

8. EPIDEMIOLOGICAL SITUATION OF SELECTED INFECTIOUS DISEASES IN POLAND

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Introduction

The COVID-19 pandemic, which broke out in 2020, significantly altered the epidemiological landscape of most infectious diseases and disrupted a number of previously observed trends in their incidence. Efforts to prevent the transmission of SARS-CoV-2 between individuals by reducing interpersonal contact (lockdowns, etc.) and minimising transmission risk during unavoidable interactions (e.g. face masks, widespread availability of disinfectants) not only curbed the spread of COVID-19 but also limited the transmission of other diseases spread via droplets or airborne routes, as well as certain foodborne illnesses. Equally important were extensive media campaigns promoting behaviours aimed at reducing epidemic threats. As a result, in the first year of the pandemic, Poland recorded a decline in the incidence of nearly all notifiable infectious diseases, with reductions often exceeding what might have been expected based on previous long-term downward trends. This decline cannot be fully explained by the fact that the number of reported cases may have been an underestimation of the true incidence, due to the strain placed on the healthcare system and sanitary inspection services by the pandemic. In 2021, partly due to changes in public behaviour resulting from a gradually diminishing sense of threat, the incidence of most infectious diseases increased noticeably compared to 2020, although generally remaining below pre-pandemic levels.

2022 and 2023 were two consecutive years in which incidence rates for most infectious diseases increased significantly, in many cases reaching levels exceeding the median values from 2016–2020. The causes of this increase should be seen in at least two phenomena. The first is the accumulation, in a given area, of individuals susceptible to infection, which occurred during the pandemic as a result of reduced interpersonal contact and mobility. This typically leads, at some point, to a sharp rise in the number of cases and the occurrence of compensatory epidemics, and this applies not only to diseases transmitted via airborne or droplet routes. The second phenomenon is the so-called “health debt” associated with unmet, or not timely met, healthcare needs of the population, created due to (objective and subjective) limitations in access to the healthcare system during the pandemic, and due to disruptions in the functioning of that system caused by the pandemic-imposed prioritisation of its tasks. In the case of infectious diseases, such a “debt” means not only an increase, in the future, in the number of cases diagnosed only at an advanced stage, as is the case with many non-infectious diseases, but may also mean a future increase in the overall number of cases, since individuals with an undiagnosed and untreated infectious disease may become a source of infection for others.

The overall epidemiological situation of infectious diseases in Poland in recent years, as well as the possible consequences of the post-pandemic health debt, are well illustrated by the general mortality connected with these diseases. Between 2020 and 2023, the mortality rate due to infectious and parasitic diseases (excluding COVID-19) in Poland increased by over 60% (from 5.27/100,000 population to 8.67), and the proportion of deaths from these causes in the total number of deaths in Poland rose by over 70% (from 0.42% to 0.73%). Such a sharp increase in this rate has not previously been observed in Poland.

Given that detailed numerical data on all registered cases of infectious and parasitic diseases in Poland that are subject to mandatory registration and epidemiological surveillance are regularly published in the annual „Infectious Diseases and Poisonings in Poland” bulletins¹, and that the epidemiological situation of diseases of particular public health importance is systematically and thoroughly analysed and commented on in the „Epidemiological Chronicle” section of the

¹ Bulletins published by the National Institute of Public Health NIPH – National Research Institute (PZH – PIB) and the Chief Sanitary Inspectorate, available at: https://www.wold.pzh.gov.pl/oldpage/epimeld/index_p.html#04

„Epidemiological Review”², this chapter is limited to the discussion of selected diseases only. Nevertheless, Table 8.1 presents basic data characterising the situation of a broader group of infectious diseases under surveillance. The numbers of registered cases and incidence rates presented in the table for the years 2021, 2022, and 2023, along with the median values for 2016–2020, allow for a general assessment of the direction and dynamics of changes occurring in the epidemiological situation of these diseases.

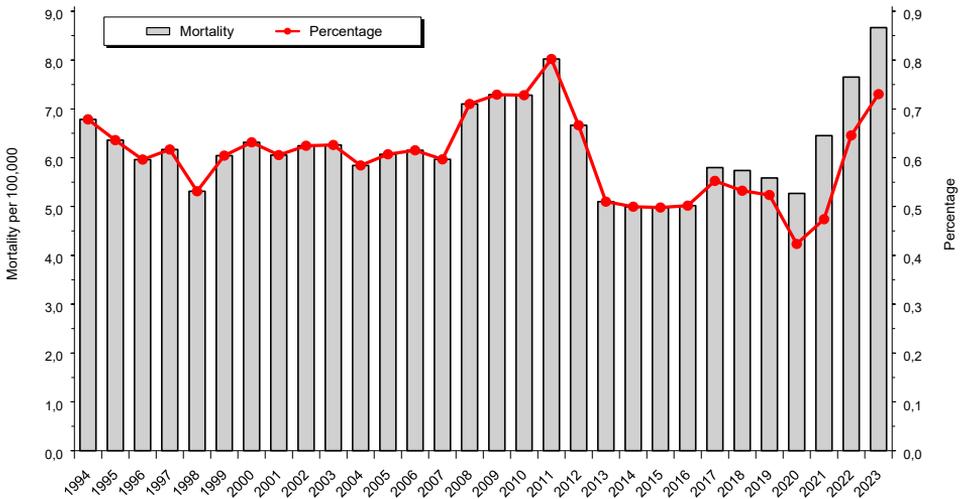


Fig. 8.1. Mortality from infectious diseases (excluding COVID-19) per 100,000 population and the percentage share of deaths from these diseases in the total number of deaths in Poland between 1994 and 2023 (based on data from Statistics Poland – GUS)

The course of the **COVID-19** epidemic in Poland between 2020 and 2023 was characterised by cyclical waves of increased numbers of infections and hospitalisations (Figure 8.2), which were associated with the spread of successive variants of the virus. In 2020, the largest wave of cases occurred between November and December, peaking at the end of the year.

² Quarterly journal published by the National Institute of Public Health NIPH – National Research Institute (PZH – PIB) and the Polish Society of Epidemiologists and Infectious Disease Physicians, available at: <https://www.przegl Epidemiol.pzh.gov.pl/>

Table 8.1. Selected notifiable infectious diseases in Poland. Number of cases and incidence per 100,000 population between 2016 and 2023

Diseases (in order by ICD-10)	Median 2016-2020	2021	2022	2023	Median 2016-2020	2021	2022	2023
	number of cases				incidence			
Cholera	0	0	0	0	0	0	0	0
Typhoid	2	0	3	6	0.005	0	0.008	0.016
Paratyphoid A, B, C	2	2	2	4	0.005	0.005	0.005	0.011
* Salmonellosis	9,957	8,294	6,575	10,348	25.9	21.7	17.4	27.4
including: foodborne intoxications	9,651	8,014	6,256	9,856	25.1	21.0	16.5	26.1
* parenteral infections	306	280	319	492	0.80	0.73	0.84	1.31
Shigellosis	37	18	43	50	0.10	0.05	0.11	0.13
* Other bacterial intestinal infections	15,047	23,307	23,933	24,544	39.2	61.1	63.3	65.1
including: * diarrhoeic <i>E.coli</i>	285	103	150	208	0.74	0.27	0.40	0.55
verotoxin-producing <i>E.coli</i>	8	9	36	96	0.02	0.02	0.10	0.25
* other specified and unspecified <i>E.coli</i>	281	124	211	330	0.73	0.32	0.56	0.88
campylobacteriosis	726	631	527	862	1.89	1.65	1.39	2.29
yersiniosis	170	142	180	313	0.44	0.37	0.48	0.83
caused by <i>Clostridioides difficile</i>	11,310	21,157	21,563	21,268	29.5	55.4	57.0	56.4
* other specified and unspecified	2,306	1,141	1,266	1,467	6.00	2.99	3.35	3.89
* Other bacterial foodborne intoxications	504	329	307	285	1.31	0.86	0.81	0.76
including: * Staphylococcal enterotoxin	37	4	125	108	0.10	0.01	0.33	0.29
botulism	22	8	14	17	0.057	0.021	0.037	0.045

Diseases (in order by ICD-10)	number of cases			Incidence				
	Median 2016-2020	2021	2022	2023	Median 2016-2020	2021	2022	2023
Pertussis	1,629	182	371	922	4.24	0.48	0.98	2.45
* Scarlet fever	18,781	2,649	12,654	44,784	48.9	6.9	33.5	118.8
Meningococcal disease	193	107	117	154	0.50	0.28	0.31	0.41
including: meningitis and/or encephalitis	96	50	65	74	0.25	0.13	0.17	0.20
sepsis	126	63	52	78	0.33	0.17	0.14	0.21
* Erysipelas	5,492	2,089	3,161	5,369	14.3	5.5	8.4	14.2
Legionellosis	47	46	118	424	0.12	0.12	0.31	1.12
Syphilis (total)	1,602	1,123	1,995	2,989	4.17	2.94	5.27	7.93
Gonorrhoea	332	287	630	1,322	0.86	0.75	1.67	3.51
Sexually transmitted chlamydia	258	283	517	977	0.67	0.74	1.37	2.59
* Lyme disease	20,629	12,500	17,370	25,285	53.7	32.8	45.9	67.1
Q fever	0	1	2	6	0	0.003	0.005	0.016
* Typhus fever, spotted fever and other rickettsioses	4	2	8	10	0.010	0.005	0.021	0.027
Poliomyelitis	0	0	0	0	0	0	0	0
* Creutzfeldt-Jakob disease	26	18	21	30	0.068	0.047	0.056	0.080
Variant Creutzfeldt-Jakob disease	0	0	0	0	0	0	0	0
Rabies	0	0	0	0	0	0	0	0
* Viral encephalitis	357	258	531	779	0.93	0.68	1.40	2.07
including: tick-borne	265	210	446	661	0.69	0.55	1.18	1.75
* other specified	29	17	48	58	0.08	0.04	0.13	0.15

Diseases (in order by ICD-10)	Median 2016-2020	2021	2022	2023	Median 2016-2020	2021	2022	2023
	number of cases				incidence			
* other unspecified	78	31	37	60	0.20	0.08	0.10	0.16
* Viral meningitis	943	194	365	775	2.45	0.51	0.96	2.06
including:								
* enteroviral	65	5	53	246	0.17	0.01	0.14	0.65
* other specified and unspecified	809	189	312	529	2.11	0.50	0.82	1.40
Dengue fever (classical and haemorrhagic)	30	2	23	70	0.08	0.01	0.06	0.19
Yellow fever	0	0	0	0	0	0	0	0
Lassa fever	0	0	0	0	0	0	0	0
Crimean-Congo haemorrhagic fever	0	0	0	0	0	0	0	0
Disease caused by Marburg or Ebola virus	0	0	0	0	0	0	0	0
* Varicella	160,707	57,669	171,708	190,825	418.2	151.1	453.9	506.2
Measles	133	13	27	35	0.346	0.034	0.071	0.093
Rubella	437	50	147	243	1.14	0.13	0.39	0.64
including:								
congenital rubella	0	0	0	0	0	0	0	0
Hepatitis A	1,067	92	233	206	2.78	0.24	0.62	0.55
Hepatitis B	3,196	1,547	2,500	3,142	8.32	4.05	6.61	8.33
including:								
acute	45	10	29	36	0.117	0.026	0.077	0.095
Hepatitis C	3,442	1,244	2,528	3,267	8.96	3.26	6.68	8.67
* Viral hepatitis other and unspecified	12	8	53	55	0.03	0.02	0.14	0.15
AIDS	102	64	137	156	0.27	0.17	0.36	0.41
Newly detected HIV infections	1,317	1,461	2,604	2,189	3.43	3.83	6.88	5.81

Diseases (in order by ICD-10)	Median 2016-2020	2021	2022	2023	Median 2016-2020	2021	2022	2023
	number of cases				incidence			
Mumps	1,585	484	922	966	4.13	1.27	2.44	2.56
Malaria	27	15	26	46	0.07	0.04	0.07	0.12
Echinococcosis	64	26	46	66	0.17	0.07	0.12	0.18
Trichinosis	4	2	1	5	0.010	0.005	0.003	0.013
Disease caused by <i>Streptococcus pneumoniae</i>	1,192	962	2,216	2,957	3.10	2.52	5.86	7.84
including: meningitis and/or encephalitis	181	123	208	273	0.47	0.32	0.55	0.72
sepsis	815	650	1,459	1,934	2.12	1.70	3.86	5.13
other specified and unspecified	466	323	853	1,271	1.21	0.85	2.25	3.37
Disease caused by <i>Haemophilus influenzae</i>	102	52	149	265	0.27	0.14	0.39	0.70
including: meningitis and/or encephalitis	10	3	16	33	0.026	0.008	0.042	0.088
sepsis	54	30	88	129	0.14	0.08	0.23	0.34
* Bacterial meningitis and/or encephalitis – other specified	122	51	78	150	0.32	0.13	0.21	0.40
* Bacterial meningitis and/or encephalitis – other unspecified	216	60	102	150	0.56	0.16	0.27	0.40
* Meningitis other and unspecified	720	311	475	649	1.87	0.81	1.26	1.72
* Encephalitis other and unspecified	100	66	89	146	0.26	0.17	0.24	0.39
Influenza and influenza-like illness	4,790,033	2,973,793	4,703,128	.	12,478.4	7,792.5	12,433.1	.
Congenital toxoplasmosis	18	13	30	25	4.48	3.92	9.83	9.18
COVID-19	x	2,852,789	2,370,351	381,244	x	7,475.4	6,266.2	1,011.3

a) Per 100,000 population overall, children under 2 years of age, and live births (congenital conditions). * Disease entities and syndromes not covered by surveillance within the European communicable disease surveillance network. 1) Data from the National Institute of Tuberculosis and Lung Diseases

Data source: Infectious Diseases and Poisonings in Poland. NIPH NIH-NRI, Chief Sanitary Inspectorate, Warsaw. Annual reports 2016–2023

In 2021, two distinct epidemic waves were observed – the first in March and April, and another, equally intense, in November and December. 2022 began with a wave between March and April, followed by a sharp decline in the number of new cases. This decline was linked to the lifting of the epidemic state in May 2022 and a significant reduction in testing. A summer wave occurred in the second half of the year, but it was considerably smaller than previous ones. In 2023, another increase in cases was observed in March and April and in November and December, though these waves were less intense than in earlier years. Despite the fluctuations in the number of recorded COVID-19 cases, the proportion of hospitalisations in the second half of 2022 and in 2023 remained similar to earlier periods, which may indicate a stabilisation in the clinical course of the disease and the influence of population immunity on the severity of infection. Widespread presence of antibodies against SARS-CoV-2 was observed in the OBSERCO II³ study conducted in 2023. Depending on the study round, the proportion of individuals with antibodies ranged from 96.5% to 97.4%.

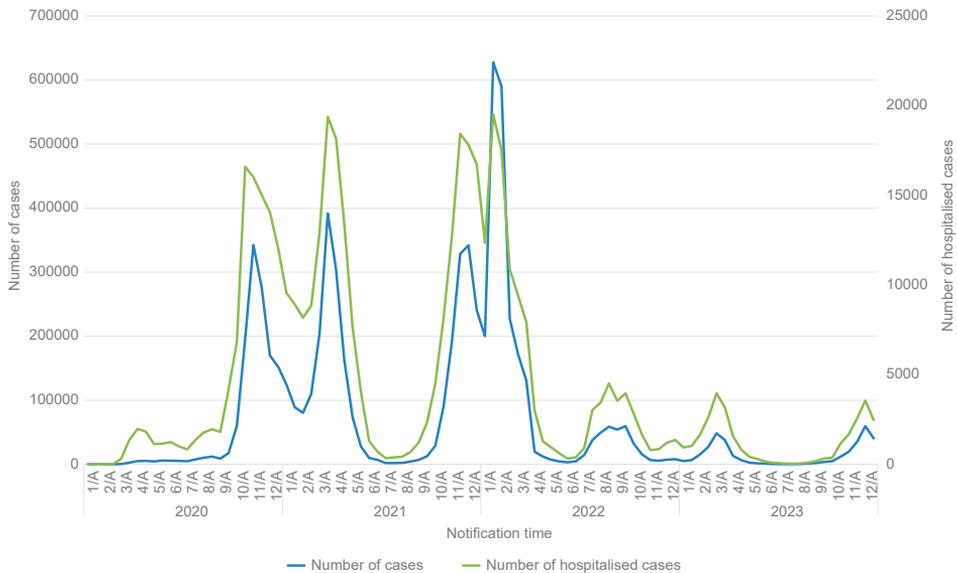


Fig. 8.2. Number of reported COVID-19 cases in Poland between 2020 and 2023, including hospitalised cases. (source: Reports on cases of infectious diseases, infections and poisonings in Poland [biweekly], available at: https://www.wold.pzh.gov.pl/oldpage/epimeld/index_p.html)

³ <https://www.pzh.gov.pl/projekty-i-programy/obserco/>

It should also be emphasised that, due to the limitations in testing, the actual number of cases is likely to be significantly higher than the number of officially reported cases, which hinders a comprehensive assessment of the epidemiological situation. Among participants in the aforementioned OBSERCO II study who experienced respiratory symptoms and underwent PCR testing between February and May 2023, COVID-19 was confirmed in 5.6% of cases, influenza in 0.4%, and RSV infection in 0.3%. During the October–December period, these proportions were 11%, 0%, and 0.2%, respectively. These findings indicate continued circulation of the SARS-CoV-2 virus in the population in 2023, despite the small number of recorded cases. Therefore, it is justified to implement a *sentinel* surveillance system, preferably integrated with existing influenza and RSV⁴ surveillance, which would enable improved monitoring of SARS-CoV-2 circulation in the population and assessment of its impact on public health.

Diseases covered by mandatory vaccination in Poland

The implementation of the National Immunisation Programme in Poland for over sixty years has had a significant impact on the epidemiological situation in the country regarding vaccine-preventable diseases. Of particular importance are the mandatory vaccinations, which apply to children and adolescents aged 0 to 19 years. As a result of compulsory vaccination, diseases such as diphtheria, tetanus, poliomyelitis, measles, rubella, hepatitis B, and infections caused by *Haemophilus influenzae* have been significantly reduced or eliminated. A reduction in the number of cases and in the occurrence of disease complications requiring hospitalisation has also been observed following the inclusion of *Streptococcus pneumoniae* vaccination in the Mandatory Vaccination Schedule in 2017. *Streptococcus pneumoniae* is responsible for severe forms of meningitis, sepsis, pneumonia, otitis media, and deaths among the youngest children as well as among older adults, especially those over the age of 65. For this reason, a 50% reimbursement for the pneumococcal vaccine was introduced for individuals over 65 years of age in designated risk groups from 1/01/2022.

⁴ ECDC, WHO Regional Office for Europe. Operational considerations for respiratory virus surveillance in Europe [Internet]. Copenhagen, Denmark and Stockholm, Sweden: European Centre for Disease Prevention and Control and WHO Regional Office for Europe; 2022 [cited 1 December 2024]. Report No.: WHO/EURO:2022-5841-45606-65427. Available at: <https://www.ecdc.europa.eu/en/publications-data/operational-considerations-respiratory-virus-surveillance-europe>

An important change in the Mandatory Vaccination Schedule was the introduction of rotavirus vaccination from 1/01/2021. Rotaviruses are the most common cause of diarrhoea among infants and young children, often requiring hospital treatment. In 2021, the incidence was 19.5 per 100,000 population, while in 2022 it was more than 4.5 times higher (90.4) compared to the previous year, and more than 5.5 times higher than in 2023, when the incidence was 16.2 per 100,000 population. It is highly likely that the increase in cases observed in 2022 was a post-pandemic effect and may have been related to increased sensitivity of the surveillance system. According to surveillance data, the proportion of hospitalised cases was very high: from over 85% to 91.7% in 2022. More favourable incidence, morbidity and hospitalisation rates are expected in the coming years as rotavirus vaccination becomes more widespread.

The epidemiological situation regarding pertussis in Poland remains complex. Periodic epidemic increases continue to be observed every 3 to 5 years, indicating sustained circulation of the bacteria in the community and continued population susceptibility to infection. Since the second half of the 1990s, there has been a rise in the number of pertussis cases, reaching approximately 2,000–3,000 annually. In 2016, an epidemic peak was recorded with as many as 6,828 reported cases. Since then, a downward trend has been observed: in 2017, 3,067 cases were reported (incidence: 7.98 per 100,000 population), and in 2018 the number further declined to 1,548 cases, i.e. a decrease of 49.4% compared to the previous year (incidence: 4.0 per 100,000). In 2019, 1,630 cases were reported (incidence: 4.25 per 100,000). The pertussis epidemiological situation in 2020 was significantly affected by restrictions on interpersonal contact introduced to limit SARS-CoV-2 transmission. A reduction of more than half in the number of pertussis cases was recorded compared to 2019, with 753 cases reported in 2020. In 2021, the number of cases dropped further to 182 – the lowest level in over 30 years – most likely due to the continued enforcement of social distancing measures and mandatory mask-wearing during the pandemic. 2022 saw an increase in the number of pertussis cases compared to the previous year (371 cases in 2022 versus 182 cases in 2021), which was influenced by the gradual lifting of social distancing restrictions and mandatory mask-wearing. Similarly, there was another increase in pertussis cases in 2023, rising to 922 cases and an incidence of 2.45 per 100,000 population. The increase in the number of individuals susceptible to pertussis may lead to compensatory epidemics in the future. Therefore, it is crucial to maintain high vaccination coverage (above 95%) in the population to prevent new cases of the disease (Fig. 8.3).

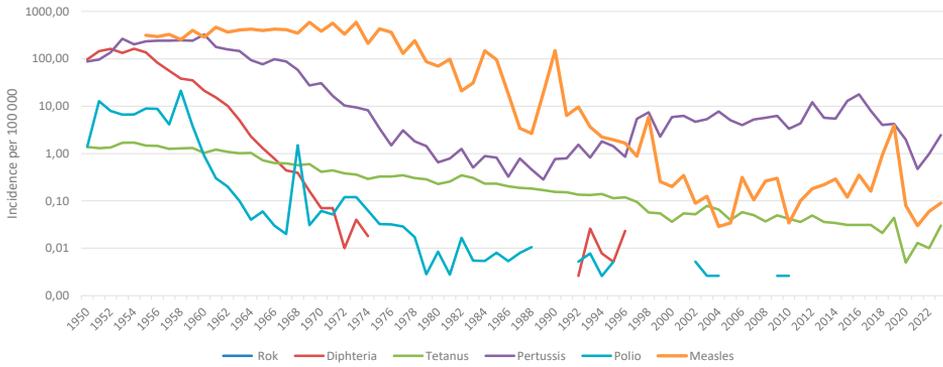


Fig. 8.3. Incidence of selected infectious diseases against which mandatory vaccination programmes are conducted for children and adolescents, 1950–2023 (Source: NIPH NIH-NRI)

It should be emphasised that the implementation of vaccinations against diphtheria, tetanus, pertussis, polio, measles, and rubella has remained at a very high level for most years, ranging between 95% and 100%. The source of information regarding the implementation of mandatory vaccinations in our country is the data on the vaccination coverage of children and adolescents, collected annually by employees of the sanitary and epidemiological stations from all healthcare facilities in Poland. Data on mandatory vaccination coverage indicates that in recent years, approximately 5% of children and adolescents were not vaccinated (Figure 8.4). Regarding most vaccinations, a slight upward trend in vaccination coverage was observed in 2022, which continued into 2023 (Figure 8.5).

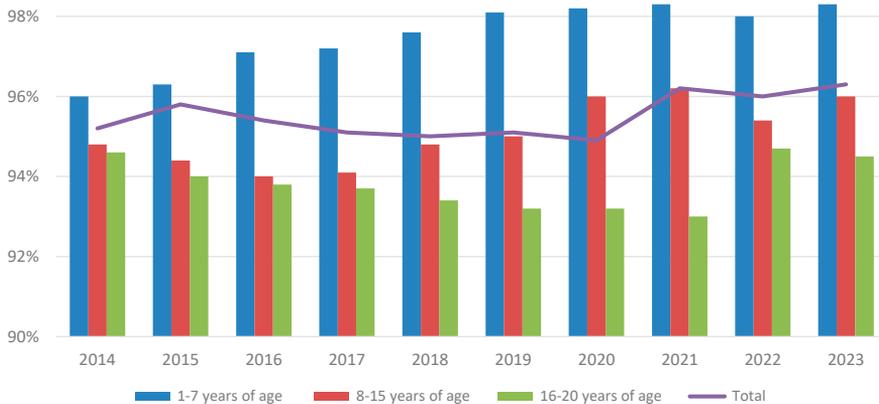


Fig. 8.4. 2006-2023 Immunisation Programme. Percentage of children and adolescents under surveillance, covered by the Programme (source: NIPH NIH-NRI)

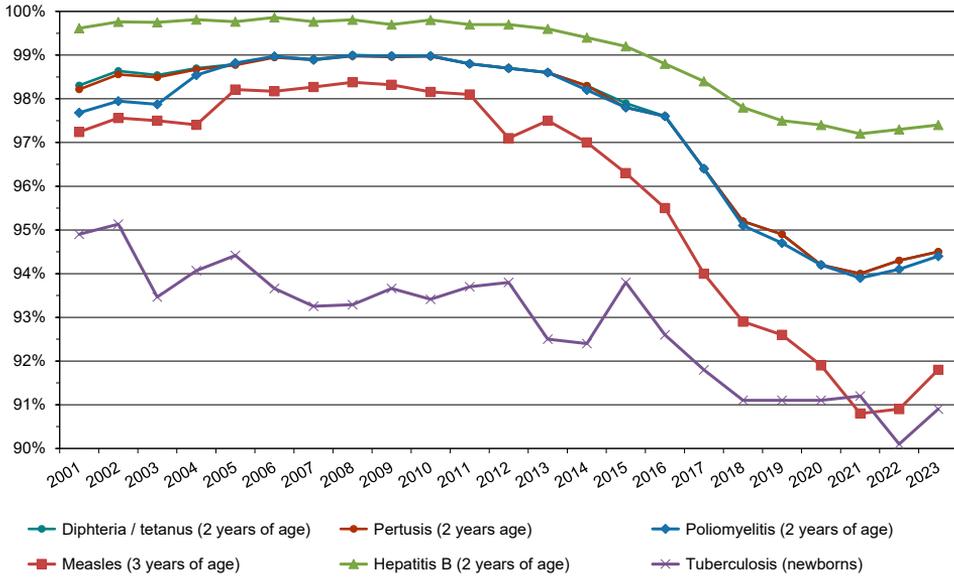


Fig. 8.5. 2001-2023 Immunisation Programme. Percentage of children aged 1-3 years vaccinated against selected diseases (source: NIPH NIH-NRI)

As in previous years, the implementation of vaccinations at the voivodship level varied, with coverage not falling below 87.0%, ranging from 87.3% to 99.1%. Additionally, there remains a trend of lower vaccination rates in the following voivodeships: Podlaskie, Lubelskie, Podkarpackie, Małopolskie, Świętokrzyskie, and Mazowieckie. The vaccination coverage rate for the population subject to mandatory vaccinations, which remains at 90.0%, is still sufficient to achieve herd immunity, preventing the epidemic spread of diseases. An important step in the process of verifying the vaccination status of the population in Poland will be the introduction of an electronic vaccination card, planned to be introduced by the Ministry of Health in the second half of 2025, which will include the registration of all vaccinations covered by the Mandatory Vaccination Schedule. From the perspective of the health security of our society, this measure will allow for an accurate assessment of the vaccination status of children and adolescents in Poland and will help outline educational and promotional actions in this area (Table 8.2).

It is worth emphasising that, as a result of the vaccination programme, the last case of poliomyelitis (Heine-Medin disease) caused by wild poliovirus in Poland was recorded in 1984 (Fig. 8.3). Since then, despite active surveillance for poliovirus infections among individuals under 15 years of age presenting with symptoms of acute flaccid paralysis (which is mandatorily reported to the surveillance system),

only sporadic cases caused by vaccine-derived poliovirus (one each in 2009, 2010, and 2013) have been registered. Following the outbreak of war in Ukraine and the mass migration of Ukrainian citizens to Poland, whose vaccination coverage was lower than that of the Polish population, concerns were raised about the potential emergence of polio cases. However, intensified epidemiological surveillance conducted under the Global Polio Eradication Initiative coordinated by WHO did not detect any cases of poliomyelitis in Poland by the end of 2023. Nevertheless, environmental surveillance identified vaccine-derived polioviruses several times in sewage samples collected in Warsaw and Lublin. This is related to the use of bOPV in Ukraine, which contains attenuated strains of types 1 and 3. The detection of such viruses is an expected outcome and may indicate effective environmental monitoring. In accordance with WHO guidelines and the National Action Plan for response to polio outbreaks or related events, these isolates are not subject to notification.

Table 8.2. Vaccination coverage in Poland in 2023 (source: NIPH NIH-NRI)

Type of vaccine	The average coverage in the country	Min. and max. coverage by voivodship	Age of children in assessment of coverage
Diphtheria/tetanus	94.50%	90.7%- 97.6%	second year of life
Pertussis	94.50%	90.7%- 97.6%	second year of life
Poliomyelitis	94.40%	90.7%- 97.5%	second year of life
Measles/mumps/rubella	91.80%	87.3%- 96.6%	third year of life
Rubella	95.70%	91.4%-98.8%	fifteenth years of life
Hemophilus influenzae	94.30%	90.8%- 97.4%	second year of life
<i>Streptococcus pneumoniae</i>	94.70%	90.7%- 97.7%	second year of life
Hepatitis B	97.40%	95.1%- 99.0%	second year of life
Tuberculosis	97.80%	95.2%- 99.1%	second year of life

From the perspective of the Global Polio Eradication Initiative coordinated by the World Health Organisation, Poland has maintained its status as a polio-free country.

Since 1975, cases of diphtheria in Poland have occurred only sporadically (Fig. 8.3) – the last confirmed case was an imported infection from the former Soviet Union in 2000. It is important to remember that there remains a risk of diphtheria re-emergence if there are susceptible individuals and unvaccinated children in the population. One case of diphtheria caused by a non-toxigenic strain of *Corynebacterium ulcerans* was registered in 2023. Accordingly, the diphtheria control strategy must be based on three fundamental components:

- maintaining high vaccination coverage among children and adolescents in accordance with the current immunisation schedule;
- administering booster doses every 10 years with a vaccine containing a reduced dose of diphtheria toxoid (Td vaccine);
- in every suspected case of diphtheria, in addition to microbiological testing for *Corynebacterium diphtheriae*, *Corynebacterium ulcerans*, and *Corynebacterium pseudotuberculosis*, testing for diphtheria toxin production must be performed, as the toxin is responsible for the severe clinical course of the disease and determines the need for vaccine-based prophylaxis.

Tetanus is an infectious disease caused by *Clostridium tetani*, which produces a neurotoxin (tetanospasmin) leading to spastic paralysis. The disease can only be prevented through vaccination. Tetanus cases are very rare in EU countries, where the disease predominantly affects individuals over the age of 60. Since 1998, the number of tetanus cases in Poland has not exceeded 30 per year, and in recent years a downward trend has been observed, with annual case numbers falling to the low teens. There were 8 cases reported in 2018, while in 2019, 17 individuals contracted tetanus. Between 2020 and 2023, a decline in reported tetanus cases was observed in Poland compared to previous years (2 cases in 2020, and 5 cases each in 2021 and 2022), although 2023 saw an increase to 13 cases (2.5 times higher than in 2022). Sporadic cases of tetanus in Poland are mainly reported among older age groups, although some occur in adults under 60 years of age. These cases can often be linked to the absence of booster vaccinations in adults (Fig. 8.6).

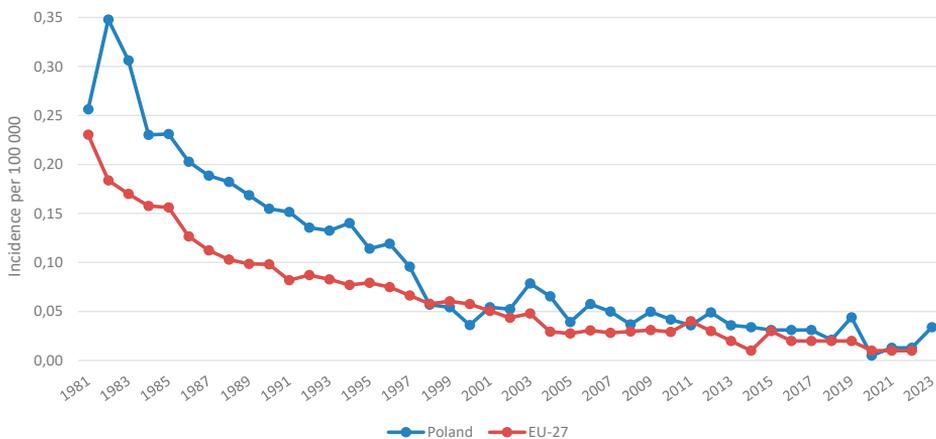


Fig. 8.6. Tetanus incidence in Poland and average in EU/EEA countries between 1981 and 2023 (source: NIPH NIH-NRI, WHO HFA DB, ECDC).

A major success of the tetanus vaccination programme has been the elimination of neonatal tetanus in Poland for several decades. A distinctive feature of tetanus is the widespread presence of *Clostridium tetani* in the environment, with its spores persisting in soil, animal and human faeces, and in human surroundings. This presence is also caused by the lack of herd immunity. In turn, this means that an individual's immunity is solely determined by the society's susceptibility to infection. Since wounds continue to pose a medical problem in both urban and rural environments, maintaining high immunity levels across the population remains the only effective method of disease prevention. Exposure to spores, combined with a high frequency of injuries and low immunity levels, increases the risk of infection. Age also plays a key role in the severity of disease and the likelihood of a fatal outcome.

After years of a steady decline in the incidence of diseases targeted for elimination, such as endemic measles, rubella, and congenital rubella syndrome, the epidemiological situation of these diseases has recently become unstable. Following several years during which approximately 100 measles cases were reported annually (with 133 cases recorded in 2016 and 63 in 2017, and an incidence rate significantly lower than the average across EU countries [Fig. 8.7]), 2018 saw an increase in measles cases to 359, with an incidence rate of 0.93 per 100,000 population – a trend that continued into 2019.

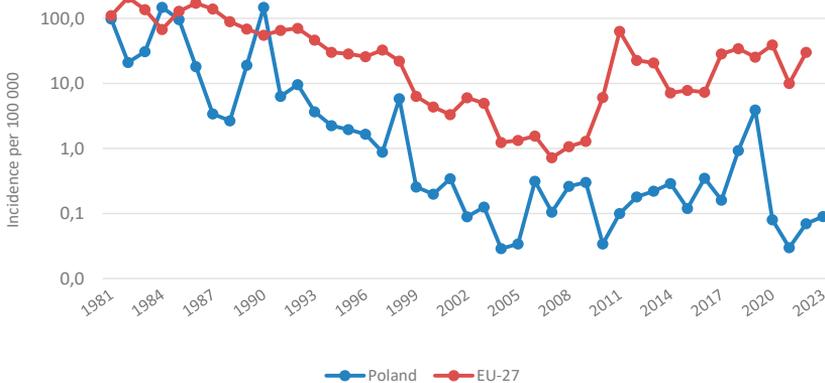


Fig. 8.7. Measles incidence in Poland and average in EU/EEA countries between 1981 and 2023 (source: NIPH NIH-NRI, WHO HFA DB, ECDC)

In total, 1,511 measles cases were reported in Poland in 2019, with an incidence rate of 3.94 per 100,000 population. Most frequently affected were adults

aged 30–44 years. In 2020, only 29 measles cases were reported in Poland (incidence rate: 0.08 per 100,000), with the highest incidence observed among children aged 0–4 years (0.42 per 100,000). Nine patients (31%) were hospitalised, and no deaths due to measles were reported. In 2021, 13 measles cases were registered (incidence rate: 0.03 per 100,000), a 44.8% decrease compared to 2020 and 80% lower than the median between 2014 and 2018. The highest incidence in 2021 was 0.32 per 100,000 among children aged 0–4 years. Six patients (46.2%) were hospitalised with no deaths reported. Vaccination coverage in 2021 for the first dose among 3-year-old children was 90.8%, and for the second dose among 9-year-olds was 84.6% (Fig. 8.15 and Table 8.2). The lower incidence in 2020 and 2021 may have resulted from reduced virus transmission due to acquired immunity following outbreaks between 2017 and 2019, continued vaccination efforts, and, very likely, from public health measures introduced in response to COVID-19, as well as changes in population health-seeking behaviour during the COVID-19 pandemic, and reduced access to healthcare. In 2022, measles cases increased to 27 (incidence: 0.07 per 100,000), followed by 37 cases in 2023 (incidence: 0.09 per 100,000), a trend likely linked to the gradual return to pre-pandemic epidemiological conditions and also to migration from Ukraine. Available data indicates low measles vaccination coverage in Ukraine, and increased population movement into Poland could pose a risk for epidemic outbreaks. A similar rise in measles incidence was observed in other European countries as well. The cause of this unfavourable situation is attributed to several observed social phenomena:

- an increasing number of parents refusing to vaccinate their children against measles, which contributes to declining vaccination coverage and the emergence of outbreaks. Regarding measles, achieving a high vaccination rate, between 90% and 95%, is crucial to establish the so-called herd immunity, which is necessary to halt virus circulation in the population. This is especially important for individuals who cannot be vaccinated, such as infants who are too young, or those with medical contraindications, like people with impaired immune systems; the high level of international and domestic mobility among certain ethnic groups and economic migrants who have not been vaccinated against measles leads to the continuous emergence of small outbreaks in various regions of Poland, regardless of the local level of immunity;
- the inability to predict the location of these outbreaks poses a significant measles risk for unvaccinated individuals, including children with delayed vaccinations. In such situations, infections can also occur among patients and partially immunised medical staff.

From the perspective of the implementation of the measles elimination programme coordinated by the WHO, the observed epidemiological situation of measles in Europe has moved the goal of eliminating the disease further away. However, it still seems achievable in the coming years.

The number of rubella cases, after the compensatory epidemic period, has clearly decreased since 2015 (Fig. 8.8). In 2018, 437 cases of rubella were registered, with an incidence of 1.1/100,000 population. In 2019, there were 285 cases (incidence of 0.7/100,000 population). In 2020 and 2021, 98 and 50 cases occurred, respectively. In the following years, an upward trend became noticeable: 147 cases in 2022 (incidence of 0.39/100,000), and in 2023, 262 cases (incidence of 0.69/100,000).

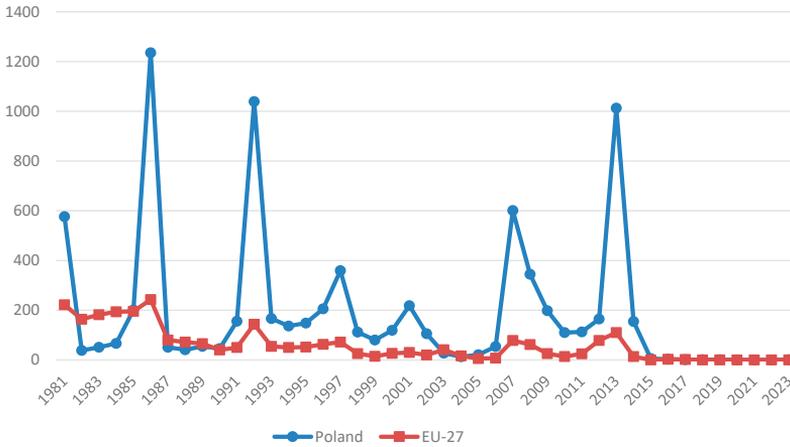


Fig. 8.8. Rubella incidence in Poland and average in EU/EEA countries between 1981 and 2023 (source: NIPH NIH-NRI, WHO HFA DB, ECDC *Atlas*)

The highest incidence of rubella in 2023 occurred in children aged 0-4 years and 5-9 years (Fig. 8.9).

The implementation of mandatory vaccinations against measles, mumps, and rubella in subsequent years will reduce the incidence of rubella and epidemic parotitis. In 2018 and 2019, approximately 1,500 people contracted mumps annually (in 2018, 1,585 people, incidence of 4.1/100,000; and in 2019, 1,338 people, i.e. 3.5/100,000). In the following “pandemic” years, there was a decrease in cases to around 500 cases, with 582 cases in 2020 and 484 cases in 2021. The following years saw an increase in cases, with 922 in 2022 and 969 in 2023, not reaching the numbers from before the pandemic. The incidence of mumps in recent years has

shown a steady, albeit slow, downward trend, less dramatic than for other infectious diseases, due to cyclic epidemics occurring every 3-4 years. However, the incidence of mumps in our country is still higher than the average incidence in EU countries (Fig. 8.10).

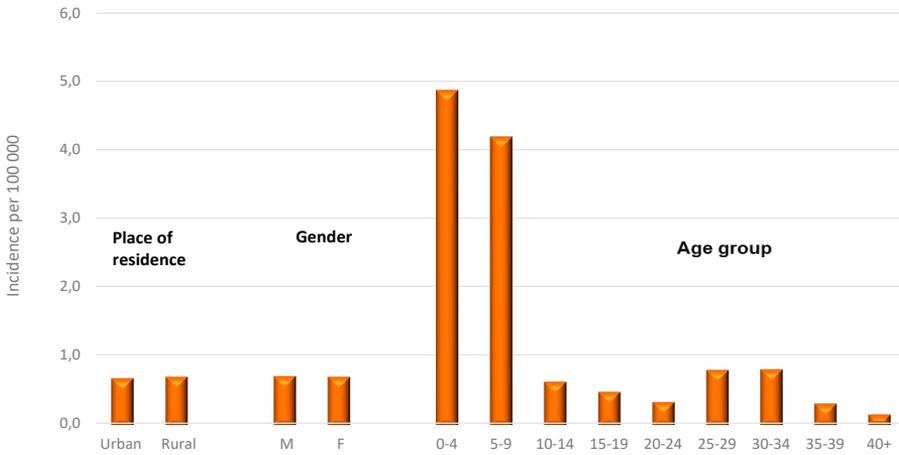


Fig. 8.9. Incidence of rubella in 2023 by place of residence, sex and age (source: NIPH NIH-NRI)

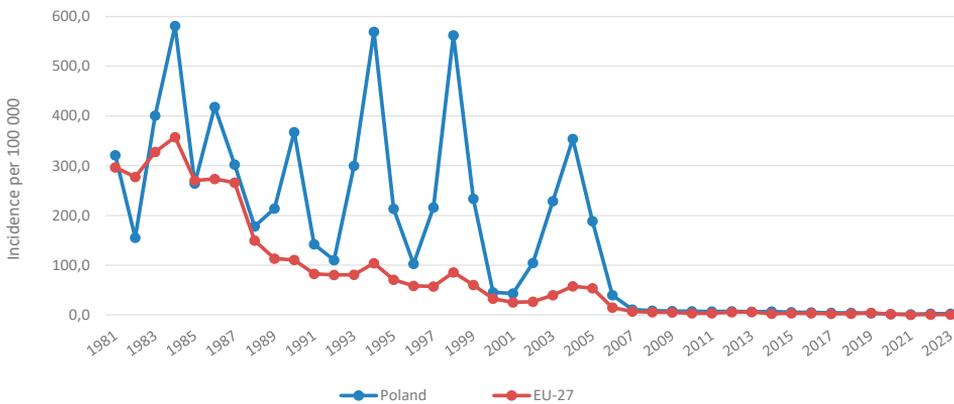


Fig. 8.10. Mumps incidence in Poland and average in EU/EEA countries between 1981 and 2023 (source: NIPH NIH-NRI, WHO HFA DB, ECDC)

The introduction of widespread vaccinations against measles, mumps, and rubella was another key element in improving the epidemiological situation of mumps, for which the decline in incidence reached a pace comparable to rubella. Similarly, the age distribution of cases is comparable to that of rubella (Fig. 8.11).

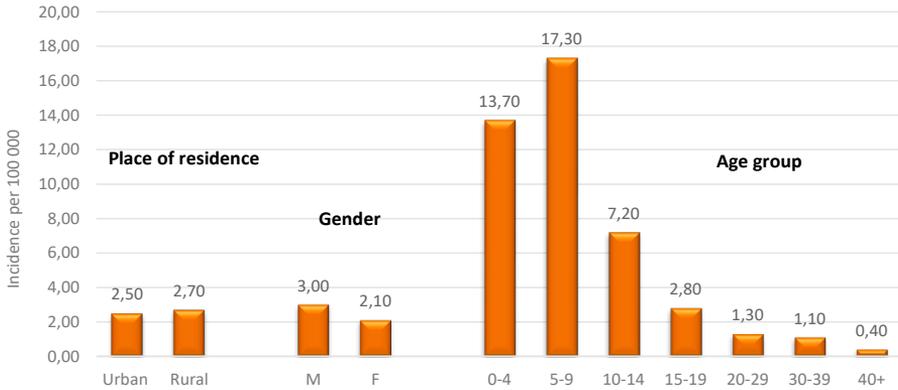


Fig. 8.11. Mumps incidence in 2023 by place of residence, sex and age (source: NIPH NIH-NRI)

However, the insufficient laboratory confirmation of suspected rubella cases remains a concerning issue. This is a necessary element for accurate diagnosis and case confirmation, and it is also a requirement stemming from Poland's participation in the implementation of the rubella elimination programme. The collection of samples for laboratory testing to confirm a clinical diagnosis also applies to cases of measles and the occurrence of acute flaccid paralysis in children under 15 years of age. These programmes are coordinated by the World Health Organisation (WHO).

Until the 1990s, Poland recorded particularly high incidence rates of **hepatitis B (HBV)**, which were more than three times the average incidence observed in other European countries. A key factor contributing to the effective reduction of new infections was the introduction of the mandatory newborn vaccination programme between 1994 and 1996, which was gradually implemented in different voivodeships.

Newborn vaccinations, along with vaccinations for healthcare workers, patients before planned surgical procedures, and improvements in sterilisation procedures in medical facilities, led to a sharp decline in the number of new acute hepatitis B cases. Since 2010, the incidence of acute hepatitis B in Poland has remained below 0.5 per 100,000 residents, representing a small percentage of all diagnosed cases of hepatitis B.

Currently, in the National Immunisation Programme, mandatory vaccinations are provided to the following groups: infants in their first year of life, healthcare workers and individuals training for healthcare professions, persons in contact with an infected individual, individuals with HCV infection, previously unvaccinated women planning pregnancy, patients with renal insufficiency, patients before or after transplantation and those with asplenia or impaired splenic function. It should be emphasised that, at present, hepatitis B vaccination prior to planned

surgical procedures is considered recommended rather than mandatory and the performance of a procedure cannot be conditional upon prior vaccination.

For the past several years, the incidence of hepatitis B (HBV) in Poland has been similar to the levels observed in EU/EFTA countries (Fig. 8.12). Currently, the majority of registered cases are chronic infections detected for the first time, acquired in the past by individuals who were not included in the mandatory newborn vaccination programme.

Similarly to other EU/EFTA countries, the number of new diagnoses significantly dropped during the COVID-19 pandemic, between 2020 and 2021. The return to pre-pandemic levels occurred between 2022 and 2023. However, in the EU/EFTA countries, this return was already observed in 2022 (incidence rate: 8.5 per 100,000 population in 2022 vs. 7.5 in 2019), whereas in Poland, this only happened in 2023, when the incidence reached 8.3 per 100,000, surpassing the 2019 level (7.4 per 100,000).

The decrease in diagnoses during the pandemic is mainly attributed to the limitation of testing due to pandemic restrictions and reduced access to medical care⁵. Therefore, the subsequent increase after the end of the pandemic can partly be explained by the restoration of previous diagnostic capabilities and the increased number of tests being performed.

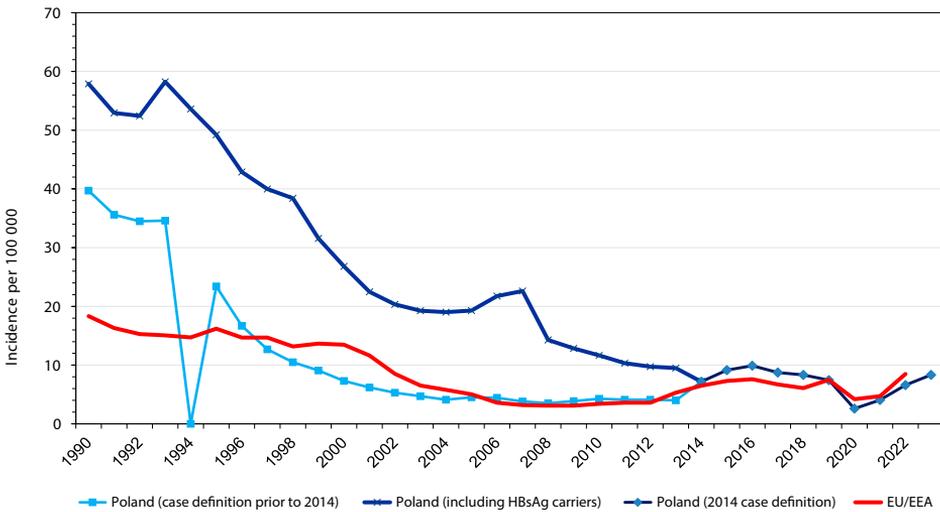


Fig. 8.12. Hepatitis B incidence in Poland and average in EU countries between 1990 and 2023 (source: epidemiological surveillance data and ECDC surveillance atlas. The indicator for EU/EEA excludes countries reporting only acute cases)

⁵ Monitoring of responses to the hepatitis B and C epidemics in EU/EEA countries – 2020 data <https://www.ecdc.europa.eu/en/publicationsdata/monitoring-responses-hepatitis-b-and-cepitemics-eueea-countries-2020-data>

Between 2022 and 2023, the incidence of acute hepatitis B increased again – from 0.03 per 100,000 inhabitants in 2021 to 0.08 in 2022 and 0.10 in 2023. Compared to previous years, cases of acute hepatitis B were recorded in birth cohorts covered by the routine neonatal vaccination programme (Fig. 8.12). In 2023, this mainly concerned individuals under the age of 30.

The change in the epidemiological situation of hepatitis B, especially in younger age groups, may be related to the intensified influx of refugees from Ukraine in 2022–2023. Among all cases of acute hepatitis B during this period, 35% were individuals from Ukraine, and in the group of people under the age of 30, their share exceeded 50%⁶. However, cases of acute hepatitis B still occur among Polish citizens as well. In this context, the declining trend in the vaccination coverage of newborns and infants against hepatitis B, observed since 2015, is concerning. Among children born in 2022, by the end of 2023, only 89.5% nationwide had received the full primary vaccination cycle, including the booster dose, while 2.6% remained completely unvaccinated.

In the case of chronic and unspecified cases, as in previous years, differences between urban and rural residents persisted – a higher incidence rate was recorded in cities (9.9 vs 5.8 per 100,000 inhabitants). Differences were also observed between genders – the incidence rate was higher among men than women (9.9 vs 6.7 per 100,000) (Fig. 8.13).

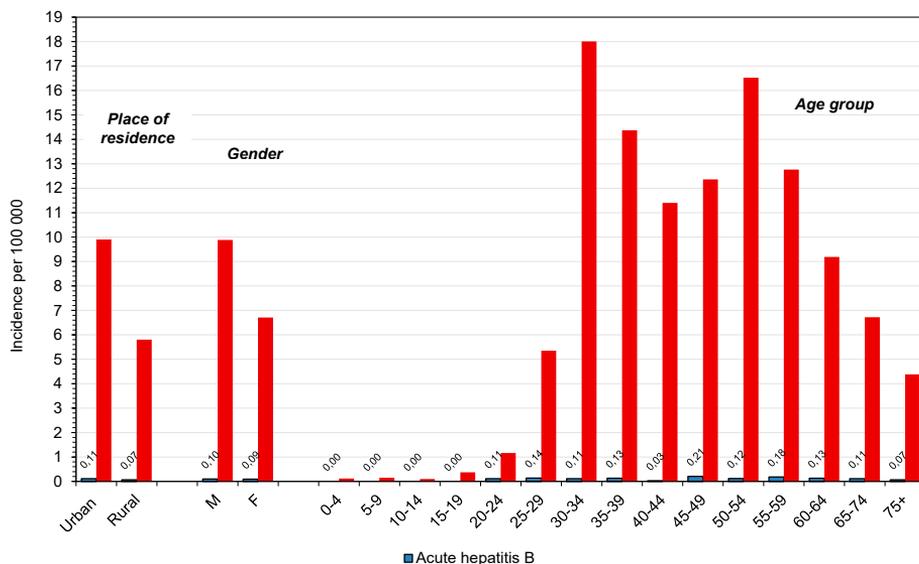


Fig. 8.13. Hepatitis B incidence in 2023 by place of residence, sex and age (source: NIPH NIH-NRI)

⁶ Stępień M, Myszkowska P. Hepatitis B in Poland in 2022. *Epidemiological Review*. 2025 Mar 18;78(4):479-495. English, Polish. doi: 10.32394/pe/197864.

The significant geographical variation in the incidence of hepatitis B observed over many years has persisted even after the pandemic period. The rate of return to pre-pandemic incidence levels varied across different voivodeships. In some regions, such as Lubelskie, Podlaskie, Pomorskie, Śląskie, Wielkopolskie, and Zachodniopomorskie voivodeships, the incidence rates returned to pre-pandemic levels as early as 2022. In contrast, in other voivodeships, including Kujawsko-Pomorskie, Łódzkie, and Świętokrzyskie, the incidence rates in 2023 were still at least 10% lower than in 2019 (Fig. 8.14).

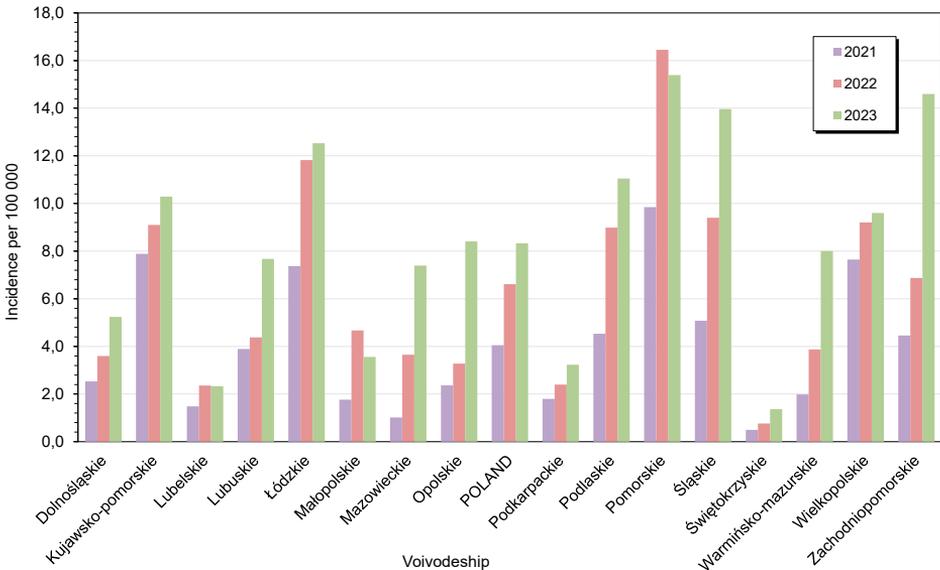


Fig. 8.14. Hepatitis B incidence between 2021 and 2023, by voivodeship (source: NIPH NIH-NRI).

The vaccination against infections caused by *Haemophilus influenzae* type B was first introduced into the vaccination schedule in 1997 as a recommended vaccination for children from the age of 2 months, aimed at preventing, among other things, meningitis and sepsis. As a mandatory vaccination for children at 1 and 2 years of age, it was introduced in 2004, initially for children from orphanages, then in 2005 for children from large families (with at least three children), and from 2007 onwards for all children at 2 months of age. Already in the same year, a 42.6% decrease in the incidence of invasive disease caused by *H. influenzae* was observed, and the incidence of meningitis and/or encephalitis decreased by 40.6%. The number of cases of meningitis and/or encephalitis caused by *H. influenzae* type B has remained at a low level – 6 cases were reported in 2018.

Despite the decrease in cases, the incidence remained the same as in 2017, i.e., 0.03 per 100,000. In the 0-4 age group, one case was reported (incidence: 0.05 per 100,000), while the others were among individuals over 34 years old. In 2019, a total of 99 people fell ill with invasive *H. influenzae* disease (incidence: 0.26 per 100,000), and in 2020 and 2021, the number of cases dropped to 78 (0.20 per 100,000) and 54 (0.14 per 100,000), respectively. However, in 2022, almost three times as many cases of invasive disease were diagnosed, i.e., 149 cases (0.39 per 100,000) compared to 2021, and 280 cases (0.74 per 100,000) in 2023.

In 2023, the vaccination coverage of 2-year-olds (primary vaccination) against *H. influenzae* in individual voivodeships ranged from 90.8% in the Podlaskie voivodeship to 97.4% in the Kujawsko-Pomorskie voivodeship, with the overall coverage for Poland being 94.3% (Fig. 8.15).

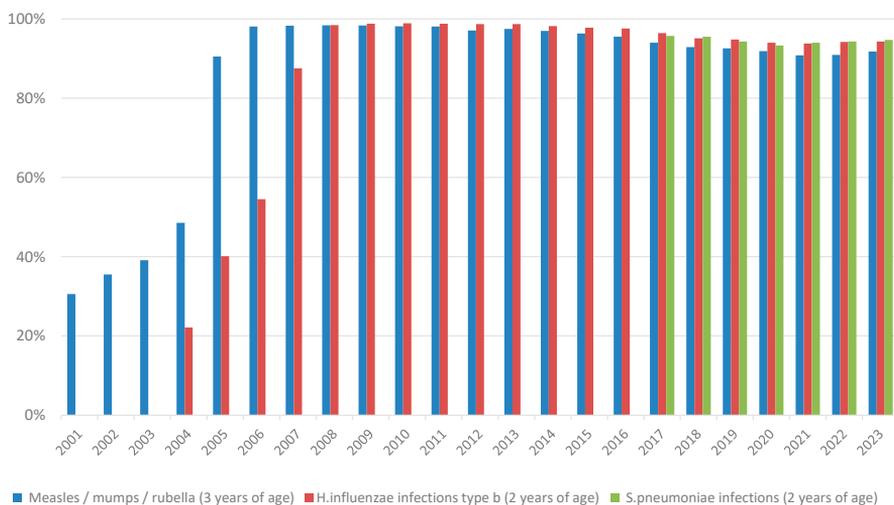


Fig. 8.15. 2001-2023 Immunisation Programme. Percentage of children aged 2–3 years vaccinated against measles, mumps and rubella, and Haemophilus influenzae type B infections (source: NIPH NIH-NRI)

Tuberculosis⁷ remains a global public health challenge. The COVID-19 pandemic contributed in many countries to the slowdown, suspension, or even reversal of previously observed progress in combating tuberculosis. A major global consequence of the pandemic was a significant decline in the number

⁷ Tuberculosis and Respiratory Diseases in Poland in 2023 [Gruźlica i Choroby Układu Oddechowego w Polsce w 2023 r.]. ed. Maria Korzeniewska-Koseła. Institute of Tuberculosis and Lung Diseases, Warsaw 2024

of people diagnosed with and treated for tuberculosis. The number of TB cases reported to the World Health Organisation (WHO) fell from 7.1 million in 2019 to 5.8 million in 2020 (18% decrease). In 2022, access to healthcare services, disrupted during the COVID-19 pandemic, improved globally, resulting in an increase in the number of people diagnosed and treated for tuberculosis. National registers worldwide recorded 7.5 million new cases. In 2022, two-thirds of the global tuberculosis burden was concentrated in eight countries: India (27%), Indonesia (10%), China (7.1%), the Philippines (7.0%), Pakistan (5.7%), Nigeria (4.5%), Bangladesh (3.6%), and the Democratic Republic of the Congo (3.0%). Between 1.18 and 1.43 million people died from tuberculosis in 2022, including individuals infected with HIV. In the same year, 36,179 cases of tuberculosis were reported in the European Union and European Economic Area, with an incidence rate of 8.0 per 100,000 population, ranging from 2.5 per 100,000 in Liechtenstein to 48.7 per 100,000 in Romania. The majority of tuberculosis patients (66.2%) in EU/EEA countries were aged between 25 and 64 years. Multidrug-resistant tuberculosis (MDR-TB) was confirmed in 933 patients (5.0% of cases with known drug susceptibility results, which was more than in the previous year). The highest proportions of MDR-TB were reported in Estonia (25.0%) and Lithuania (16.7%). HIV infection was identified in 620 patients (4.1% of cases with known HIV status).

The epidemiological situation of tuberculosis in Poland is improving, although the process remains rather slow (Fig. 8.16).

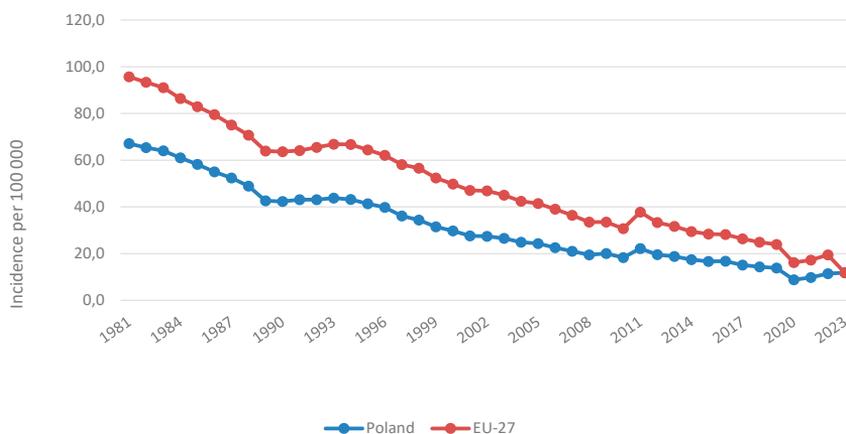


Fig. 8.16. Tuberculosis incidence in Poland and average in EU/EEA countries between 1981 to 2023 (source: IGICH, WHO HFA DB, ECDC)

Despite a continuing downward trend in tuberculosis incidence, Poland remains among the countries with a higher TB incidence rate than the average for Western European countries. In 2018, the average incidence rate of tuberculosis in the EU/EEA was 14.3 cases per 100,000 population (Fig. 8.16). In 2023, a total of 4,436 tuberculosis cases were registered in Poland, which is 122 more than in the previous year, and 2,262 fewer than in 2014. In 2023, the overall incidence of all forms of tuberculosis was 11.8 per 100,000 population, which represents an increase of 3.5% compared to 2022, and a decrease of 32.2% compared to 2014, when the rate stood at 17.4. New cases of tuberculosis, with no history of previous treatment, accounted for 88.4% of all reported cases in 2023 (3,920 individuals; incidence rate: 10.4). 516 recurrent cases, with an incidence rate of 1.4, accounted for 11.6% of all reported TB cases. Pulmonary tuberculosis was the most common form of the disease, representing 96.1% of all cases in 2023. A total of 4,265 pulmonary TB cases were registered (incidence rate: 11.3). Patients with exclusively extrapulmonary tuberculosis accounted for 3.9% of all cases in 2023 – 171 cases, incidence rate: 0.5. As in previous years, the most common form of extrapulmonary tuberculosis was tuberculous pleuritis – 69 cases, accounting for 40.4% of all extrapulmonary TB cases. Three individuals were diagnosed with tuberculous meningitis and encephalitis. In 2023, no cases of this form of TB were registered among children (aged 0–14 years) and adolescents (15–19 years).

Vaccination against tuberculosis has been carried out for many years, and its implementation remains at a high level, despite a downward trend observed in recent years (Fig. 8.5). The effectiveness of this method of protecting public health is relatively low. The inclusion of tuberculosis vaccination in the schedule is based on its role in preventing tuberculous meningitis and encephalitis, as well as on WHO recommendations for countries with a higher tuberculosis incidence. In 2023, tuberculosis incidence rate increased with age, but only up to 45–64 age group. Rates ranged from 0.9 among children aged 0–14 years to 19.1 among persons aged 45–64 years. People aged 45–64 years accounted for the largest proportion of all tuberculosis cases – 42.5%. In earlier years, the highest incidence rates were observed in the oldest age group, i.e. those aged ≥ 65 years. In 2023, the incidence rate among persons aged 65 years and older was 15.3. The highest TB incidence rates in children were recorded in the following voivodeships: Pomorskie – 2.6, Lubelskie – 2.4, and Zachodniopomorskie – 2.2 (0.4). As in previous years, tuberculosis incidence was higher among men than among women in 2023. 3,282 cases of tuberculosis were reported in men (incidence rate: 18.0) and 1,154 cases in

women (incidence rate: 5.9). Male cases accounted for 74.0% of all TB cases. Once again in 2023, tuberculosis incidence among urban residents was higher than in rural populations. A total of 2,877 cases were registered in cities, and 1,559 in rural areas. The incidence rate among urban residents was 12.8, and 10.2 among rural residents. Significant differences in tuberculosis incidence rates between voivodeships, observed for many years, were also present in 2023. The highest incidence of all forms of tuberculosis was recorded in the following voivodeships: Lubelskie – 16.2, Śląskie – 15.7, and Świętokrzyskie – 15.5. The lowest incidence rates were observed in Podlaskie – 6.3, Warmińsko-Mazurskie – 6.7, Lubuskie – 7.0, and Wielkopolskie – 7.1 (Fig. 8.16). In 2023, tuberculosis was bacteriologically confirmed in 3,554 patients, including 3,460 cases of pulmonary tuberculosis. The incidence of all bacteriologically confirmed tuberculosis cases was 9.4, and 9.2 for culture-confirmed pulmonary TB. Among the tuberculosis cases registered in 2023, there were 352 foreign nationals, most of whom (235 individuals) were aged 20–44 years. Cases among foreign nationals accounted for 7.9% of all reported TB cases. Among these, 6 cases were recorded in children aged 0–14 years, and 16 cases among adolescents aged 15–19 years. The largest number of foreign nationals with tuberculosis, 98, were treated in the Mazowieckie voivodeship. Ukrainians were the largest group (250), followed by significantly smaller groups from Georgia (13) and India (10). Foreign nationals diagnosed with tuberculosis came to Poland from 29 countries. As in previous years, the coexistence of tuberculosis and HIV infection in Poland in 2023 was rare. According to data from the NIPH NIH-NRI, tuberculosis was an AIDS-defining illness in 32 people living with HIV. In 2023, 167 tuberculosis patients were identified as having been held in pre-trial detention centres or prisons (incidence rate: 218.9 per 100,000 inmates). Outpatient treatment in 2023 included 102 cases of tuberculosis with resistance to at least one anti-TB drug. Among these were 56 cases of multidrug-resistant tuberculosis (MDR-TB). MDR-TB cases accounted for 2.8% of all bacteriologically confirmed TB cases and 3.1% of cases with known drug susceptibility (in 2023, drug susceptibility test results were available for 89.7% of culture-positive cases). In 2022, tuberculosis was the cause of death in 472 people. The mortality rate was 1.2 per 100,000 population. As in previous years, pulmonary tuberculosis was the main cause of TB-related deaths – 461 people died from it (mortality rate: 1.2). Extrapulmonary tuberculosis caused 11 deaths. Deaths from tuberculosis accounted for 0.1% of all deaths in Poland in 2022 and 18.7% of deaths caused by infectious and parasitic diseases.

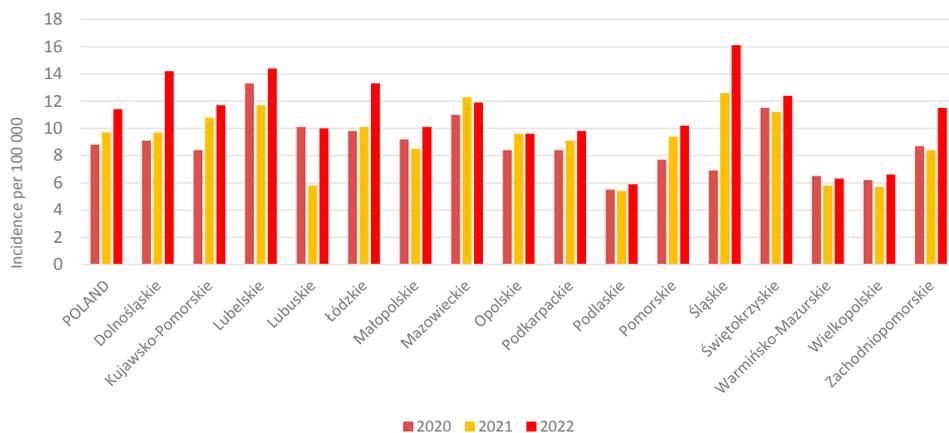


Fig. 8.17. Tuberculosis incidence by voivodeship in 2020, 2021 and 2022 (source: National Institute of Tuberculosis and Lung Diseases)

Among diseases covered by long-term vaccination programmes, only pertussis has shown a deterioration in the epidemiological situation. Pertussis remains a public health concern because vaccine-induced immunity does not last a lifetime – it wanes over time, typically within 4 to 10 years after vaccination. Newborns and infants who are unvaccinated or not fully immunised, particularly during the first six months of life, account for the majority of pertussis-related deaths in EU/EEA countries. Between 2011 and 2022, registered infant deaths due to pertussis involved children under six months of age, with most occurring in infants during their first month of life. This highlights the importance of vaccinating pregnant women during each pregnancy, in order to protect the youngest children from severe disease and death until they receive their primary immunisations. Moreover, a concerning trend is the decreasing vaccination coverage against pertussis among children in their second year of life who are subject to mandatory primary immunisation. An increase in the number of individuals susceptible to pertussis may lead to large compensatory outbreaks in the future. Therefore, under the current epidemiological conditions, it is essential to maintain a population vaccination coverage rate of over 95% to prevent new pertussis cases. In the coming years, the number of pertussis cases is expected to continue rising, which makes it essential to raise awareness, particularly among healthcare professionals, regarding early diagnosis, diagnostic methods, treatment, and notification to the State Sanitary Inspection, which is vital for maintaining surveillance of pertussis. This is not an isolated phenomenon, as many European and non-European countries have also recorded increases in pertussis incidence (Fig. 8.18).

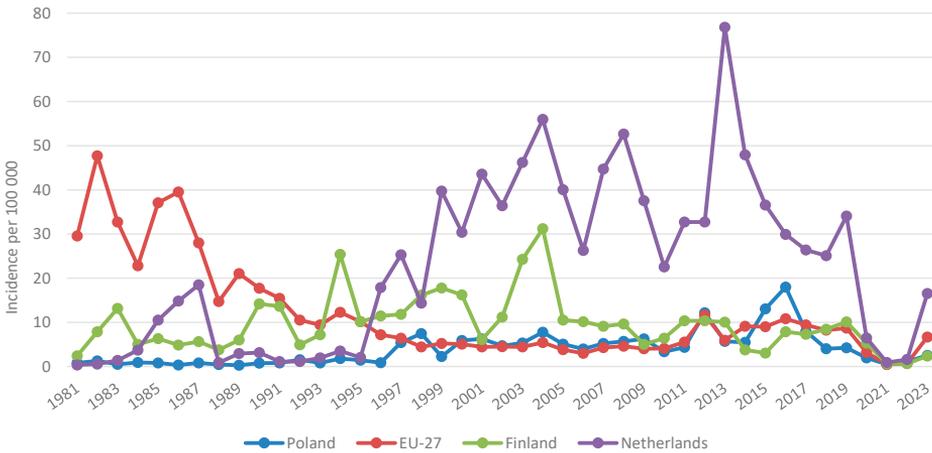


Fig. 8.18. Pertussis incidence in Poland, the Netherlands and Finland and average in the EU/EEA countries between 1981 and 2023 (source: NIPH NIH-NRI, WHO HFA DB, ECDC)

In Poland, an increase in pertussis cases occurred in 1996, and already by 1998, the national incidence rate exceeded the average level observed in EU countries for the first time (Poland: 7.4 per 100,000; EU: 4.3). Since most cases involved children aged 5 to 14 years, a booster dose of pertussis-containing vaccine was introduced into the immunisation schedule at the turn of 2003 and 2004 for children aged 6 years, by replacing the DT vaccine with DTaP. As a result of this vaccination strategy, a decline in pertussis incidence was expected in the following years, ideally to a level comparable with that of the 1980s, i.e. below 1 case per 100,000 population. Unfortunately, the introduction of the DTaP booster dose did not meet those expectations. An increase in pertussis incidence continued to be observed among adolescents and older adults, who serve as a source of infection for the youngest children who have not yet received, or not yet completed, their full vaccination schedule (Fig. 8.19). It must be emphasised, however, that until a new vaccine is developed, the only available preventive measure which remains is maintaining pertussis vaccination in accordance with the current schedule.

A highly concerning and growing problem of vaccine refusal and avoidance could be observed in recent years despite the remarkable success of vaccination programmes and the favourable epidemiological situation they have achieved. An analysis of data from periodic reports submitted by healthcare facilities to the Sanitary Inspection indicates that more than 87,000 children were not vaccinated in 2023 (Fig. 8.20).

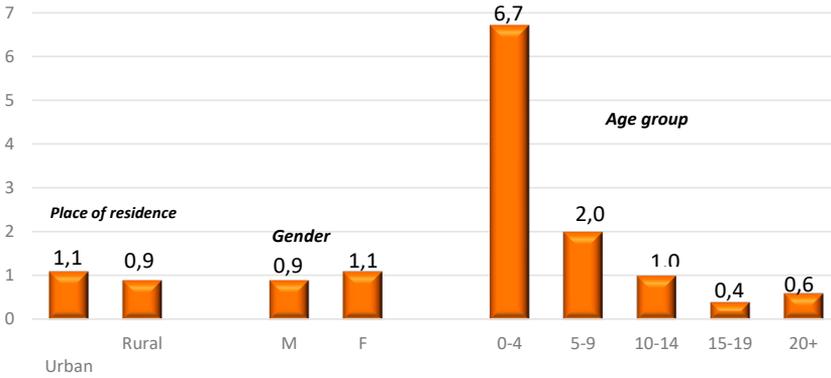


Fig. 8.19. Pertussis incidence in 2022 by place of residence, sex and age (source: NIPH NIH-NRI)

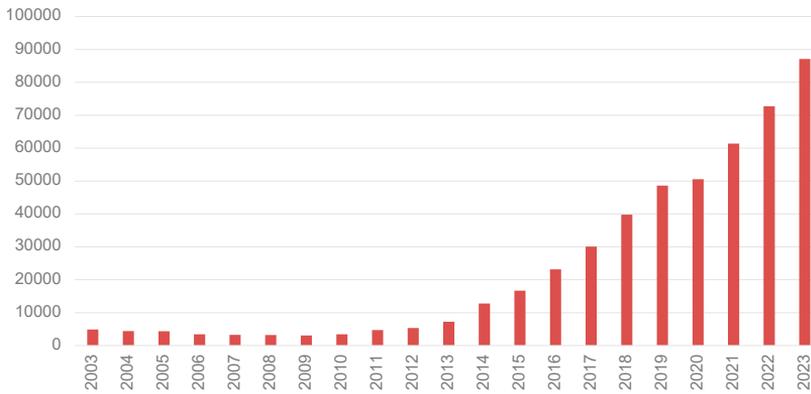


Fig. 8.20. Number of persons evading mandatory vaccinations between 2003 and 2023 (source: NIPH NIH-NRI)

This situation arises, on the one hand, from the growing number of proponents of anthroposophical philosophy, a lifestyle in harmony with nature, religious beliefs, and the strengthening of the anti-vaccination movements, and on the other hand, from the aggressive and often misleading information disseminated by these movements regarding the alleged harmfulness and dangers associated with vaccination. It is important to emphasise that the continued upward trend in the number of people refusing vaccinations poses a risk of the return of epidemics of diseases that have been brought under control through immunisation in the coming years.

Adverse vaccine reactions, known as AEFI (Adverse Events Following Immunisation), which have been subject to mandatory reporting and registration for just under 30 years (the reporting and registration system has been in

operation since 1996), constitute a key tool for assessing vaccine safety in our country. AEFIs are a consequence of vaccinations administered using vaccines registered and marketed in Poland. An increase in the number of reported AEFIs has been observed since the beginning of the registration system until 2023. This should be interpreted as a reflection of the steadily increasing sensitivity of the surveillance system, rather than an actual increase in vaccine reactogenicity. Furthermore, one must consider the several-fold increase in the number of vaccine products used and the types of reactions described over 30 years of surveillance. Equally important from the perspective of surveillance and vaccine safety is the application of a very broad definition of an adverse event following immunisation – one that, under legal regulations, is recognised or suspected by a physician. Reportable reactions include those described in the Summary of Product Characteristics (SmPC), as well as any adverse symptom/reaction occurring within 30 days post-vaccination that may be related to the vaccination. This corresponds to the definition of an Adverse Medical Event. Both AEFIs and Adverse Medical Events are subject to reporting and registration. In 2023, physicians identified and reported a total of 3,857 AEFIs to the State Sanitary Inspection, following vaccinations carried out under the Mandatory Vaccination Schedule and against COVID-19. Of these, 3,371 were classified as mild (87% of all AEFIs), 410 as moderate (11%), and 76 as severe (2.0%). The importance of monitoring adverse events following immunisation is multifaceted. On the one hand, it aims to detect the occurrence of new, atypical and rare reactions, as well as to monitor already known adverse events. On the other hand, it serves to identify risk factors for specific types of reactions, detect vaccine batches with an increased incidence of adverse events, and assess the safety of newly introduced vaccines. It is therefore one of the most essential tools for controlling the post-registration safety of vaccines.

Other infectious diseases

Human immunodeficiency virus (HIV) infections

According to the ECDC report, 24,731 new HIV infections were recorded in 30 EU/EEA countries in 2023 (notification rate of 5.3 per 100,000 population)⁸. The highest rate was reported in Malta (21.0 – 114 HIV infections), and the lowest

⁸ European Centre for Disease Prevention and Control/WHO Regional Office for Europe. HIV/AIDS surveillance in Europe 2024 – 2023 data. Stockholm: ECDC; 2024

in Slovenia (2.1 – 44 HIV infections) and Austria (2.1 – 194 HIV infections). A notification rate exceeding 10 per 100,000 population was registered in as many as six countries. In Poland, the rate stood at 6.0, slightly above the average notification rate for the entire European Union. More than 46% of reported infections were among men who have sex with men (MSM). This is the predominant route of transmission in most Western and Central European countries, according to WHO regional classification. In contrast, in countries of Eastern Europe, a region that includes non-EU/EEA member states, the dominant transmission route is heterosexual contact (over 70%), followed by infections among people who inject drugs (18.4%). In 2023, the notification rate of new HIV diagnoses in Western EU/EEA countries increased by over 47% compared with 2021 (from 4.2 to 6.2 per 100,000 population), likely due to the renewed reporting of infections among migrants, primarily from Ukraine, who were received by various countries in connection with the armed conflict in Ukraine. A similar increase was observed in Central European countries – from 3.2 per 100,000 population in 2021 to 4.2 in 2023 (Fig. 8.21). Only Eastern European countries recorded a decrease in the number of infections, by approximately 6% in 2023 compared to 2021, probably due to the onset of migration from Eastern Europe to Central and Western European countries as a result of the armed conflict in Ukraine.

The influx of such a large group of HIV-infected migrants required ensuring access to antiretroviral therapy (ART). At the beginning of 2022, a group of 47 infectious disease experts from 24 countries, affiliated with Euroguidelines in Central and Eastern Europe (ECEE), participated in a survey assessing their respective countries' capacity to provide care for these individuals⁹. Most HIV centres in countries that received refugees from Ukraine (14 countries) were able to organise a rapid response to the needs of migrants, including access to medical consultations and the provision of ART during the first visit (in over 80.0% of centres). Access to treatment continuation was ensured for a period of 30 to 90 days, depending on the policies adopted by the respective country/centre.

Prior to the COVID-19 pandemic, Poland experienced a steady and fairly dynamic increase in the notification rate of newly diagnosed HIV infections, which rose from 2.9 per 100,000 population in 2012 to 3.7 per 100,000 in 2017. In the following

⁹ Kowalska J D.; Rukhadze N, Sojak L, Bociaga-Jasik M, Sedlacek D, Matulionyte R, Jilich D, Yancheva N, Papadopoulos A, Rozplochowski B, Patrascu R, Aimla K, Begovac J, Parczewski M, Golovco E, Bielec D, Bartovská Z, Shembri A, Zvirbulis V, Hlebowicz M, Kocbach P, Lakatos B, Preliminary report on the provision of HIV care to war refugees with HIV who are migrating from Ukraine: data from the ECEE Network Group. *AIDS* 36(13):p 1887-1890, November 1, 2022. Doi. 10.1097/QAD.0000000000003355

years, a slight decrease in the rate was observed. Additionally, in 2020 – the onset of the pandemic – the rate dropped significantly to 2.5 cases per 100,000 population. However, in the subsequent years, a return to pre-pandemic levels became evident, with a rate of 3.8 per 100,000 population in 2021. In 2022, due to the influx of individuals infected with HIV from Ukraine as a result of the armed conflict, the rate of new infections increased to 6.9 per 100,000 population and remained at a similar level in 2023 – 6.4 cases per 100,000 population (Fig. 8.21). The number of infections detected among foreign nationals increased from 72 in 2020 to 136 in 2021, and in 2022, i.e. following the rise in migration, the number of reported HIV cases reached as many as 714, more than half of whom had been diagnosed while still in Ukraine (370 out of 714). However, in the absence of documentation to continue antiretroviral therapy, it was necessary to conduct HIV testing in Poland. On this basis, the individual was included in epidemiological surveillance as a newly diagnosed case of HIV infection.

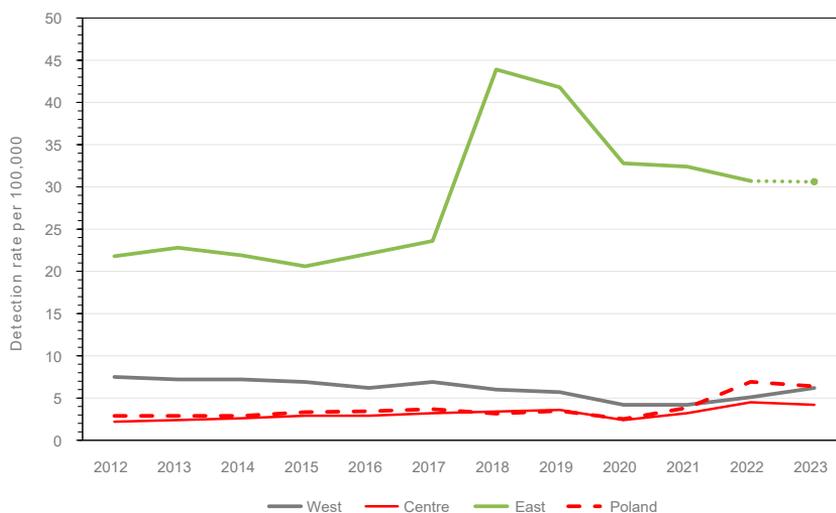


Fig. 8.21. HIV incidence rate per 100 000 inhabitants between 2012 and 2023 in Poland and WHO European sub-regions (source: ECDC HIV surveillance report 2023 and individual data from Epibaza, NIPH NIH-NRI)

A marked variation in the trends of detection and registration of new HIV infections is evident, with the vast majority of diagnoses made among men (Fig. 8.22). However, it is also important to note the growing number of infections among women – largely due to the registration of infections in women who arrived from Ukraine. In 2022, infections among Ukrainian women accounted for 51.1% of all infections in women (428 out of 838 cases), and in 2023 – 48.3% (290 out of 601 cases). Nevertheless, excluding infections among Ukrainian women and considering only those cases

where the stated nationality was Polish, the number of infections in women increased from 79 cases in 2020 to 105 in 2023. It is also important to bear in mind the rising number of cases where no nationality was reported, suggesting that, due to these reporting gaps, the actual increase in diagnoses among Polish women was likely even greater. Between 2021 and 2023, women accounted for 26% of all newly diagnosed HIV cases, with regional variation ranging from 17.5% in the Małopolskie Voivodeship to 38.3% in the Lubuskie Voivodeship (Table 8.3).

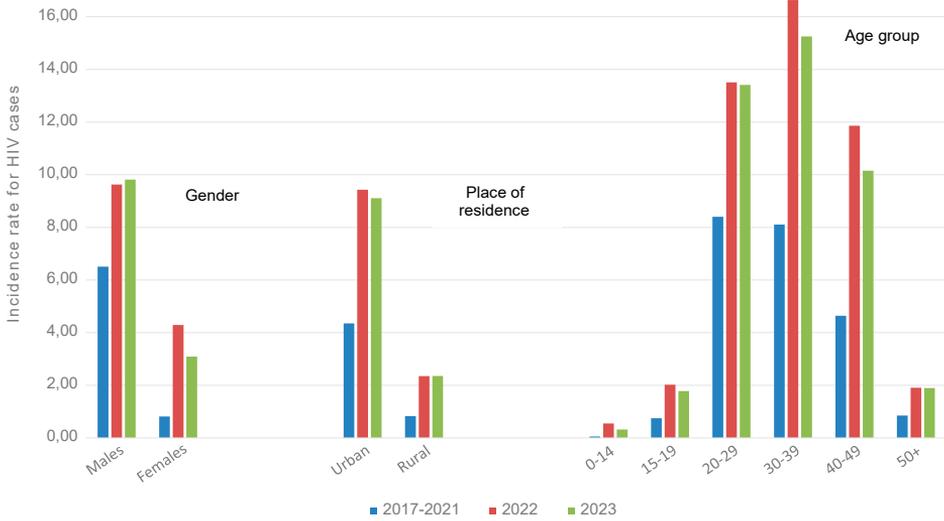


Fig. 8.22. Notification rate of newly diagnosed HIV infections in Poland between 2017 and 2023 by sex, age group, and place of residence (source: individual data from Epibaza, NIPH NIH–NRI)

The trend in infections across different age groups has not changed over time, with the highest number of cases still being reported among individuals aged 30–39 years. However, a notable increase in infections among older individuals should be highlighted – a 54.3% rise in the 40–49 age group and a 122.4% increase among those aged 50 and over (Fig. 8.22). Although the majority of these infections concern people migrating to Poland, this is still a significant group representing a population at risk of transmission. Similarly, the increase in infections among children aged 0–14 years is linked to the registration of vertically transmitted infections that had already been diagnosed in Ukraine. These cases were included in Poland’s epidemiological surveillance system as individuals who had been diagnosed previously and are now residing in Poland. However, they do not represent new mother-to-child transmissions.

In 2023, the highest notification rates of new infections, exceeding 6 cases per 100,000 population, were recorded in the following voivodeships: Dolnośląskie, Łódzkie, Małopolskie, Mazowieckie, Pomorskie, and Zachodniopomorskie.

Among individuals with a known route of transmission, infections were most frequently reported among men who have sex with men (MSM), accounting for 55.1% of all cases between 2021 and 2023. Infections acquired through heterosexual contact constituted 34.8% of all reported cases. The distribution of infections among MSM varies geographically: in the Małopolskie, Mazowieckie, and Wielkopolskie voivodeships, infections in this group accounted for more than 70% of all cases with a known route of transmission. Conversely, infections among MSM were least frequently reported in the Warmińsko-Mazurskie voivodeship – 14.8% of male cases. Infections transmitted through heterosexual contact accounted for half of all reported cases in the Opolskie, Warmińsko-Mazurskie, and Zachodniopomorskie voivodeships (Table 8.3).

Table 8.3 Rates of newly detected HIV infections per 100 000 inhabitants between 2017 and 2023 and characteristics of infections detected in 2021-2023, by voivodeship (source: unit data from Epibaza, NIPH NIH-NRI)

Voivodeship	2017-2021	2022	2023	Cases diagnosed in 2021-2023			
				%female	%MSM*	%PWID*	%MSW, WSM*
DOLNOŚLĄSKIE	5.14	12.19	10.07	33.8%	50.9%	7.9%	28.1%
KUJAWSKO-POMORSKIE	2.51	6.28	4.71	25.4%	57.1%	2.0%	38.8%
LUBELSKIE	1.56	2.67	2.64	24.8%	53.6%	7.1%	35.7%
LUBUSKIE	4.05	6.84	5.03	38.3%	28.6%	19.0%	47.6%
ŁÓDZKIE	3.56	7.32	6.35	29.1%	50.9%	4.5%	32.7%
MAŁOPOLSKIE	4.33	11.02	8.95	17.5%	80.6%	2.4%	15.8%
MAZOWIECKIE	5.77	10.85	8.98	20.2%	71.1%	3.9%	19.7%
OPOLSKIE	2.12	4.46	5.66	34.4%	21.3%	6.4%	63.8%
PODKARPACKIE	1.36	2.50	2.85	18.1%	67.9%	7.1%	21.4%
PODLASKIE	1.73	3.50	2.28	34.1%	44.7%	14.9%	38.3%
POMORSKIE	4.24	7.38	9.28	29.2%	48.6%	6.0%	42.1%
ŚLĄSKIE	4.51	1.59	5.37	21.7%	51.1%	8.7%	38.0%
ŚWIĘTOKRZYSKIE	0.80	0.85	0.60	20.0%	54.5%	0.0%	45.5%
WARMIŃSKO-MAZURSKIE	1.81	2.49	3.17	29.3%	14.8%	22.2%	63.0%
WIELKOPOLSKIE	3.71	6.24	5.73	26.6%	79.2%	5.7%	15.1%
ZACHODNIOPOMORSKIE	3.29	13.84	7.91	38.2%	25.3%	5.5%	66.4%
POLAND	3.88	6.92	6.39	25.9%	55.1%	6.0%	34.8%

*percentages relative to cases with a known route of transmission (21.7% of notifications);

MSM – men who have sex with men; PWID – people who inject drugs; MSW, WSM – heterosexuals

In response to the rising number of newly diagnosed HIV infections, the Ministry of Health introduced, as of 5 May 2025, changes to the guaranteed services package within primary healthcare (PHC, Polish: POZ). These changes allow PHC physicians to order HIV testing without requiring patients to visit a Consultation and Diagnostic Centre or to undergo testing privately at other medical laboratories. The initiative is intended to expand access to HIV diagnostics and increase the HIV testing rate in Poland.

Hepatitis C

The achievement of the global strategy for the elimination of hepatitis C virus (HCV) infection as a public health problem, particularly regarding the detection of chronic infections, was significantly hampered during the COVID-19 pandemic. The HCV detection rate in EU countries in 2020 fell by more than half and in Poland it declined 3.5-fold, remaining at a low level throughout 2021.

In 2022, the number of newly diagnosed cases in EU/EEA countries returned to pre-pandemic levels (6.2 per 100,000 population, compared with 5.7 in 2019). In Poland, the HCV detection rate increased significantly in 2022 but remained below pre-pandemic values. It was only in 2023 that the rate reached a level comparable to 2019 (Figure 8.23 A). As of July 2022, primary healthcare facilities were authorised to perform anti-HCV testing within their allocated diagnostic budget.

Despite this, improvements in HCV detection remain insufficient, reflecting persistent barriers to testing. In particular, following the introduction of this mechanism, the patterns of detection did not change significantly: cases identified in primary healthcare continued to account for the largest proportion, approximately one-third, with a slight upward trend observed in 2023, reaching 41% (Figure 8.23 B). The lack of significant change is partly due to the still relatively short observation period and the incomplete utilisation of this instrument by PHC facilities. It should also be noted, however, that the diagnostic budget allocation applies to tests performed on medical indications (i.e. non-screening tests) and is subject to a predetermined limit. In 2022, this amounted to 60 tests per 10,000 individuals under care within a six-month accounting period.

Estimated analyses conducted in 2019 indicate that the number of chronic HCV cases in EU/EEA countries reaches nearly 1.8 million, while in Poland it is approximately 108,000. Given the wide availability of effective treatment, the main barrier to HCV elimination remains insufficient diagnosis. As infection prevalence declines, increasing detection will require a radical expansion of testing, including screening directed at the general population.

Limitations in access to screening for the general population, the lack of targeted diagnostic programmes for people who use or are dependent on psychoactive substances and difficulties in accessing treatment within this group may constitute the main barriers to achieving HCV elimination targets in Poland.

It is also worth noting the significant decline in the number of acute HCV cases during the pandemic. Although an increase has been observed post-pandemic, the number of new cases remains below pre-2020 levels.

Similar to HBV, the epidemiology of HCV in 2022-2023 was influenced to some extent by increased migration. Overall, individuals of Ukrainian nationality accounted for approximately 10% of registered HCV cases.

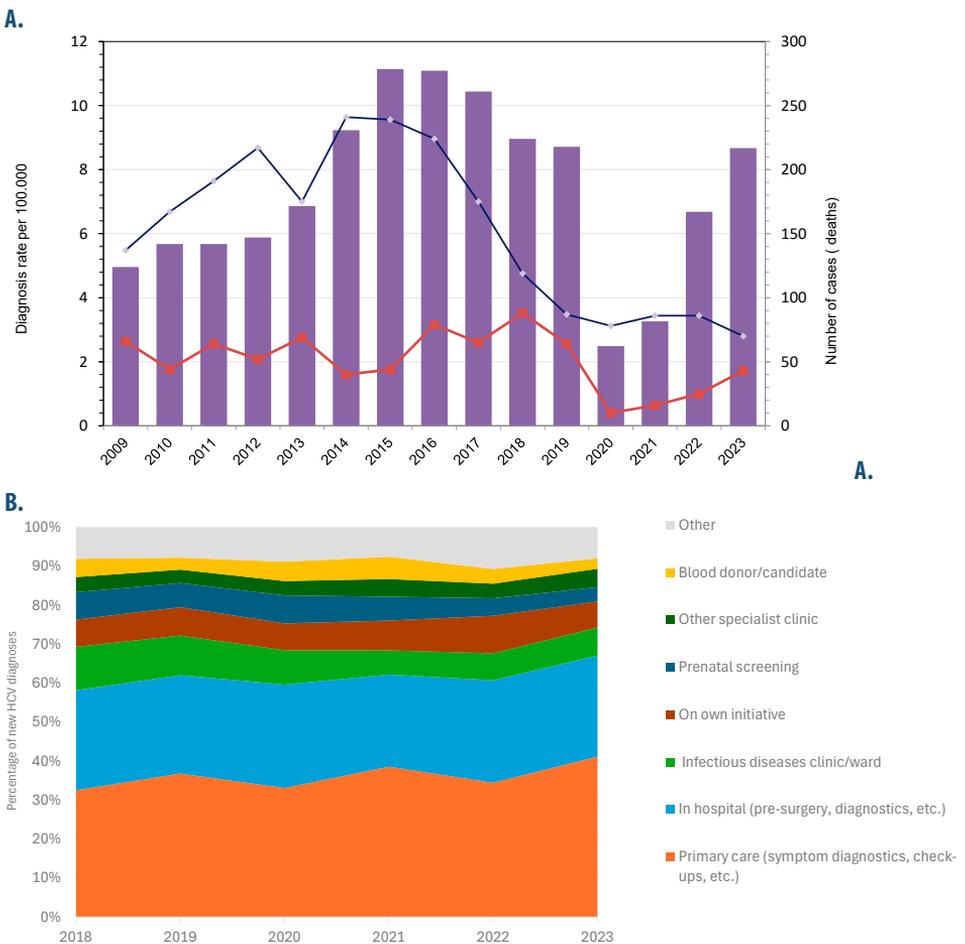


Fig. 8.23. The incidence of HCV infection per 100,000 population and the number of acute cases and deaths due to hepatitis C, ICD-10 codes B17.1, B18.2 (source: epidemiological surveillance data and Statistics Poland – GUS)

Food poisoning and foodborne infections

Foodborne diseases constitute a broad group of disease entities that vary in terms of the pathogens causing them and their clinical manifestations, with the common characteristic being the route of infection. They represent a significant public health problem, serving as a key indicator of food safety and the level of sanitary and hygienic conditions in households, food preparation and serving places within collective catering, as well as in food production facilities, including primary production. The dynamics of incidence of bacterial infections and food poisoning since 1981 is shown in Figure 8.24.

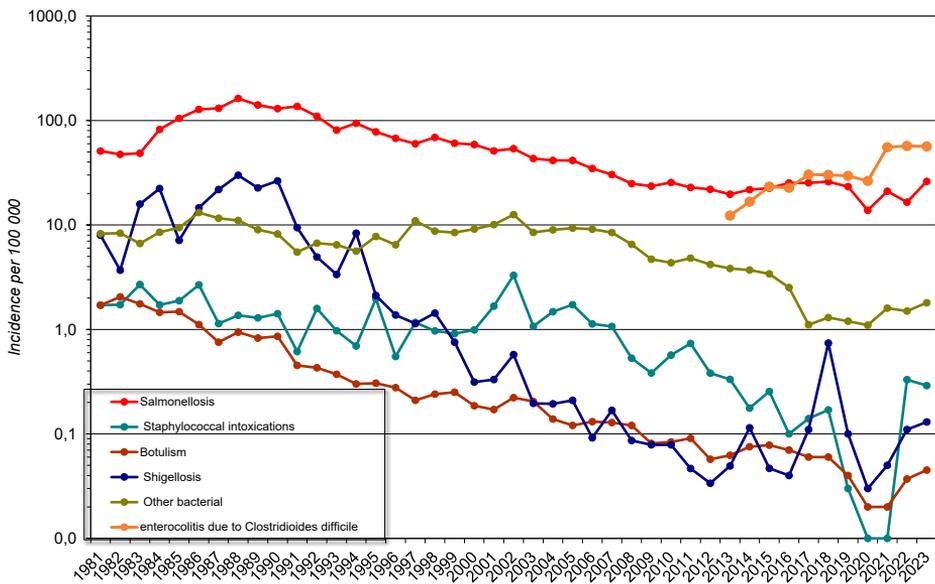


Fig. 8.24. Incidence of salmonellosis and other bacterial food poisoning and foodborne infections between 1981 and 2023 (source: NIPH NIH-NRI)

The logarithmic scale curves reveal significant differences in incidence between individual diseases, illustrating the declining trends in the incidence of salmonellosis, bacterial dysentery, botulism, and staphylococcal toxin poisoning up to 2020. However, in 2021, the second year of the pandemic, and in the following years, the values for most diseases began to rise, surpassing in 2023 the levels recorded in 2019. One disease entity in this group that has shown a very strong upward trend is intestinal infections caused by *Clostridioides difficile*. In 2013, when the registration of infections caused by these bacteria was first separated as a distinct category,

4,738 cases were reported. In subsequent years, there was a steady increase in the number of recorded cases, which more than doubled by 2017, reaching over 11,000 cases, and since then, it has stabilised at this level, amounting to 11,310 cases in 2019 (incidence rate: 29.5/100,000 population). In 2020, a slight decline in the number of registered *Clostridioides difficile* infections was observed, with a total of 10,139 cases (incidence rate: 26.4/100,000 population). However, in 2021, these figures more than doubled, reaching 21,174 cases, which corresponded to an incidence rate of 55.5/100,000. In the following two years, the numbers of cases remained very similar, with incidence rates of 57 and 56.4/100,000 in 2022 and 2023, respectively.

In Poland, *Salmonella* bacteria have been the dominant cause of foodborne infections for many decades. Among them, *S. Enteritidis* is the most commonly encountered serotype. In 1991, the percentage of all foodborne outbreaks/infections caused by this pathogen exceeded 90% (Fig. 8.25).

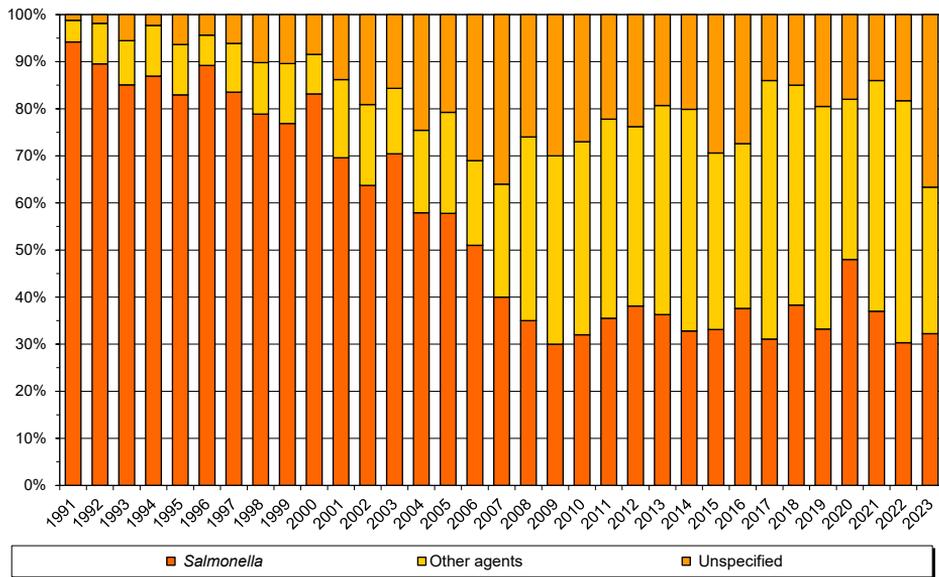


Fig. 8.25. Outbreaks of food poisoning and foodborne infections in Poland between 1991 and 2023 by aetiological agent (source: NIPH NIH–NRI)

However, the share of these pathogens among the factors responsible for outbreaks has steadily decreased, and in the years leading up to the pandemic, it did not exceed 40%. At the same time, the proportion of foodborne infections caused by other identified factors has increased, with a growing trend of infections caused by viruses. This

situation changed in 2020, when outbreaks caused by *Salmonella* species accounted for almost 48% of all reported outbreaks, although their numbers were still significantly lower than in the years prior to the pandemic. In subsequent years, the share of salmonellosis outbreaks decreased, making up 31.1% of all outbreaks in 2023. From 2011 to 2021, the percentage of foodborne outbreaks and infections in Poland where the aetiological agent was not identified steadily decreased, although in some years it still reached nearly 30%, and in 2023, it even rose to 36.6%, despite the rapidly expanding availability of molecular testing for intestinal pathogens.

Aetiological agents of foodborne diseases other than *Salmonella* are identified much less frequently, which is also a consequence of less frequent testing for these pathogens. A period of significant increase in the incidence of salmonellosis occurred in the second half of the 1980s. The 1990s saw a clear decrease in the incidence of foodborne infections caused by *Salmonella* bacteria, and since the second half of that decade, the incidence in Poland has not significantly differed from the average for EU countries (Fig. 8.26). However, since 2016, there has been an increase in both the number and incidence of salmonellosis, which was primarily the result of the introduction of *Salmonella-contaminated eggs from Poland into domestic and international markets*. This led to the emergence of an international outbreak that persisted from 2016 to 2019, with an increase in cases during the summer season in each of the subsequent years.

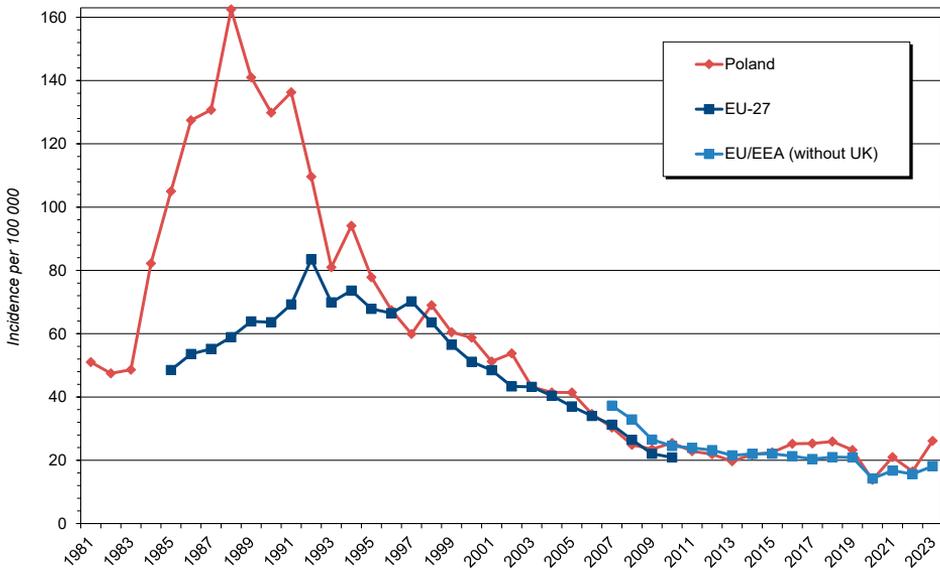


Fig. 8.26. Salmonellosis incidence in Poland and average in EU countries between 1981 and 2023 (source: WHO HFA DB, ECDC Atlas)

In 2020, the incidence of salmonellosis in Poland was even slightly lower than the average incidence in EU/EEA countries, but in 2021, it was again higher by more than 4 percentage points, and in 2023, by almost 8.

The incidence of salmonellosis, similarly to other foodborne diseases, is highest and most frequently reported in the youngest age groups. Among children aged 0–4 years, it reached 221.2 per 100,000 population in 2023, exceeding the levels recorded in the pre-pandemic year 2019. The highest incidence was observed among children aged 2, 3, and 4 years – 275.5, 251.3, and 224.9 per 100,000, respectively. Subsequently, the incidence declined, reaching its lowest level of 5.9 in the 40–44 age group, before gradually increasing in the older age groups, peaking at 14.9 per 100,000 among persons aged 75 and over. Incidence rates among men and women, as well as between rural and urban populations, did not differ significantly (Fig. 8.27).

There are significant territorial differences in the incidence of salmonellosis. In 2023, the incidence across individual voivodeships ranged from 11.3 per 100,000 population in the Zachodniopomorskie voivodeship to 51.1 in the Podkarpackie voivodeship (Fig. 8.28). The Podkarpackie voivodeship has consistently recorded the highest incidence rates of salmonellosis for many years.

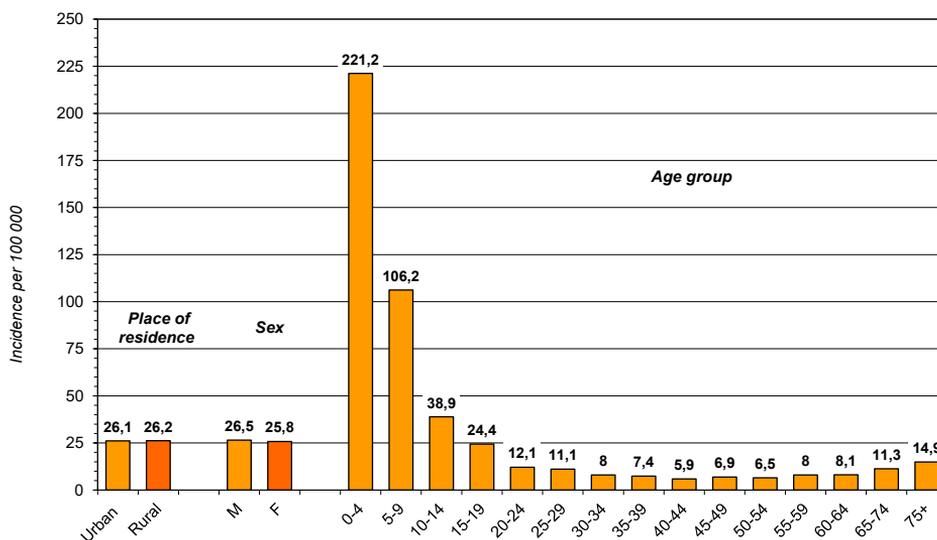


Fig. 8.27. Salmonellosis incidence by place of residence, sex and age in 2023 (source: NIPH NIH-NRI)

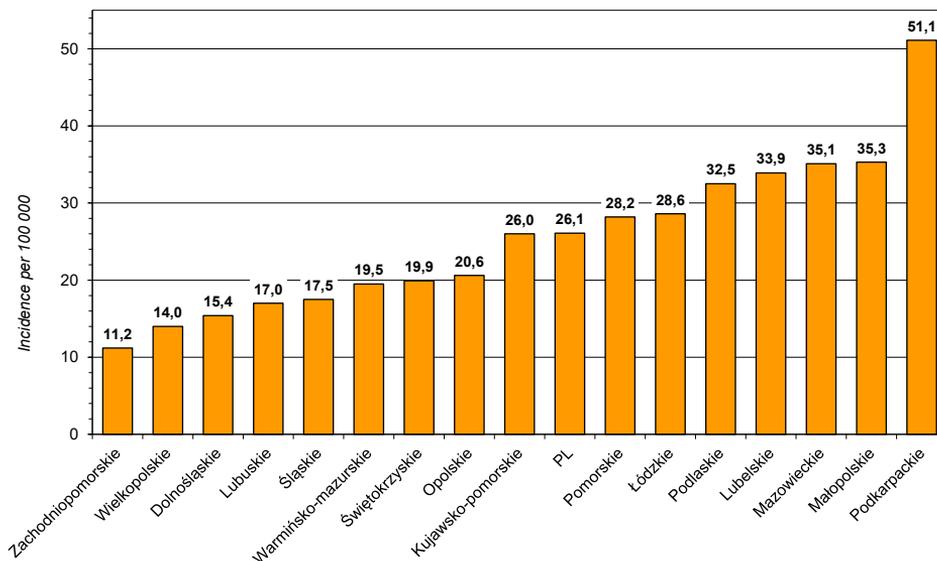


Fig. 8.28. Incidence of salmonellosis in 2023 by voivodeship (source: NIPH NIH-NRI)

Two very important types of bacteria responsible for foodborne infections, *Campylobacter* and *Yersinia*, are being diagnosed with increasing frequency in Poland, although still much less often than in other European Union countries. Since 2002, infections caused by *Campylobacter spp.* have been reported as a distinct entity within the infectious disease surveillance system. The number of diagnosed and reported cases of campylobacteriosis has increased year by year, along with the geographic areas in which the disease has been recognised and registered. In 2003 and 2004, reports came only from the Małopolskie and Mazowieckie voivodeships. In the following years, more voivodeships joined, as laboratories gradually implemented methods for detecting *Campylobacter* bacteria in clinical specimens. In 2017, the highest number of campylobacteriosis cases to date, 877, was reported from all 16 voivodeships (though in two of them only isolated cases were recorded). In the next two years, the number of reported cases declined to 726 and 715 in 2018 and 2019, respectively. In the first year of the pandemic, the number of recorded cases did not exceed 500. In contrast, in 2021, the number rose to 632, and by 2023 it had reached 862 cases. The slow yet steady increase in the number of reported cases is likely a result of several factors: the growing number of laboratories conducting diagnostic testing in this area, the wider adoption of molecular diagnostic methods, increased awareness among physicians regarding the possibility of intestinal infections caused by this

pathogen, and the introduction of mandatory reporting by laboratories of positive diagnostic results for these pathogens. In 2003, nearly 87% of individuals diagnosed with campylobacteriosis were hospitalised. In subsequent years, this proportion declined, reaching 54.1% in 2010. However, from 2013 onwards, it began to rise again, reaching 81.4% in 2019. In the following two years, it began to slowly decline reaching 76.8% in 2020 and 78.2% in 2021, but between 2022 and 2023 it again exceeded 80%. Such high hospitalisation rates indicate significant underdiagnosis and underreporting of campylobacteriosis, with testing primarily conducted among patients requiring hospital care.

Infections caused by *Yersinia* species are also being reported with increasing frequency. In the first two years of reporting this disease (2003 and 2004), the number of reported cases was 71 and 84, respectively. In 2005, 136 cases were reported to the surveillance system. A similar number of cases, 140, was recorded in 2006, and 206 in 2010. From that year until 2019, the number of yersiniosis cases remained relatively stable. In 2020, there was a marked decline in reported cases, with a total of 117 registered, and 142 in 2021. In 2022 and 2023, the number of cases increased to 180 and 313, respectively. Since the beginning of yersiniosis reporting, the percentage of patients hospitalised due to the disease has varied, ranging from 59.2% in 2003 to 83.1% in 2005. In 2022 and 2023, the hospitalisation rates were 58.3% and 53.4%, respectively. Significant regional variation in hospitalisation rates has also been observed in recent years.

Other bacterial foodborne diseases recorded in Poland, such as botulism, staphylococcal toxin poisoning, and bacillary dysentery, currently occur in small numbers and play a lesser role as public health threats. In the case of dysentery, a significant increase in the number of cases occurred in 2018, with a total of 284 cases registered. This number mainly resulted from two outbreaks: one within the country, although affecting an international community, and the other linked to holiday travel by Polish citizens to Albania. Following a decline in 2020 and 2021 to 12 and 18 cases, respectively, the number of cases began to rise again in 2022 and 2023, reaching 43 and 50 cases.

There was a notable increase in the number of infections caused by verotoxigenic *Escherichia coli* in 2022 and 2023, reaching 36 and 96 cases, respectively.

In the case of hepatitis A, following an epidemic increase between 2017 and 2019, linked to an outbreak in Western European countries among men who have sex with men, the number of cases declined significantly in 2020 and 2021, with 111 and 92 cases reported, respectively. These figures correspond to the levels recorded in Poland prior to 2017. In 2022 and 2023, the number of cases increased again, reaching 233 and 206, respectively.

Sexually transmitted infections

According to the World Health Organisation (WHO), sexually transmitted infections should be treated as a priority due to the continuously increasing number of new cases. According to CDC¹⁰ surveillance data, in 2023 over 2.4 million new STI cases were reported in the United States. The most common infections were caused by *Chlamydia trachomatis* (1,648,568 cases of chlamydia), *Neisseria gonorrhoeae* (601,319 cases of gonorrhoea), and *Treponema pallidum* (209,253 cases of syphilis). Chlamydia infections are most frequently recorded among young people aged 15–29 years – accounting for 73.7% of all cases. Available data on *Neisseria gonorrhoeae* infections indicate a decrease of more than 7% compared to 2022. Infections caused by *Treponema pallidum* have declined by approximately 13% among men who have sex with men (MSM); however, this population group still represents the majority of *Treponema pallidum* infections.

In most countries, surveillance of sexually transmitted infections is mandatory, and case reporting is required from all medical institutions. In some countries, a sentinel surveillance system has been introduced, whereby more detailed information on infections is reported only by selected healthcare centres. In some countries, e.g. the United Kingdom, a high number of detected cases results from population-wide screening programmes¹¹.

Syphilis incidence in Europe showed an upward trend between 2012 and 2019, increasing from 4.67 per 100,000 population in 2012 to 7.53 in 2019. In subsequent years, the incidence declined to 5.63 in 2020, but then rose again, reaching 9.97 per 100,000 in 2023. The observed decrease in reported cases was likely related to the exclusion of data from the United Kingdom following its departure from the EU. The significant increase in cases already observed in 2022 primarily concerned men, with the highest number of cases reported among men who have sex with men (MSM). Among those with a known route of transmission, MSM accounted for nearly 72% of syphilis infections in 2023¹².

In 2023, a total of 41,051 confirmed syphilis cases were reported in 29 EU/EEA countries. The incidence rate was 9.97 per 100,000 population, with the lowest rate recorded in Latvia, 0.8 per 100,000 (15 cases), and the highest in Luxembourg, 24.8 per 100,000 (164 cases).

¹⁰ Sexually Transmitted Infection Surveillance, 2023, CDC, (available at: <https://www.cdc.gov/sti-statistics/annual/index.html>)

¹¹ European Centre for Disease Prevention and Control. Annual epidemiological report for 2017. Surveillance systems overview for 2017 [Internet; Excel workbook]. Stockholm: ECDC; 2018

¹² European Centre for Disease Prevention and Control. Syphilis. In: ECDC. Annual epidemiological report for 2023. Stockholm: ECDC; 2025

Poland, with an incidence rate of 8.1 (calculated based solely on laboratory-confirmed cases), was among 14 countries with an incidence rate below 10 per 100,000 population.

The incidence recorded in Poland, including cases classified according to the national case definition used for infectious disease surveillance (which includes possible, probable, and confirmed cases¹³), was 6.95 per 100,000 in 2023, which remains below the European average. However, Poland has also experienced a marked increase in reported cases in recent years – from 3.44 per 100,000 in 2013, to 4.45 in 2017, and up to 6.95 per 100,000 in 2023 (Fig. 8.29).

There is a notable variation in syphilis treatment rates between voivodeships. For example, the treatment rate ranged from 1.16 per 100,000 in the Podkarpackie voivodeship to 16.25 in the Mazowieckie voivodeship, which accounted for 34.2% of all reported infections (Fig. 8.30). In 2023, the majority of syphilis cases were treated¹⁴ at the clinical stage of early syphilis – almost 60%, with the majority being symptomatic cases in the most infectious stage (over 70% of early syphilis cases in 2023).

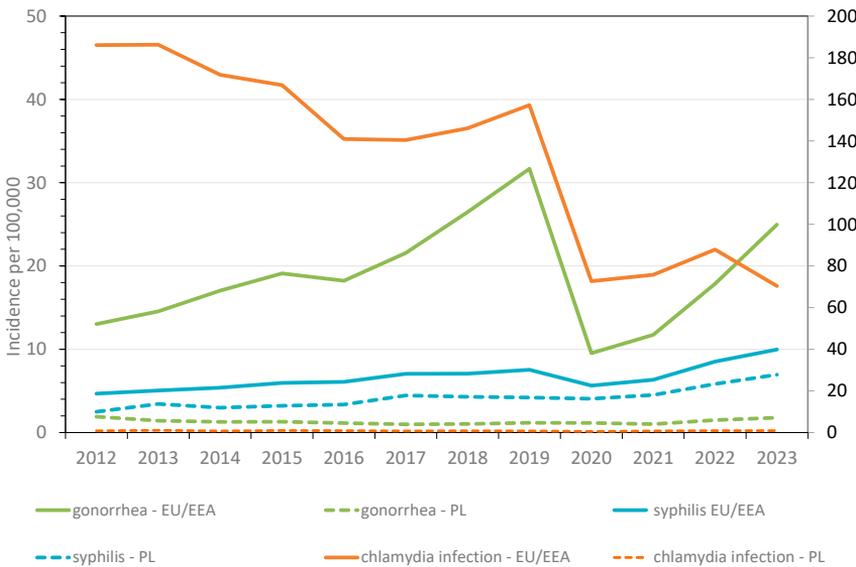


Fig. 8.29. Average incidence of syphilis, gonorrhoea and chlamydia per 100,000 population in EU/EEA countries and in Poland between 2012 and 2023 (source: e-Health Centre: MZ-14 and ECDC surveillance atlas)

¹³ Case definitions for infectious diseases for the purpose of epidemiological surveillance, draft version (6c), January 2025, Department of Epidemiology and Surveillance of Infectious Diseases, NIPH NIH-NRI (available at: https://wwwold.pzh.gov.pl/oldpage/epimeld/inne/Def_PL2_6c.pdf)

¹⁴ Bulletin: Infectious Diseases and Poisonings in Poland in 2023, NIPH NIH-NRI; https://wwwold.pzh.gov.pl/oldpage/epimeld/2023/Ch_2023.pdf.

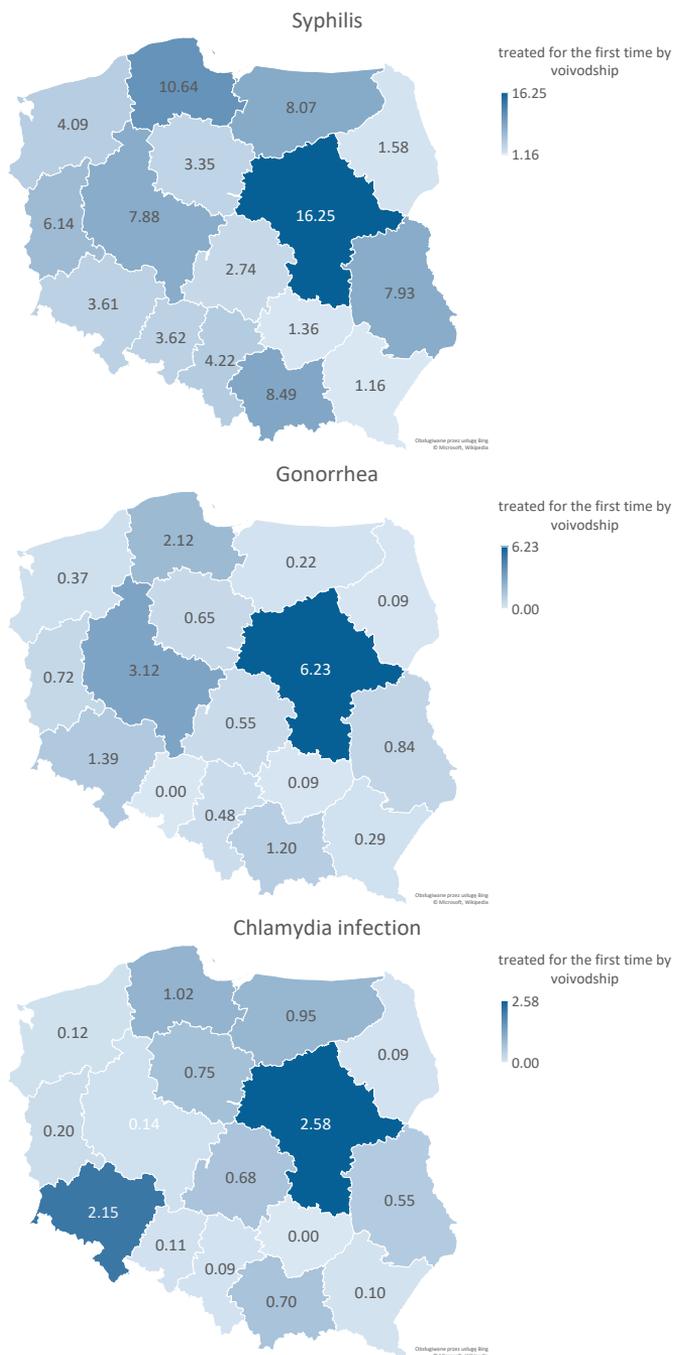


Fig. 8.30. Number of individuals treated for syphilis, gonorrhoea and chlamydia in individual voivodeships in Poland per 100,000 population in 2023 (Source: NIPH NIH-NRI Bulletin based on data from the e-Health Centre: MZ-14)

The incidence of gonorrhoea, similarly to syphilis, has also shown an upward trend across European Union countries¹⁵. Between 2012 and 2019, incidence rates ranged from 13.02 to 31.67 per 100,000 population. The turning point, as with syphilis, was 2019, when the incidence dropped significantly to 9.53 per 100,000. This was likely linked to the exclusion of UK cases from EU statistics. Nevertheless, the incidence rate more than doubled in the following years, reaching 24.96 per 100,000 in 2023.

In 2023, 96,969 confirmed cases of gonorrhoea were reported from 28 EU/EEA countries, with an overall incidence of 25.0 per 100,000 population. The rates ranged from 0.2 in Romania (30 cases) to 122.2 in Ireland (6,440 cases). Among women, the highest incidence was recorded in the 20–24 age group (72 cases per 100,000), while among men, the dominant group was aged 25–34 years (131 cases per 100,000). Infections among men who have sex with men (MSM) accounted for over 58% of all reported gonorrhoea cases in 2023. Poland, with an incidence rate of 3.3 (cases reported to ECDC based on the year of notification), was among the 10 countries with an incidence rate below 10 per 100,000 population.

Although the incidence of gonorrhoea in Poland is also increasing, from 1.01 in 2021 to 1.78 per 100,000 in 2023, it remains disproportionately low compared to other EU countries (Fig. 8.29). This is most likely due to a low number of diagnostic tests being performed, underreporting by infected individuals, and/or failure to report cases to epidemiological surveillance systems. This is suggested by the highly uneven geographic distribution of cases across voivodeships. In the Mazowieckie voivodeship, the treatment rate in 2023 was 6.23 per 100,000 population, 343 cases in total, while in other voivodeships the number of treated cases ranged from 1 in Podlaskie and Świętokrzyskie to 109 in Wielkopolskie (Fig. 8.30).

In EU countries, the most common sexually transmitted infection remains *Chlamydia trachomatis*, which particularly affects young individuals shortly after sexual initiation¹⁶. Between 2012 and 2019, the incidence of chlamydia in European countries ranged from 146.10 to 186.25 cases per 100,000 population. In the following four years (2020–2023), after excluding data from the United Kingdom, the average incidence rate was 76.7 per 100,000.

In 2023, 230,199 confirmed cases of chlamydia were reported by 27 EU/EEA countries, with an incidence rate of 70.4 per 100,000 population. The lowest rate was recorded in Romania, 0.1 per 100,000 (24 cases), and the highest in

¹⁵ European Centre for Disease Prevention and Control. Gonorrhoea. In: ECDC. Annual epidemiological report for 2023. Stockholm: ECDC; 2025.

¹⁶ European Centre for Disease Prevention and Control. Chlamydia infection. In: ECDC. Annual epidemiological report for 2023. Stockholm: ECDC; 2025

Denmark, 625.5 per 100,000 (37,111 cases). The highest incidence was observed among women aged 20–24 years. Infections among MSM accounted for 20% of all cases and increased by 4% compared to 2022, ranking among the 9 countries with the lowest incidence – below 10 per 100,000 population with a rate of 2.7.

In comparison with these figures, it is clear that *Chlamydia trachomatis* infections are significantly underreported in Poland, with the incidence rate not exceeding 1 per 100,000 population (Fig. 8.29). As with gonorrhoea, this is most likely due to limited diagnostics and underreporting of new infections, particularly by private medical providers. In some voivodeships, only isolated cases of individuals treated for chlamydia infections are recorded annually, fewer than 10 per year, for example, in the Lubuskie, Opolskie, Podkarpackie, Podlaskie, Wielkopolskie and Zachodniopomorskie voivodeships. The highest numbers of cases treated in 2023 were recorded in the Dolnośląskie and Mazowieckie voivodeships, with 62 and 142 cases respectively – treatment rates were 2.15 in Dolnośląskie and 2.58 in Mazowieckie per 100,000 population (Fig. 8.30).

According to ECDC reports, gonorrhoea in EU countries occurs more frequently among men who have sex with men (MSM). In 2023, they accounted for over 58% of all infections. The highest incidence of new cases was observed in individuals aged 20–34 years.

For chlamydia, a growing proportion of infections has been recorded among MSM. Between 2019 and 2023, this increase reached 48% in the group of countries that consistently reported transmission routes for *Chlamydia trachomatis*. Nevertheless, the highest incidence of new infections continues to be observed among women aged 20–24 years (more than 700 cases per 100,000 women).

The incidence rate of new syphilis infections in EU countries is highest among men aged 25–34 years (40 cases per 100,000 population), and infections among men are eight times more common than among women. The majority of cases with a known route of transmission are also reported in the MSM population.

In Poland, according to individual case data reported to epidemiological surveillance in 2023, among persons with a known route of transmission, most infections with *Neisseria gonorrhoeae* and *Treponema pallidum* were transmitted in the MSM group, accounting for 55.9% and 55.1% of all infections, respectively. Gonorrhoea cases among heterosexual individuals constituted 25.5% of all infections, and syphilis cases in this group accounted for 26.9%. The remaining infections were reported as unspecified sexual contacts. In the case of *Chlamydia trachomatis* infections, the highest number of cases was recorded among MSM, 36.0%, as well as among individuals with an unspecified type of sexual contact that could have been the source of infection – 35.2%. Infections among heterosexual individuals accounted for 28.8% of cases.

In 2023, the incidence of syphilis and gonorrhoea was six times and eleven times higher, respectively, among men than among women, which confirms the spread of syphilis and gonorrhoea in the MSM population in Poland, also considering information on the transmission route among those with known exposure. In contrast, in the case of chlamydia, the incidence rate is comparable in both male and female populations.

Syphilis incidence is highest among individuals aged 25–29 and 20–24 years, amounting to 21.88 and 21.19 cases per 100,000 population, respectively. Similarly, the incidence of gonorrhoea and chlamydia is also highest in these same age groups, although the rates are lower – approximately 9 cases per 100,000 population in each of these age groups (Fig. 8.31).

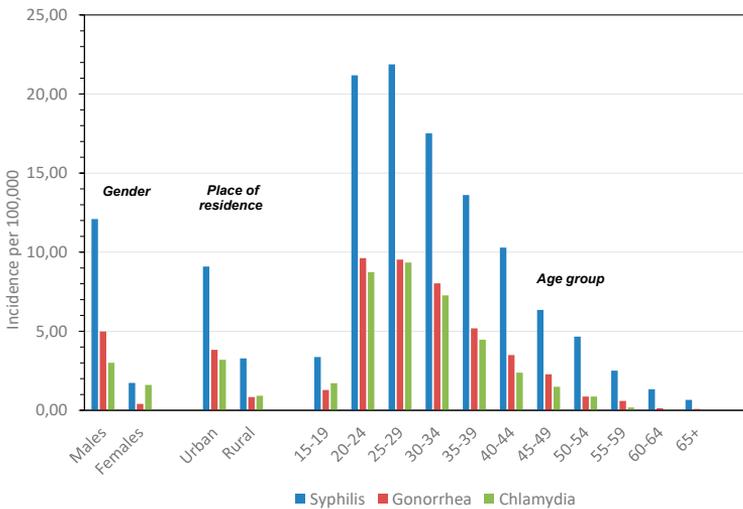


Fig. 8.31. Incidence of syphilis, gonorrhoea and chlamydiosis in 2023 by place of residence, sex and age (source: individual data from Epibaza, NIPH NIH-NRI)

Adult vaccination

Importance of adult vaccination

Vaccinations are important not only for children. The risk of illness and complications from many infectious diseases is significantly higher among unvaccinated adults compared to children. Most severe cases, hospitalisations, cases of disability, and deaths from vaccine-preventable infectious diseases occur in

adults¹⁷. Vaccinations administered to adults reduce the severity of illness in the event of infection and protect against complications. The COVID-19 pandemic demonstrated how dangerous infectious diseases can be, despite advances in medical knowledge. It became a powerful lesson in the importance of vaccination across various adult populations in the modern world.

Not all adults acquired immunity during childhood to infectious diseases commonly affecting children, such as chickenpox, measles, or rubella. These diseases may have a more severe course in adults, lead to complications, or pose additional risks, e.g., to pregnant women. Not all childhood vaccinations provide lifelong protection. Therefore, booster doses are necessary for some vaccines (e.g. against diphtheria, tetanus, and pertussis). Some infectious diseases are caused by pathogens that undergo changes and mutations, which is why regular vaccination is required (e.g. against influenza or COVID-19). Chronic diseases are more commonly observed in adults, which can increase susceptibility to infectious diseases. These diseases may have a more severe course and lead to complications that are dangerous to health or even life-threatening. In Poland, according to epidemiological data, people over the age of 50 have on average four chronic conditions. Respiratory diseases, cardiovascular diseases, or commonly occurring diabetes increase the risk of complications and severe outcomes from respiratory infections. Vaccination also reduces the risk of exacerbation of chronic conditions. Factors increasing the risk of severe infection include reduced immune function in cancer patients, transplant recipients, or individuals who have had their spleen removed. Research data does not confirm any adverse effects of vaccination on the course of chronic diseases. On the contrary, the opposite effect is often observed. For example, it has been shown that patients vaccinated against influenza have a significantly lower risk of heart attack or stroke in the months following vaccination, compared to unvaccinated patients. On the other hand, there is a large body of evidence confirming the risk of severe infectious disease in patients with chronic conditions, as well as data confirming the adverse impact of infection on the course of these diseases. Many scientific societies around the world explicitly list the presence of chronic diseases as an indication for vaccination in their recommendations and guidelines. Ageing is a universal risk factor for more frequent and more severe infectious disease, with increased risk of serious complications to health or life. After the age of 60, immunity declines, the immune system ages, and changes occur in the activity of

¹⁷ „Infectious Diseases and Poisonings in Poland” bulletins. NIPH NIH-NRI. Department of Epidemiology of Infectious Diseases and Surveillance. https://www.wold.pzh.gov.pl/oldpage/epimeld/index_p.html#04

immune cells. As society ages, the number of people at increased risk of severe illness from bacterial and viral infections grows. Immunosenescence refers to the gradual deterioration of immune system function caused by biological ageing. Both innate and acquired immunity decline, resulting in greater susceptibility to disease. Changes occur that weaken immune responses, and a state of chronic inflammation arises, caused by increased release of proinflammatory cytokines. Adult vaccination is also recommended to protect close contacts who cannot be vaccinated, e.g., due to age or medical contraindications. This is known as the cocoon strategy. Through vaccination, we minimise the risk of falling ill and, as a result, avoid becoming a source of infection for those around us. The need for adult vaccination may also arise from lifestyle factors, such as certain activities or travel. Occupational exposure may also be an indication for vaccination. Health-care workers are the best example, as through vaccination they protect not only themselves but also their patients.

The benefits of adult vaccination are particularly significant in the context of increasing life expectancy and improving quality of life. Especially when considering, on the one hand, an increasingly ageing population, and on the other, the growing proportion of individuals with chronic illnesses who are effectively treated with therapies that impair immune function. By improving quality of life, adult vaccination represents an important component of the healthy lifestyle paradigm, alongside proper nutrition, physical activity, sleep hygiene, and stress management.

Basic principles of adult vaccination

An adult should verify their immune status. Vaccination history recorded in a vaccination booklet and/or immunisation card allows assessment of which vaccines have been received, whether all required doses were administered and, if necessary, to complete any missing vaccinations. In situations where documentation or knowledge of previous vaccination or disease is lacking, immunity for certain vaccines can be assessed through serological testing to measure antibody levels.

The number of doses required depends on the specific vaccine. In some cases, a single dose is sufficient, while in others the full vaccination schedule must be administered, typically consisting of two or three doses. Certain vaccines may require booster doses at intervals of several years. The most detailed information on each vaccine can be found in its Summary of Product Characteristics (SmPC).

Recommendations for adult vaccinations are listed in the National Immunisation Programme (Polish: Program Szczepień Ochronnych, PSO) under the section for recommended vaccinations, indicating the appropriate age or specific

health indications for administration. Some vaccinations are provided free of charge through dedicated programmes (e.g., COVID-19 vaccination under the National COVID-19 Vaccination Programme), while others, such as influenza, pneumococcal, RSV or shingles vaccines, may be partially or fully reimbursed for certain patient groups. In these cases, the patient may either bear no cost or cover only part of the cost, with the level of reimbursement determined by the healthcare professional during vaccination assessment and prescription. Mandatory adult vaccinations occur in travel medicine, in accordance with international regulations - for example, yellow fever vaccination is required for travel to certain countries. Post-exposure vaccinations are also mandatory, such as those for tetanus or rabies. Selected groups of adult patients with immunodeficiencies (e.g., following haematopoietic stem cell or organ transplantation, post-splenectomy, asplenia or impaired splenic function) are entitled to receive certain vaccines against specific infectious diseases free of charge. Hepatitis B vaccination is also mandatory for individuals at particular risk due to epidemiological or clinical indications. Qualification for vaccination in adults involves a brief medical interview. This covers the individual's current health status, aiming to exclude acute infections, exacerbations of chronic conditions and to assess any medications taken as well as history of severe allergic reactions. When qualifying for subsequent doses of the same vaccine, the interview also addresses any severe adverse reactions experienced after previous doses. A physical examination may be conducted based on individual indications, although it is generally not necessary if the patient reports no symptoms. During the vaccination assessment, the patient should be informed about the potential risk of adverse reactions associated with the vaccine. Vaccines available in Poland are administered to adults as injections at designated vaccination points, including pharmacies that offer vaccination services. Most vaccines are given intramuscularly, with the preferred anatomical site being the posterolateral aspect of the upper arm. Some vaccines recommended for travellers are administered orally. A common and recommended practice in adult vaccination is the administration of multiple vaccines during a single visit. Research evidence indicates that this approach does not increase the risk of adverse reactions. Two vaccines can be administered in the same anatomical area, provided a minimum distance of 2.5 cm is maintained between injection sites.

Qualification for adult vaccination involves taking a brief medical history. This includes assessing the current health status in order to rule out acute infection, exacerbation of a chronic illness, current medications, and a history of severe allergic reactions. When qualifying a patient for subsequent doses of the same vaccine, the interview also covers any serious adverse events following previous

doses. A physical examination may be conducted based on individual indications, although it is usually not required if the patient does not report any symptoms. During the qualification process, the patient should be informed about the potential risk of adverse post-vaccination reactions that may occur in connection with the vaccination. Vaccines available in Poland are administered to adults as injections, delivered at designated vaccination points, including pharmacies authorised to carry out vaccinations. Most vaccines are given intramuscularly, with the preferred anatomical site being the posterolateral area of the upper arm. Some vaccines recommended for travelling individuals are administered orally. A common and recommended practice in adult vaccination is administering several vaccines during a single visit. Scientific studies show that this approach does not increase the risk of adverse post-vaccination reactions. Two vaccines can be administered in the same anatomical region, provided that an injection site spacing of at least 2.5 cm is maintained.

Adult vaccination schedules

The adult vaccination schedule includes recommended vaccinations based on age (Table 8.4) or health-related factors, including the presence of specific chronic diseases or other indications related to lifestyle.

Table 8.4. Adult vaccination schedule (all adults by age group). The schedule includes vaccinations recommended for all non-immune individuals of a given age, as well as those with additional risk factors (e.g. medical, occupational, or lifestyle-related)

Vaccine against	Age (years)				
	19-26	27-49	50-59	60-64	>65
Influenza (IIV)	1 dose annually, during the infection season (preferably at its onset)*				
Diphtheria, tetanus, pertussis (Tdap)	1 dose every 10 years				
Chickenpox (VZV)	2 doses (for individuals who have neither had chickenpox nor been vaccinated)				
Measles, mumps, rubella (MMR)	2 doses (for individuals who have neither had measles or rubella nor been vaccinated)				
COVID-19	vaccinations according to current recommendations				
Hepatitis B virus (HBV)	3 doses (for individuals who have not been previously vaccinated)				
Human papillomavirus (HPV)	3 doses	3 doses (vaccination decision to be made after a consultation with a physician regarding the benefits)			

Vaccine against	Age (years)				
	19-26	27-49	50-59	60-64	>65
Pneumococcal disease (PCV, PPSV)			1 dose PCV-13 or PCV-20	1 dose PCV-13 or PCV-20	1 dose PCV-13 + PPSV-23 or 1 dose PCV-20
Herpes zoster (RZV)			2 doses, 2-6 months apart		
Respiratory Syncytial Virus (RSV)			1 dose		
Tick-borne encephalitis (TBE)		3 doses + booster doses every 3-5 years			
Hepatitis A virus (HAV)	2 doses (for individuals who have not been previously vaccinated)				
Meningococcal disease (MenB, MCV-4)			1 or 2 doses		

*a high-dose vaccine is recommended for individuals aged ≥60 years; if it is unavailable or not accepted by the patient, the standard-dose vaccine should be used instead.

IIV – inactivated influenza vaccine; Tdap – tetanus, diphtheria and pertussis vaccine; VZV – varicella (chickenpox) vaccine; MMR – measles, mumps and rubella vaccine; COVID-19 – COVID-19 vaccine; HBV – hepatitis B vaccine; HPV – human papillomavirus vaccine; PCV – pneumococcal conjugate vaccine; PPSV – pneumococcal polysaccharide vaccine; RZV – recombinant zoster vaccine (against herpes zoster); RSV – respiratory syncytial virus vaccine; TBE – tick-borne encephalitis vaccine; HAV – hepatitis A vaccine; MenB – meningococcal group B vaccine; MCV-4 – meningococcal conjugate vaccine against groups A, C, W, and Y.

Personalised vaccination schedules for adults, tailored to age, health condition, profession, and lifestyle, are available on the NIPH NIH-NRI website¹⁸. These schedules are an important tool in public health promotion and health protection. They have been developed in collaboration with experts from the Polish Society of Vaccinology, based on the recommendations for adult vaccinations outlined in the Polish Immunisation Programme and international vaccination advisory groups, including the US Advisory Committee on Immunisation Practices (ACIP). The calendars form part of the ‘My Health – Adult Health Check’ service, introduced into primary healthcare from the 5th of May. During the summarising visit, PHC personnel use identified risk factors to establish an individual health plan (IHP) with recommended preventive interventions for the patient, including, among other measures, the recommended vaccinations.^{19, 20, 21}

¹⁸ National Institute of Public Health NIH-NRI. Adult vaccination schedules. <https://szczepienia.pzh.gov.pl/kalendarze-szczepien-doroslych/>

¹⁹ Polish Society of Vaccinology. Adult vaccination schedules. <https://ptwac.org.pl/szczepienia-doroslych/>

²⁰ Centers for Disease Control and Prevention. Vaccines in the Adult Immunization Schedule. <https://www.cdc.gov/vaccines/hcp/imz-schedules/adult-age.html>

²¹ Bridges C.B., Woods L., Coyne-Beasley T. et al: Advisory Committee on Immunization Practices (ACIP). Recommended immunization schedule for adults aged 19 years and older – United States, 2013. *MMWR*, 2013; 62: 9-18.

Adult vaccination schedules include⁴:

- Adult vaccination schedule – all adults by age (Table 8.4).
- Vaccination schedules for elderly (Table 8.5).
- Vaccination schedule for women planning pregnancy and pregnant women (Table 8.6).
- Vaccination schedule for patients with diabetes⁴.
- Vaccination schedule for patients with respiratory diseases⁴.
- Vaccination schedule for patients with cardiovascular diseases⁴.
- Vaccination schedule for patients with chronic kidney disease⁴.
- Vaccination schedule for patients with chronic liver disease⁴.
- Vaccination schedule for patients with asplenia or splenic dysfunction⁴.
- Vaccination schedule for patients with rheumatic and musculoskeletal diseases⁴.
- Vaccination schedule for patients with immune disorders⁴.
- Vaccination schedule for patients with HIV infection⁴.
- Vaccination schedule for healthcare workers⁴.
- Vaccination schedule for travel medicine⁴.

Table 8.5. Vaccination schedule for the elderly. The schedule takes into account the recommended vaccinations for all unimmunised individuals of a specified age, as well as the presence of additional risk factors (e.g., medical, occupational, lifestyle-related)

Vaccine against	Age (years)		
	50-59	60-64	>65
Influenza (IIV)	1 annually, during the infection season (preferably at its onset)*		
Diphtheria, tetanus, pertussis (Tdap)	1 dose every 10 years		
COVID-19	Vaccination according to current recommendations		
Hepatitis B virus (HBV)	3 doses (for individuals who have not been previously vaccinated)		
Pneumococcal disease (PCV, PPSV)	1 dose PCV-13 or PCV-20	1 dose PCV-13 or PCV-20	1 dose PCV-13 + PPSV-23 or 1 dose PCV-20
Herpes zoster (RZV)	2 doses, 2-6 months apart		
Respiratory Syncytial Virus (RSV)	-	1 dose	
Tick-borne encephalitis (TBE)	3 doses + booster doses every 3-5 years		
Meningococcal disease (MenB, MCV-4)	1 or 2 doses		

*a high-dose vaccine is recommended for individuals aged ≥ 60 years; if it is unavailable or not accepted by the patient, the standard-dose vaccine should be used instead.

IIV – inactivated influenza vaccine; Tdap – tetanus, diphtheria and pertussis vaccine with reduced diphtheria and pertussis antigen content; COVID-19 – COVID-19 vaccine; HBV – hepatitis B vaccine; PCV – pneumococcal conjugate vaccine; PPSV – pneumococcal polysaccharide vaccine; RZV – recombinant zoster vaccine (against herpes zoster); RSV – respiratory syncytial virus vaccine; TBE – tick-borne encephalitis vaccine; MenB – meningococcal group B vaccine; MCV-4 – meningococcal conjugate vaccine against groups A, C, W, and Y.

Table 8.6. Vaccination schedule for women planning pregnancy and pregnant women

Vaccination schedule for women planning pregnancy	
Vaccine against	Pre-conception period
Hepatitis B virus (HBV)	3 doses (for women who have not been previously vaccinated)
Chickenpox (VZV)*	2 doses (for women who have neither had chickenpox nor been vaccinated)
Measles, mumps, rubella (MMR)*	1 or 2 doses (for women who have neither had rubella nor been vaccinated)
Influenza (IIV)	1 dose during the infection season (preferably at its onset)
Vaccination schedule for pregnant women	
Vaccine against	Pregnancy period
Influenza (IIV)	1 dose, can be administered at any stage of pregnancy
Diphtheria, tetanus, pertussis (Tdap)	1 dose during each pregnancy, can be given between 27th and 36th gestation week (ideally between 28th and 32nd week)
COVID-19	vaccination according to current recommendations
Respiratory Syncytial Virus (RSV)	1 dose, can be given between 24th and 36th gestation week (ideally between 32nd and 36th week)

*vaccination should be completed no later than one month before conception

IIV – influenza vaccine, inactivated; Tdap – tetanus, diphtheria and pertussis vaccine with reduced diphtheria and pertussis antigen content; COVID-19 – COVID-19 vaccine; RSV – respiratory syncytial virus vaccine; HBV – hepatitis B vaccine; VZV – varicella (chickenpox) vaccine; MMR – measles, mumps and rubella vaccine.

Key vaccines recommended for adults

Influenza vaccines

Influenza vaccines for adults are inactivated vaccines administered by injection. They contain inactivated fragments of influenza viruses and are available as split-virion vaccines or subunit vaccines containing surface proteins of the influenza virus. Vaccines are either trivalent or quadrivalent. The composition of the vaccines is updated each season. Influenza vaccination is recommended for individuals at increased risk of influenza-related complications, as well as for those who may be a source of infection to these individuals, including: 1/ all persons aged ≥ 55 years; 2/ residents of nursing homes and other long-term care or medical facilities (regardless of age); 3/ people with chronic conditions: cardiovascular diseases, kidney disease, liver disease (including liver failure and nephrotic syndrome), respiratory diseases (including asthma and COPD), metabolic disorders (including diabetes, obesity with BMI ≥ 40), immune deficiency (including that caused by immunosuppressive treatment or HIV), cancer patients (especially haematologic malignancies), organ or tissue transplant recipients; 4/ patients with impaired respiratory function or difficulty clearing airway secretions, and

those at increased risk of aspiration (e.g. due to impaired consciousness, dementia, spinal cord injury, seizure disorders, or other neuromuscular diseases); 5/ pregnant women and women who will be pregnant during the upcoming influenza season; 6/ people who may transmit influenza to the above groups (epidemiological indications), such as staff of nursing homes or facilities for chronically ill patients, individuals providing in-home care or living with people at risk, health-care personnel, caregivers, parents and household contacts of children under 5 years of age; 7/ workers in education, retail, transport, and other sectors involving frequent contact with the public²². Influenza vaccination should be offered to any individual who wishes to reduce their risk of contracting influenza. Annual vaccination during the autumn–winter season builds immunity. Vaccines are available free of charge to selected groups (e.g. older adults, pregnant women) or with partial reimbursement (e.g. people with comorbidities/all adults). One dose per season is recommended. The optimal time for influenza vaccination is before the onset of the period of increased influenza activity. Ideally, vaccination should precede the peak incidence, which in Poland typically occurs from January to March, although this may vary slightly each season. If vaccination cannot be done early, it may still be administered at any time during the influenza season. For adults aged ≥ 60 years, the high-dose vaccine is recommended, and if it is unavailable or not accepted by the patient, the standard-dose vaccine may be used instead²³.

Hepatitis B vaccines

Hepatitis B (HBV) vaccines are inactivated vaccines that contain the genetically engineered HBs antigen and an adjuvant to enhance the immune response. They are available as monovalent vaccines or in combination with the hepatitis A vaccine. Hepatitis B vaccination is mandatory for individuals at particularly high risk of infection due to epidemiological or clinical factors, including: 1/ individuals who have not previously been vaccinated against hepatitis B; 2/ students enrolled in medical or health sciences programmes; 3/ individuals at particular risk due to contact with a person infected with hepatitis B (household members or residents of

²² Seremak-Mrozikiewicz A., Nitsch-Osuch A., Czajkowski K. et al. Guidelines of the Polish Society of Gynecologists and Obstetricians, the Polish Society for Vaccinology, and the Polish Society for Family Medicine on vaccinating women with reproductive plans and pregnant or breastfeeding women. *Ginekol Pol* 2023, Aug 21.

²³ Nitsch-Osuch A., Jankowski P., Kokoszka-Paszkot J., Kuchar E., Mastalerz-Migas A., Mitkowski P., Wysocki J., Zmysłowska A., Antczak A. Towards better protection of older people against influenza and its complications. Polish recommendations for HD influenza vaccine. *Family Medicine & Primary Care Review*. 1/2024, vol. 26.

care homes, educational institutions, and closed facilities); 4/ healthcare workers at risk of exposure; 5/ individuals infected with the hepatitis C virus; 6/ women planning pregnancy. Mandatory HBV vaccinations for high-risk individuals include: 1/ patients in advanced stages of kidney disease with glomerular filtration rates (GFR) below 30 ml/min and dialysis patients; 2/ individuals after haematopoietic cell transplantation, organ transplantation, splenectomy, or with asplenia or splenic dysfunction; 3/ individuals in the advanced stage of kidney disease with a glomerular filtration rate below 30 ml/min, and dialysis patients (booster doses should be administered if the concentration of anti-HBs antibodies is below the protective level (10 IU/l); it is recommended to test antibody levels every 6–12 months; for organ transplant recipients, it is recommended to maintain an antibody level of ≥ 100 IU/l; antibody levels should be monitored every 6 months; if the concentration falls below < 100 IU/l, a double dose of the vaccine should be administered). Determining the level of anti-HBs antibodies in chronically ill individuals, as part of the medical qualification examination for vaccination, is free of charge for these patients. Hepatitis B vaccination is recommended for individuals susceptible to infection, including: 1/ persons who, due to their lifestyle or occupation, are at risk of infection through tissue injury or sexual contact (e.g. those travelling to regions with endemic hepatitis B, engaging in high-risk sexual behaviours, or using intravenous drugs); 2/ chronically ill patients at high risk of HBV infection (e.g. those with immunodeficiency, including that caused by immunosuppressive treatment, chronic liver disease, or diabetes), who have not been vaccinated under the mandatory vaccination programme; 3/ patients preparing for surgical procedures and invasive medical interventions; 4/ patients with haematological malignancies; 5/ all previously unvaccinated adults, particularly older individuals. The standard hepatitis B vaccination schedule for adults consists of three doses administered at 0, 1, and 6 months. Booster vaccinations are not recommended for healthy individuals. In exceptional cases (e.g. before surgery or travel to an HBV-endemic region), an accelerated primary vaccination schedule may be used: 4 doses administered on days 0, 7, 21, and at 12 months. Special procedures include post-exposure prophylaxis and chronically ill individuals.

Diphtheria, tetanus and pertussis vaccine

The diphtheria, tetanus, and pertussis vaccine is available as the inactivated Tdap vaccine, which protects against diphtheria, tetanus, and pertussis. It contains a reduced dose of diphtheria toxoid (d), tetanus toxoid (T), and a reduced-dose acellular pertussis component (ap), containing 3–5 proteins. Toxoids are inactivated toxins produced by the diphtheria and tetanus bacteria. The vaccine is available in

combined forms (Td), also in formulations including pertussis antigens (Tdap) and polio antigens (Tdap-IPV), or as monovalent vaccines (d or T).

Vaccination with a pertussis-containing vaccine is recommended for: 1/ adults who have, or will soon have, close contact with infants under 12 months of age (parents, grandparents, caregivers), healthcare personnel (especially those working in neonatal and paediatric wards), and nursery staff — to reduce the risk of severe pertussis in infants as part of the cocoon strategy; 2/ pregnant women; 3/ healthcare workers in direct contact with patients in hospitals or outpatient settings, and staff of long-term care facilities, nurseries, and schools (for epidemiological reasons); 4/ adults who wish to reduce their own risk of contracting pertussis. The vaccine containing diphtheria and tetanus toxoids is recommended for adults who were previously properly vaccinated with the primary series (as booster doses), and for those who have never been vaccinated (as a primary series), especially older adults or those whose occupation puts them at risk of tetanus (e.g. farmers, horse and cattle breeders, gardeners). Vaccination is also recommended for individuals travelling to areas with diphtheria outbreaks or in the event of an outbreak within the country.

An adult who has previously received a complete primary vaccination series should receive a booster dose of Tdap, repeated every 10 years. An adult who has never been vaccinated or has no knowledge of their vaccination history should receive three doses of the primary vaccination series, following a 0, 1, 6–12 month schedule. One dose of Tdap should be given, followed by two doses of Td. Ideally, Tdap should be given first, followed by Td for the remaining doses. Neither a past pertussis infection nor vaccination provides long-lasting immunity. To maintain protection, booster doses are necessary and are recommended every 10 years. Pertussis vaccination is recommended during pregnancy, between 27th and 36th gestation week. Pregnant women at risk of preterm delivery should be vaccinated after the end of 20 weeks of gestation. The Tdap vaccine should be administered during every pregnancy. Pregnant women may receive Tdap vaccines or their derivatives that also include the polio component. Post-exposure management for injuries posing a risk of tetanus includes: 1/ vaccination in justified cases; 2/ if the risk is high – the first vaccine dose should be administered together with human tetanus immunoglobulin at a different injection site. If the wound is infected, contains a foreign body, is treated more than 24 hours after injury, or the patient presents with hypovolaemic shock or weighs more than 90 kg – the immunoglobulin dose should be doubled (to 500 IU); 3/ for immunocompromised individuals (primary or acquired, including those undergoing immunosuppressive therapy) or those with contraindications to vaccination, a second dose of human tetanus immunoglobulin is recommended 3–4 weeks after the first.

Vaccination against Covid-19

COVID-19 vaccines represent a new class of vaccine technologies. These include mRNA vaccines, which contain genetic information (a template for the production of a protein/antigen) enclosed in a lipid nanoparticle capsule, and vector vaccines, which use an adenovirus containing embedded genetic information as a template for protein (antigen) production. The adenovirus does not cause infection as it serves solely as a delivery platform. Traditional vaccines are also available: protein-based vaccines produced via recombinant methods and containing an adjuvant to enhance the immune response. The inventors of the mRNA vaccine technology were awarded the Nobel Prize. The SARS-CoV-2 virus mutates (new variants emerge), and therefore the vaccine composition is regularly updated. COVID-19 vaccination is recommended for individuals at risk of severe disease, including people aged 60 and over, persons with obesity (BMI \geq 25), diabetes, chronic lung disease, chronic kidney disease, cardiovascular disease, neurodevelopmental disorders, active cancer, or immunosuppressive disease or treatment, healthcare workers, especially those in direct contact with patients or infectious material. Vaccination is also recommended for pregnant women. The primary vaccination schedule for adults includes 2 or 3 doses, depending on individual health status. The number of booster doses depends on current recommendations. Immunocompromised patients require an additional dose in the primary series and more frequent booster doses.

Pneumococcal vaccines

Pneumococcal vaccines are inactivated vaccines. Conjugate vaccines contain pneumococcal capsule polysaccharides linked to a carrier protein that ensures a stronger and longer-lasting immune response. Vaccines available for adults include PCV-13 (covers 13 serotypes) and PCV-20 (covers 20 serotypes). Polysaccharide vaccines contain only capsule polysaccharides. For adults, the available vaccine is PPSV-23 (covers 23 serotypes). Conjugate and polysaccharide vaccines function differently; they are not interchangeable and should not be substituted for one another. Pneumococcal vaccination is recommended for adults: 1/ aged >50 years; 2/ who smoke tobacco; 3/ with chronic conditions: cardiovascular, respiratory (e.g. asthma, COPD, emphysema), liver, kidney, metabolic diseases (including diabetes); 4/ with alcohol dependence; 5/ with congenital or acquired immunodeficiency, including those on immunosuppressive therapy, with complement deficiencies, or phagocytic disorders (excluding chronic granulomatous disease); 6/ after splenectomy, with functional asplenia, spherocytosis, or haemoglobinopathies; 7/ with Hodgkin's lymphoma, non-Hodgkin lymphoma,

leukaemia, myeloma, or other malignant neoplasms; 8/ with cerebrospinal fluid leaks; 9/ with cochlear implants, or before planned cochlear implantation; 10/ after solid organ transplantation^{24,25}.

Vaccination for adults aged ≥ 65 years includes one dose of PCV-13 and one dose of PPSV-23, spaced 1 year apart, or one dose of PCV-20. Vaccination of adults at risk of pneumococcal disease includes one dose of PCV-13 and one dose of PPSV-23 at an interval of ≥ 8 weeks, or a single dose of PCV-20. For adults ≥ 65 years of age or aged 19–64 in risk groups who have previously received a single dose of PCV-13, one dose of PPSV-23 should be given after 1 year (≥ 65 years) or after ≥ 8 weeks (individuals from pneumococcal disease risk groups). An alternative approach is the administration of a single dose of PCV-20. For adults ≥ 65 years or aged 19–64 years in risk groups who have previously received one dose of PPSV-23, one dose of PCV-20 should be administered 1 year later. An exception applies to a specific risk group, i.e. patients after haematopoietic stem cell transplantation for whom a different vaccination schedule is recommended. In such cases, medical consultation is necessary. In the case of limited availability of PPSV-23, adult vaccination should be carried out using a single dose of PCV-13 or PCV-20. Vaccination of adults aged 50–64 years includes administration of one dose of PCV-13 or one dose of PCV-20.

Herpes zoster vaccine

The herpes zoster vaccine is an inactivated vaccine. It contains the varicella-zoster virus glycoprotein, produced using recombinant methods. The vaccine prevents herpes zoster and postherpetic neuralgia (persistent pain following herpes zoster). Vaccination is recommended for adults aged 50 years and over at increased risk of herpes zoster due to: 1/ chronic pulmonary or cardiac disease, chronic kidney failure, diabetes; 2/ immunocompromised status: iatrogenic immunosuppression, solid organ transplant, congenital or acquired immunodeficiency, HIV infection; 3/ cancer: leukaemia, Hodgkin's disease, multiple myeloma, disseminated malignancy; 4/ autoimmune disease: psoriasis, psoriatic arthritis, inflammatory bowel disease, rheumatoid arthritis, multiple sclerosis, systemic lupus erythematosus,

²⁴ Kuchar E., Antczak A., Skoczyńska A. et al. Pneumococcal vaccination among adults – updated Polish recommendations. *Family Medicine & Primary Care Review* 2022; 24(3): 285–291.

²⁵ Mamcarz A., Welnicki M., Drożdż J., Grabowski M., Jankowski P., Kuchar E., Leszek P., Mitkowski P., Wysocki J. The role of pneumococcal vaccination in reducing the cardiovascular risk of cardiac patients: opinion of experts of the Prevention Committee of the Polish Cardiac Society supported by the Polish Vaccinology Society. *Kardiologia Polska* 2023, Sep 3.

ankylosing spondylitis²⁶. The vaccine is reimbursed as follows: 100% reimbursement for individuals aged 65+ at increased risk of shingles and 50% reimbursement for individuals aged 18+ at increased risk. The herpes zoster vaccination schedule includes 2 doses, given 2 to 6 months apart. The vaccine prevents herpes zoster in individuals who have previously had chickenpox. The herpes zoster vaccine is not intended for use in the prevention of chickenpox.

Respiratory syncytial virus (RSV) vaccines

RSV vaccines are inactivated vaccines. They contain one or two glycoproteins produced using recombinant genetic methods. The vaccine may include an adjuvant (a substance that enhances the immune response). The monovalent adjuvanted vaccine is used to prevent lower respiratory tract disease caused by RSV in adults aged 60 years and older and adults aged 50–59 years at increased risk of RSV-related illness. The bivalent vaccine is recommended for administration to adults aged 60 years and older. RSV vaccination is recommended for older adults, especially those with chronic conditions (bronchial asthma, chronic obstructive pulmonary disease, other chronic respiratory diseases, coronary artery disease, heart failure, arrhythmia, diabetes, chronic kidney disease), immunocompromised individuals and residents of care homes²⁷. Additionally, the bivalent vaccine is recommended for pregnant women between 24th and 36th gestation week, preferably between the 32nd and 36th week. Vaccinating a woman in the third trimester of pregnancy enables transplacental transfer of neutralising antibodies to the infant, providing protection against RSV in the first six months of life.

Tick-borne encephalitis (TBE) vaccination

TBE vaccines are inactivated vaccines. Vaccination is recommended for individuals living in or travelling to endemic areas, either for tourism or work purposes, especially: 1/ forest workers, soldiers, firefighters and border guards; 2/ hunters, farmers; 3/ tourists and youth camping or spending time in forested areas, participants of camps and summer colonies. The primary vaccination schedule consists of three doses administered at 0, 1–3, and 5–12 months. After two doses, 90% of vaccinated individuals develop specific antibodies. An accelerated primary schedule includes doses at 0, 14 days, and 5–12 months. A booster dose should be given after 3 years, followed by subsequent boosters every 3–5 years.

²⁶ Kuchar E., Rudnicka L., Kocot-Kępska M. et al. Vaccination against herpes zoster.

Recommendations of the expert group of the Polish Society of Vaccinology, Polish Society of Family Medicine, Polish Dermatological Society, Polish Association for the Study of Pain, and Polish Neurological Society. *Med. Prakt.* 2023, 5, 64-72.

²⁷ Nitsch-Osuch A., Antczak A., Barczyk A. et al. Expert group recommendations on respiratory syncytial virus (RSV) vaccination in adults. *Lekarz POZ* 6/2023, vol. 9.