

## Oral Health Status Among 12-Year-Old Schoolchildren in Kosovo

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### Abstract

**Objective:** To evaluate the oral health status of 12-year-old schoolchildren in Kosovo. **Material and Methods:** The study involved 1204 schoolchildren aged 12 years from urban and rural areas, from different cities of Kosovo. The questionnaire included demographic data, gender, residence, dental status, oral hygiene, and daily brushing habits. The feasibility of the questionnaire was verified replicating it on 10% of the sample. Daily brushing habits were reported to frequency: as once per day, twice a day and rarely. Caries status was recorded in permanent dentition as DMFT and Oral Hygiene Index - Simplified (OHI-S) was used to assess oral hygiene status. The analysis included occurrences and means. The differences among means were tested using the student t-test ( $p < 0.05$ ). **Results:** The highest mean and standard deviation of DMFT and OHI-S index was found among rural schoolboys  $3.67 \pm 1.98$  and OHI-S 1.75. In total sample, 54.1% of them brush their teeth only once a day, 39.7 % brush their teeth twice a day and only 6.2 % rarely brush their teeth. **Conclusion:** Preventive measures are needed to improve dental health in 12 years old schoolchildren.

**Keywords:** Dental Caries; DMF Index; Oral Hygiene Index; Preventive Dentistry.

## Introduction

Oral health is a thoroughly important feature to maintain constant general health and quality of life [1,2]. Many people around the globe suffer from oral pain or discomfort. It is a basic human right attributed to people to having essential oral health care, therefore ensuring health and quality of life [3].

The most frequent diseases of the oral cavity are dental caries and periodontal problems. Dental caries is a common oral disease, affecting a general circle of individuals [4], however, its emphasis is concentrated over schoolchildren, making it the most prevalent chronic disease among children worldwide [5]. According to the 2003 WHO report, 60-90% of children have caries [6]. In many low-income countries, dental caries still is a major problem [3]. Also, in many developing countries, access to oral health services is limited and teeth are often left untreated or are extracted because of pain [6].

Unfortunately, oral care remains more focused on treatment than on prevention. Oral health is an essential component of health throughout life, due to the association of oral cavity with the development of a healthy personality, perceptions, and the overall experiences of pleasure [7]. However, millions of individuals suffer from dental caries and periodontal disease, resulting in unnecessary pain, difficulties in chewing, swallowing and speaking and sometimes unaffordable high medical costs [3]. Untreated oral diseases among children frequently lead to serious general health problems, significant pain, interference with eating and school absence [8,9]. The earliest sign of a new carious lesion is the appearance of a chalky white spot on the tooth surface, which indicates an area of demineralization of enamel surface [10].

The oral health of 12 years old children was the object of numerous epidemiological studies conducted around the world [11]. The authors suggest that the percentage of children completing primary education may be considered a good predictor of DMFT indexes in developing countries [12]. The World Health Organization (WHO) has selected 12-year-olds as the focus age group of conducting international comparisons amidst children's oral health [13,14]. Thus, the 12-year-old age group is a suitable cluster to determine the dental caries status in permanent teeth, because all the permanent teeth have erupted, except for the third molars.

This study aimed to assess the prevalence of caries among 12-year-old schoolchildren from different cities of Kosovo.

## Material and Methods

### Study Design and Sample

This cross-sectional study was conducted during 2016/2017 among 12-year-old schoolchildren in Kosovo. The oral health questionnaire was performed in a total number of 1204 schoolchildren, from different cities in Kosovo.

### Data Collection

The questionnaire included demographic data, gender, residence, dental status, simplified oral hygiene, and daily brushing habits. The feasibility of the questionnaire was verified replicating it on 10% of the sample. Daily brushing habits were reported to frequency; as once per day, twice a day and rarely.

### Dental Examination

The dental examination was performed by two working teams; each comprising a pediatric dentist and two students from the final year of the School of Dentistry, Medical Faculty, University of Prishtina, Kosovo.

The examiners were trained and observed by the experienced pediatric dentist - researcher. The process of training and calibration was performed according to the World Health Organization standards, embodied in its basic manual dedicated particularly to epidemiological studies [13].

For the caries assessments, all tooth surfaces were examined. The examinations were performed under natural light, using a dental mirror and a probe. A tooth was considered erupted if any feature of the crown penetrated the oral mucosa. Every defect in the tooth was tested with a probe, and every visual change in enamel's transparency in the early phases of demineralization was defined as a carious lesion. Children's oral health status was evaluated using the WHO caries diagnostic criteria for Decayed, Missing and Filled teeth for permanent dentition (DMFT) [13] and Simplified Oral Hygiene Index [15].

### Oral Hygiene

The measurement of the state of oral hygiene by Greene and Vermillion index was based on recording soft debris in selected teeth in the mouth [15]. The criteria used for assigning scores to the tooth surfaces are the same as the ones used for the OHI-S (the Simplified Oral Hygiene Index). The six surfaces examined for the OHI-S are selected from four posterior and two anterior teeth: In the posterior portion of the dentition, usually the first molar (16) but sometimes the second (17) was examined. The buccal surfaces of the selected upper molars and the lingual surfaces of the selected lower molars were inspected. In the anterior portion of the mouth, the labial surfaces of the upper right (11) and the lower-left central incisors (31) were scored. In the absence of either of this anterior tooth, the central incisor (21 or 41 respectively) on the opposite side of the midline was substituted.

Criteria for classifying debris: 0 = No presence of debris or stain; 1 = Soft debris covering not more than one-third of the tooth surface, or presence of extrinsic stains without other debris regardless of surface area covered; 2 = Soft debris covering more than one third, but no more than two-third, of the exposed tooth surface; and 3 = Soft debris covering more than two-thirds of the exposed tooth surface [15].

Inclusion criteria of this study were schoolchildren aged 12 years (both genders). The following parameters were taken as exclusion criteria: primary teeth present and their carious status not recorded third molars, and unerupted permanent teeth, also children who suffered from systemic illness.

### Ethical Clearance

The research protocol was approved by the Ministry of Education, Science, and Technology of the Republic of Kosovo, with Reference Number: 3752/2016. Each school authority was informed about the aim of the study and freely expressed their consent to participate and facilitate our research.

### Statistical Analysis

Data analysis was accomplished using the software Statistical Package for Social Sciences, version 19.0 (SPSS Inc., Chicago, Illinois, USA). There were calculated frequencies and means. Student's t-test was used to compare the differences between means (boys vs. girls). The significance level was set at  $p < 0.05$ .

### Results

The mean and standard deviation for DMFT was found significantly higher among boys from rural areas ( $3.67 \pm 1.977$ ) compared to boys from urban areas ( $2.90 \pm 1.801$ ) (Table 1). Furthermore, the F-

component was dominant throughout both genders from an urban area, followed by the D component, which was found to be higher in girls and boys from rural areas. M component showed slightly lower in girls and boys from urban areas (Table 1).

**Table 1. Mean and standard deviation for DMFT components in children from urban and rural areas, based on gender.**

Residence	Gender	N	DMFT Components	Mean (SD)	t- value	p-value	
Urban	Girls	325	Decayed	1.13 ± 1.140	17.901	0.001	
			Missing	0.23 ± 0.511	7.924	0.001	
			Filled	1.37 ± 1.401	17.659	0.001	
				DMFT	2.73 ± 1.713	28.692	0.001
	Boys	275	Decayed	1.03 ± 1.030	16.506	0.001	
			Missing	0.28 ± 0.557	8.229	0.001	
			Filled	1.59 ± 1.209	21.850	0.001	
				DMFT	2.90 ± 1.801	26.680	0.001
	Rural	Girls	322	Decayed	1.71 ± 1.208	25.427	0.001
Missing				0.49 ± 0.762	11.480	0.001	
Filled				1.09 ± 1.136	17.216	0.001	
				DMFT	3.29 ± 1.770	33.334	0.001
Boys		282	Decayed	1.65 ± 1.130	24.461	0.001	
			Missing	0.76 ± 0.813	15.680	0.001	
			Filled	1.27 ± 1.137	18.743	0.001	
				DMFT	3.67 ± 1.977	31.210	0.001
Total		Overall	1204	Decayed	1.38 ± 1.171	40.991	0.001
	Missing			0.43 ± 0.702	21.338	0.001	
	Filled			1.32 ± 1.241	36.988	0.001	
	DMFT			3.14 ± 1.847	58.956	0.001	

On the other hand, the children with poor oral hygiene status were higher in rural areas (1.64 for girls and 1.75 for boys), compared to urban areas (1.61 for girls and 1.65 for boys). In total, the OHI-S index was 1.66 (Table 2).

**Table 2. OHI-S index in children based on residential areas and gender.**

Residence	Gender	N	Mean (SD)
Urban	Girls	325	1.61 ± 0.210
	Boys	275	1.65 ± 0.230
Rural	Girls	322	1.64 ± 0.177
	Boys	282	1.75 ± 0.237
Overall		1204	1.66 ± 0.219

The oral hygiene of the examined schoolchildren was found relatively poor. A total of 54.1 % reported that they brush their teeth once per day, 39.7 % of them brush their teeth twice per day, although 6.2 % of schoolchildren brush their teeth rarely (Table 3).

**Table 3. Tooth brushing frequency per day based on residential areas and gender.**

Residence	Gender	Brushing Frequency	N	%
Urban	Girls (N=325)	Once	161	49.5
		Twice	138	42.5
		Rare	26	8.0
	Boys (N=275)	Once	144	52.4

		Twice	123	44.7
		Rare	8	2.9
Rural	Girls (N=322)	Once	190	59.0
		Twice	115	35.7
		Rare	17	5.3
	Boys (N=282)	Once	156	55.3
		Twice	102	36.2
		Rare	24	8.5
Total	Overall	Once	651	54.1
		Twice	478	39.7
		Rare	75	6.2
		Total	1204	100.0

## Discussion

Wide-reaching, the most prevalent of the oral diseases is considered dental caries, with significant discrepancies in its occurrence between countries, regions, areas within social and ethnic groups. Oral health is a part of general health and is important for children and their healthy life [16-18]. This study reported results that can be generalized to all 12-year-old schoolchildren from Kosovo.

The DMFT index was used to record the dental caries experience of the permanent dentition of the children. Standardization of examiners with a qualified oral epidemiologist was carried out a week before the examination. Duplicate check-ups were carried out on 10% of the schoolchildren during the examination.

In the previous study, the mean of DMFT among 10 to 15 years old children in Kosovo was found  $5.81 \pm 2.3$ , compared with a present study among 12 years old schoolchildren where the mean of DMFT was found lower [19,20]. Though, after too many years in our study, it was found to be well below the lower limit of value of 3 set by the WHO who jointly with the FDI World Dental Federation conveyed goals regarding oral health until year 2000 as a global average for 12 years old children. Unlike the goals for the year 2000, for 12 years old children, the target was set: to reduce the DMFT at age 12 particularly the component 'D', with special attention for high-risk groups, considering both the average values as their distributions [14,21].

Based on the findings of this study, the mean of total DMFT was found  $3.14 (\pm 1.85)$ , which was higher than findings reported from other studies in neighbour countries as Bulgaria, Greece, Hungary, Romania and Slovenia [22,23]. The DMFT reported in this study appeared to be high in comparison with data of similar age groups in Europe as in the Czech Republic, Lithuania, Turkey, Italy and Germany [22-25]. Likewise, also in Jakarta, Sudan, Nigeria, Laos, and Zimbabwe, the DMFT index was reported lower than in our country [26-30]. Furthermore, our findings were reported lower than the results of the DMFT index compared with other countries as in Albania, Bosnia Herzegovina, North Macedonia, Croatia, Slovakia, Moldava and Qatar [2,7,11,22,31]. Thus, our study was envisioned to evaluate the oral status of Kosovar 12-year-olds. More than a few points were chosen in different geographical sections to provide data representative of the entire nation.

Nevertheless, a difference in DMFT values remains between children from different urban or rural areas. Efforts should be made to improve oral hygiene practice and to reduce dental caries through preventive programs, especially at school level in a rural area where the disease remains out of control.

Moreover, it was observed that in more developed countries, especially in Europe, presented DMFT index larger than the least developed countries. The most obvious reason for this is the diet. The high consumption of refined carbohydrates in the richer countries has led to a selective proliferation of cariogenic

bacteria, unlike the poorest countries that had a diet based on hunting and subsistence agriculture, with low-carbohydrate diets [32].

The results of this study showed that the mean OHI-S scores were higher among boys from rural areas than other children of the same age. Inflammation of the gingival is a response to the bacterial plaque build at and below the gingival margin. Our results are similar to 12 years old Lithuanian school children (1.36) [33] but lower than 12 years old children from India (1.9) [34].

The present study showed that over 50% of the children brush their teeth only once per day. Similar results were also found by other authors [30], whereas other researchers reported that children brush their teeth twice or more per day [35]. Conversely, the poor oral hygiene condition of most of the schoolchildren is reflected by irregular tooth brushing habits, and this could be also due to inadequate brushing time, ineffective brushing technique or both factors. Thus, it is important to teach children good behaviour in maintaining oral health to avoid the risk of caries.

There are several strengths and limitations of this study. The main strength of our study includes necessary steps and pilot testing for inter-rater agreement, so obtained results are reliable and consistent. Secondly, we have assessed oral status according to WHO criteria and procedures for epidemiological studies, so our findings in future could allow correspondence of the obtained results from Kosovo with the results obtained from other developed and developing countries with different cultures. Also this is the first post-war research that has been conducted regarding oral health in children of 12 years of age. Few limitations of the study must be considered. The limitation of this study includes our inability to investigate the other factors contributing to caries like sugar consumption and attitude toward dental services. Henceforth the results, even though they may shed light to the current situation, may not be generalized to the whole 12 years old children population in Kosovo.

## Conclusion

This study showed the significance of epidemiological studies for caries prevention and maintenance of oral health. The percentage of 12-year-old children with one or more caries lesions was too high considering the presently available preventive possibilities. The obtained DMFT and OHI-S indexes, in comparison with other countries, show poor oral health, low oral hygiene, and unsatisfactory prevention in Kosovo, as well as a need to invest in therapeutic methods and modern public preventive dentistry.

## Authors' Contributions

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All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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None.

## Conflict of Interest

The authors declare no conflicts of interest.

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