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# Oral health status of 12-year old children in the Warmia and Mazury region

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**ABSTRACT**

**Introduction:** The relationship between the general state of health and condition of the oral cavity has been in the scope of interest of physicians since the early history of medicine. This issue was mentioned as early as during the times of Hippocrates. Oral cavity has been termed a “mirror of the body system.” Not only is the organism’s overall health reflected in the oral cavity, but its status also affects the course of various diseases. Hence, oral cavity health status and care are considered to be specific branches of medicine. Currently, there exist organizations involved in the control of the oral cavity status and in assigning health objectives so that the Polish population may be characterized as having healthy oral cavities. **Aim:** The aim of this study was to assess indicators of dental caries among 12-year old children from the Province of Warmia and Mazury in 2010.

**Materials and methods:** In total, 160 children (12 years of age), who reside in the Province of Warmia and Mazury, were examined. According to the organizers’ guidelines, this monitoring was conducted in two districts: Elk and Bartoszyce. The clinical examination took place in the school physicians’ and nurses’ offices, and in classrooms, employing artificial light, utilizing a mirror and probe, and assessment criteria devised by the World Health Organization (WHO). The presence of primary and secondary dental caries, missing teeth, the presence of permanent fillings and fissure sealants were evaluated. Medical needs concerning dental restorations, endodontic treatment and surgical treatment were determined. The following data were calculated: DMFT index (the number of decayed teeth – D, missing teeth because of tooth decay – M and filled teeth – F), number of children without dental caries (DMFT=0), the intensity of dental caries (expressed as the mean number of DMF/S, where S is the number of examined subjects), treatment rate (TR), respective frequency of caries (caries prevalence, expressed as a percentage). These calculations were made taking into account the distribution of the place of residence (town, village) and sex (boys and girls). The obtained results were compared with those of 12-year old children examined in the Province of Warmia and Mazury in 2002 and 2005 and those achieved in other provinces on the basis of the available literature.

**Results and discussion:** The obtained results were as follows: the number of children without dental caries amounted to 38; caries intensity (DMF/S) was 2.86, TR equaled 0.82, and caries

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prevalence was 76%. Medical treatment needs among the examined children were as follows: we performed 53 one-surface restorations as conservative treatment and 19 fillings involving two or more surfaces; 5 teeth were qualified for endodontic treatment, and also 5 needed extraction.

Conclusions: (1) The average DMFT index for 12-year old children ( $DMF/S=2.86$ ) indicates that the intensity of dental caries is moderate, but has increased over the ensuing years. (2) TR of 0.82 for 12-year old children is comforting because it indicates a high efficacy of treatment in this age group.

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## 1. Introduction

Dental caries is an infectious bacterial disease that involves the hard tissues of the tooth. It is a pathological process that causes demineralization of non-organic substances and proteolysis of organic substances that form tooth tissues, as a result of the activity of acids produced by bacteria accumulating on a tooth's surface. Because of its prevalence, serious complications and economic losses, dental caries has been ranked as one of the social diseases.<sup>8</sup> The major sources of information concerning caries incidence are the results of clinical examinations conducted periodically in Poland and commissioned by the World Health Organization (WHO). Apart from providing the evaluation of the current oral health status of the population, these examinations additionally determine the rate of caries and verify whether national and European health aims have been achieved. The prevalence and intensity of dental caries are among the most frequently examined values with respect to monitoring oral health status conducted in Poland.

## 2. Aim

This study aimed at the evaluation of oral cavity health status in 12-year old children from the Province of Warmia and Mazury in 2010, carried out on the basis of epidemiological indices, and a comparison of these results with data from the current medical literature.

## 3. Materials and methods

In 2010, 160 children, aged 12 years, from the Province of Warmia and Mazury, were examined. According to the organizers' guidelines, the monitoring was conducted in two districts: Elk and Bartoszyce. The clinical examination took place in the school physicians' and nurses' offices, and in classrooms, employing artificial light, utilizing a mirror and probe, and the assessment criteria devised by the World Health Organization (WHO). The results were recorded in the previously devised unified charts of epidemiological research.

The following issues were evaluated:

- the presence of primary and secondary dental caries,
- missing teeth,
- the presence of permanent fillings and fissure sealants.

Treatment needs were determined regarding the following:

- dental restoration,
- endodontic treatment,
- surgical treatment: extractions.

The following data were calculated:

- number of children without dental caries ( $DMFT=0$ ),
- DMFT index (average  $DMF/S$ , where the total number of decayed teeth –  $D$ , missing teeth because of tooth decay –  $M$  and filled teeth –  $F$  is divided by the number of examined subjects –  $S$ ),<sup>3</sup>
- the intensity of dental caries (prevalence of caries; the number of individuals with caries in relation to the number of examined subjects, expressed as a percentage),<sup>8</sup>
- treatment rate (TR) ( $TR=F/D+F$ ; the relation of filled teeth –  $F$  to the total number of filled teeth –  $F$  and decayed teeth –  $D$ ).<sup>8</sup>

These calculations were made taking into account the distribution of the place of residence (town, village) and sex (boys and girls). The obtained results concerning DMFT index were compared with the outcomes of examinations carried out on 12-year old children in the Province of Warmia and Mazury in 2002 and 2005 (WHO) and in relation to results from other Polish provinces on the basis of available literature. Error rate was not included in the analysis of the results.

## 4. Results

Table 1 demonstrates the results of examinations carried out on 12-year old children with respect to the place of residence and sex.

The average  $DMF/S$ , expressing caries intensity, equals 2.86 for 12-year old children. Among girls, the value of the DMFT index amounts to 3.27, whereas in boys – 2.48. Depending on the place of residence, DMFT index is 3.21 and 2.77 for rural and urban children, respectively. The prevalence of dental caries in 12-year old children is at the level of 76%. As regarding sex, the prevalence of caries reaches 77% in girls and 75% in boys. As for the place of residence, the intensity of caries in rural and urban areas is 90% and 72%, respectively. TR for 12-year old children in the Province of Warmia and Mazury amounts to 0.82. In the examined group of 12-year old children there were 38 individuals with  $DMFT=0$  (23.75%). There were 17 girls with

**Table 1 – Indicators and their values by sex and place of residence.**

Sex	Place of residence	Number of subjects	DMF number	DMFT index	Caries intensity (%)	TR
Girls	Town	62	203	3.27	74	0.86
	Village	14	46	3.28	92	0.88
Boys	Town	65	149	2.29	70	0.79
	Village	19	60	3.15	89	0.72
Boys and girls	Town and village	160	458	2.86	76	0.82
Boys	Town and village	84	209	2.48	75	0.77
Girls	Town and village	76	249	3.27	77	0.86
Boys and girls	Village	33	106	3.21	90	0.79
Boys and girls	Town	127	352	2.77	72	0.83

**Table 2 – Medical treatment needs of 12-year old children.**

Treatment needs	Girls	Boys	Total
One-surface restoration	21	32	53
Two-surface restoration	7	12	19
Endodontic treatment	4	1	5
Extraction	2	3	5

**Table 3 – Children without caries (DMFT=0) in specific years in the Province of Warmia and Mazury (in percentage).**

	Total	Girls	Boys	Town	Village
2002	16.80	11.90	19.70	8.20	26.90
2005	19.80	–	–	24.10	14.60
2010	23.75	22.30	25.00	27.50	9.00

DMFT=0, i.e., 10.60% of the entire population of 12-year olds, and 22.30% of the examined girls; and 21 boys with DMFT=0, i.e., 13.12% of the entire population of 12-year olds, and 25.00% of the examined boys.

Table 2 demonstrates medical treatment needs of 12-year old children.

It was assessed that 53 permanent teeth required one-surface restoration, and 19 teeth – two-surface restoration; 5 teeth were qualified for endodontic treatment, and also 5 needed extraction.

**Table 4 – DMFT scores and TR values in specific years in the Province of Warmia and Mazury.**

Year	DMFT	TR
2002	2.50	0.80
2005	2.50	0.65
2010	2.86	0.82

## 5. Discussion

The epidemiological index DMFT=0 determines the number of children without dental caries. When comparing the results of examinations conducted in the Province of Warmia and Mazury in 2002 and 2005 with those in 2010, it can be concluded that the percentage of children without caries (DMFT=0) has increased: from 16.80% in 2002 to 19.80% in 2005 and 23.75% in 2010 (Table 3). Such outcomes are satisfactory.

The average DMF/S and the values of its particular elements are the basic indices determining oral health status. Due to the universal nature of DMFT index, specific individuals as well as entire communities or populations can be compared. WHO criteria concerning DMFT index for 12-year old children fall within several categories: (1) caries intensity from 0 to 1.1 is deemed as very low; (2) from 1.2 to 2.6 as low; (3) from 2.7 to 4.4 as moderate; (4) from 4.5 to 6.5 as high; and (5) 6.6 and more as very high.<sup>1,8</sup> Between the years 2002 and 2005, dental caries intensity in the Province of Warmia and Mazury remained at a constant level (DMFT index=2.5) and was low. In 2010 the obtained DMFT score was 2.86, thus indicating that the intensity of dental caries increased and is now moderate.

DMFT scores and TR with respect to specific years are presented in Table 4.

The evaluation of DMFT scores for 12-year old children obtained in the Province of Warmia and Mazury in the years 2002 and 2005 in relation to other Polish provinces allows one to conclude that:

- the Province of Warmia and Mazury ranks in the first position among the 3 provinces examined in 2002 as a province with the lowest value of the DMFT index,
- in 2005, the obtained DMFT score places the Province of Warmia and Mazury in the second position among other examined Polish provinces as regarding the lowest value of this index.<sup>9,10</sup>

When comparing DMFT obtained in the Province of Warmia and Mazury in 2002 and 2005 (2.50) with data provided by other authors, it can also be concluded that its value is lower than that attained in examinations conducted by other researchers. Bachanek and Orłowski who evaluated oral health status in the former Province of Chełm in 2001 arrived at the DMFT of 4.00;<sup>1</sup> whereas the DMFT score obtained by Milewska and Łuczaj-Cepowicz, who examined the population of Białystok in 2004, was 5.85.<sup>5</sup> However, literature reports indicate that over the years the value of this index has decreased in other provinces, whereas it has increased in the Province of Warmia and Mazury. Perkowski et al. obtained DMFT of 2.11 when examining oral health status in the Province of Łódź.<sup>6</sup>

In 2010 in the Province of Warmia and Mazury this value was higher (2.86). TR determines the efficacy of dental caries conservative treatment. This index assumes the values from 0 to 1.0. The interval of 0–0.5 indicates a low level of treatment efficiency; the efficiency increases with values being closer to 1.0. TR at a level of 1.0 indicates 100% efficiency of conservative treatment.<sup>1</sup> The research conducted by Bachanek and Orłowski in 2001 in the former Province of Chełm among 12-year old children indicated TR at a level of 0.55 (0.57 in girls and 0.52 in boys; 0.6 in rural children and 0.5 in urban children).<sup>1</sup> Perkowska et al. obtained a TR of 0.57 and rated it as low.<sup>6</sup> Our research conducted in the Province of Warmia and Mazury among 12-year old children demonstrated TR of 0.82 (0.79 in rural children and 0.83 in urban children), thus indicating a high efficiency of treatment in this age group of patients. An equally good result of TR (0.80) was obtained in the Province of Warmia and Mazury in 2002.

In conclusion, it needs to be emphasized that epidemiological research studies concerning other fields of medicine are also being undertaken in the region of Warmia and Mazury. Authors who conduct such studies highlight their significance and point to the need for continuing such examinations.<sup>4</sup> We believe that such studies are a very important source of information for practicing physicians because they provide specific data concerning the efficiency of their everyday work. Such studies can also be employed as a basis for the planning of nationwide prophylactic activities.

## 6. Conclusions

1. The average DMFT index for 12-year old children (DMF/S = 2.86) indicates that the intensity of dental caries is moderate, but has increased over the years.
2. TR of 0.82 for 12-year old children is comforting because it indicates a high efficacy of treatment for this age group.

## Conflict of interest

None declared.

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## FURTHER READING