

Trends in caries experience of 12-year-old children in east European countries

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Summary. This paper reviews published data on the caries experience of 12-year-old children in east European countries, including the 14 states of the former Soviet Union. With the exception of the Czech Republic (2.7) all *DMFT* indices in the east European countries were within the range of 3.1 (Bulgaria) to 5.1 (Poland). For the states of the former Soviet Union the *DMFT* indices were higher in the northern regions (range 3.3 in Belorussia to 7.7 in Latvia) than in the southern regions (1.2 in Tadzikistan to 3.1 in Kirgizia). Other than in southern states of the former Soviet Union, 'low' or 'moderate' caries experience (by WHO criteria) were found only in countries with developed oral health care systems. In most of the other countries implementation of oral health promotion and prevention at the community level is needed.

Introduction

Since the beginning of the 1980s dental public opinion has been dominated by the caries decline in the western hemisphere of the industrialized world [1]. This was confirmed at the Second Conference on Declining Caries in London 1994 [2]. The global aim for oral health by the year 2000 has been reached for 12-year-olds in most of the highly developed industrialized countries; for example, the *DMFT* index in Switzerland is 1.1, in England and Wales 1.2, and in Denmark 1.3.

However, little is known in this context about east European countries, including the states of the former Soviet Union. There are different reasons for this. On the one hand there have been dramatic political developments, and changes have taken place which have had their repercussions on dental services and oral health. On the other hand, oral epidemiology is underdeveloped in most of these countries, and regular regional or national surveys have not been carried out. Published information on their oral health status is therefore sparse or

available only in professional journals that are not easily accessible.

This paper reviews published data on the caries experience of 12-year-old children in east European countries. The majority of the data results from 'Pathfinder-Surveys', which were conducted as national studies by calibrated dentists under the direction of experts from the WHO. This standard cannot, however, be assumed in the surveys conducted in the states of the former Soviet Union, and therefore the *DMFT* indices from those surveys cannot be directly compared with the others.

East European countries

The caries experience of 12-year-old children reported in surveys carried out in seven east European countries is presented in Table 1. With the exception of Poland, all *DMFT* indices from surveys reported between 1991 and 1993 were within the 'moderate' range (*DMFT* 2.7–4.4), according to the WHO categories. Poland had a *DMFT* value in the 'high' caries range (5.1), according to 1992 studies; this study, however, included 13-year-old children.

The Czech Republic had low *DMFT* and high *F* values [3]; this is evidence of the effectiveness of the

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Table 1. Caries experience (*DMFT*) of 12-year-old children in east European countries. R = Random samples; N = other national surveys; P = 'Pathfinder' Survey (WHO).

Country	Reference	Year	Survey	Number of children	DMFT	DT	MT	FT
Austria	5	1984	P	982	4.0	1.6	0.3	2.1
	6	1993	N	491	3.0	1.1	0.04	1.9
Bulgaria	21	1989	—†	—	3.5	—	—	—
	21	1993	—†	—	3.1	—	—	—
Czech Rep.	3	1987	R	651	3.3	0.8	0.03	2.5
	3	1993	R	593	2.7	0.4	0.0	2.3
Hungary	7	1985	P	893	5.0	2.5	0.4	2.0
	7	1991	P	898	4.3	1.9	0.3	2.0
Poland	8	1985	N	27943	4.4	2.7	0.1	1.6
	9	1992*	P	1006	5.1	2.7	0.2	2.3
Romania	21	1986	P	—	3.1	—	—	—
	11	1992	P	660	4.0	—	—	—
Slovak Republic	22	1962	N	—	5.0	—	—	—
	4	1987	R	731	4.1	—	—	—

*Also included 13-year-old children.

†Type of survey not known.

School Dental Service which was in existence until 1993. The apparent caries decline of 20% for the years from 1987 to 1993 (3.3 to 2.7 *DMFT*) has been explained by the increased availability of fluoridated toothpastes, but water fluoridation was also available till 1990 for more than 22% of the population, and 30% of mothers and children received *F* tablets [3]. Fluoridated domestic salt was introduced on a national scale in 1995.

In 1987, the caries experience of 12-year-olds in today's Slovak Republic was higher than in the Czech and Moravian parts of the former Czechoslovakia (4.1 and 3.3 *DMFT*, respectively). At that time, *DMFT* indices varied in different Slovakian regions between 2.0 and 5.0 [4]. Only in 1996, after evaluation of the WHO/EURO-ORATEL-Project, will current caries data for the Slovak Republic become available (D. Belus, personal communication, 1995).

Little data are available for the neighbouring country of Austria. In 1988 the national caries experience of 12-year-olds was given as 4.3 *DMFT* [5]. In 1993 a *DMFT* value of 3.0 was reported for the same age group [6], a significant reduction, which indicates the effective implementation of oral prevention programmes.

The epidemiological situation is different in the neighbouring country of Hungary. Two 'Pathfinder' surveys of 1985 and 1991 indicated a declining trend in caries experience (*DMFT* 5.0 in 1985 and 4.3 in 1991) [7]. The national figures, however, provide

only an incomplete picture, as very significant regional differences can be found (Fig. 1), ranging from *DMFT* 2.7 in Baly to 7.4 in Nyireoház, and also differences between urban and rural areas, children from rural areas usually having lower caries experience. These data are an indication of the existence of children with high caries risk. As in the Czech Republic, fluoridated domestic salt was introduced in 1995.

In Poland the situation is entirely different. The repeated participation in the International Collaborative Studies of WHO (ICS-I in 1976 and 1990) and in a 'Pathfinder' survey [8,9] permit a comparative analysis. The caries experience of 12-year-olds increased from 4.4 to 5.1 *DMFT* between 1987 and 1992. The *DMFT* values in 1992 were higher in rural than in urban areas (4.8 versus 5.5 *DMFT*). Szatko [10] characterized the oral health status in Poland as a disaster. For the adolescent population he explained this on the basis of an increase in extractions of permanent teeth and an increase of secondary caries, yet water fluoridation was available to about 3.5% of the population until 1990 (then discontinued, with the exception of a city with 400,000 inhabitants), and other preventive measures were continued or extended.

A comparable trend has also occurred in Romania [11]. There was an increase in caries experience from 1986 to 1992 (3.1 to 4.0 *DMFT*), with great geographical differences (3.0 to 5.9), the higher figures being for the most urbanized areas. In

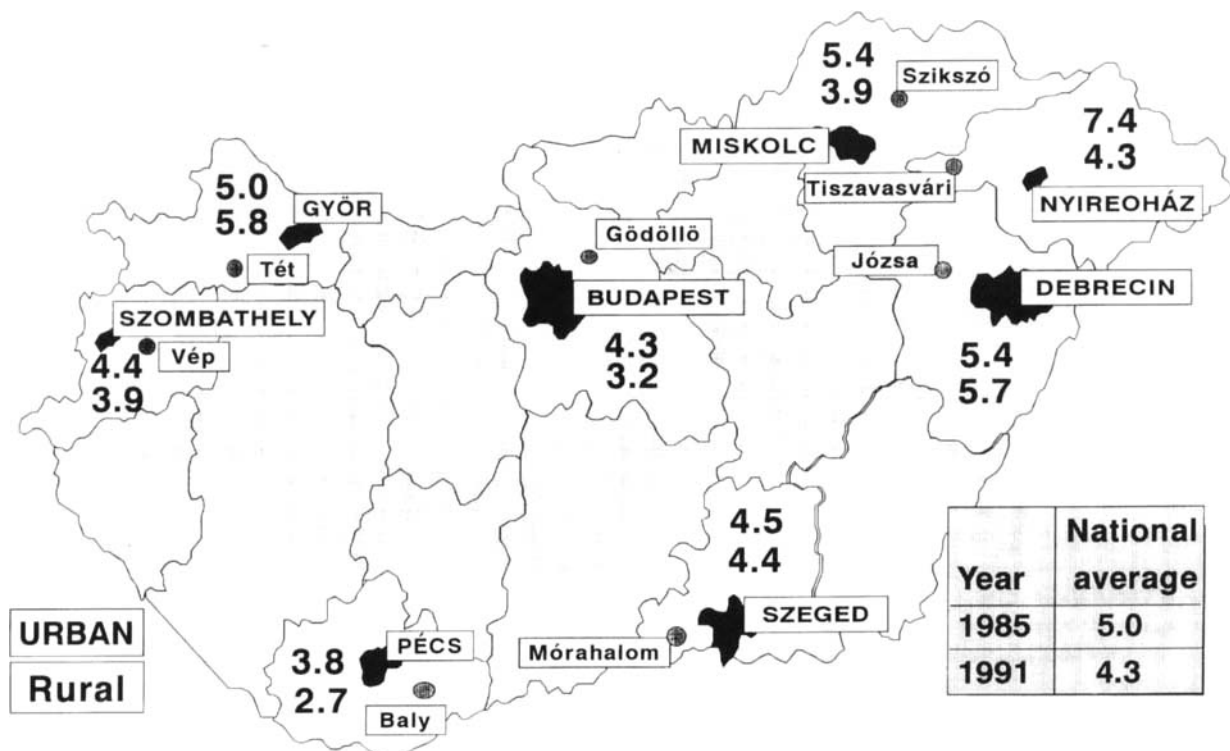


Fig. 1. Caries experience (*DMFT*) of 12-year-old children in Hungary (from 'Pathfinder' survey 1991, WHO data bank).

contrast to Romania, caries experience in Bulgaria may be decreasing slightly.

States of the former Soviet Union

Given the geographic dimension of the former Soviet Union it is not surprising that the caries experience of 12-year-olds differs greatly from one country to another. Leous [12] and Kuzmina [13] have shown that caries experience of 12-year-olds in the 14 countries in the years 1985–90 varied between *DMFT* 1.2 and 7.7 (Fig. 2). Caries experience differed generally between the cold northern and the warm southern regions; *DMFT* indices were highest in the Baltic states of Lithuania, Estonia and Latvia. Only as supplementary information it may be mentioned that 15-year-olds from the Chernobyl region had a *DMFT* of 4.6 in 1992 [14].

Of great interest are the relatively low *DMFT* indices for the Moscow region, ranging between 1.7 and 3.9 [15]. In only one of the 55 survey points was a high *DMFT* (5.1) recorded for 12-year-old children. The different levels of caries experience were directly related to the fluoride concentrations

in the drinking water [15], 'low' *DMFT* levels (1.7–2.3 *DMFT*) being recorded in areas with the higher fluoride concentrations (0.6–0.8 and 0.9–1.1 ppm F), and 'moderate' *DMFT* levels (2.7–3.9) in regions with low fluoride concentrations (0.1–0.3 ppm F).

The epidemiological situation was remarkably better in countries having a warmer climate (south). The *DMFT* reached a value of 3.1 only in Kirgizia and ranged between 1.2 and 2.6 in the other Asian states (Tadzhikistan, Ousbekistan, Georgia and Turkmenistan). The low *DMFT* (2.4) for Armenia corresponds well with findings in children of Armenian refugees in Germany, most of whom showed caries-free permanent dentitions (W. Künzel, unpublished data). Children in neighbouring Mongolia have similar caries experience; in a survey initiated by us, a *DMFT* of 2.6 (*DT* 2.2) was found for 12-year-old children from Ulan Bator [16]. WHO data for 1976 [17] showed a *DMFT* of 1.4, so it seems that there is a trend towards increasing caries experience in Mongolia.

There are no studies specifically concerning the causes of differing levels of caries experience in the states of the former Soviet Union, but it is known that water fluoridation, which operated in 120

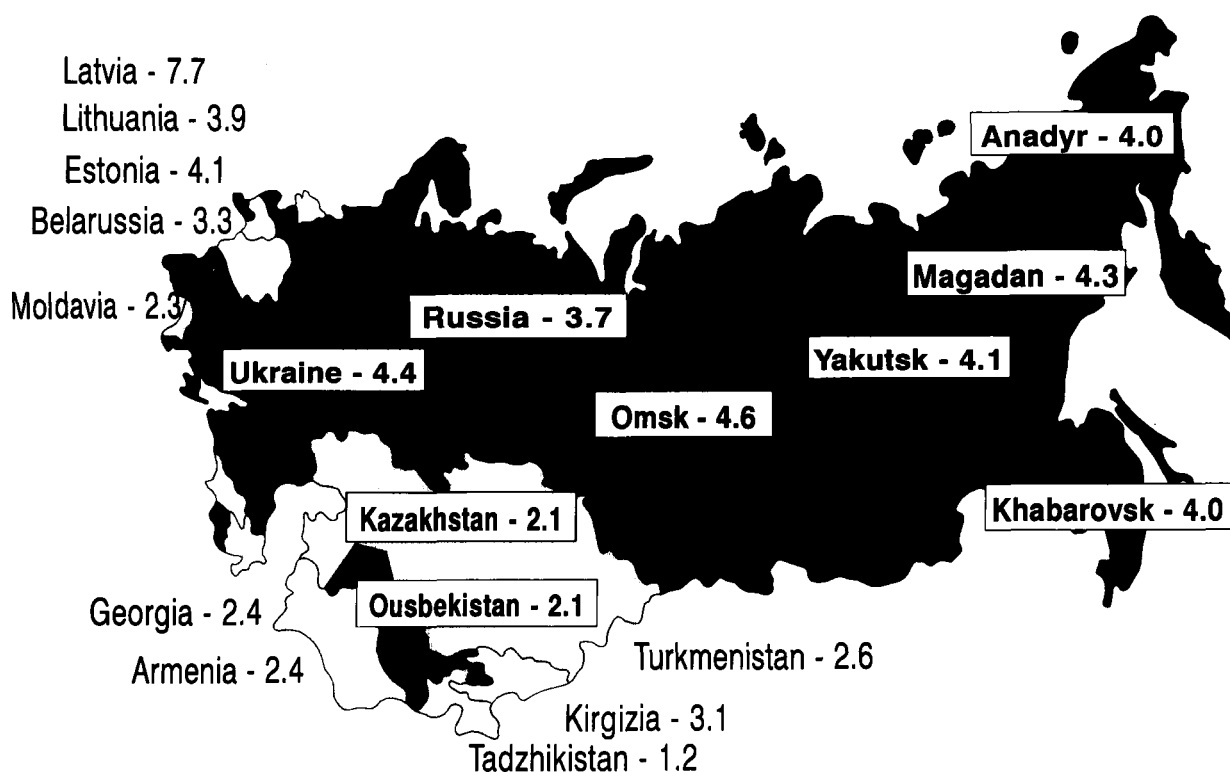


Fig. 2. Caries experience (DMFT) of 12-year-old children in states of the former Soviet Union (data from Leous [12] and Kuzima [13]).

towns (e.g. in Norilsk, Murmansk, Ivano-Frankovsk, Dubna, Monchegorsk, St Petersburg) for 15% of the population throughout the Soviet Union in 1984 [18], was terminated in 1990. Sugar consumption has traditionally been very high (46.8 kg/pCY in 1988 [19]) but has been lower in the southern countries, where there was frequent consumption (even by children) of green tea with a high fluoride concentration [20]. Currently, information concerning possible trends in caries experience in the 14 countries of the former Soviet Union is lacking, but an increase may be expected in the southern regions, where people have given up their traditional way of life, especially regarding diet.

Conclusion

The current status of oral health of 12-year-old children is acceptable only in a few of the countries discussed in this review. According to WHO criteria [19], by which caries experience is categorized from 'low' ($DMFT < 2.7$) to 'very high' ($DMFT > 6.6$), 'low' and 'moderate' levels are found mainly (with the exception of the southern countries of former

Soviet Union) in countries with developed oral health care delivery systems (Czech Republic, Austria and Bulgaria). In most of the other countries the present level and pattern of dental caries are more severe and the implementation of oral health promotion and prevention at the community level is needed.

No clear-cut conclusion can be drawn regarding reasons for the changes in caries experience that have been reported; discussion of possible influences would operate too much in the realm of speculation. There is obviously still work to be done in the field of oral health research.

Expérience carieuse des enfants âgés de 12 ans des pays de l'Europe de l'est

Resumé. Cette étude passe en revue les données publiées sur l'expérience carieuse d'enfants âgés de 12 ans des pays de l'Europe de l'est, dont 14 états de l'ancienne Union Soviétique. A l'exception de la république tchèque (2.7), tous les indices CAOD des pays de l'Europe de l'est étaient compris entre 3.2 (Bulgarie) et 5.1 (Pologne). Pour les états de

l'ancienne Union Soviétique, les indices Caod étaient plus élevés dans les états du Sud (1.2 au Tadjikistan jusqu'à 3.1 en Kirguizie). A part dans les états du Sud de l'ancienne Union Soviétique, une expérience carieuse basse ou modérée (selon les critères de l'OMS) a été trouvée dans les pays qui ont un système de prise en charge de la santé dentaire. Dans la majorité des autres pays, une amélioration de la prise en charge de la santé dentaire et des mesures de prévention sont nécessaires.

Entwicklungen der Kariesanfälligkeit, von 12 jährigen Kinder, in Ost Europäischen Ländern

Zusammenfassung. Diese Arbeit ist eine Übersicht von publizierten Daten der Kariesanfälligkeit dieser Kinder, einschliesslich der 14 Staaten der früheren Soviet-Union, aber ohne die Tschechische Republik. Alle DMFT indizes in den Ost-Europaischer Länder waren innerhalb der Spanne von 3.1 (Bulgarien) bis 5.1 (Polen). In der ehem. Sov. Union der DMFT war höher in der nördlichen Regione (3.3 in Belorussia bis 7.7 in Litau). In der südlichen Regionen (1.2 in Tadjikistan bis 3.1 in Kirgisien). Ausser in diesen südlichen Staaten, wurden niedrige Kariesanfälligkeit entsprechend WHO Kriterien, nur in Länder mit gut entwickelten Prophylaxe Systemen gefunden. Dementsprechend müssen, in den meisten anderen Ländern noch grosse Anstrengungen gemacht werden, zur Einführung solcher Systeme.

Tendencias en la prevalencia de caries en niños de 12 años de edad en países de Europa oriental

Resumen. Se revisan los datos publicados sobre prevalencia de caries en niños de 12 años de edad en países de Europa oriental, incluyendo 14 estados de la anterior Unión Soviética. Con la excepción de la República Checa (2.7) todos los índices CPOD de los países evaluados estuvieron entre los rangos de 3.1 (Bulgaria) a 5.1 (Polonia). Para los estados de la anterior Unión Soviética, los índices de CPOD fueron más altos en las regiones del norte (rango 3.3 Belorussia a 7.7 Latvia) que en las regiones del sur (1.2 Tadjikistán a 3.1 en Kirguizia). En las otras regiones de la anterior Unión Soviética con prevalencia de caries baja o moderada (de acuerdo a los criterios de la OMS) se observó en aquellas regiones con sistemas

de salud oral desarrollados. En la mayoría de los otros países se necesita la implementación de la promoción de salud oral y prevención a nivel comunitario.

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