

Elżbieta Jodkowska, Maria Wierzbicka, Izabela Strużycka, Ewa Rusyan

## POLISH PUBLIC PROGRAMME OF DENTAL CARIES PREVENTION IN CHILDREN AGED 6, 12 AND 18 YEARS IN 2012

Department of Conservative Dentistry - Faculty of Conservative Dentistry  
Warsaw Medical University

### ABSTRACT

**INTRODUCTION.** Studies conducted within the framework of „Monitoring of oral health in Polish population”, adapted by Ministry of Health, determined the percentage of children aged up to 18 years who were involved in prophylactic programme in schools.

**OBJECTIVE.** The study aimed at analyzing the prophylactic programme conducted in 2012 in Poland, combined with the procedure of sealing of primary and permanent lateral teeth in 3 age groups.

**MATERIAL AND METHODS.** A total of 5,723 children aged 6, 12 and 18 years living in 7 voivodeships were involved in epidemiological study. The study was conducted pursuant to WHO recommendations (Oral Health Surveys).

**RESULTS.** The percentage of children in particular age groups involved in prophylactic programme was: 34.8% and 97.3%, while the 18-year-olds were not subject to prophylaxis. Taking into account the completion status of prophylactic programmes, considerable differences between voivodeships were observed. A minor percentage of children aged 6 years had primary and permanent teeth sealed with their respective share being 0.6% and 7.1%. The percentage of children aged 12 years with sealed teeth amounted to 33%. The noticed disparities in the percentage of sealed teeth in particular voivodeships ranged from 1.4 to 56.0%. Less than 1% (0.8%) of examined 18-year-olds required sealing of teeth as generally lateral teeth in this age were filled or affected by dental caries.

### CONCLUSIONS

1. Having analyzed the place of residence (urban, rural area) in relation to the number of children involved in prophylactic programme, no differences were observed in children aged 6 years. However, considerable disparities were present between particular voivodeships. A minor percentage of 6-year-olds had sealed permanent teeth, its value was less regarding primary teeth.
2. Nearly all children aged 12 years were subject to fluoride prophylactic programme, while in four voivodeships it amounted to 100%. The percentage of sealed teeth was 33%. From the analysis of number of sealed teeth in examined children transpires that more than 67% of children had no sealing of teeth, while 13% of them had from 4 to 6 teeth with sealants.

**Key words:** *dental caries prophylaxis, epidemiological study, fissure sealing*

### INTRODUCTION

According to World Health Organization (WHO), the most important actions are: reduction of oral diseases prevalence and accompanying disorders, especially in low-income population, promotion of healthy lifestyle, development of health care systems aimed at improving oral health by the means of programmes of various types and realization levels (1). The objectives which are to be met were formulated in the document of the Foundation of Oral Health Promotion:

1. Increase in the percentage of dental caries-free children aged 6 years up to 60%.
2. Compared to 2002, reduction of disparities in percentage of dental caries-free 6-year-olds between voivodeships by 20%.
3. Decrease of mean value of DMFT in children aged 12 years to 2.
4. Compared to 2003, reduction of disparities in dental caries severity in children aged 12 years between voivodeships by 30%.
5. Decrease of SiC value in children aged 12 years to 4.

6. Increase in the percentage of children aged 18 years with full permanent dentition up to 90%.
7. Compared to 2002, decrease of percentage of persons aged 35-44 years with edentulism by 50% (2).

The 11th operational target specified in the National Health Programme for 2007-2015 aimed at intensifying the prevention of dental caries among children and adolescents (3). As many as six activities were formulated, i.e.: implementation or intensification of health education on oral health in parents of children aged up to 7 years, pre-school children, children and adolescents, popularization of teeth brushing following main meals in kindergartens, intensification of group exogenous fluoride prophylaxis among children of I-VI classes, intensification of professional fluoride prophylaxis in children and adolescents at high risk of developing dental caries and launch of long-term healthcare policy of Ministry of Health entitled "Programme to improve dental care for children and adolescents" and improvement of access to dental services for children and adolescents.

From the results of epidemiological studies conducted within the framework of "Monitoring of Oral Health" in 2011, in which a total 1,819, 1,806 and 2,646 children aged 5, 7 and 15 years, respectively, were enrolled into, transpires that at least one dental cavity was observed in 79.9%, 90.5% and 91.8% of 5, 7 and 15-year-olds, respectively. In mazowieckie voivodeship, 21.5% of children aged 6 years had no dental cavity reported, 35.7% of them had at least 4 teeth affected by dental caries and only 16.6% had permanent teeth sealing. Unfortunately, the statistics showed that prophylactic programme has not been conducted adequately. In mazowieckie voivodeship, in 1,439 out of 3,127 schools exogenous fluoride prophylaxis was performed, in 9.4% of communes prophylactic programme on hygiene of oral cavity was organized and only 1.17% of NHF expenditures on dental services in 2011 were assigned to prophylaxis (5).

The objective of the study was to assess the effectiveness of nationwide prophylactic programme conducted in 2012 which was combined with primary and permanent teeth sealing in three age groups, i.e. 6, 12 and 18-year-olds.

## MATERIAL AND METHODS

A total of 5,723 persons aged 6, 12 and 18 years living in 7 voivodeships selected on a basis of multistage sampling were enrolled into the epidemiological study.

The study was conducted pursuant to WHO recommendations (Oral Health Survey). The study group was representative, randomly selected sample. In the study the criteria for clinical assessment on international scale and epidemiological rates were applied. During dental examination, mouth mirror and standard probe

(WHO probe) under identical light conditions were employed. The study protocol was approved by The Bioethics Committee of Warsaw Medical University; No. AKBE/551/12 as of 24 July 2012. The persons performing examinations participated in special trainings, including calibration process. The credibility of clinical assessment done by persons responsible for examination was verified based on re-examinations of 10% of study sample. The obtained results were subject to statistical analysis, using chi-square tests, Mann-Whitney test and ANOVA analysis of Kruskal-Wallis.

## RESULTS

Table I presents the number of children and adolescents enrolled into the study. Out of 5,723 examinees, the percentages of 6, 12 and 18-year-olds were 34.4%, 32.6% and 32.9%, respectively. Having analyzed the gender, the percentage of 6-year-old boys was 52.5%; 12-year-olds - 49.4% and 18-year-olds - 49.3; while the percentages of girls were 47.4%, 50.6% and 50.7, respectively. Given the place of residence, the number of children and adolescents living in urban areas was higher with their respective share being: 54.9%, 56.6% and 55.3%.

Table I. Number of children and adolescents examined in 2012.

Age of the examined	Total (in country)	Number of the examined			
		Boys	Girls	Urban areas	Rural areas
6	1,968	1,034	934	1,080	888
12	1,868	923	945	1,058	810
18	1,887	930	957	1,043	844
Total	5,723	2,887	2,836	3,181	2,542

Generally, the percentage of children involved in prophylactic programme in 2012 was 34.8% and 97.3% for 6 and 12-year-olds, respectively. The adolescents aged 18 years were not subject to prophylactic programme. The data with regard to the gender of 6-year-olds included in the programme was not presented. However, the higher percentage of children living in rural (36.1%) compared to urban areas (33.7%) was observed (Tab. II). Having considered the gender of children aged 12 years, slightly higher percentage of children under prophylaxis was reported in boys

Table II. Percentage of children and adolescents subject to prophylactic programme in 2012.

Age of the examined	Total (in country)	Percentage of the examined			
		Boys	Girls	Urban areas	Rural areas
6	34.8	n.a.	n.a.	33.7	36.1
12	97.3	97.4	97.1	99.2	94.7
18	-	-	-	-	-

(97.4%) than girls (97.1%) and in persons living in urban areas (99.2% ) compared to rural areas (94.7%).

The prophylactic programme consisted in everyday supervised brushing with fluoride toothpaste in kindergarten/ school. Given the place of residence, no significant differences in percentage of children under aforesaid programme were determined: 33.7% in urban and 36.1% in rural areas. However, the considerable differences were reported while comparing the completion status in particular voivodeships. It ranged from 0.0% in warmińsko-mazurskie to 98.7% in mazowieckie voivodeship (Tab. III).

Table III. Percentage of children examined during prophylactic programme by voivodeships.

Voivodeship	Age of the examined		
	6	12	18
dolnośląskie	0.4	100.0	n.a.
kujawsko-pomorskie	34.6	100.0	-
lubelskie	23.8	91.7	-
lubuskie	73.0	100.0	-
mazowieckie	98.7	100.0	-
podkarpackie	17.5	93.4	-
warmińsko-mazurskie	0.0	97.3	-

**Prophylactic programme of 6-years – olds.** The presence of sealant in primary teeth was reported in 0.6 of 6-year-old examined children. The percentage of primary teeth with sealants was higher in boys (0.8%) and children living in urban areas (0.8%) compared to girls (0.4%) and children living in rural areas (0.2). Generally, the percentage of 6-year-olds with sealants in permanent teeth was low, amounting to 7.1%. The percentage of permanent teeth was slightly higher in girls (7.3%) compared to boys (7.0%) and in children living in rural (7.5%) than urban areas (6.8%). The percentage of children aged 6 years with sealants in permanent teeth for seven voivodeships (dolnośląskie, kujawsko-pomorskie, lubelskie, lubuskie, mazowieckie, podkarpackie and warmińsko-mazurskie) ranged from 0.7% (mazowieckie voivodeship) to 14.2 (lubuskie voivodeship) (Tab. V).

**Prophylactic programme of 12-years –olds.** In 2012, almost all children aged 12 years (97.3%) were involved in prophylactic programme. In 4 out of 7 analyzed voivodeships, 100% of children benefited from programme (dolnośląskie, kujawsko-pomorskie,

lubuskie and mazowieckie), in three voivodeships from 91.7% to 97.3% of children participated in programme (lubelskie, podkarpackie, warmińsko-mazurskie). The adolescents aged 18 years were not subject to prophylaxis. The analysis of therapeutic needs suggested that approximately 14% of adolescents did not require treatment but only dental caries prophylaxis and motivation for using fluoride toothpaste were needed.

Table V. Percentage of children and adolescents with sealed permanent teeth.

Voivodeship	Age of the examined		
	6	12	18
dolnośląskie	6.3	17.5	0
kujawsko-pomorskie	6.0	27.7	0
lubelskie	8.7	41.1	4.8
lubuskie	14.2	20.5	0
mazowieckie	0.7	56.0	0
podkarpackie	8.0	1.4	0
warmińsko-mazurskie	7.7	54.0	0

Generally, the percentage of 12-year-olds with sealants in permanent lateral teeth amounted to about 33%. Given the gender and place of residence, it was 33.2% and 32.7% for boys and girls and 36.2% and 28.6% for urban and rural areas, respectively (Tab. IV). From the analysis of teeth with sealants transpired that slightly more than 67% of examined 12-year-olds had no sealants in even one tooth, while 13% of examinees had from 4 to 16 lateral teeth sealed. There were considerable differences in application of sealants in particular voivodeships, ranging from 1.4% in podkarpackie to 56.0% in mazowieckie voivodeship (Tab. V). As many as 0.8% of adolescents aged 18 years required sealing. Taking into account the gender and place of residence, it was 1.1% and 0.6% for boys and girls, respectively and 1.0% of adolescent living in urban compared to 0.6% in rural areas. Given the voivodeship, the need for putting the sealant was determined in 4.8% of adolescents in lubelskie voivodeship.

## RESULT INTERPRETATION AND DISCUSSION

The results of epidemiological studies conducted in 2012 suggest that public prophylactic programmes in

Table IV. Percentage of children and adolescents with sealed primary and permanent teeth.

Age of the examined	Total (in country)		Percentage of the examined							
	Primary teeth	Permanent teeth	Boys		Girls		Urban areas		Rural areas	
			primary teeth	permanent teeth	primary teeth	permanent teeth	primary teeth	permanent teeth	primary teeth	permanent teeth
6	0.6	7.1	0.8	7.0	0.4	7.3	0.8	6.8	0.2	7.5
12	-	32.9	-	33.2	-	32.7	-	36.2	-	2.9
18	-	0.8	-	1.1	-	0.6	-	1.0	-	0.6

Table VI. Percentage of children aged 6, 12 and 18-year-old adolescents involved in prophylactic programme.

Age of the examined	Year of examinations	Number of the examined	Boys	Girls	Urban areas	Rural areas	Total (in country)
6 years	2002	1,305	12.0	16.1	18.3	9.6	14.1
	2005	2,154	8.2	8.1	5.7	10.6	8.2
	2008	1,825	n.a.	n.a.	n.a.	n.a.	24.4
	2010	2,618	n.a.	n.a.	52.0	36.7	45.6
	2012	1,968	52.5	47.4	54.8	45.2	34.8
12 years	2002	342	n.a.	n.a.	n.a.	n.a.	48.0
	2003	3,338	n.a.	n.a.	n.a.	n.a.	20.2
	2005	2,435	48.5	48.6	46.7	50.1	48.6
	2007	2,337	54.9	55.4	58.0	51.8	55.2
	2010	2,782	n.a.	n.a.	77.3	61.5	70.8
	2012	1,868	49.4	50.6	56.6	43.4	97.3
18 years	2004	3,051	5.8	3.1	6.3	1.9	4.3
	2008	2,103	n.a.	n.a.	n.a.	n.a.	9.8
	2012	1,887	49.3	50.7	55.3	44.7	0

n.a.– not available

Poland were realized only in small proportion. The percentage of children subject to prophylactic programme was 34.8% and 97.3% of children aged 6 and 12 years, respectively. The 18-year-olds were not involved in prophylactic programme. The comparison of current and previous results of epidemiological studies conducted on children aged 6 years in 2002, 2005, 2008, 2010 suggest that percentage of children under prophylaxis amounted to 14.3% in 2002 and was implemented only in four voivodeships (lubelskie-31.4%, małopolskie-100.0%, podlaskie-47.6% and śląskie-50.0%) (6). In 2005, the percentage of 6-year-olds subject to prophylactic programme was 8.2% and was conducted in małopolskie (49.3%), podlaskie (10.6%) and śląskie voivodeships (26.5%) (7).

In 2008, the percentage of children involved in prophylactic programme amounted to 24.4% and was initiated in six voivodeships, i.e. dolnośląskie (0.8%), lubuskie (100.0%), łódzkie (21.%), małopolskie (100.0%), podkarpackie (97.5%) and wielkopolskie voivodeships (49.2%) (8). In 2010, the percentage of 6-year-olds involved in prophylactic programme was 45.6% and was conducted in lubuskie, małopolskie and warmińsko-mazurskie voivodeships (9). In several voivodeships, i.e. kujawsko-pomorskie, opolskie, podkarpackie, zachodniopomorskie and śląskie none of the children were subject to programme of dental caries prevention. In 2012, only 34.8% of children were under prophylactic programme. Having compared the completion status of programme, significant differences were observed between voivodeships, i.e. only 1 of the examined children in dolnośląskie voivodeship, none of the children in warmińsko-mazurskie voivodeship and 98.7% of children in mazowieckie voivodeship (10).

From the observations of physicians responsible for epidemiological studies in 2002 transpired that only 35.7% of children aged 12 years were subject to prophylaxis (6). The children were living only

in three voivodeships (wielkopolskie, dolnośląskie and warmińsko-mazurskie voivodeships). Given the voivodeship, the percentage of 12-year-old children enrolled into the study ranged from 46.0% to 49.5%. In 2003, out of 3,338 examined children aged 12 years, only 20.2% were subject to prophylactic programme (11). The children under prophylaxis were living in seven voivodeships (lubelskie, lubuskie, łódzkie, małopolskie, podkarpackie, warmińsko-mazurskie and zachodniopomorskie). In two voivodeships, i.e. lubuskie and zachodniopomorskie, all children were subject to prophylaxis. The lowest number of children involved in prophylactic programme, amounting to 11.7%, was reported in podlaskie voivodeship.

In 2005, the percentage of children aged 12 years benefiting from prophylactic programme was 48.6%. The percentage of children varied between particular voivodeships. In four voivodeships (dolnośląskie, opolskie, warmińsko-mazurskie and wielkopolskie), none of the children participated in dental caries prevention programme (7). In two voivodeships, prophylactic programmes were of minor scope, ranging from 10.6% (kujawsko-pomorskie) to 17.8% (podkarpackie), while in three voivodeships (lubelskie, lubuskie and podlaskie) the programme scope was high, exceeding 99%. In 2007, the percentage of 12-year-olds included in the prophylactic programme was 55.2%, dependent on the place of residence, it was higher in urban compared to rural areas and differed considerably in relation to voivodeship (12). In lubelskie, podkarpackie and pomorskie voivodeships, only 0.3%-7.0% of children did not benefit from prophylaxis, while in mazowieckie voivodeship none of the examined children were involved in prophylactic programme. In śląskie and warmińsko-mazurskie voivodeships, in similar situation were 81.5% and 78.2% of children, respectively. In 2010, more than 45% of children were

Table VII. Percentage of children aged 6, 12 and 18-year-old adolescents subject to sealing of permanent teeth in 2002-2012.

Age of the examined	Year of examinations	Type of dentition	Boys	Girls	Urban area	Rural area	Total (in country)		
6 years	2002	primary	2.2	2.1	3.1	1.1	2.1		
		permanent	6.8	7.9	9.9	4.6	7.4		
	2005	primary	n.a.	n.a.	n.a.	n.a.	n.a.		
		permanent	7.3	11.0	11.6	6.8	9.2		
	2008	primary	1.2	0.7	1.1	0.8	0.9		
		permanent	4.2	4.2	6.5	4.8	5.6		
	2010	primary	n.a.	n.a.	n.a.	n.a.	n.a.		
		permanent	n.a.	n.a.	n.a.	n.a.	5.8		
	2012	primary	0.8	0.4	0.8	0.2	0.6		
		permanent	7.0	7.3	6.8	7.5	7.1		
	12 years	2002	Permanent teeth	39.4	31.2	33.9	37.6	35.7	
				0.8*	0.7*	0.7*	0.8*	0.8*	
2003		27.8		24.4	31.3	20.5	26.1		
		0.74*		0.70*	0.92*	0.50*	0.72*		
2005		2.4		23.8	26.0	19.3	22.6		
		21.4*		2.8*	2.9*	2.3*	2.6*		
2007		28.9		30.9	36.0	22.9	30.0		
		2.63*		2.77*	2.76*	2.61*	2.70*		
2010		n.a.		n.a.	n.a.	n.a.	21.5		
		12.6		13.3	14.6	10.7	29.1*		
18 years		2004		Permanent teeth	n.a.	n.a.	6.3	1.9	4.3
					16.3	14.8	16.9	13.6	15.4
	2008	2.97*	2.79*		3.04*	2.61*	2.87*		
	2012	1.1	0.6		1.0	0.6	0.8		

\*mean number of sealed teeth

n.a.– not available

Table VIII. Percentage of children aged 6,12 and adolescents aged 18 years subject to prophylactic programme by voivodeships in 2002-2012.

Voivodeship	6 years					12 years						18 years		
	2002	2005	2008	2010	2012	2002	2003	2005	2007	2010	2012	2004	2008	2012
dolnośląskie	0.0	0.0	0.8	5.2	0.4	49.5	0.0	0.0	70.1	60.5	100.0	17.7	97.9	6.8
kujawsko-pomorskie	0.0	0.0	0.0	0.0	34.6	0.0	0.0	10.6	0.0	0.0	100.0	1.1	13.9	0.0
lubelskie	31.4	0.0	0.0	100.0	23.8	0.0	25.2	99.3	99.7	100.0	91.7	0.0	8.4	13.7
lubuskie	0.0	0.0	100.0	50.6	73.0	0.0	100.0	99.5	0.0	97.7	100.0	3.4	0.0	41.1
łódzkie	0.0	0.0	21.4	46.8	n.a.	0.0	22.1	25.7	0.0	100.0	n.a.	0.0	0.0	n.a.
małopolskie	100.0	47.3	100.0	100.0	n.a.	0.0	52.4	76.9	0.0	45.7	n.a.	0.0	100.0	n.a.
mazowieckie	0.0	0.0	0.0	98.7	98.7	0.0	0.0	48.3	0.0	98.3	100.0	0.0	0.0	n.a.
opolskie	0.0	0.0	0.0	0.0	n.a.	0.0	0.0	0.0	0.0	100.0	100.0	0.0	95.3	n.a.
podkarpackie	0.6	0.0	97.0	0.0	17.5	0.0	0.0	17.8	93.6	100.0	n.a.	0.0	0.0	0.0
podlaskie	47.6	10.6	0.0	39.6	n.a.	0.0	11.7	99.3	0.0	99.0	n.a.	0.0	8.2	35.4
pomorskie	0.0	0.0	0.0	0.6	n.a.	0.0	0.0	97.2	93.0	99.4	n.a.	0.0	20.4	n.a.
śląskie	50.0	26.5	0.0	0.0	n.a.	0.0	0.0	33.2	18.5	53.2	n.a.	0.0	0.0	n.a.
świętokrzyskie	0.0	0.0	0.0	62.4	n.a.	0.0	0.0	59.0	0.0	20.6	n.a.	0.0	0.0	n.a.
warmińsko-mazurskie	0.0	0.0	0.0	100.0	0.0	46.0	40.1	0.0	21.8	100.0	97.3	0.0	1.4	n.a.
wielkopolskie	0.0	0.0	49.2	51.4	n.a.	48.3	0.0	0.0	0.0	43.9	n.a.	9.5	3.2	13.7
zachodnio-pomorskie	0.0	33.2	0.0	0.0	n.a.	0.0	100.0	70.5	50.0	0.0	n.a.	0.0	22.5	n.a.
Total	14.3	8.0	24.4	45.6	34.8	48.0	20.2	48.6	55.2	70.8	97.3	4.3	27.4	13.9

under prophylaxis (9). In lubuskie, małopolskie and warmińsko-mazurskie voivodeships, 100% of children were involved in prophylactic programme. On the other hand, in several voivodeships, i.e. kujawsko-pomorskie, opolskie, podkarpackie, zachodniopomorskie and

śląskie, none of the children were subject to dental caries prevention programme. In current study, the percentage of 12-year-olds benefiting from prophylactic programme was 97.3%, even in the rural area as many as 94.7% of children participated in fluoride prophylaxis.

Table IX. Percentage of 6-year-old children with fissures sealed and mean number of sealed teeth per child by voivodeships.

voivodeship	2002		2005		2008		2010		2012	
	primary teeth	perma-ment teeth								
dolnośląskie	0.0	9.7	n.a.	10.7	n.a.		n.a.	3.9	n.a.	6.3
kujawsko-pomorskie	0.0	2.6	n.a.	15.7	n.a.	+	n.a.	0.0	n.a.	6.0
lubelskie	11.4	0.0	n.a.	8.1	n.a.	+	n.a.	11.7	n.a.	8.7
lubuskie	0.0	0.0	n.a.	12.2	+	+	n.a.	2.2	n.a.	14.2
łódzkie	2.8	4.2	n.a.	1.7	+	+	n.a.	6.4	n.a.	n.a.
małopolskie	3.6	3.6	n.a.	8.7	n.a.	+	n.a.	5.1	n.a.	n.a.
mazowieckie	0.0	18.8	n.a.	3.8	n.a.	+	n.a.	16.6	n.a.	0.7
opolskie	0.0	17.9	n.a.	n.a.	n.a.	n.a.	n.a.	7.4	n.a.	n.a.
podkarpackie	1.1	5.7	n.a.	2.1	+	+	n.a.	2.9	n.a.	8.0
podlaskie	0.0	12.2	n.a.	15.5	n.a.	+	n.a.	15.1	n.a.	n.a.
pomorskie	0.0	5.1	n.a.	6.9	n.a.	+	n.a.	3.8	n.a.	n.a.
śląskie	0.0	15.0	n.a.	8.6	+	+	n.a.	2.8	n.a.	n.a.
świętokrzyskie	0.0	0.0	n.a.	8.3	n.a.	+	n.a.	3.4	n.a.	n.a.
warmińsko-mazurskie	0.0	5.6	n.a.	9.9	n.a.	+	n.a.	7.8	n.a.	7.7
wielkopolskie	0.0	10.3	n.a.	9.5	n.a.	n.a.	n.a.	5.6	n.a.	n.a.
zachodnio-pomorskie	20.0	1.4	n.a.	19.4	n.a.	+	n.a.	0.0	n.a.	n.a.
Total	2.1	7.4	n.a.	9.2	0.9	5.6	n.a.	5.8	0.6	7.1

Table X. Percentage of 12-year-old children with fissures sealed and mean number of sealed masticatory surfaces of permanent teeth per child by voivodeships.

	2002		2003		2005		2007		2010		2012	
	Percentage of children with sealed teeth (%)	Mean number of sealed teeth	Percentage of children with sealed teeth (%)	Mean number of sealed teeth	Percentage of children with sealed teeth (%)	Mean number of sealed teeth	Percentage of children with sealed teeth (%)	Mean number of sealed teeth	Percentage of children with sealed teeth (%)	Mean number of sealed teeth	Percentage of children with sealed teeth (%)	Mean number of sealed teeth
dolnośląskie	n.a.	n.a.	n.a.	n.a.	24.8	2.9	40.2	2.34	12.3	n.a.	17.5	n.a.
kujawsko-pomorskie	n.a.	n.a.	n.a.	n.a.	25.5	4.6	0.0	0.0	20.0	n.a.	27.7	n.a.
lubelskie	n.a.	n.a.	n.a.	n.a.	40.4	2.7	45.6	2.67	33.0	n.a.	41.1	n.a.
lubuskie	n.a.	n.a.	n.a.	n.a.	28.4	2.5	0.0	0.0	19.4	n.a.	20.5	n.a.
łódzkie	n.a.	n.a.	n.a.	n.a.	10.0	2.6	0.0	0.0	19.7	n.a.	n.a.	n.a.
małopolskie	n.a.	n.a.	n.a.	n.a.	4.6	2.0	0.0	0.0	20.7	n.a.	n.a.	n.a.
mazowieckie	n.a.	n.a.	n.a.	n.a.	26.5	2.1	41.8	3.01	31.3	1.3	56.0	n.a.
opolskie	n.a.	n.a.	n.a.	n.a.	32.6	2.4	0.0	0.0	21.0	n.a.	n.a.	n.a.
podkarpackie	n.a.	n.a.	n.a.	n.a.	19.1	2.0	34.1	3.30	5.1	n.a.	1.4	n.a.
podlaskie	n.a.	n.a.	n.a.	n.a.	33.6	3.2	0.0	0.0	38.8	3.56	n.a.	n.a.
pomorskie	n.a.	n.a.	n.a.	n.a.	9.9	1.7	21.5	2.59	13.9	n.a.	n.a.	n.a.
śląskie	n.a.	n.a.	n.a.	n.a.	16.6	2.7	11.4	1.98	18.6	n.a.	n.a.	n.a.
świętokrzyskie	n.a.	n.a.	n.a.	n.a.	27.3	2.2	0.0	0.0	12.8	n.a.	n.a.	n.a.
warmińsko-mazurskie	n.a.	n.a.	n.a.	n.a.	24.4	2.3	16.5	2.27	35.2	n.a.	54.0	n.a.
wielkopolskie	n.a.	n.a.	n.a.	n.a.	15.6	1.6	0.0	0.0	22.8	n.a.	n.a.	n.a.
zachodnio-pomorskie	n.a.	n.a.	n.a.	n.a.	27.4	2.7	0.0	0.0	10.9	n.a.	n.a.	n.a.
Total	35.7	0.8	26.1	0.72	22.6	2.6	30.0	2.70	21.5	2.91	32.9	n.a.

In four out of seven voivodeships, 100% of children were subject to programme (dolnośląskie, kujawsko-pomorskie, lubuskie, mazowieckie) (10).

In 2004, the percentage of adolescents aged 18 years requiring to be involved in prophylactic programme (13) amounted to 4.3% and was slightly higher in adolescents living in urban (6.3%) compared to rural areas (1.9%). Having considered the voivodeship, the differences in prophylactic needs were observed, ranging from

1.1% in kujawsko-pomorskie to 17.7% in dolnośląskie voivodeship. The highest percentage of persons requiring prophylaxis (41.5%) was reported in high-risk group. The percentage of adolescents aged 18 years who were examined in 2008 indicated that only 9.8% of them were involved in dental caries prevention programme. In the analyzed group, it was stated that 30% of persons required professional prophylaxis, almost 50% needed putting filling covering single tooth surface, 33% required fill-

Table XI. Percentage of adolescents aged 18 years

voivodeship	2004	2008		2012
		Percentage	Mean	
dolnośląskie	n.a.	6.2	1.89	0
kujawsko-pomorskie	n.a.	1.4	8.00	4.8
lubelskie	n.a.	29.8	3.90	0
lubuskie	n.a.	29.8	3.43	0
łódzkie	n.a.	10.1	3.42	0
małopolskie	n.a.	31.1	2.26	0
mazowieckie	n.a.	24.6	2.17	0
opolskie	n.a.	8.7	2.85	0
podkarpackie	n.a.	10.7	2.50	0
podlaskie	n.a.	7.1	3.86	0
pomorskie	n.a.	1.1	3.00	0
śląskie	n.a.	13.7	1.53	0
świętokrzyskie	n.a.	18.2	4.08	0
warmińsko-mazurskie	n.a.	14.2	2.76	0
wielkopolskie	n.a.	6.4	3.75	0
zachodnio-pomorskie	n.a.	13.	2.19	0
Total	n.a.	15.4	2.87	0.8

ing of 2-surfaces of teeth, about 6% needed endodontic therapy and extraction and for 7.4% prosthetic treatment was necessary. In current study, nearly 14% of examined population did not require treatment but only better motivating of fluoride toothpaste application (10). As many as 59.2% of adolescents required putting filling covering single surface, 36.8% - 2-surfaces, 4.8% - endodontic therapy and 5.8% - extraction due to dental caries. The analysis of therapeutic needs in particular voivodeships showed considerable differences. In two voivodeships, all examinees required some form of treatment. In lubuskie voivodeship, more than 41.1% of examined persons did not require treatment but motivation for undertaking prophylactic actions.

From the comparative studies transpires that since 2002 sealing of masticatory surfaces of primary lateral teeth in children aged 6 years decreased from 2.1% to 0.9% in 2008 and 0.6% in 2012 (6,8,10). Given permanent dentition, it increased to 9.2% in 2005 and then decreased to 5.6% in 2008 and 5.8% in 2010, while in 2012 it raised to 7.1% (6,7,8,9,10). Given the completion status of programme, there were considerable differences between particular voivodeships in the whole analyzed period. Generally, oral health of children aged 6 years is poor. Furthermore, it remains stable, i.e. does not exceed 15% in the analyzed period of 10 years (14). A minor percentage of children is involved in programme of sealing of fissures in primary and permanent teeth. The analysis of results of examinations suggest that the huge therapeutic and prophylactic needs in the analyzed age group are not met. These needs vary in relation to voivodeships and place of residence (urban, rural area).

In 2002, the sealing of teeth was observed in 35.7% of children aged 12 years with mean number of primary teeth with sealants, amounting to 0.8 (6). In 2003, the percentage of children decreased to 26.1%, the mean

number of sealed teeth was also reduced to 0.72 (11). Taking into account the gender and place of residence, the percentage of teeth with sealants differed. The number of sealed teeth was higher by 10% in children living in urban than rural area and in boys compared to girls. In 2005, only 22.6% of 12-year-olds had teeth with sealants and mean number of sealed teeth was 2.6 (7). Having analyzed the realization of sealing, considerable differences were observed between voivodeships, ranging from 4.6% in małopolskie to 40.4% in lubelskie voivodeship. The mean number of sealed teeth in a child also varied from 1.6 in wielkopolskie to 4.6 in kujawsko-pomorskie voivodeship. In 2007, sealed teeth were observed in 30.0% of 12-year-old examined children, more frequently in children living in urban - 36.0% compared to rural areas - 22.9% (12). The mean number of sealed teeth amounted to 2.7 and did not differ significantly by gender and place of residence. However, it varied significantly in particular voivodeships. The lowest percentage of children with sealed permanent teeth was reported in śląskie (11.4%) and warmińsko-mazurskie (16.5%) voivodeships. The mean number of teeth with sealants in a child ranged from 1.98 in śląskie to 3.3 in podkarpackie voivodeship. In 2010, a total of 21.5% of 12-year-olds had sealants in lateral dentition (9). The mean number of sealed teeth was 2.91. The number of teeth with sealants ranged from 1.3 in mazowieckie to 3.56 in podlaskie voivodeship. The highest percentage of children with sealed teeth, exceeding 30% was observed in lubelskie, mazowieckie, podlaskie and warmińsko-mazurskie voivodeships. In 2012, the percentage of children with sealed teeth amounted to 33% (10). The differences in application of sealants were observed between voivodeships, ranging from 1.4% in podkarpackie to 56.0% in mazowieckie voivodeship. From the analysis of number of sealed teeth in 12-year-old child transpired that slightly more than 67% of examinees had not sealed teeth, while 13% of children had from 4 to 16 teeth with sealants.

There is no data on sealing of teeth in 18-year-olds in 2004 (13). In 2008, the percentage of adolescents aged 18 years with sealed lateral teeth was 15.4% with the mean number of teeth with sealants amounting to 2.87 (8). Having analyzed the percentage of examined adolescents with sealed teeth, the considerable differences in application of this method are observed in particular voivodeships. In some voivodeships, it was used in very low percentage of population, i.e. slightly more than 1%, but in maximum number of teeth (kujawsko-pomorskie voivodeship). In three voivodeships: małopolskie, lubelskie and lubuskie nearly or more than 1/4 of examined population used this prophylactic method. There were about 2-4 teeth protected. In 2012, less than 1% of population required sealing of fissures, because filling or dental cavity were present

on the masticatory surfaces of majority of teeth (10). The analysis of therapeutic needs and sealing realization between particular voivodeships indicated that 4.8% of population in only lubelskie voivodeship required sealing of lateral teeth. In the examined population, 14% of adolescents had no therapeutic needs and only prophylactic procedures application was required.

## SUMMARY

The results of current studies conducted in 2002-2012 within the framework of „Monitoring of oral health in Polish population” showed that the prophylactic potential of fluoride compounds and methods of dental caries prevention of documented effectiveness are rarely used. The analysis of data suggest there are considerable differences in the percentages of children involved in prophylactic programme in relation to the voivodeships. There are also disparities regarding the number of children subject to examinations in particular years, which was dependent on funds dedicated by Ministry of Health to examinations.

All activities aimed at improving oral health should raise the awareness of oral diseases prevention in society. The most crucial role is played by health promotion, which involves three main actions, i.e.: training of oral hygiene, proper eating habits and awareness of necessity of fluoride compounds provision. Apart from the need for implementation of effective health policy, the adequate organization of health care system and cooperation between all organizations acting for oral health are required.

## REFERENCES

- Klepalska-Adamowicz B, Wierzbicka M, Strużycka I. Założenia i cele zdrowia jamy ustnej na lata 2006-2020. *Czas. Stomatol.* 2005; 58(5):457-460.
- Buczkowska-Radlińska J, Iracki J, Jodkowska E, Kaczmarek U, Klepalska-Adamowicz B, Limanowska-Shaw H, Stopa J, Strużycka I, Trykowski J, Weyna E, Wierzbicka M, Ziętek M. Konsensus grupy ekspertów w sprawie promocji zdrowia jamy ustnej i profilaktyki Zdrowia Jamy Ustnej. Warszawa: PUW, 2004.
- Narodowy Program Zdrowia na lata 2007-2015. Załącznik do uchwały Nr 90/2007 Rady Ministrów z dnia 15 maja 2007r.
- Wierzbicka M, Szatko F, Strużycka I, Rusyan E, Ganowicz M, Zawadziński M, Garus-Pakowska H. Monitoring Zdrowia Jamy Ustnej. Stan zdrowia jamy ustnej i jego uwarunkowania oraz potrzeby profilaktyczno-lecznicze dzieci w wieku 5,7 i 15 lat. Polska 2011. ISBN 978-83-7637-115-3, Warszawa 2011:14-79.
- Skarbek M. Profilaktyka stomatologiczna na Mazowszu. *Puls* 2012;11:16-17.
- Wierzbicka M, Szatko F, Zawadziński M, Pierzynowska E. Ogólnopolski Monitoring Zdrowia Jamy Ustnej i jego uwarunkowań. Polska 2002. MZ, Zakład Stomatologii Zachowawczej AM w Warszawie, Katedra Higieny i Epidemiologii AM w Łodzi:9-27.
- Wierzbicka M, Jodkowska E, Szatko F, Pierzynowska E, Ganowicz M, Zawadziński M. Stan zdrowia jamy ustnej oraz potrzeby profilaktyczno-lecznicze dzieci w wieku 6 i 12 lat w Polsce w pierwszych latach procesu integracji europejskiej. Warszawa 2005, MZ : 9-12,16-18.
- Jodkowska E, Wierzbicka M, Szatko F, Strużycka I, Iwanicka-Grzegorek E, Ganowicz M, Zawadziński M. Stan Zdrowia Jamy Ustnej Dzieci i Młodzieży. Monitoring Zdrowia Jamy Ustnej Polska 2008, ISBN 978-83-7637-024-8: 6-50.
- Małkiewicz E, Wierzbicka M, Szatko F, Strużycka I, Ganowicz M, Zawadziński M, Rusyan E. Monitoring Zdrowia Jamy Ustnej. Stan Zdrowia Jamy Ustnej i jego uwarunkowania oraz potrzeby profilaktyczno-lecznicze dzieci w wieku 6 i 12 lat oraz osób dorosłych w wieku 35-44 lat. Polska 2010, ISBN 978-83-76-37-188-77-3-160.
- Wierzbicka M, Szatko F, Strużycka I, Małkiewicz E, Rusyan E, Ganowicz M, Ganowicz E, Garus-Pakowska A. Monitoring Zdrowia Jamy ustnej. Stan zdrowia jamy ustnej i jego uwarunkowania oraz potrzeby profilaktyczno-lecznicze dzieci w wieku 6 i 12 lat oraz młodzieży w wieku 18 lat. Polska 2012, ISBN 978-83-7637-205-1:6-114.
- Wierzbicka M, Szatko F, Zawadziński M, Pierzynowska E, Strużycka I, Dybiżbańska E, Słotwińska S, Drabarczyk-Nasińska M, Ganowicz M. Ogólnopolski Monitoring Zdrowia Jamy Ustnej i jego Uwarunkowań. Polska 2003, MZiOŚ, Instytut Stomatologii AM w Warszawie, Katedra Higieny i Epidemiologii AM w Łodzi, Warszawa 2003:18-33.
- Jodkowska E, Wierzbicka M, Szatko F, Strużycka I, Ganowicz M, Zawadziński M. Monitoring Zdrowia Jamy Ustnej Populacji Polskiej Warszawa 2007, ISBN 978-83-60565-60-5:1-126.
- Wierzbicka M, Jodkowska E, Szatko F, Piekarczyk B, Mierzińska-Nastalska E, Pierzynowska E, Ganowicz M, Zawadziński M. Ogólnopolski Monitoring Zdrowia Jamy Ustnej i Jego uwarunkowań. Polska 2004 MZ, Zakład Stomatologii Zachowawczej, Katedra i Zakład Protetyki, Zakład Ortodoncji AM w Warszawie, Katedra Higieny i Epidemiologii AM w Łodzi, Warszawa :1-22,24-32.
- Watt RG. Strategies and approaches in oral disease preventing and health promotion. *Public Health Reviews. Bulletin of WHO* sep.2005,83,9:711-717.

Received: 21.05.2013

Accepted for print: 7.01.2014

### Address for correspondence:

Prof. Elżbieta Jodkowska

Miodowa 18, 00-246 Warsaw

Tel: 22/502-20-32 Fax.:22 502-20-38

e-mail: e.jodkowska@gmail.com