

THIRTY YEARS OF ORAL HEALTH SURVEYS IN BOSNIA AND HERZEGOVINA: A REVIEW

Mediha Selimović-Dragaš^{1*}, Amina Huseinbegović¹,
Elmedin Bajrić¹, Nina Marković¹,
Amra Arslanagić Muratbegović¹, Sedin Kobašlija¹

¹ Department of Preventive and Pediatric Dentistry, Faculty of Dentistry
with Clinics, University of Sarajevo, Sarajevo, Bosnia and Herzegovina

*Corresponding author

Mediha Selimović-Dragaš,
Associate Professor
Bolnička 4a,
71000 Sarajevo,
Bosnia and Herzegovina
Phone: +387 33 407-870
E-mail: mediha.dragas@gmail.com

ABSTRACT

Introduction: The first nationwide epidemiological oral health survey in Bosnia and Herzegovina was conducted in 1987 when Bosnia and Herzegovina was a part of Yugoslavia and the second one in 2004. It was expected that time period of 30 years, which was the timeframe for this review, brought some changes in oral health as well.

Objective: The aim of this review was to evaluate the overtime trends of oral health of the children's population in Bosnia and Herzegovina following the results of published studies in chronological order since 1987 till May 2017. This review compared the results of ten studies which used the same methodology and same age study group of 12-years old participants.

Methods: Electronic and hand-searches up to May 2nd, 2017, were conducted using the following electronic bibliographic databases: PubMed, MEDLINE, WHO/oral health databases, EBSCO, HINARI, COBISS.BH and Library of the Faculty of Dentistry, University of Sarajevo.

Results: The values of DMFT of 12-year-olds in the studies evaluated in this review indicate that the oral health in post-war Bosnia and Herzegovina is slightly better compared with the results of the survey conducted in the year 1987, but with no considerable relevance.

Conclusion: It can be expected that changes in oral health strategies, based on incorporation of oral health surveillance into national health surveillance scheme, will lead to improvement of dmft/DMFT indicators of children in Bosnia and Herzegovina.

Key words: children's oral health, DMFT/dmft indexes, dental public health, prevalence of dental caries in children, health care surveys

Introduction

Oral health is a major public health issue affecting all groups of the population. It is of great importance to understand the impact that oral health has on the health of an individual, as well as the population. The goal of data collection is to measure the progress, impact, and efficacy of efforts to control diseases that are already affecting all population.

In the last decades, a large number of scientific reports have documented a remarkable decline in the prevalence of caries among school children in many European countries [1, 2].

Unlike the reduction of oral disease found in the children's population in most western European countries, an occurrence of dental caries in some East and Central European countries have been increased [3].

The dramatic economic and political changes which have happened in this region have its consequences on health services as well as on oral health. Political transition with the comprehensive health reform in Bosnia and Herzegovina coincides with a worsening of oral health in the children's population. Data from several studies showed that DMFT in 12-year old children were above 4,0 [4, 5].

A weak epidemiological tradition of most Central and East European countries, as well as rare national oral health surveys, is the characteristic for epidemiological studies in Bosnia and Herzegovina too.

The first nationwide epidemiological survey was conducted in 1987 when Bosnia and Herzegovina was still a part of Yugoslavia and the second one in 2004. After this time, some studies which covered small regions of Bosnia and Herzegovina or single town were conducted, but the deficiency of new data is evident. It was expected that time period of 30 years, which was the timeframe for this review, brought some changes in oral health as well.

The aim of this review was to evaluate the overtime trends of oral health of the children's population in Bosnia and Herzegovina following the results of published studies in chronological order since 1987 till May 2017.

Materials and Methods

Data Sources and Searches

Electronic searches up to May 2nd, 2017, were conducted using the following electronic bibliographic databases: PubMed, MEDLINE, WHO/oral health databases, EBSCO, HINARI and COBISS.BH. In order to identify additional primary studies which were not published elsewhere, hand-searches of Library of the Faculty of

Dentistry University of Sarajevo were conducted too [6]. The key words, both in English and Bosnian language, used in the search were: children's oral health, schoolchildren, DMFT/dmft indexes, dental public health, prevalence of dental caries in children, health care surveys, epidemiology, Bosnia and Herzegovina. The search was not limited to the English language nor restricted by other means. Once potentially relevant abstracts were selected, the full reports were retrieved for a final selection process. If the abstract was judged to contain insufficient information to ascertain the appropriateness of the work for inclusion, the full report was obtained and reviewed before a final decision was made.

Out of the primary list of studies, 17 studies were selected as they fulfilled the following inclusion criteria:

1. Studies published after the year 1987 and

2. Studies which evaluated oral health of children's population in Bosnia and Herzegovina not diagnosed with any chronic disease [7 - 23].

The main reasons for exclusion were that the articles were not within the scope of any of the dental fields or that they did not use explicit methods to identify relevant studies.

The selected studies, including Master and Ph.D. thesis based on the children's oral health in Bosnia and Herzegovina, were classified according to a year of publishing, a journal of publishing, towns where the survey was conducted and the age groups included in surveys (**Table 1.**)

Mean dmft /DMFT index in children in Bosnia and Herzegovina during the period 1987-2017 were presented in ascending order based on the year when surveys were conducted in **Table 2.**

Different methodologies, which have been used in those studies, resulted in a wide range of data which couldn't always be compared. That's why this study compared only the results of the studies in which study participants were 12-year old. In the end, this review evaluated the results of ten studies which were conducted by the methodology proposed by World Health Organization (WHO) for basic oral health surveys for 12-year-olds [23].

Results

Table 2. shows the mean dmft and DMFT in children in Bosnia and Herzegovina during the period 1987 -2017 based on oral health survey data presented by year of the study and by age.

The mean DMFT varied from 3,91 in 7-year old children from Mostar 14 to 10,8 in 15 to 18-year-olds in Foča [12]. Although time distance and different age of participants between those two studies should be taken into account,

Table 1. The studies, Master and Ph.D. thesis based on the children's oral health in Bosnia and Herzegovina (ranged by the year of publication)

No.	Year of publishing (Reference number within brackets)	Journal of Publishing, Master/Ph.D thesis	Authors	Towns were the survey was conducted	The age groups Included in surveys
1.	1987. (7)	PhD thesis	Hatibović Š.	Sarajevo, Mostar, Trebinje, Banja Luka	3-year, 6-year, 12-year, 15-year and 18-year-olds
2.	1988, Oct. (8)	Community Dent Oral Epidemiol.	Vrbić V, Vulović M, Rajić Z, Topić B, Tatić E, Malić M, et al.	22 Yugoslav towns	6-year, 12-year and 15- year-olds
3.	2000, Mar. (9)	Acta Stomatol Croat.	Kobašlija S, Maglajlić N, Tahmišćija H. Huseinbegović-Čengić A,	Sarajevo	5 to 7-year and 12 to 15-year-olds
4.	2001. (10)	Master thesis	Huseinbegović A.	Sarajevo	5 to 6-year-olds
5.	2002. (11)	Master thesis	Selimović-Dragaš M.	Sarajevo	6 to 7, 12 and 15 year-olds
6.	2006, Jan. (12)	Stom Glas S	Stojanović N, Krunić J.	Foča	15 to 18 year-olds
7.	2007, June (13)	Int Dent J	Zukanović A, Kobašlija S, Ganibegović M.	Sarajevo	12-year-olds
8.	2008, June (5)	Acta Stomatol Croat.	Muratbegović A, Marković N, Kobašlija S, Zukanović A.	Sarajevo, Tuzla, Mostar, Banja Luka, Široki Brijeg, Visoko, Sanski Most, Goražde, Vitez	12-year-olds
9.	2008, Aug. (14)	Med glas	Sarić B, Hasanagić M.	Mostar	7, 9 and 11 year-olds
10.	2009. (15)	Master thesis	Deljo E.	Goražde	6-year and 12-year-olds
11.	2010, Mar. (16)	OHDMBSC	Dolić O, Vojinović J, Đukanović D, Čupić S, Šukara S, Obradović M, Kojić Z, Trtić N.	Banja Luka	6-year and 12-year-olds
12.	2012, Mar. (17)	Stom Glas S	Đorđević S, Ivanović T, Žuža A, Kulić LJ, Nogo-Živanović D	Foča	15-year and 17-18-year-olds
13.	2013.(18)	Master thesis	Kajtažović J	Bihać	12-year-olds
14.	2013, Sept. (19)	Mater Sociomed	Deljo E, Čavaljuga S, Mešković B.	Goražde	6-year and 12-year-olds
15.	2015. (20)	PhD thesis	Deljo E.	Goražde	6-year and 12-year-olds
16.	2015. (21)	Master thesis	Muminović-Zulum A.	Kiseljak	5,5-year to 7-year-olds
17.	2016, May. (22)	Acta medica academica	Šaćić L, Marković N, Muratbegović Arslanagić A, Zukanović A, Kobašlija S.	Sarajevo	3 to 5-year-olds

differences in DMFT values are significant. Such a high value of DMFT found in Foča in 2006 corroborate with the results of the study published in 2002 where the author reported the DMFT value of 11,88 for 15-year olds in Sarajevo [12, 11].

This review compared the results of ten studies which used the same methodology and same age study group of 12-years old participants. (**Table 3.**) The year 1987, when the first nationwide epidemiological survey was conducted, represents a zero point of this research. It can be said that the oral health in post-war Bosnia and Herzegovina is

slightly better compared with the results of the first nationwide epidemiological survey conducted in the year 1987.

Discussion

The goal of data collection is to assist governments, health authorities and health professionals in formulating policies, specifying standards and developing pro-

Table 2. Mean dmft /DMFT index in children in Bosnia and Herzegovina in time period 1987 -2017 presenting in ascending order of year when surveys were conducted

Year of publishing (Reference number within brackets)	Towns were the survey was conducted	The age groups Included in surveys	Mean dmft /DMFT
1987. (7)	Sarajevo, Mostar, Trebinje, Banja Luka	3-year, 6-year, 12-year, 15-year and 18-year-olds	3,07 / 6,54 / 6,50/ 9,70/ 12,19
1988. (8)	22 Yugoslav towns	6-year and 12-year-olds	7,3 / 6,1
2000. (9)	Sarajevo	5 to 7 and 12 to 15- year-olds	7,53 / 7,18
2001. (10)	Sarajevo	5 to 6-year-olds	6,87
2002. (11)	Sarajevo	6 to 7, 12 and 15 year-olds	8,32 / 10,38 / 11,88
2006. (12)	Foča	15 –year to 18-year-olds	10,8
2007. (13)	Sarajevo	12-year-olds	4,8
2008. (5)	Sarajevo, Tuzla, Banja Luka, Mostar, Visoko, Široki Brijeg, Goražde, Sanski Most, Vitez	12-year-olds7-year,	4,16
2008. (14)	Mostar	9-year and 11-year-olds	3,91 / 7,58 / 8,25
2009. (15)	Goražde	6-year and 12-year-olds	9,26 / 5,84
2010. (16)	Banja Luka	6-year and 12-year-olds	8/5
2012. (17)	Foča	15-year and 17-18 year-olds	6,6 / 9,5
2013. (18)	Bihać	12-year-olds	5,39
2013. (19)	Goražde	6-year and 12-year-olds	7,93 / 5,42
2015. (20)	Goražde	6-year and 12-year-olds	4,80 / 7,78
2015. (21)	Kiseljak	5,5 –year to 7- year-olds	9,23
2016. (22)	Sarajevo	3 to 5 year olds	6,79

Table 3. Mean DMFT Index of 12-year-olds in Bosnia and Herzegovina in time period 1987 - 2017. presenting in ascending order of year when the surveys were conducted

Year of publishing (Reference number within brackets)	Towns were the survey was conducted	Mean DMFT of 12-year-olds
1987. (7)	Sarajevo, Mostar, Trebinje, Banja Luka	6,50
2000. (8)	Sarajevo	7,18
2002. (11)	Sarajevo	10,38
2007. (13)	Sarajevo	4,80
2008. (5)	Sarajevo, Tuzla, Banja Luka, Mostar, Široki Brijeg Visoko Goražde, Sanski Most, Vitez	4,16
2009. (15)	Goražde	5,84
2010. (16)	Banja Luka	8,00
2013. (18)	Bihać	5,39
2013. (19)	Goražde	5,42
2015. (20)	Goražde	7,78

grammes to prevent disease, and to measure the progress, impact, and efficacy of efforts to control diseases that are already affecting their populations. Although public health problems associated with the oral disease can be considered as a serious burden on countries around the globe it can be said that the surveillance of oral health is neglected in modern public health [23].

For global comparison, dental caries trends in the young population, represented by 12-year-olds, are the centre of attention and likewise a monitoring instrument of the success of preventive measures.

The results of this review showed a lack of information on the oral health of the children's population in Bosnia and Herzegovina. The literature on the oral health of children in Bosnia and Herzegovina has several limitations. The difference in methodology applied in the studies published in the domain of oral health in Bosnia and Herzegovina can be considered as a main limiting factor in the evidence base. The principal shortcomings are the difference in age groups which are not standardized monitoring groups suggested by World Health Organization (WHO) and some study design issues.

At the time when most industrialized countries report a remarkable decline in the prevalence of dental caries [24] Bosnia and Herzegovina didn't achieve even the WHO Global Goals for oral health by the year 2000 which is that on average no more than 3 DMFT should be observed in children at the age of 12 years [25]. The reasons for this situation can be found in the study of Topić in 1985 who evaluated oral health care on a primary level in Bosnia and Herzegovina. Based on his findings, the author claimed that primary dental care in Bosnia and Herzegovina has a sufficient number of well-trained staff but oral health care for the population groups in high caries risk, such as children and a pregnant woman, was not sufficiently developed [26]. At the same time, financial support for primary dental health care was not enough to meet the needs of specific population groups [26]. An average DMFT of 4,16 in 12-year-olds reported in the second nationwide epidemiological survey conducted in 2004 coincides with an increase in the occurrence of dental caries in some countries of Eastern Europe at the beginning of 21 Century [3, 27]. Such a high value of DMFT of 12-year-olds found in 2004 could be expected, because of a high value of untreated caries, which was 93,6% for deciduous teeth, previously found in the study conducted in 2001. [5,10]

The decline in dental caries prevalence of children, [28, 29] reported by most of the Western European countries wasn't found in Bosnia and Herzegovina and in several countries in Balkan region. DMFT above 4 of 12-year-olds found in 2004 in Bosnia and Herzegovina corresponds with the mean DMFT value of 4,2 of 12-year-olds in Croatia in 2015 [29].

Macedonia with a mean DMFT value of 3,5 of 12-year-olds in 2013 and Montenegro with a mean DMFT value of 3,4 of 12-year-olds in 2006 are at the threshold of achieving WHO goals with no more than 3 DMFT observed in children at the age of 12 years [29]. World Health Organization: Oral Health, Country/Area Profile Programme for 12-Year-Olds showed that the last report from Serbia was in 1994, when the mean DMFT value of 12-year-olds was 7,8. [29].

Results of this study show no big difference between mean DMFT values of 12-year-olds in different regions in Bosnia and Herzegovina, although it could be expected having in mind the considerable difference in economic status of this regions. However, all of them have a rather high value of DMFT. The highest mean DMFT value of 7,78 of 12-year-olds was reported in a study conducted in Goražde in 2015. Author of this study pointed out insufficient preventive measures at the community level [20].

Lack of data on population's oral health status and on the prevalence of risk factors can be considered as an important limiting factor in the process of identification of the needs of specific population groups and of developing and designing the relevant intervention strategies. Poor oral health in Bosnia and Herzegovina with DMFT of 4,16 of 12-year-olds reported in the second nationwide epidemiological survey conducted in 2004, confirms this statement [5].

Conclusion

This review shows the lack of information about the oral health status of the population in Bosnia and Herzegovina. Although it was expected that the time period of 30 years, which was the timeframe for this review, brought some changes in oral health, there was no difference between the results of DMFT values of 12-year-olds in Bosnia and Herzegovina obtained in 1987 and mean DMFT values of 12-year-olds obtained in studies which were conducted in the last 30 years. Oral health studies are a useful tool for researchers, clinicians, and policymakers because they serve to systematically identify and appraise the available evidence regarding a specific topic. For effective surveillance, WHO suggests that clinical oral health surveys should be conducted regularly every five to six years in the same community. Having in mind that information on the major common risk factors for chronic diseases is the key entry point for health authorities in planning health promotion and primary prevention programmes, it is as well of great importance for oral health, as well as health of children in Bosnia and Herzegovina in general, to incorporate oral health surveillance into national health surveillance scheme. Only then it can be

expected that dmft/DMFT of children in Bosnia and Herzegovina, as a crucial indicator of oral health, to reach the goals set by World Health Organization.

DECLARATION OF INTEREST

There is not any conflict of interest for all authors, between the authors, or for any organization.

References

1. Marthaler TM, O'Mullane DM, and Arabic V. The prevalence of dental caries in Europe 1990-1995. *Caries Res* 1996; 30:237-55
2. Vrbic V. Reasons for the caries decline in Slovenia. *Community Dent Oral Epidemiol* 2000; 28:126-32
3. Künzel W. Trends in caries experience of 12-year-old children in east European countries. *Int J Paediatr Dent* 1996; 6:221-226
4. Zukanović A, Muratbegović A, Kobaslija S, Marković N, Ganibegović M, Beslagić E. Relationships between socioeconomic backgrounds, caries-associated microflora and caries experience in 12-year-olds in Bosnia and Herzegovina in 2004. *Eur J Paediatr Dent*. 2008; 9(3):118-24.
5. Muratbegović, A., Marković, N., Kobašlija, S., Zukanović, A. Oral Health Indices and Molar Incisor Hypomineralization in 12 Year Old Bosnians. *Acta Stomatol Croat*. 2008; 42(2): 155-163.
6. Vassar M, Atakpo P, Kash M.J, Manual search approaches used by systematic reviewers in dermatology. *J Med Libr Assoc* 2016; 104(4) :302-304 DOI: <http://dx.doi.org/10.3163/1536-5050.104.4.009> (accessed 5.02.2017)
7. Hatibović Š. Stanje oralnog zdravlja i primjena najpogodnijih preventivnih mjera kod djece i omladine u SRBiH. [*Oral health and the implementation of the most appropriate preventive measures in children and youth in SRB&H*]. PhD thesis. Univerzitet u Sarajevu, Stomatološki fakultet, Sarajevo; 1987.
8. Vrbic V, Vulović M, Rajić Z, Topić B, Tatić E, Malić M, et al. Oral Health in SFR Yugoslavia in 1986. *Community Dent Oral Epidemiol*. 1988; 16: 286-288.
9. Kobašlija S, Maglajlić N, Huseinbegović- Čengić A, Tahmišćija H. Prevalencija karijesa u djece u Sarajevu. *Acta Stomatol Croat*. 2000; 34(1): 83-85.
10. Huseinbegović A. Socijalno-medicinski aspekt karijesa mlječnih zuba u gradskim uslovima [*Socio-medical aspect of deciduous teeth caries under urban conditions*]. Master thesis. Univerzitet u Sarajevu, Stomatološki fakultet Sarajevo; 2001
11. Selimović-Dragaš M. Uticaj životne sredine na stanje oralnog zdravlja raseljene djece [*Influence of environmental factors on the oral health of displaced children*] Master thesis. Univerzitet u Sarajevu, Stomatološki fakultet Sarajevo; 2002.
12. Stojanović N, Krunić J. Caries prevalence in adolescents in Eastern Bosnia – Foca municipality. *Stom Glas S*. 2006; 53:229-235
13. Zukanović A, Kobašlija S, Ganibegović M. Caries risk assessment in Bosnian children using Cariogram computer model. *Int Dent J*. 2007; 57(3):177-183
14. Sarić B, Hasanagić M. Risk factors for caries - control and prevention. *Med glas* 2008; 5 (2):109-115
15. Deljo E. Epidemiološka studija i primjena preventivnih mjera u Bosansko-podrinjskom kantonu. [*Epidemiological study and implementation of preventive measures in Podrinje Canton*]. Master thesis. Univerzitet u Sarajevu, Stomatološki fakultet Sarajevo; 2009.
16. Dolić O, Vojinović J, Đukanović D, Čupić S, Šukara S, Obradović M, Kojić Z, Trtić N. Caries prevalence in the primary and permanent dentition of rural and urban children in the municipality of Banja Luka, Bosnia and Herzegovina. *OHDMBSC* 2010; 9(1):39-47
17. Đorđević S, Ivanović T, Žuža A, Nogo-Živanović D, Kulić L. Prevalence of caries and gingivitis among school children in the municipality of Foča. *Stom Glas S*. 2012; 59:22-26.
18. Kajtažović J. Utjecaj programa oralno-zdravstvene edukacije na dentalni status dvanaestogodišnjaka . [*The influence of the oral health education program on the dental status of the twelve-year-olds*]. Master thesis. Univerzitet u Sarajevu, Stomatološki fakultet Sarajevo; 2013.
19. Deljo E, Čavaljuga S, Mešković B. Prevalence of dental caries in the municipality Goražde during the period 2007-2012. *Mater Sociomed* 2013; 25(3):163-166
20. Deljo E. Povezanost nastanka karijesa i primjene primarnih preventivnih mjera u Bosansko-podrinjskom kantonu sa posebnim osvrtom na ekonomski aspekt značaja prevencije oralnih oboljenja [*The relationship between the emergence of caries and the application of primary preventive measures in Podrinje canton, with special emphasis on the economic aspect of the importance of the prevention of oral diseases*] PhD thesis. Univerzitet u Sarajevu, Stomatološki fakultet, Sarajevo; 2015.

21. Muminović-Zulum A. Uticaj opšteg zdravlja na oralno zdravlje kod djece predškolskog uzrasta [*Influence of general health on oral health in pre-school children*] Master thesis. Univerzitet u Sarajevu, Stomatološki fakultet, Sarajevo; 2015.
22. Šaćić L, Marković N, Muratbegović Arslanagić A, Zukanović A, Kobašlija S. The prevalence and severity of early childhood caries in preschool children in the Federation of Bosnia and Herzegovina Acta medica academica 2016; 45(1):19-25
23. WHO/*Oral health surveys: basic methods - 5th edition*. Available at:www.who.int/oral_health/publications/9789241548649/en/
24. Petersson HG, Bratthal D. The caries decline: a review of reviews. Eur J Oral Sci 1996; 104:436-443
25. Petersen PE. Changing oral health profiles of children in Central and Eastern Europe-Challenges for the 21st century. available at:http://who.int/entity/oral_health/media/en/orh_eastern_europe.pdf
26. Topić B. Principi primarne stomatološke zaštite u SR Bosni i Hercegovini (valorizacija 1982.godine i projekcija 1990.i 2000. godine.)Univerzitetsko-medicinski centar, Stomatološki fakultet Univerziteta Sarajevo. Sarajevo 1985.godine
27. Szóke J, Petersen PE. Evidence for dental caries decline among children in an East European country (Hungary). Community Dent Oral Epidemiol 2000;28:155-160
28. Jordan RA, Bodechtel C, Hertrampf K, Hoffmann T, Kocher T, Nitschke I. et al. The Fifth German Oral Health Study (Fünfte Deutsche Mundgesundheitsstudie, DMS V) –rationale, design, and methods. BMC Oral Health 2015;14:161 available at: <http://www.biomedcentral.com/1472-6831/14/161>
29. WHO, World Health Organization: Oral Health, Country/Area Profile Programme (CAPP). Caries for 12-Year-Olds by Country/Area. Malmö: Malmö University; 2017