

*Ewa Rybarczyk-Townsend, Aleksandra Hilt, Joanna Szczepańska*

## DENTITION STATUS IN 12-YEAR-OLD CHILDREN IN ŁÓDZKIE PROVINCE IN 2014

Medical University of Łódź  
Faculty and Department of Paediatric Dentistry

### ABSTRACT

**BACKGROUND.** In the year 2014 an epidemiological study was carried out again in the region of Łódź amongst 12-year old children as a part of general study in Poland.

**OBJECTIVES.** The purpose of the study was to evaluate the prevalence of carries, caries severity measured by the DMF index among 12-year old children in the region of Łódź.

**MATERIAL AND METHODS.** 328 children aged 12 were randomly selected and examined, of which 176 girls and 152 boys respectively. The methodology was based on clinical examination according to WHO standards. The prevalence of carries, DMF index, treatment index was calculated in łodzkie voivodeship.

**RESULTS.** The studies indicated that the prevalence of caries was 67.8% for 12-year old children and decreased 1.4% in comparison with last studies in the region of Łódź. DMF index also decreased and the value was 1.63. The score obtained caused that the goal proposed by the WHO for 2015 for 12-year-old children was achieved in łodzkie voivodeship. SiC index in the study group was estimated at 4.03. Compare to the previous study in the SiC index value has been reduced in Łódzkie voivodeship. The result makes our study group very close to the next goal proposed by the WHO for 12-year-old children where SiC index should be less than 4.

**CONCLUSIONS.** Intensity and prevalence of caries for 12-year old children in Łódź and surrounds suggests that it is on the decrease, and dental state in the study group is satisfactory.

*Key words: dental caries, epidemiology, DMF index, SiC index*

### INTRODUCTION

At the end of 2014, examinations in children aged 12 years were conducted again within the frames of the Nationwide Oral Health Monitoring Programme of the Polish population. Examination in such age group allows for an assessment of the effectiveness of prophylactic programmes and health education present in nursery schools and schools. Beginning from the 70s, a decreasing tendency of dental caries intensity in permanent teeth was observed. It resulted from treatment programmes addressed to school children and introduction of sealing of molar teeth (1,2,3). Unfortunately, the successive examinations revealed an increase of dental caries intensity index up to the DMF value of 3.3 (2005). Probably, it may be associated with a liquidation of dental offices in schools and, thus, limitation of dental

service accessibility (4,5). On a basis of results of the recent epidemiological study carried out in Łódzkie province in 2007, a decreasing tendency was stated again which amounted to the DMF value of 2.11 (6). Our present study will allow for an assessment of dental caries in children aged 12 years as well as verification whether the WHO goals for 2015 concerning this age group will be achieved (7). A total of three provinces participated in the Nationwide Programme, including Podlaskie, Dolnośląskie and **Łódzkie** provinces.

### OBJECTIVE

This paper aimed at assessing dentition status of 12-year-old children in Łódzkie province.

## MATERIAL AND METHODS

A total of 328 children aged 12 years were enrolled into the epidemiological study, including 176 girls and 152 boys. They were selected on a basis of stratified cluster sampling method. Administrative map of Łódzkie province was divided into 4 quadrants. First, north-eastern quadrant of Łódzkie province was sampled, then Łódzki and Brzeziński districts and adequate communes and villages. Schools in Łódzkie province were sampled based on a list of all primary schools registered in Łódzkie province in 2014. From a list of upper-secondary schools, lyceums and upper secondary schools were sampled in both districts. Primary schools were sampled from a list of primary schools in both districts.

At the day of examination, children were aged 12 years. Having considered the place of residence, two study samples were distinguished, i.e. those living in urban and rural areas. Table I presents the characteristics of study population.

Table 1. 12 year-old-children examined by gender and place of residence.

Place of residence	Urban area		Rural area		Total	
	n	%	n	%	n	%
Boys	86	46.7	66	45.8	152	46.3
Girls	98	53.3	78	54.2	176	53.7
Total	184	100.0	144	100.0	328	100.0

Clinical examinations of teeth in students were performed in school or nursing offices under artificial light (head lamp), using dental mirror and probe pursuant to the WHO criteria. Students were enrolled into the study once their parents signed the informed consent. Findings of examinations were recorded in the WHO epidemiological cards for epidemiological research. Stomatologists who participated in this programme were first trained and subject to calibration.

Data collected were used to calculate, i.a., prevalence, intensity (severity) of dental caries expressed in DMF values and treatment index. Children free of dental caries were also selected (DMF=0). Results were subject to statistical analysis, using Mann-Whitney test, chi-squared test ( $\chi^2$ ).

## RESULTS

Prevalence of dental caries in the group of examined 12-year-old children in Łódzkie province was 67.8%. In case of urban and rural areas it was 67.4% and 68.1%, respectively. For girls and boys, this value amounted to 65.9% and 69.7%, respectively. There were no statistically significant differences with regard to the place

of residence and gender (Fig.1). From examinations transpires that more than 1/3 of students were free of dental caries (32.3%). Higher percentage of examined children was reported in urban areas (32.6%) and girls (34.1%). However, the difference was not of statistical significance (Tab.3).

The average intensity of dental caries expressed in DMF for the study sample amounted to 1.63. Slightly lower value was observed in rural areas, i.e. 1.49. The value of DMF in girls was lower compared to boys, however, there were no statistically significant differences. Intensity of dental caries was higher in boys in both urban and rural areas (Tab.2). A special attention should be paid to the fact that the values of particular components of DMF are very close in girls and boys and places of residence. Filled teeth (F) were the dominant component of DMF – 1.23. The number of filled teeth (F) was slightly higher in urban areas – 1.26 compared to rural areas – 1.20 and higher in boys – 1.38. The average number of decayed teeth (D) was 0.38. This number was slightly higher in urban areas. The number of missing teeth (M) in study population was low and amounted to 0.03 (Tab.2). It was demonstrated that 2.18% of students on average had at least one tooth removed. In both urban and rural areas, the number of missing teeth ranged from 0 to 2 teeth. The presence of fissure sealant was stated in 29.57% of examined students while 57.01% of children had at least one tooth with filling.

Table 2. DMF index, its components and treatment index by gender and place of residence in Łódzkie province.

Place of residence	Gender	D	M	F	DMF	Treatment index
Urban area	Girls	0.45	0.01	1.07	<b>1.53</b>	0.71
	Boys	0.49	0.03	1.47	<b>1.99</b>	0.75
	<b>Total</b>	0.47	0.02	1.26	<b>1.74</b>	0.73
Rural area	Girls	0.29	0.05	1.14	<b>1.49</b>	0.80
	Boys	0.21	0.02	1.27	<b>1.50</b>	0.81
	<b>Total</b>	0.26	0.03	1.20	<b>1.49</b>	0.80
Total	Girls	0.38	0.03	1.10	<b>1.51</b>	0.75
	Boys	0.37	0.03	1.38	<b>1.78</b>	0.77
<b>Total</b>		0.38	0.03	1.23	<b>1.63</b>	0.76

From epidemiological studies transpires that dental caries occurred more frequently in mandible (1.02) than jaw (0.62) in 12-year-olds examined. The difference was statistically significant. These values were significant and higher in mandibular teeth in both urban and rural areas.

DMF values equal to  $\leq 3$  were reported in 84.5% of study sample. In case of the remaining students, these values exceeded 3 and amounted to 4-5. This percentage was substantially higher in rural areas (91.0%) compared to urban areas (79.3%). The percentage of boys living in urban areas with DMF  $\leq 3$  was considerably lower than in boys living in rural areas (Tab. 3). The

percentage of 12-year-old children with dental caries intensity lower or equal to 1 ( $DMF \leq 1$ ) accounted for a half of the study sample, amounting to 52.1%. In case of rural areas and girls, this percentage was slightly higher. Statistically significant difference was reported exclusively between boys and girls in urban areas in favour of girls (Tab.III).

Table 3. Percentage of 12-year-old children with  $DMF \leq 3$ ,  $DMF \leq 1$  and  $DMF = 0$  by place of residence in Łódzkie province.

Place of residence	Gender	PUW $\leq 3$	PUW $\leq 1$	PUW=0
Urban area	Girls	82.6%	57.1%* <sup>↑</sup>	34.7%
	Boys	75.6%* <sup>↑</sup>	41.9%* <sup>↑</sup>	30.2%
	Total	79.3%*	50%	32.6%
Rural area	Girls	91.0%	56.9%	33.3%
	Boys	90.9%* <sup>↑</sup>	53.0%	30.3%
	Total	91%*	54.9%	31.9%
Total	Girls	86.4%	56.8%	34.1%
	Boys	82.2%	46.7%	30.3%
Total		84.5%	52.1	32.3%

→ \* statistically significant difference

Usually, 12-year-old children have full dentition. In our study, exclusively 24.4% of students had full permanent teeth erupted except for third molars. Significantly higher percentage with full dentition was observed in urban areas – 34.2% compared to rural areas - 11.8%. Statistical differences were not reported between boys and girls in both urban and rural areas. Treatment index for study sample was 0.76. It was higher in rural areas – 0.80 than in urban areas – 0.73. Differences were not statistically significant which is presented in Table II.

In our study, SiC index was also calculated in 12-year-olds. It allows for an identification of group which is exposed to dental caries to the largest extent. As it is showed in Figure 2, SiC index for study sample was 4.03. The value of this index was slightly higher in boys than girls. Having compared urban and rural areas, the value of SiC was considerably higher in urban areas (4.8) compared to rural areas (3.53). In the remaining group of 2/3 of study sample, the average DMF was 0.74. It was slightly higher in boys – 0.84 than girls – 0.63.

## DISCUSSION

From the results of the study carried out in 12-year-old children in 2014 in Łódzkie province transpires that the prevalence of dental caries decreased by 1.4% compared to the study conducted in 2007 (6,8). Furthermore, its value – 67.8% proved to be the lowest in our province compared to the values reported in Podlaskie province (71.1) and Dolnośląskie province (89.04%). Its

value was also lower than the average for the country in that year (75.91%) [9]. Better results were obtained in Wielkopolskie province in Poznań in which the prevalence in 2009 was estimated at 60.67% (10). Our results also suggested that the prevalence of dental caries was lower in girls than boys contrary to the results obtained in 2007 and studies carried out in Lubelskie province (6,11). No significant differences were observed in the prevalence of dental caries in urban and rural areas, as it was in recent studies. This percentage was slightly higher in rural areas in both cases (6,8).

Intensity of dental caries in Łódzkie province expressed in DMF was lower compared to studies conducted in previous years, amounting to 1.63. DMF value obtained in studies carried out in 2008 was 2.11 (6), while its value for the country gained from monitoring in 2007 was 3.07 (8). Having compared the dentition of children in our province in 2014 to the whole country, it may be observed that intensity of dental caries is of the lowest value in our region. Close value – 2.4 was noted in Podlaskie province while considerably higher value was reported in Dolnośląskie province – 4.47 (9). High DMF value – 4.42 was also obtained in Lubelskie province in 2007 (11). These results suggest that there is an improvement in oral health status of children aged 12 years in Łódzkie province in recent years. Such decreasing tendency was also reported in Poznań, where its value was even lower and it amounted to 1.59 and 3.3 in 2003 (10). DMF value obtained in our province also suggests that prophylactic programmes carried out in schools proved to be effective enough to meet the WHO goal for 2015. It stated that the average DMF should be no more than 2 at 12 years of age (7). An attention should be paid to the fact that similarly to the previous years filled teeth (F) were the dominant component of DMF in Łódzkie province – 1.23 and not decayed teeth (D) with an example being Dolnośląskie province (6,9). Low number of missing teeth in children in all provinces studied is also satisfactory. The average number of missing teeth (M) was 0.02. Furthermore, an increase in the percentage of 12-year-olds with  $DMF \leq 3$  in our province is also positive aspect. This percentage was 55.7%, 58.9% and 84.5% in 2005, 2007 and 2015, respectively (8). Such high percentage of children with  $DMF \leq 3$  was also noted in Poznań - 80.06% (10).

According to a number of authors, prophylactic tooth sealing plays an important role in reducing the dental caries (12,13). Out of examined children, 29.57% had at least one permanent teeth filled. This percentage was higher in recent studies carried out in Łódzkie province (38.34%) (6). It seems to be that it may result from the fact that stomatologists use colourless sealant, thus, there are difficulties to verify its status and retention. In Podlaskie province, this percentage was higher

(32.55%) while in Dolnośląskie province its value was lower (23.25%) in recent studies (9).

Compared to recent studies in 2008, our studies demonstrated that treatment index increased from 0.57 to 0.76 (6). It suggests that the effectiveness of conservative treatment in Łódzkie province in children examined has substantially improved. In the nationwide studies in remaining provinces, treatment index amounted to 0.7 and 0.4 in Podlaskie and Dolnośląskie provinces, respectively.

SiC index, which allows for identifying children at high risk of dental caries, was 4.03 in our region. Its value was lower compared to the value gained in 2003 – 6.89 (14). Therefore, we observe an improvement of dentition status also in a group at the highest risk of dental caries. Furthermore, it proves to be that the value obtained is close to the successive WHO goal for 2015 for 12-year-old children. It states that SiC index should be less than 4 (7). It is an interesting fact that SiC index in Łódzkie province in rural areas was 3.53. It suggests that such group of children achieved also the second WHO oral health goal. Unfortunately, SiC index in urban areas was substantially higher (4,8). In other provinces studied, Bratthall index was far from the WHO health goal as it exceeded 6.0 (9).

Having summarized the results of study, it may be stated that there is a decrease of dental caries incidence in 12-year-old children in Łódzkie province. A noticeable improvement in the dentition status of children at low and high risk of dental caries was observed, especially in rural areas. Data obtained suggest that one of the WHO oral health goal for this age group for 2015 was achieved. Furthermore, we come nearer to the results gained in the Western European countries (15). Moreover, the effectiveness of treatment improved substantially. Thus, we may conclude that informative and educational actions as well as the access to dental offices are on the increase.

Successive WHO goals are slightly different than those issued so far as they do not include specific guidelines. Current goals should be determined on a basis of the situation of particular region as well as social and environmental conditions of given country. Taking it into account, each country should establish its own goals to improve the status of oral health. According to the data, DMF should be reduced in 12-year-old children by 2020, especially D component and in those at high risk (8). Based on our results, we observe a noticeable improvement of DMF index in Łódzkie province. It is also with regard to high-risk children. Thus, we assume that we approach the right direction to meet the goals for 2020. Knowledge on oral health should be constantly disseminated in parents and their children beginning from preschool age. It should be done with an engagement of teachers in schools and adequately

trained medical personnel. Only such health education combined with prophylactic programmes for dental caries would allow for further decrease of the incidence of dental caries in children and adolescents as well as achievement of better results by 2020.

## CONCLUSIONS

1. There was a decrease in the incidence of dental caries in 12-year-old children in Łódzkie province.
2. The WHO goal regarding DMF value for 2015 for this age group was achieved.

## REFERENCES

1. Rybarczyk-Townsend E. Ocena stanu uzębienia dzieci 12-letnich z województwa łódzkiego objętych programem profilaktycznego uszczelniania bruzd pierwszych zębów trzonowych stałych. Rozprawa doktorska. Łódź 2001.
2. Rybarczyk-Townsend E. Ocena stanu uzębienia dzieci 12-letnich z województwa łódzkiego objętych programem profilaktyki uszczelniania bruzd pierwszych zębów trzonowych stałych. *Mag Stomatol* 2002; 12(4): 30-33.
3. Wochna-Sobańska M, Lubowiedzka B, Rybarczyk-Townsend E. Zachorowalność na próchnicę zębów dzieci 12-letnich w województwie łódzkim w latach 1978-2003. *Czas Stomatol* 2006; 59(1): 26-30.
4. Jańczuk Z. O wybranych, trudnych problemach profilaktyki stomatologicznej dla dzieci i młodzieży. *Mag Stomatol* 2006; 16(2): 10-12.
5. Hilt A, Wochna-Sobańska M. Stan zębów pierwszych trzonowych stałych u 12-letnich dzieci z Łodzi. *Zdr Publ* 2007; 117(1): 44-47.
6. Perkowska M, Hilt A, Rybarczyk-Townsend E, Wochna-Sobańska M. Trend zachorowalności na próchnicę pierwszych zębów trzonowych stałych u dzieci 12-letnich w województwie łódzkim w latach 1978-2008. *Nowa Stomatol* 2010;2: 47-53.
7. Adamowicz- Klepalska B, Wierzbicka M, Strużycka I. Założenia i cele zdrowia jamy ustnej w kraju na lata 2006-2020. *Czas Stomatol* 2005; 58(6): 457-460.
8. Wierzbicka M, Kaczmarek U. Trend choroby próchnicowej u 12-letnich dzieci na podstawie badań monitoringowych stanu zdrowia jamy ustnej. Czy polskie dzieci mają szansę na osiągnięcie narodowego i europejskiego celu zdrowia jamy ustnej?. *Dent Med Probl* 2009; 46:149-156.
9. Ogólnokrajowy Monitoring Zdrowia Jamy Ustnej i Jego Uwarunkowań. Polska 2014. Dzieci w wieku 12 i 18 lat. Min. Zdrowia. Uniwersytet Medyczny w Lublinie.
10. Chłapowska J, Pawlaczyk-Kamińska T, Gromadzińska-Zapłata E, Borysewicz-Lewicka M. Stan uzębienia 12-letnich dzieci miejskich objętych publicznym programem profilaktyki próchnicy. *Dent Med Probl* 2010;47(3):283-289.

11. Bachanek T, Klichowska -Palonka M, Wolańska E, Orłowski M. badania porównawcze uzębienia stałego dzieci w wieku 12 lat z województwa lubelskiego. Zdr Publ 2009;119(4): 391-394.
12. Rybarczyk-Townsend E. Ocena stanu uzębienia dzieci 12-letnich z województwa łódzkiego objętych programem profilaktyki uszczelniania bruzd pierwszych zębów trzonowych stałych. Mag Stomatol 2002; 12( 4): 30-33.
13. Szymańska J. Wybrane aspekty kliniczne zastosowania laku szczelinowego Contact-Seal w profilaktyce próchnicy powierzchni żujących. Przegl Stomatol Wiekii Rozw 1993; 3: 25-27.
14. Rybarczyk-Townsend E, Lubowiedzka-Gontarek B, Wochna-Sobańska M. Wskaźnik SiC u 12-letnich dzieci w województwie łódzkim w roku 2003. Dent Med Probl 2005; 42(1) : 65-68.
15. Global caries data for 12-year-old age group WHO Oral Health Country/Area Profile Programme. <http://www.whocollab.od.mah.se/exp/globalcar.html>

Received: 13.10.2015

Accepted for publication: 28.01.2016

**Adres do korespondencji:**

Ewa Rybarczyk-Townsend, MD

Medical University of Łódź

Faculty and Department of Paediatric Dentistry

92-213 Łódź, 251 Pomorska Street

Tel.42 6757516

E-mal:ewa.rybarczyk-townsend@umed.lodz.pl

