" was higher than in 2010 and more than one and a half times higher than in the median in the years 2005-2009. However, there was a further significant decrease in the incidence of hepatitis A. The epidemiological situation of cases of hepatitis A are discussed in a separate article.

When compared with the data for 2010 and the earlier years number of parasitic infections such as trichinosis or echinococcosis, has been markedly reduced, with about two-fold decrease in incidence.

In 2011, were recorded 32 cases of mushroom poisoning (incidence 0.08). This number is lower than the median for the years 2005-2009 and almost three times lower than the number recorded in 2010 (Table IIB).

According to data from the Central Statistical Office in 2011 three people died due to infections caused by *Salmonella*. Rotavirus infection resulted in two deaths

Table I. Foodborne infections and intoxications registered in Poland in 2005-2011. Number of cases and incidence per 100 000 population

Foodborne infections and intoxications	Median 2005-2009		2010		2011	
	number of cases	incidence rate	number of cases	incidence rate	number of cases	incidence rate
bacterial						
Typhoid/paratyphoid fever	6	0.02	6	0.02	2	0.01
Shigellosis	35	0.09	30	0.08	17	0.04
Salmonellosis	11 568	30.3	9732	25.5	8813	22.9
<i>Staphylococcus aureus</i>	407	1.1	217	0.57	283	0.73
<i>Clostridium botulinum</i>	46	0.1	32	0.08	35	0.09
<i>Clostridium perfringens</i>	4	0.0	8	0.021	24	0.062
Other bacterial - specified	142	0.4	32	0.08	53	0.14
Listeriosis	33	0.06	64	0.17	64	0.17
Leptospirosis	6	0.02	4	0.01	4	0.01
Other bacterial - unspecified	3 096	8.1	1626	4.30	1800	4.70
viral						
Viral intestinal infections	21 759	57.10	32723	85.7	44906	116.6
children under 2 years old	10 226	1384.53	15853	1901.7	21250	258.8
Hepatitis A	109	0.29	155	0.41	65	0.41
parasitical						
Trichinellosis	70	0.18	51	0.13	23	0.06
Echinococcosis	34	0.09	36	0.09	21	0.09
other						
Acute diarrhoea in children under 2 years	9 610	1289.10	11581	1389.2	13068	1591.4
mushroom poisonings	80	0.21	93	0.24	32	0.08
Berries or other parts of plants poisonings	12	0.03	5	0.013	8	0.021
Pesticide poisonings	72	0.19	19	0.05	19	0.05

Data sources: Infectious diseases and poisonings in Poland. NIZP-PZH. MZiOŚ / GIS. Warsaw. Annual Reports:2005 -2011

Table II A. Bacterial foodborne infections and intoxications registered in Poland in 2005-2011. Number of cases and incidence per 100 000 population by province

Province	Median 2005-2009		2010		2011	
	number of cases	incidence rate	number of cases	incidence rate	number of cases	incidence rate
Polska	15 249	40,0	11464	30	10847	28,2
Dolnośląskie	862	29,9	642	22,3	595	20,4
Kujawsko-pomorskie	935	45,3	635	30,7	582	27,7
Lubelskie	1 016	46,7	563	26,1	648	29,8
Lubuskie	312	30,9	242	23,9	133	13
Łódzkie	933	36,4	668	26,3	572	22,5
Małopolskie	1 221	37,4	797	24,1	925	27,7
Mazowieckie	1 881	36,4	1873	35,8	1956	37,1
Opolskie	288	27,7	155	15,1	139	13,7
Podkarpackie	1 083	51,6	802	38,1	615	28,9
Podlaskie	600	50,2	528	44,4	278	23,1
Pomorskie	1 299	58,9	843	37,7	701	30,8
Śląskie	1 655	35,5	1565	33,7	1550	33,5
Świętokrzyskie	426	33,5	284	22,4	242	18,9
Warmińsko-mazurskie	582	40,8	538	37,7	610	42
Wielkopolskie	1 041	30,8	739	21,6	669	19,4
Zachodniopomorskie	806	47,6	590	34,8	632	36,7

Data sources: Infectious diseases and poisonings in Poland. NIZP-PZH, MZiOS / GIS. Warsaw, Annual Reports:2005 -2011

Table II B. Mushroom poisonings in Poland in 2005-2011. Number of cases and incidence per 100 000 population by province

Province	Median 2005-2009		2010		2011	
	number of cases	incidence rate	number of cases	incidence rate	number of cases	incidence rate
	80	0,2	93	0,24	32	0,24
Dolnośląskie	2	0,1	4	0,14	3	0,1
Kujawsko-pomorskie	4	0,2	8	0,39	3	0,14
Lubelskie	8	0,4	24	1,11	7	0,32
Lubuskie	3	0,3	9	0,89	6	0,59
Łódzkie	15	0,6	6	0,24	2	0,08
Małopolskie	7	0,2	2	0,06	4	0,12
Mazowieckie	4	0,1	2	0,04	1	0,02
Opolskie	1	0,1	1	0,1	-	-
Podkarpackie	5	0,2	7	0,33	2	0,09
Podlaskie	4,5	0,4	1	0,08	-	-
Pomorskie	4,5	0,2	3	0,13	-	-
Śląskie	3	0,1	6	0,13	2	0,04
Świętokrzyskie	5	0,4	3	0,24	-	-
Warmińsko-mazurskie	1	0,1	3	0,21	1	0,07
Wielkopolskie	5	0,2	5	0,15	1	0,03
Zachodniopomorskie	5,5	0,3	9	0,53	-	-

Data sources: Infectious diseases and poisonings in Poland. NIZP-PZH, MZiOS / GIS. Warsaw, Annual Reports:2005 -2011

and “viral intestinal infection, unspecified” - one death. Furthermore, “a bacterial infection of the intestines, other and unspecified” was the cause of 75 deaths and “diarrhea and gastrointestinal inflammation of possibly infectious origin – 50.

## OUTBREAKS OF FOODBORNE POISONING AND INFECTIONS

In 2011, it was reported 490 outbreaks of foodborne poisoning/ infections, in which were exposed

32 552 people and 6 386 got ill, including 1 718 children up to 14. Out of them 1 364 people required hospitalization. Most of the cases (40.6%) and outbreaks (36.5%) were caused by viruses. Zoonotic *Salmonella* types caused 35.5% of outbreaks and 27.8% of cases. In the total number of outbreaks those, in which no etiological agent was detected amounted to 22.2% (Table IV). In 2011, as in the earlier years among zoonotic bacteria dominated *Salmonella* Enteritidis (92% of outbreaks, 96.9% of cases). There were also reported outbreaks caused by *S. Typhimurium* (2.3% of outbreaks, 0.7% of cases) (Table V).

Table III. Bacterial foodborne infections and intoxications registered in Poland in 2011. Number of cases, percentage and incidence by age, gender and residence (urban/rural)

A. urban and rural areas									
Age group	Urban area			Rual area			Total		
	number of cases	%	incidence rate	number of cases	%	incidence rate	number of cases	%	incidence rate
0 - 4	2 759	40.1	230.7	1 536	38.8	176.4	4 295	39.6	207.8
0	433	6.3	187.4	367	9.3	220.3	800	7.4	201.2
1	658	9.6	267.0	389	9.8	219.7	1 047	9.7	247.2
2	652	9.5	259.8	322	8.1	177.1	974	9.0	225.0
3	587	8.5	243.2	259	6.5	146.3	846	7.8	202.2
4	429	6.2	189.7	199	5.0	118.4	628	5.8	159.3
5 - 9	940	13.7	93.4	517	13.0	64.2	1 457	13.4	80.4
10 - 19	659	9.6	28.4	448	11.3	22.4	1107	5.4	25.6
20 - 29	521	7.6	14.2	277	7.0	11.5	798	3.9	13.2
30 - 39	387	5.6	10.5	223	5.6	9.9	610	3.1	10.3
40 - 49	282	4.1	9.9	197	5.0	10.0	479	2.5	9.9
50 - 59	435	6.3	11.6	268	6.8	12.9	703	3.7	12.1
60 i >	902	13.1	18.3	496	12.5	18.1	1398	7.7	18.2
Total	6 885	100.0	29.4	3 962	100.0	26.2	10 847	100.0	28.2
B. men and women									
Age group	Men			Women			Total		
	number of cases	%	incidence rate	number of cases	%	incidence rate	number of cases	%	incidence rate
0 - 4	2 285	43.2	215.5	2 010	36.2	199.7	4 295	39.6	207.8
0	425	8.0	207.6	375	6.7	194.4	800	7.4	201.2
1	576	10.9	265.1	471	8.5	228.4	1 047	9.7	247.2
2	519	9.8	234.1	455	8.2	215.5	974	9.0	225.0
3	429	8.1	200.1	417	7.5	204.4	846	7.8	202.2
4	336	6.4	166.1	292	5.3	152.1	628	5.8	159.3
5 - 9	750	14.2	80.7	707	12.7	80.2	1 457	13.4	80.4
10 - 19	526	9.9	23.8	581	10.5	27.5	1107.0	5.4	25.6
20 - 29	376	7.1	12.2	422	7.6	14.1	798.0	3.9	13.2
30 - 39	276	5.2	9.2	334	6.0	11.4	610.0	3.1	10.3
40 - 49	211	4.0	8.7	268	4.8	11.1	479.0	2.5	9.9
50 - 59	306	5.8	10.9	397	7.1	13.3	703.0	3.7	12.1
60 i >	558	10.6	18.0	840.0	15.1	18.4	1398.0	7.7	18.2
total	5 288	100.0	28.4	5 559	100.0	28.0	10 847	100.0	28.2

Data sources: Infectious diseases and poisonings in Poland, NIZP-PZH, MZiOŚ / GIS, Warsaw, Annual Reports:2005 -2011

Table IV. Outbreaks of foodborne and waterborne infections and intoxications in Poland in 2010-2011. Number and percentage of outbreaks and cases by etiological agent.

Etiological agent	2010				2011			
	Outbreaks		Cases		Outbreaks		Cases	
	number	%	number	%	number	%	number	%
zoonotic <i>Salmonella</i> types	129	32.9	1570	22.4	174	35.5	1774	27.8
<i>Staphylococcus aureus</i>	5	1.3	145	2.1	1	0.2	19	0.3
<i>Escherichia coli</i>	5	1.3	133	1.9	5	1.0	30	0.5
other bacterial agents	2	0.5	16	0.2	14	2.9	105	1.6
viruses	100	25.5	2099	30.0	179	36.5	2590	40.6
poisonous mushrooms	-	-	-	-	3	0.6	22	0.3
parasites	1	0.3	4	0.1	5	1.0	13	0.2
unknown	150	38.3	3 027	43.3	109	22.2	1 833	28.7
total	392	100.0	6994	100.0	490	100.0	6386	100.0

In 2011, there were five outbreaks, in which got ill 100 people or more. In two of them etiologic factor was norovirus in two consecutive *S. enteritidis*, but in one causative factor has not been established. In total, in these outbreaks 588 people fell ill, of which four were hospitalized. Just

as in 2010, the most common place where the outbreak occurred was a private apartment (235 outbreaks, 1074 cases) and hospital (118 outbreaks, 1737 cases).

Table V. Outbreaks of foodborne and waterborne infections and intoxications caused by *Salmonella*. Poland. 2010-2011. Number and percentage of outbreaks and cases by serotype.

Zoonotic <i>Salmonella</i> types	2010				2011			
	Outbreaks		Cases		Outbreaks		Cases	
	number	%	number	%	number	%	number	%
<i>S. Enteritidis</i>	112	86.8	1309	83.4	160	92.0	1719	96.9
<i>S. Typhimurium</i>	3	2.3	51	3.2	4	2.3	12	0.7
<i>S. Infantis</i>	6	4.7	112	7.1	2	1.1	7	0.4
<i>S. Saintpaul</i>	3	2.3	26	1.7	-	-	-	-
<i>S. Mbandaka</i>	1	0.8	5	0.3	-	-	-	-
<i>S. Stanley</i>	-	-	-	-	1	0.6	2	0.1
<i>S. group B</i>	-	-	-	-	3	1.7	14	0.8
<i>S. group D</i>	3	2.3	56	3.6	1	0.6	2	0.1
<i>S. Enteritidis</i> + <i>S. group D</i>	1	0.8	11	0.7	-	-	-	-
<i>S. Enteritidis</i> + <i>S. spp.</i>	-	-	-	-	1	0.6	11	0.6
<i>S. Enteritidis</i> + <i>S. Typhimurium</i>	-	-	-	-	1	0.6	5	0.3
<i>S. Typhimurium</i> + <i>S. Derby</i>	-	-	-	-	1	0.6	2	0.1
<i>Salmonella</i> - total	129	100.0	1570	100.0	174	100.0	1774	100.0

Table VI. Outbreaks of foodborne infections and intoxications in Poland in 2011. Number of cases in outbreaks by vehicle of infection.

Etiological agent		Vehicle of infection									
		milk and eggs	eggs	poultry and eggs	red meat and eggs	red meat	mixed food	other food	unknown	total	%
<i>Salmonella</i>	outbreaks	52	48	4	16	3	12		39	174	35.5
	cases	523	462	35	140	7	260		347	1774	27.8
<i>Escherichia coli</i>	outbreaks				1		1		3	5	1.0
	cases				8		3		19	30	0.5
<i>Staphylococcus aureus</i>	outbreaks						1			1	0.2
	cases						19			19	0.3
other bacterial agents	outbreaks					1	3		10	14	2.9
	cases					4	7		94	105	1.6
viruses	outbreaks	1			1	1	5	1	170	179	36.5
	cases	5			25	39	151	7	2363	2590	40.6
parasites	outbreaks					3				3	0.6
	cases					22				22	0.3
poisonous mushrooms	outbreaks							5		5	1.0
	cases							13		13	0.2
unknown agent	outbreaks	3		1	1	1	15	7	81	109	22.2
	cases	27		24	28	6	417	118	1213	1833	28.7
total	outbreaks	56	48	5	19	9	37	13	303	490	
	%	11.4	9.8	1.0	3.9	1.8	7.6	2.7	61.8		
	cases	555	462	59	201	78	857	138	4036	6386	
%	8.7	7.2	0.9	3.2	1.2	13.4	2.2	63.2			

It was registered 50 outbreaks in which total of 1,404 people fell ill in which the cause was food consumption in restaurants. (Table VI).

There have been 25 outbreaks (454 cases) that occurred after the occasional parties (such as weddings, christenings, communion) held in places other than household, in which 16 of them were related to parties which were held in places such as restaurants, or wedding halls. In those outbreaks fell ill altogether 297 people. The remaining nine outbreaks (157 cases) occurred after the parties organized in places such as a fire station and a common room.

As in previous years, the most common carrier of infection was food prepared from milk and eggs (11.4% of outbreaks, 8.7% of cases) and egg only dishes (9.8% of outbreaks, 7.2% of cases). In 303 (61.8%) outbreaks, which accounted for 63.2% of cases infectious factor has not been established (Table VII.). In 2011 in 338 (69.0%) of outbreaks of foodborne poisoning / infection the stage of food handling of preparation at which contamination occurred, that lead to infection, has not been established. At the epidemiological investigations it was found that in 83 (16.9%) outbreaks lack or inadequate heat treatment have contributed to their occurrence. The clinical presentation of disease, as in

Table VII. Outbreaks of foodborne infections and intoxications in Poland in 2011. Number of outbreaks by etiological agent and setting

Setting	Etiological agent								total	total %
	<i>Salmonella</i>	<i>E.coli</i>	<i>S. aureus</i>	other bacterial agents	viruses	parasites	poisonous mushrooms	unknown agent		
household, domestic kitchen	131 (724)	2 (6)		7 (19)	60 (205)	2 (14)	5 (13)	28 (93)	235 (1074)	48,0 (16,8)
restaurant, bar, hotel, catering	17 (335)				10 (244)	1 (8)		22 (286)	50 (973)	10,2 (15,2)
kindergarden, creche	6 (214)		1 (19)		3 (17)			2 (42)	12 (292)	2,5 (4,6)
school	2 (57)	1 (8)			1 (111)			2 (49)	6 (225)	1,2 (3,5)
school trip, camp	1 (101)	1 (14)			2 (56)			10 (177)	14 (348)	2,9 (5,4)
children's home, boarding schools				1 (28)	5 (148)			3 (99)	9 (275)	1,8 (4,3)
social care	1 (29)			1 (12)	6 (271)			3 (68)	11 (380)	2,2 (6,0)
hospital	3 (19)	1 (2)		5 (46)	83 (1286)			26 (384)	118 (1737)	24,1 (27,2)
sanatorium, rehabilitation center					6 (181)			5 (219)	11 (400)	2,2 (6,3)
prison	1 (143)							3 (267)	4 (410)	0,8 (6,4)
other setting	12 (152)				3 (71)			5 (49)	20 (272)	4,1 (4,3)
total	174 (1774)	5 (30)	1 (19)	14 (105)	179 (2590)	3 (22)	5 (13)	109 (1833)	490 (6386)	
total %	35.5 (27.8)	1.0 (0.5)	0.2 (0.3)	2.9 (1.6)	36.5 (40.6)	0.6 (0.3)	1.0 (0.2)	22.4 (28.7)		

\* number of outbreaks

\*\* number of cases ( )

previous years, depended on the etiological agent, and were as follows:

- In the diseases caused by *Salmonella* dominated: 88.9% diarrhea, abdominal pain and fever 64.9% 61.9%.
- In cases of staphylococcal etiology - vomiting in 100% of patients and diarrhea in 26.3%;
- In the diseases caused by viruses predominated diarrhea in 77% of patients and vomiting in 60.5%.

Figure 1. shows the seasonal occurrence of outbreaks caused by different etiological factors. Clearly marked increase in the number of foci in the autumn and winter months is characteristic of outbreaks caused by viruses (noroviruses and rotavirus). However, outbreaks caused by zoonotic *Salmonella*, occurred primarily in the summer, with a peak incidence in July, August and September. There were no other outbreaks of seasonal occurrence. Seasonality outbreaks, in which no etiologic factor was identified is very similar to that of viral etiology. This may indicate that most of them are caused by these pathogens but not diagnosed (Fig. 1). Information about the outbreaks is also transferred to the EU database run by EFSA, in accordance with the criteria adopted. To the EFSA it was submitted total of 480 outbreaks data from 2011, including 96 outbreaks

that meet the criteria of confirmed outbreaks caused by food contamination.

## SUMMARY AND CONCLUSIONS

1. In 2011, as in previous years, increased the number and proportion of outbreaks of foodborne poisoning / infection, in which viruses were an etiologic factor
2. Particular attention is paid to seasonal outbreaks with no established etiological factor, which pattern is similar to the outbreaks of viral etiology. This indicates that in these those seasons particular attention should pay to the diagnosis of the samples taken for viral factors.

Received: 04.07.2013

Accepted for publication: 11.07.2013

### Address for correspondence:

Dr Małgorzata Sadkowska-Todys

Department of Epidemiology National Institute of Public Health - National Institute of Hygiene

24 Chocimska Street, 00-791 Warsaw, Poland

Tel. +48 22 54 21 204

E-mail: mtodys@pzh.gov.pl