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## RUBELLA IN POLAND IN 2013\*

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### ABSTRACT

**BACKGROUND.** In 2004, Poland has adopted the WHO goal of rubella elimination and congenital rubella syndrome prevention. The main target of the Programme is to stop transmission of the virus in the environment and prevention of congenital rubella in children. This can be achieved by carrying out the vaccination. Participation in the rubella elimination program requires clinical diagnosis of rubella cases and their confirmation with laboratory test. In Poland, until 2003, national vaccination recommendation included a dose of rubella vaccine only for girls aged 13 years. Among men, the incidence of measles remained high creating a risk of infection of non-immune pregnant women which may lead to the development of congenital rubella syndrome in the child. **AIM.** To assess epidemiological situation of rubella in Poland in 2013, including vaccination coverage in Polish population.

**METHODS.** The descriptive analysis was based on data retrieved from routine mandatory surveillance system and published in the annual bulletins "Infectious diseases and poisonings in Poland in 2013" and "Vaccinations in Poland in 2013" (MP. Czarkowski, Warszawa 2014, NIZP-PZH, GIS).

**RESULTS.** In 2013, there was big epidemic of rubella in Poland – with 38 548 registered cases (6 times more than in 2012), incidence 84.4 per 100 000 (5 times higher than in the previous year). The highest incidence rate, regardless of gender and the environment, was observed among adolescents aged 15-19 years (911.6 per 100,000). The incidence of rubella in boys and men was significantly higher than the incidence in girls and women (181.4 versus 23.9). In 2013, two cases of congenital rubella syndrome were registered.

**SUMMARY AND CONCLUSIONS.** Rubella epidemic which occurred in Poland in 2013 was the result of use in the past vaccination against rubella only for girls 13 years of age. The proportion of laboratory tests confirming/excluding rubella infection is still very low in Poland. In 2013, only 0.2% of rubella cases were laboratory confirmed.

**Keywords:** *rubella, congenital rubella syndrome, epidemiology, Poland, 2013*

### INTRODUCTION

Rubella infection in children has generally mild course, but during pregnancy poses a serious risk to the fetus in the form of congenital rubella syndrome. Since 2004, Poland has been participating in the Rubella Elimination Program, coordinated by the World Health Organization (WHO). The main goals of the program are interruption of rubella virus transmission and prevention of congenital rubella syndrome in children. Rubella elimination is possible when very high coverage level (>95%) with at least one dose of rubella-containing vaccine is maintained. In Poland between 1987 and

2003 only girls were vaccinated (one dose in 13 year of age). This fact indirectly contributed to the increase of susceptibility to the disease among men, who are reservoir of the virus. In November 2003, a compulsory vaccination with MMR vaccine was introduced to the national vaccination schedule. In 2004 it was accompanied by second dose of MMR vaccine administered for children 10 years of age. The two-dose immunization with MMR vaccine is currently mandatory. In Poland, rubella is notifiable since 1966, and congenital rubella syndrome since 1997. In 2013, in comparison with 2010 the incidence of rubella increased over 10 times. In 2013 occurred a compensatory epidemic of rubella.

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## AIM

The aim of the study was to assess epidemiological situation of rubella in Poland in 2013, including vaccination coverage in Polish population.

## MATERIAL AND METHODS

The descriptive analysis of epidemiological situation of rubella was based on data retrieved from routine mandatory surveillance system and published in the annual bulletin "Infectious diseases and poisonings in Poland in 2013". Vaccination coverage was assessed based on data published in the annual bulletin "Vaccinations in Poland in 2013".

Rubella cases were classified according to the criteria of surveillance case definition implemented in the European Union (Commission Decision of 28 April 2008 amending Decision 2002/253/EC) and introduced into routine surveillance in Poland in 2009 („Definitions of cases of infectious diseases for the purpose of epidemiological surveillance”, Department of Epidemiology NIZP-PZH, 2012-2013).

## RESULTS

**Epidemiological situation of rubella in 2013.** In 2013, 38 548 cases of rubella were registered in Poland - incidence 100.1/100,000, higher by 83.7 % in comparison to the previous year and by 65.5 % in comparison

to median incidence in 2007-2011 (Tab. I). In 2013, 2 cases of congenital rubella syndrome were registered.

A higher rubella incidence in 2013 compared to 2012 was noted in all 16 voivodeships. The largest incidence occurred in małopolskie voivodeship (254.9 per 100,000 population), and it was 2 times higher than incidence of all cases registered in Poland in 2013 (100.1/100 000). The lowest incidence – 18.1 per 10,000 - was noted in dolnośląskie voivodeship (almost 4 times higher than incidence in the same voivodeship in the previous year – 4.7/ 100 000. The highest increase (25 times) of incidence was registered in wielkopolskie voivodship (incidence increased from 9.3 to 225.6 per 100 000 population) (Tab. I).

As in previous years (2010-2012), in 2013 the incidence of rubella in girls and women (23.9 per 100,000) was 9 times lower than the incidence in boys and men (181.4) (Tab. II).

The main reason was the fact that men who are ill with rubella in the past were not vaccinated. Despite rubella incidence decrease in total population in previous years, incidence in men, who are susceptible for infection, did not noticeably change. As a result of this situation an equalized epidemic has been registered, which began in late 2012 and lasted until 2013.

The biggest difference in the incidence between men and women was noted in age groups 15-19 years (1747.6 vs. 36.8 per 100,000), 20-24 years (532.5 vs. 13.7) and in individuals aged 0 to 1 year (158.6 vs. 15.2). In other age groups, especially among adults aged 30 to 54 years, a higher incidence was observed among women (Fig. 1).

Tab. 1. Rubella in Poland in 2007-2013. Number of cases and incidence per 100 000 population by provinces

Provinces	Median 2007-2011		2012		2013	
	number	Incidence per 100 000	number	Incidence per 100 000	number	Incidence per 100 000
<b>POLAND</b>	7 587	34,5	6 263	16,3	38 548	100,1
1. Dolnośląskie	452	15,7	138	4,7	527	18,1
2. Kujawsko-pomorskie	340	18,0	323	15,4	2 472	118,0
3. Lubelskie	232	12,9	1 766	81,4	2 242	103,0
4. Lubuskie	201	19,9	117	11,4	2 153	210,6
5. Łódzkie	318	12,9	169	6,7	734	29,2
6. Małopolskie	389	19,7	743	22,2	8 557	254,9
7. Mazowieckie	727	24,8	285	5,4	1 924	36,3
8. Opolskie	344	33,2	109	10,8	952	94,5
9. Podkarpackie	461	22,0	364	17,1	2 064	97,0
10. Podlaskie	464	38,8	74	6,2	628	52,5
11. Pomorskie	238	39,5	361	15,8	1 939	84,6
12. Śląskie	648	19,4	1 005	21,8	3 587	77,9
13. Świętokrzyskie	410	57,3	56	4,4	814	64,1
14. Warmińsko-mazurskie	149	19,8	146	10,1	583	40,3
15. Wielkopolskie	1 108	36,1	320	9,3	7 813	225,6
16. Zachodniopomorskie	296	17,5	287	16,7	1 559	90,7

Tab.2. Rubella in Poland 2013. Number of cases, incidence per 100 000 population, and percentage of cases by age, gender and location

Age (years)	Gender						Location						Total		
	males			females			urban areas			rural areas			number of cases	incidence per 100 000	%
	number of cases	incidence per 100 000	%	number of cases	incidence per 100 000	%	number of cases	incidence per 100 000	%	number of cases	incidence per 100 000	%			
0-4	1 486	143.0	4.4	1 250	127.0	26.3	1 618	138.1	8.2	1 118	131.3	5.9	2 736	135.2	7.1
0	300	158.6	0.9	279	15.2	5.9	330	155.3	1.7	249	160.3	1.3	579	157.4	1.5
1	343	169.9	1.0	323	169.5	6.8	393	172.4	2.0	273	166	1.4	666	169.7	1.7
2	256	122.8	0.8	179	90.8	3.8	261	110.7	1.3	174	102.4	0.9	435	107.2	1.1
3	287	131.9	0.8	219	106	4.6	314	127.6	1.6	192	107.8	1.0	506	119.3	1.3
4	300	135.3	0.9	250	118.3	5.3	320	128.2	1.6	230	125.5	1.2	550	127	1.4
5-9	1 537	157.1	4.5	1 243	133.8	26.2	1 532	143.0	7.8	1 248	149.3	6.6	2 780	145.8	7.2
5	399	186.2	1.2	307	150.6	6.5	403	168.5	2.0	303	169.2	1.6	706	168.8	1.8
6	362	179.1	1.1	316	164.7	6.6	375	167.7	1.9	303	177.8	1.6	678	172.1	1.8
7	319	165.2	0.9	263	143.3	5.5	322	152	1.6	260	157.7	1.4	582	154.5	1.5
8	251	134.6	0.7	210	118.6	4.4	265	131.1	1.3	196	121.4	1.0	461	126.8	1.2
9	206	113.2	0.6	147	85.2	3.1	167	85.8	0.8	186	116.3	1.0	353	99.5	0.9
10-14	765	80.5	2.3	412	45.7	8.7	558	56.4	2.8	619	71.8	3.3	1 177	63.6	3.1
15-19	19 403	1747.6	57.4	391	36.8	8.2	9 030	778.3	45.9	10 764	1064.5	57.0	19 794	911.6	51.3
20-24	7 206	532.5	21.3	178	13.7	3.7	3 960	265.2	20.1	3 424	295.1	18.1	7 384	278.3	19.2
25-29	1 964	124.8	5.8	151	9.9	3.2	1 319	69.7	6.7	796	65.9	4.2	2 115	68.2	5.5
30-34	740	45.5	2.2	176	11.1	3.7	608	30.1	3.1	308	25.9	1.6	916	28.6	2.4
35-39	369	24.5	1.1	294	20.0	6.2	417	22.8	2.1	246	21.6	1.3	663	22.3	1.7
40-44	163	12.9	0.5	385	31.0	8.1	345	23.3	1.8	203	19.8	1.1	548	21.8	1.4
45-49	82	7.0	0.2	157	13.4	3.3	150	10.9	0.8	89	9.1	0.5	239	10.2	0.6
50-54	34	2.6	0.1	71	5.3	1.5	67	4.1	0.3	38	3.6	0.2	105	3.9	0.3
55-59	21	1.5	0.1	28	1.8	0.6	35	1.8	0.2	14	1.4	0.1	49	1.7	0.1
60-64	8	0.7	0.0	6	0.4	0.1	8	0.5	0	6	0.7	0.0	14	0.5	0.0
65-74	13	1	0.0	5	0.3	0.1	15	0.8	0.1	3	0.3	0.0	18	0.6	0.0
75+	5	0.6	0.0	5	0.3	0.1	4	0.2	0	6	0.6	0.0	10	0.4	0.0
Total	33 796	181.4	100.0	4 752	23.9	100.0	19 666	84.4	100.0	18 882	124.1	100.0	38 548	100.1	100.0

Tab. 3. Rubella in Poland in 2007-2013. Number of cases and Incidence per 100 000 population by gender and environment

Gender	Environment	Median 2007-2011		2012		2013	
		Number	Incidence per 100 000	Number	Incidence per 100 000	Number	Incidence per 100 000
Woman	city	1 865	15.2	874	7.1	2 718	22.2
	city < 20 000	511	20.0	204	7.9	811	31.8
	city 20-49 000	354	16.1	205	9.2	484	21.7
	city 50-99 000	420	25.0	124	7.3	329	19.5
	city ≥ 100 000	580	9.9	341	5.9	1 094	19.0
	rural areas	1 727	23.2	612	8.0	2 034	26.7
	Total	3 592	18.2	1 486	7.5	4 752	23.9
Man	city	2 632	23.9	2 282	20.6	16 948	153.4
	city < 20 000	1 308	55.4	541	22.6	4 533	190.5
	city 20-49 000	940	47.1	656	32.2	3 285	161.1
	city 50-99 000	966	61.6	351	22.6	2 616	169.4
	city ≥ 100 000	1 364	26.5	734	14.4	6 514	128.1
	rural areas	4 884	66.3	2 495	33.0	16 848	222.1
	Total	4 897	26.6	4 777	25.6	33 796	181.4
Total	city	6 535	28.0	3 156	13.5	19 666	84.4
	city < 20 000	1 819	37.0	745	15.0	5 344	108.3
	city 20-49 000	1 294	30.9	861	20.2	3 769	88.3
	city 50-99 000	1 478	46.0	475	14.6	2 945	91.1
	city ≥ 100 000	1 944	17.7	1 075	9.9	7 608	70.1
	rural areas	6 611	44.6	3 107	20.5	18 882	124.1
	Total	13 146	34.5	6 263	16.3	38 548	100.1

The incidence in the cities varied in 2013 from 70.1 per 100,000 population in the largest cities with population of  $\geq 100,000$  to 108.3 in cities with population of 20-49,000 (Table III).

The incidence of rubella in rural areas (84.4/100 000) was 31.9% lower than the incidence in the smaller cities (124.1/100 000). Despite lower overall incidence in the cities, among children aged 0-4 years, as in the previous years, higher incidence was reported in the cities (Table II).

Of the total number of rubella cases reported in 2013, 17.4 % involved children and young people under the age of 15 (21% of all cases in children aged 0-4 years and 16% in children aged 5-9 years) (Table II). In con-

trast to 2012, when the highest incidence, regardless of gender and the environment, was among children aged 15 to 19 (911,6 per 100 000) and 20-24 (278,3). Total number of cases in these two age groups constituted 70,5% of all cases registered in 2013.

In 2013, 205 persons were hospitalized due to rubella, i.e. 0.53% of all reported patients, mostly in mazowieckie (43 cases) and wielkopolskie (36 cases) voivodeships. According to preliminary data of the Central Statistical Office, there were no deaths from rubella recorded in 2013.

Seasonality of rubella in 2013 was similar to the seasonality observed in previous years. Most cases occurred in the period from March to May with a peak in

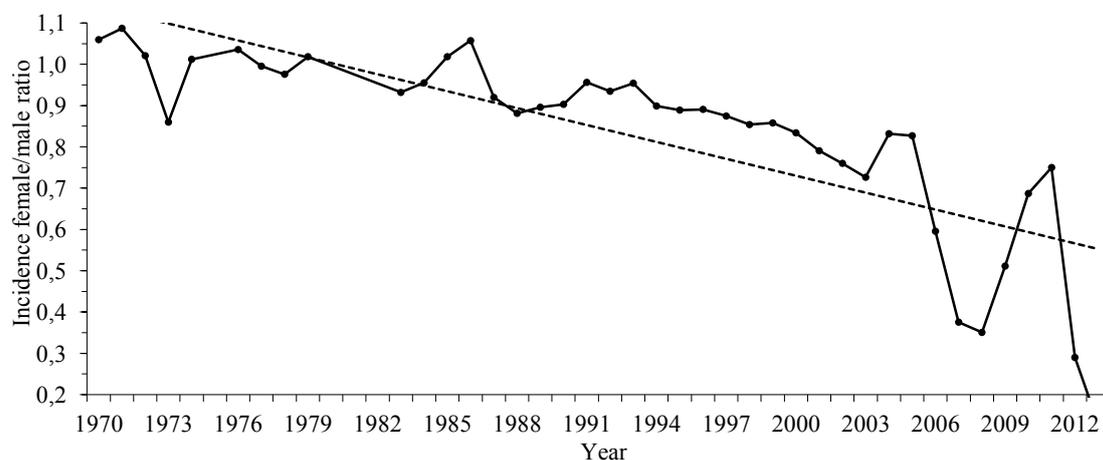


Fig. 1. Rubella in Poland 1970-2013. Incidence (per 100 000 population) female/male ratio

Tab. 4. Rubella in Poland in 2013. Number of cases and incidence per 100 000 population by age and vaccination state

Age	Vaccinated			Not vaccinated			No data	
	Number of vaccinated	Cases	Incidence	Number of vaccinated	Cases	Incidence	Cases	%
0	.	11	.	.	461	.	107	18.5
1	314 402	315	100.2	65 457	206	314.7	145	21.8
2	370 876	288	77.7	9 473	54	570.0	93	21.4
3	398 282	360	90.4	5 082	43	846.1	103	20.4
4	405 744	407	100.3	3 550	44	1239.4	99	18.0
5	401 608	528	131.5	2 502	45	1798.6	13	1.8
6	377 446	511	135.4	1 778	32	1799.8	135	19.9
7	361 511	427	118.1	1 377	39	2832.2	116	19.9
8	349 600	319	91.2	1 029	35	3401.4	107	23.2
9	337 546	225	66.7	641	37	5772.2	91	25.8
10-14	1 730 306	669	38.7	7 874	180	2286.0	328	27.9
15-19	.	400	.	.	14 606	.	4 788	24.2
20-24	.	88	.	.	4 918	.	2 378	32.2
24+	.	60	.	.	2 862	.	1 755	37.5
<b>Total</b>	.	4 608	.	.	23 562	.	10 258	26.6

\* vaccination with MMR vaccine ("Vaccinations in Poland in 2013". Warsaw 2013. PZH. GIS)

April – 11 877 cases (31.1% of all cases in the year). The lowest number of cases was registered in September (237, i.e. 0.6 %) (Fig.2).

**Laboratory diagnosis of rubella.** The diagnosis of rubella should be based on the result of the laboratory testing. In 2012-2013 a new rubella case definition was introduced and therefore the classification criteria for confirmed and probable cases were changed. According to the new definition, probable case is defined as a patient in whom, in addition to having an epidemiological link to a confirmed case, presence of specific IgM antibodies against rubella in the serum was detected. To confirm a rubella case, more specific virological tests, including virus isolation, PCR, or demonstration of a significant increase in IgG antibodies in serum or saliva are required. Laboratory diagnosis for each reported suspected rubella case is of particular importance be-

cause the symptoms are similar to symptoms of many childhood diseases. According to the law on control of infections and infectious diseases in humans (Act of 5 December 2008 on prevention and control of infections and infectious diseases in humans, Dz.U.08.234.1570 with further amendments) laboratory testing of suspected rubella cases can be performed in sanitary-epidemiological stations. According to the WHO Rubella Elimination Program, each confirmed case of rubella should additionally be tested in the National Laboratory accredited by WHO. In Poland, a reference center is Laboratory of Department of Virology NIPH - NIH.

**The sensitivity and specificity of rubella diagnosis in Poland in 2013.** In Poland, confirmation of clinical diagnosis of rubella with laboratory tests is still insufficient and makes an assessment of the impact of introduced in 2003 universal vaccination of all chil-

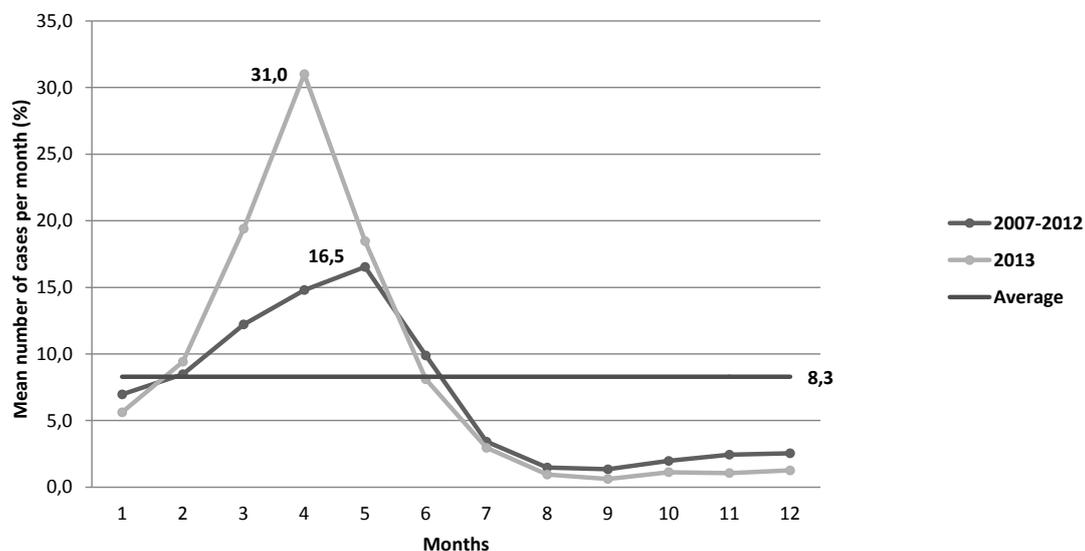


Fig.2. Seasonality of rubella in Poland in 2007-2013 (by month)

dren against rubella difficult. In 2013, only 52 (0.2%) cases were classified as confirmed and 107 (0.4%) as probably. The remaining 99.6% of cases (38 387) were reported on the basis of clinical symptoms. This may explain a significant number of rubella cases registered among vaccinated individuals (Tab. IV).

In 2013, the percentage of rubella cases for whom the vaccination status was unknown was 27%, the same compared with 2012. In children aged 1-9 years, vaccination status was unknown for 18% of cases and increased by 2 % compared with the previous year (Tab. IV).

**Vaccinations against rubella in 2013.** Rubella vaccination in 2013 included the administration of two doses of MMR vaccine. The vaccination schedule hasn't been changed since 2004 and consists of administration of primary dose in 13-15 months and a booster dose at 10 years of age. In 2013, rubella vaccine coverage among children aged 3 years vaccinated decrease by 0.4 % compared with previous year and was 97.5 %. (ranged from 96.4% in mazowieckie to 99.7% in warmińsko-mazurskie voivodeships). Vaccine coverage among girls aged 13 years was 99.3 % and among girls aged 14 years - 99.5%.

## SUMMARY AND CONCLUSIONS

In 2013, in Poland an compensatory epidemic of rubella occurred. The World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) recommended for travellers who planned to visit Poland, especially women of childbearing age,

vaccination against rubella. Taking into account the higher incidence of rubella among men in the age at which they have contact with women of childbearing age, vaccination coverage among girls below 100% and the fact that approximately 50% of rubella infection are subclinical, there is still a risk of rubella infection for women of childbearing age and the occurrence of congenital rubella syndrome in newborns.

Taking into consideration that a high percentage of vaccination coverage among girls and boys effectively prevents congenital rubella syndrome, education of public in this field should be intensified.

In 2013, only 0.3% of rubella cases was confirmed with laboratory test, the remaining 99.7% of the cases were reported solely on the basis of the clinical picture. This situation requires rapid improvement. Polish participation in the Rubella Elimination Program requires a clinical diagnosis to be confirmed with laboratory tests. The high percentage of missing data on vaccination status of rubella cases makes it difficult to interpret the impact of vaccination programme on epidemiological situation of the disease.

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