

Demographic and social inequalities in need for orthodontic treatment among schoolchildren in Lithuania

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Key words: schoolchildren; survey; oral health; orthodontic anomalies; social factors; health inequalities.

Summary. The present study, which focused on Lithuanian 11–15-year-old schoolchildren, was aimed to describe the frequency of orthodontic anomalies in terms of self-reported complaints about malposed teeth and malocclusion and self-reported use of orthodontic appliances (removable or braces) across different sociodemographic strata.

Material and methods. The study population comprised 5632 schoolchildren surveyed in the 2005–2006 school year according to the WHO collaborative cross-national HBSC study in Lithuania.

Results. Almost half (47.5%) of schoolchildren reported orthodontic complaints. Therefore, only 15.8% of total population or 27.0% of schoolchildren who had orthodontic complaints reported wearing orthodontic appliances. Several municipalities of Lithuania with a high prevalence of orthodontic problems among schoolchildren were identified. Orthodontic problems were more prevalent among girls than boys. The prevalence of orthodontic complaints was not associated with social factors, while the use of orthodontic appliances was significantly related to social determinants. Children from rural areas were 2.44 times less likely of wearing orthodontic appliances than those living in cities, and children from families with low affluence were 2.33 times less likely of wearing orthodontic appliances than children from high-affluence families.

Conclusion. There is a considerable variation and high social inequalities in need of orthodontic treatment among schoolchildren across different municipalities in Lithuania.

Introduction

Scientific research shows that orthodontic anomalies are one of the most common dental pathologies with a prevalence ranging from 39% to 93% among children (1–5). The prevalence of orthodontic anomalies in Lithuania has not been thoroughly investigated; however, in 2002, the study performed at the Clinic of Orthodontics, Lithuanian University of Health Sciences (former Kaunas University of Medicine) reported estimates that the prevalence of such anomalies among 7–15-year-old Lithuanian children could reach about 85% (6). Considerable variation in epidemiologic data across studies can be explained by different diagnostic criteria.

Diagnosis of orthodontic anomalies among children usually implies the detection of morphologic changes in dental clinics (7–9). However, such an investigation is relatively expensive, and therefore cheaper alternatives are considered when trying to tackle orthodontic issues at public health level.

Subjective, self-reported oral health measures are successfully employed in research among adult populations (9, 10). Such measures are being successfully implemented in research on children (11–15). Recent studies suggest that age-adjusted questionnaires for children are relatively valid and proper instruments for evaluation of oral health (16–18), demonstrating that 12-year-old children are sufficiently aware about their oral health and its related factors (19).

The above-mentioned studies provide evidence that with the use of schoolchildren's surveys, valuable information on dental issues, including malocclusions, their prevalence, associations with sociodemographic factors, and potential needs for dental care, could be obtained. This opportunity emerged in 1992, when Lithuania joined the cross-national study on Health Behavior in School-aged Children (HBSC) under the auspices of the World Health Organization (WHO) (20, 21). The survey conducted

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in the 2005–2006 school year was the first attempt to include the questions on oral health for the estimation of the prevalence of orthodontic anomalies by regions and sociodemographic groups. Such data are valuable in planning the needs of treatment of orthodontic pathology, possible workload of orthodontists in municipalities, and setting priorities for care in sensitive social groups to reduce health inequalities (22).

The aim of this study was to estimate the prevalence of orthodontic anomalies in terms of self-reported complaints about malposed teeth, malocclusion, and self-reported use of orthodontic appliances (removable and braces) among schoolchildren across different sociodemographic strata.

Material and methods

The study was performed from March to May 2006, as a part of the WHO HBSC study (20). Permission for the study was obtained from the Ministry of Education and Science, education units of municipalities, governing bodies of schools, and the Lithuanian Bioethics Committee. A total of 108 schools from 23 municipalities were randomly selected; from each school, one fifth-, seventh-, and ninth-grade class was chosen. An anonymous questionnaire was used based on the international study protocol (23). The response rate was about 95%. The data quality was verified at the international data center, where 5632 questionnaires were selected. The responders were divided into subgroups based on gender (boys, 51.6%, $n=2904$; girls, 48.4%, $n=2728$) and age (11-year olds, 33.1%, $n=1864$; 13-year olds, 33.9%, $n=1907$; and 15-year olds, 33.0%, $n=1861$).

The questions on orthodontic complaints were formulated as follows:

“Have you ever observed that your teeth grow abnormally and there is malocclusion?” Possible answers: “Yes,” “Yes, the doctor has confirmed,” and “No.” The first two answers show the case with orthodontic problems.

“Do you have, or have you ever had, removable appliance, braces or alike?” Possible answers: “Yes” and “No.”

The validity of questions was checked in a pilot study ($n=25$). In the main study, these two questions were responded by 99.8% and 99.6% of schoolchildren, respectively.

While analyzing the data, attention was paid to municipality (where a particular school was located), place of residency, and family affluence. The place of residency was categorized into 4 groups: cities ($n=967$ or 17.2%), centers of rural municipalities ($n=1616$ or 28.8%), small towns ($n=1194$ or

21.2%), and country area ($n=1842$ or 32.8%). Family affluence was estimated indirectly, using the index of family socioeconomic status (20). According to this index, the responders were categorized into 3 groups: high- ($n=905$ or 16.3%), average- ($n=2558$ or 46.1%), and low-affluence ($n=2084$ or 37.6%) families.

The data analysis was performed using the statistical package SPSS 15.0 for Windows. Besides standard statistical procedures, the odds were calculated using a multivariate logistic regression model for orthodontic complaints and use of orthodontic appliances. The latter was calculated separately for a whole study population and only for children who reported orthodontic complaints.

Results

“Have you ever observed that your teeth grow abnormally and there is malocclusion?” This question was positively answered by 2672 children, and this accounted for about half of the sample (47.5%); 14.4% of schoolchildren reported that it was confirmed by doctor, and 33.1% reported based on personal opinion.

Girls more often than boys reported complaints about occlusion (53.6% vs. 41.8%; $P<0.001$).

The frequency of orthodontic complaints did not depend on age; however, there was a trend toward less frequent complaints among older boys (44.9% among 11-year olds, 40.7% among 13-year olds, and 39.8% among 15-year olds; $\chi^2=5.69$; $df=2$; $P=0.058$), while no trend was observed among girls (53.5% among 11-year olds, 52.0% among 13-year olds, and 55.8% among 15-year olds; $\chi^2=2.22$; $df=2$; $P=0.330$).

“Do you have, or have you ever had, removable appliance, braces or alike?” This question was answered positively by 886 responders, accounting for 15.8% of total sample or 27.0% of children who had complaints about malocclusion.

Orthodontic appliances were worn less frequently by boys than girls (20.8% and 32.2%, respectively; $P<0.001$) and by 11-year-old children than older ones (23.1% vs. 29.1% of 13-year olds and 29.1% of 15-year olds; $\chi^2=10.93$; $df=2$; $P=0.004$).

Table 1 shows the frequency of orthodontic complaints in every of 23 study municipalities. The greatest need for orthodontic treatment was in Šalčininkai municipality where the prevalence of malocclusion among schoolchildren reached 64.8%. The lowest prevalence of malocclusion was observed in Rietavas municipality (45.7%). The frequency of complaints in the cities ranged from 49.1% in Kaunas to 56.3% in Klaipėda and was similar to other areas of Lithuania.

Table 1. Self-reported orthodontic complaints (malposed teeth and malocclusion) and self-reported use of orthodontic appliances (removable and braces) among schoolchildren by municipalities of Lithuania

Municipality	Orthodontic complaints %	Use of orthodontic appliances % of all respondents	Use of orthodontic appliances % of respondents who reported complaints
Total sample	47.5	15.8	27.0
Urban municipalities (cities):			
Klaipėda	56.3	14.3	23.8
Vilnius	53.2	19.1	28.7
Panevėžys	51.0	32.2	50.0
Šiauliai	50.6	20.3	31.7
Kaunas	49.1	24.7	40.8
Rural municipalities:			
Šalčininkai	64.8	4.9	9.5
Skuodas	61.6	6.2	14.0
Prienai	60.0	14.8	31.5
Joniškis	57.1	7.1	10.6
Radviliškis	56.8	6.1	5.3
Kaišiadorys	55.7	9.5	17.1
Anykščiai	55.0	8.7	16.3
Šiauliai	53.1	13.8	21.7
Kretinga	52.8	19.2	35.6
Pakruojis	51.8	16.1	27.1
Plungė	51.0	10.8	21.2
Kupiškis	50.2	13.7	21.9
Kelmė	49.3	23.2	34.6
Šilutė	48.8	11.0	20.4
Marijampolė	46.8	27.8	47.1
Varėna	46.6	10.6	18.0
Utena	45.9	6.8	10.9
Rietavas	45.7	8.0	12.2

Table 1 also depicts the prevalence of the usage of orthodontic appliances across Lithuania. Comparing the municipalities, there were considerable differences in the percentages of children wearing appliances.

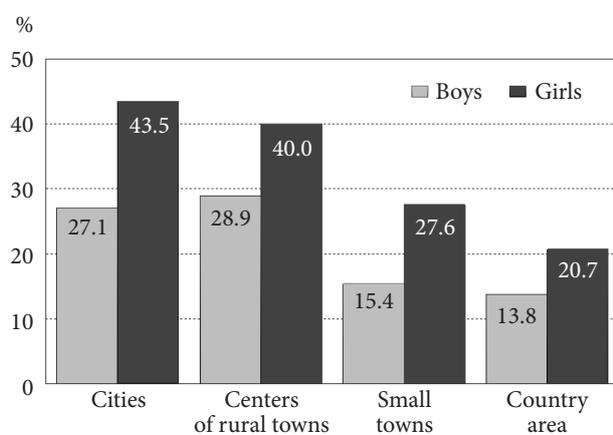


Fig. 1. Self-reported use of orthodontic appliances (dental plates and braces) by place of residence
 $\chi^2=35.00$; $df=3$; $P<0.001$ for boys; $\chi^2=56.94$; $df=3$; $P<0.001$ for girls.

Among cities, the appliances were most common in Panevėžys and least common in Klaipėda. Among centers of rural municipalities, such as Šalčininkai, Radviliškis, Skuodas, and Joniškis, the percentages of children with complaints were highest but the percentages of schoolchildren wearing removable appliances, braces, or other dental appliances were lowest. The opposite trends were observed in Marijampolė, Kelmė, and Kretinga municipalities.

Further analysis included the associations between orthodontic complaints and usage of orthodontic appliances across socioeconomic strata.

The frequency of orthodontic complaints did not differ significantly across living areas: the prevalence was 50.8% in cities, 52.6% in centers of rural municipalities, 52.0% in small towns, and 53.6% in country areas ($\chi^2=2.13$; $df=3$; $P=0.545$).

The use of orthodontic appliances, however, differed depending on place of residence. The proportion of children wearing removable appliances or braces in the cities was twice as high as that of country areas (Fig. 1).

The evaluation of family economic status revealed insignificant differences among the subgroups: in low-, average-, and high-affluence families, 49.5%, 46.0%, and 47.8% of schoolchildren, respectively, reported orthodontic complaints ($\chi^2=5.61$, $df=2$; $P=0.061$). However, children from high-affluence families reported wearing orthodontic appliances twice as often as their counterparts from low-income families (Fig. 2).

The association between the use of orthodontic appliances and socioeconomic factors was analyzed more in detail employing a multivariate logistic regression model (Table 2). The analysis involving both demographic and social factors revealed that the prevalence of orthodontic complaints was signif-

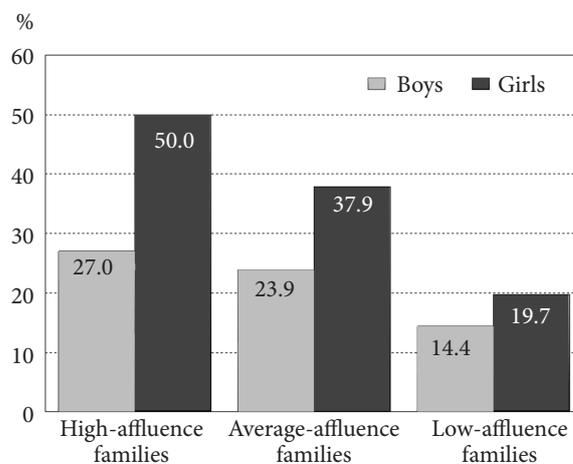


Fig. 2. Self-reported use of orthodontic appliances (dental plates and braces) by family affluence
 $\chi^2=18.89$; $df=2$; $P<0.001$ for boys; $\chi^2=82.22$; $df=2$; $P<0.001$ for girls.

Table 2. Relationship of orthodontic complaints and use of orthodontic appliances with gender, age, place of residency, and family affluence (multivariate logistic regression analysis)

Dependent and independent variable*	B	OR	95% CI	P
Orthodontic complaints:				
Girls (boys)	0.47	1.59	1.43–1.77	<0.001
13-year olds (11-year olds)	–0.11	0.90	0.79–1.02	0.095
15-year olds (11-year olds)	–0.07	0.93	0.82–1.06	0.279
Centers of rural municipalities (cities)	–0.07	0.93	0.79–1.10	0.390
Small towns (cities)	–0.05	0.95	0.80–1.13	0.581
Country areas (cities)	–0.13	0.88	0.75–1.03	0.119
Average-affluence family (high-affluence family)	–0.10	0.90	0.77–1.05	0.184
Low-affluence family (high-affluence family)	0.04	1.04	0.89–1.22	0.614
Use of orthodontic appliances (assessed among all respondents):				
Girls (boys)	0.73	2.08	1.78–2.42	<0.001
13-year olds (11-year olds)	0.26	1.30	1.08–1.56	0.005
15-year olds (11-year olds)	0.17	1.18	0.98–1.43	0.076
Centers of rural municipalities (cities)	–0.15	0.86	0.71–1.05	0.142
Small towns (cities)	–0.58	0.56	0.45–0.71	<0.001
Country areas (cities)	–0.88	0.41	0.33–0.52	<0.001
Average-affluence family (high-affluence family)	–0.28	0.76	0.63–0.92	0.005
Low-affluence family (high-affluence family)	–0.84	0.43	0.35–0.54	<0.001
Use of orthodontic appliances (assessed among respondents who reported complaints):				
Girls (boys)	0.65	1.92	1.59–2.31	<0.001
13-year olds (11-year olds)	0.38	1.46	1.17–1.83	0.001
15-year olds (11-year olds)	0.32	1.38	1.10–1.72	0.005
Centers of rural municipalities (cities)	–0.06	0.94	0.74–1.21	0.636
Small towns (cities)	–0.63	0.53	0.40–0.70	<0.001
Country areas (cities)	–0.81	0.45	0.34–0.58	<0.001
Average-affluence family (high-affluence family)	–0.29	0.75	0.59–0.95	0.018
Low-affluence family (high-affluence family)	–1.00	0.37	0.28–0.48	<0.001

*In brackets, reference category of the variable is indicated.

B, coefficient of logistic regression; OR, odds ratio; CI, confidence interval.

icantly associated only with gender: girls were 1.59 times more likely to complain about orthodontic issues. Other factors were not significantly associated with orthodontic complaints.

Similarly, the use of orthodontic appliances was also related with social factors. Schoolchildren living in towns and country areas were 1.79 and 2.44 times, respectively, less likely of wearing removable appliance or braces than their peers living in cities. Additionally, schoolchildren from average- and low-affluence families as compared to their counterparts from high-affluence families were 1.32 and 2.33 times, respectively, less likely of wearing orthodontic appliances. Similar estimates were obtained if calculations were conducted separately for children with orthodontic complaints.

Discussion

The study was conducted following the strict requirements based on international methodology: relatively large sample size, representative sample, assured anonymity of study participants, validity of data verified at the international data center, etc. However, regardless of all measures taken to ensure validity, an open question still exists – does the survey really show oral health status among schoolchildren? This question has been already addressed

by several researchers who used subjective indicators for the evaluation of oral health (16–19). These researchers, based on comparison of their studies with clinical studies, report that adequately adjusted questionnaires for children are sufficiently valid and suitable instruments for the evaluation of oral health.

Earlier studies on orthodontic anomalies among children that used the survey method also applied extensive questionnaires, which enabled to estimate the dental position, distances between teeth, chewing function, esthetics, dental disorders, and their extent (24–26). Unfortunately, during this study, the health of children from an orthodontic perspective was estimated based only on two self-reported questions, because the number of items in the questionnaire was strictly limited. Therefore, these two questions were formulated as clearly as possible and at the same time providing as much information as possible. The validity of questionnaire was confirmed in a pilot study. Two questions enabled the detection of orthodontic complaints and usage of any means for their elimination without any specification of the type of disorder or orthodontic appliances worn by children. Since the study was not aimed to establish the exact prevalence of orthodontic anomalies, but rather to com-

pare study subgroups, the current methodology is sufficiently reliable according to the objectives of the study.

Our study showed that almost half (47.5%) of 11–15-year-old schoolchildren reported some abnormalities of teeth or occlusion. Definitely, these are one of the main malocclusion, which are easily recognized by children themselves or by a dentist. However, there was no opportunity to ask children about other types of malocclusion; therefore, the overall prevalence of orthodontic complaints among Lithuanian children should be certainly higher. As mentioned above, the high prevalence of malocclusion was also seen among children of other countries (1–5) and Lithuania (6). The authors have reported that a relatively high prevalence of orthodontic complaints may be disclosed by the method of questioning (11–15).

The present study demonstrated that girls reported malocclusion more often than boys. Similar gender differences were observed also in other studies (27). In addition, our findings showed that there was no association between the prevalence of malocclusion and place of residence or family affluence. However, the literature presents conflicting data. Some studies reported that children from high-income families were more satisfied with the way their teeth look and oral health than their peers from poorer families (28, 29). A study by Okullo et al. (30) showed that children from urban areas were less satisfied with their oral health than their counterparts from rural areas.

The comparison of municipalities, which were included into the study, showed considerable differences in the prevalence of complaints about malocclusion (from 45.7% to 64.8%) and usage of appliances including braces and removable plates (from 4.9% to 27.8%). Such regional inequalities showed that children from the municipalities of Šalčininkai, Radviliškis, Skuodas, and Joniškis had the greatest need for orthodontic treatment. These municipalities had the greatest percentage of children with orthodontic complaints, and the percentage of children wearing appliances was lowest.

Although there is a lack of scientific studies on the need of orthodontic treatment among children across Lithuania, the extent of this need can be implied from the reports of health care settings. For example, Klaipėda dental report 2007 has outlined that almost 60% of children need orthodontic treatment, and only 5% of these children receive it annually (31). This information coincides with the data

of our study quite well.

The Lithuanian Dental Chamber data show that there were 83 orthodontists across the country in 2006 (32). Due to shortage of human resources and uneven distribution across regions, the access to orthodontic and dental health care in general is insufficient in towns and villages; public oral health care for children is available only in cities (33).

The above-mentioned limitations of study methodology disabled the evaluation of type (public or private) and location of health care settings, where children wearing orthodontic appliances are treated. However, the study data show that the proportion of children successfully receiving orthodontic treatment in some centers of rural municipalities (e.g., Marijampolė, Kelmė, Kretinga) is not smaller than that in the biggest cities. It might be explained by fact that parents tend to bring their children to clinics of cities for the treatment. However, the study also shows that such services are affordable only for high-income families. According to the data of the Department of Statistics of Lithuania, in Šalčininkai municipality, the average income is lowest across the country (cited from [34]). This could be one of the main reasons why children in this municipality are least likely to obtain orthodontic treatment regardless of its proximity to Vilnius, the capital of Lithuania.

Our study showed that considerable social inequalities and differences in need of orthodontic treatment exist among children across different Lithuanian municipalities. The elimination of such inequalities should imply a reasonable planning of orthodontic care services for children in Lithuania.

Conclusions

Almost half (47.5%) of 11–15-year-old schoolchildren in Lithuania had complaints about malposed teeth and malocclusion. These complaints were more prevalent among girls than boys. There were no associations between the prevalence of these disorders and place of residence or family socioeconomic status.

Removable appliances, braces, or other appliances were reported to be worn by 15.8% of all children or 27.0% of children with orthodontic problems. The appliances were worn less common among children from rural areas and poorer families.

The highest need for orthodontic treatment among schoolchildren was registered in the municipalities of Šalčininkai, Radviliškis, Skuodas, and Joniškis.

Ortodontinės pagalbos poreikio mokyklinio amžiaus vaikams demografiniai ir socialiniai netolygumai Lietuvoje

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Raktažodžiai: mokyklinio amžiaus vaikai, apklausa, burnos sveikata, ortodontinės anomalijos, socialiniai veiksniai, sveikatos netolygumai.

Santrauka. *Tyrimo tikslas.* Nustatyti, kiek mokyklinio amžiaus vaikų turi ortodontinio pobūdžio problemų (netaisyklingai išdygę dantys, blogas sąkandis) ir kiek iš jų nešioja ortodontinius aparatus (plokštelę, breketus) priklausomai nuo demografinių ir socialinių veiksnių.

Medžiaga ir metodai. Tyrimas atliktas 2005–2006 mokslo metais vykdant PSO tarptautinę „Mokyklinio amžiaus vaikų sveikatos ir gyvenimo studiją – HBSC“. Iš viso apklausti 5632 vaikai 11–15 metų amžiaus, atrinkti atsitiktiniu būdu iš 23 savivaldybių.

Rezultatai. Beveik pusė (47,5 proc.) apklaustų moksleivių skundėsi netaisyklingai išdygusiais dantimis arba blogu sąkandžiu. Tokių problemų dažniau turėjo mergaitės. Skundų paplitimas nebuvo susijęs su gyvenamosios vietovės pobūdžiu ir šeimos turtingumu. Plokštelę, breketus arba kitus ortodontinius aparatus prisipažino nešioję 15,8 proc. tirtų moksleivių arba 27,0 proc. moksleivių, turinčių ortodontinio pobūdžio problemų. Ortodontinius aparatus rečiau naudojo miestelių ir kaimo vaikai bei neturtingų šeimų vaikai. Lyginant atskiras savivaldybes, nustatyta, kad ortodontinė pagalba labiausiai reikalinga Šalčininkų, Radviliškio, Skuodo ir Joniškio rajonų moksleiviams.

Išvada. Lietuvos moksleiviams būdingi reikšmingi ortodontinės pagalbos poreikio socialiniai netolygumai ir žymūs skirtumai tarp savivaldybių.

References

- Thilander B, Pena L, Infante C, Parada SS, de Mayorga C. Prevalence of malocclusion and orthodontic treatment need in children and adolescents in Bogota, Colombia. An epidemiological study related to different stages of dental development. *Eur J Orthod* 2001;23(2):153-67.
- Willems G, De Bruyne I, Verdonck A, Fieuws S, Carels C. Prevalence of dentofacial characteristics in a Belgian orthodontic population. *Clin Oral Investig* 2001;5(4):220-6.
- Abu Alhaija ES, Al-Khateeb SN, Al-Nimri KS. Prevalence of malocclusion in 13-15 year-old North Jordanian school children. *Community Dent Health* 2005;22(4):266-71.
- Perinetti G, Cordella C, Pellegrini F, Esposito P. The prevalence of malocclusal traits and their correlations in mixed dentition children: results from the Italian OHSAR Survey. *Oral Health Prev Dent* 2008;6(2):119-29.
- Grando G, Young AA, Vedovello Filho M, Vedovello SA, Ramirez-Yañez GO. Prevalence of malocclusions in a young Brazilian population. *Int J Orthod Milwaukee* 2008;19(2):13-6.
- Ortodontinių anomalijų epidemiologija, diagnostika, gydymas ir profilaktika. (Epidemiology, diagnostics, treatment and prevention of orthodontic anomalies.) Stomatologijos fakulteto mokslinių tyrimų programa 2003–2008 m. Veido, žandikaulių ir burnos patologija. KMU; 2003. Available from: URL: <http://www.kmu.lt/get.php?f.1596>
- Jenny J, Cons NC. Comparing and contrasting two orthodontic indices, the Index of Orthodontic Treatment need and the Dental Aesthetic Index. *Am J Orthod Dentofacial Orthop* 1996;110(4):410-6. Erratum in: *Am J Orthod Dentofacial Orthop* 1997;111(4):454.
- Kuijpers MA, Kiekens RM. Research methods in dentistry 10. Assessment of orthodontic treatment need. *Ned Tijdschr Tandheelkd* 2005;112(6):206-10.
- Järvinen S. Indexes for orthodontic treatment need. *Am J Orthod Dentofacial Orthop* 2001;120(3):237-9.
- Jokovic A, Locker D. Dissatisfaction with oral health status in an older adult population. *J Public Health Dent* 1997; 57:40-7.
- Masalu JR, Astrom AN. Applicability of an abbreviated version of the oral impacts on daily performances (OIDP) scale for use among Tanzanian students. *Community Dent Oral Epidemiol* 2003;31:7-14.
- David J, Åström AN, Wang NJ. Prevalence and correlates of self-reported state of teeth among schoolchildren in Kerala, India. *BMC Oral Health* 2006;6:10.
- Brunswick AF, Nikias M. Dentist's ratings and adolescents' perceptions of oral health. *J Dent Res* 1975;54:836-43.
- Kallio P, Murtomaa H. Determinants of self-assessed gingival health among adolescents. *Acta Odontol Scand* 1997;55: 106-10.
- Kiwanuka SN, Åström AN. Self-reported dental pain and associated factors in Ugandan schoolchildren. *Norsk Epidemiologi* 2005;15:175-82.
- Ostberg AL, Eriksson B, Lindblad U, Halling A. Epidemiological dental indices and self-perceived oral health in adolescents: ecological aspects. *Acta Odontol Scand* 2003; 61:19-24.
- Jokovic A, Locker D, Stephens M, Kenny D, Tompson B, Guyatt G. Validity and reliability of a questionnaire for measuring child oral-health-related quality of life. *J Dent Res* 2002;81:459-63.
- Jokovic A, Locker D, Tompson B, Guyatt G. Questionnaire for measuring oral health-related quality of life in eight- to ten-year-old children. *Pediatr Dent* 2004;26:512-8.
- Gherunpong S, Tsakos G, Sheiham A. Developing and evaluating an oral health-related quality of life index for children; the CHILD-OIDP. *Community Dent Health* 2004; 21:161-9.
- Currie C, Nic Gabhainn S, Godeau E, Roberts C, Smith R, Currie D, et al. Inequalities in young people's health. HBSC international report from the 2005/2006 survey. Copenhagen: WHO Regional Office for Europe; 2008. Avail-

- able from: URL: http://test.cp.euro.who.int/Document/E91416_prelim_ch1.pdf
21. Zaborskis A. Lietuvos moksleivių gyvenimo vertinimas 1994–2002 metais. (Health behaviour of Lithuanian schoolchildren in 1994–2002.) Lietuvos bendrosios praktikos gydytojas 2005;9:326–33.
 22. Sveikatos ir sveikatos priežiūros skirtumai Lietuvoje. (Inequalities in health and health care in Lithuania.) Kaunas: Pasaulio sveikatos organizacija; Kauno medicinos universitetas; 1998.
 23. Health Behaviour in School-aged Children: a World Health Organization collaborative cross-national study. Members' area. HBSC 2005/2006 survey protocol. Available from: URL: <http://www.hbsc.org/ma/Protocol/protocol2005resources.html>
 24. Bos A, Hoogstraten J, Prah-Andersen B. Dutch primary schoolchildren's attitude towards their dental appearance. *Pediatr Dent* 2008;30(5):439–42.
 25. Gottstein I, Borutta A. The suitability of orthodontical groups of indications (OGI) for preventive dental examinations of the public health service. *Gesundheitswesen* 2007; 69(10):577–81.
 26. Mtaya M, Astrom AN, Brudvik P. Malocclusion, psychosocial impacts and treatment need: a cross-sectional study of Tanzanian primary school-children. *BMC Oral Health* 2008;8:14.
 27. Ostberg AL, Halling A, Lindblad U. A gender perspective of self-perceived oral health in adolescents: associations with attitudes and behaviours. *Community Dent Health* 2001; 18:110–6.
 28. Chen MS, Hunter P. Oral health and quality of life in New Zealand: a social perspective. *Soc Sci Med* 1996;43:1213–22.
 29. Chen MS. Social, psychological, and economic impacts of oral conditions and treatments. In: Cohen LK, Gift HC, editors. *Disease Prevention and Oral Health Promotion, Socio-Dental Sciences in Action*. Copenhagen: Munksgaard; 1995. p. 33–72.
 30. Okullo I, Astrom AN, Haugejorden O. Social inequalities in oral health and in use of oral health care services among adolescents in Uganda. *Int J Paediatr Dent* 2004;14:326–35.
 31. Viešųjų įstaigų vadovų veiklos ataskaita. (Annual report of the directors of public institutions.) 2007. Klaipėda: VšĮ Klaipėdos miesto stomatologijos poliklinika. Available from: URL: <http://taryba.klaipeda.lt/2008-06-05/43pr8.doc>
 32. Tutkuvienė A, Žvynaitė R. Odontologai ir burnos priežiūros specialistai Lietuvoje. (Odontologists and oral hygienists in Lithuania.) Lietuvos Respublikos odontologų rūmai; 2007. Available from: URL: http://www.odontologurumai.lt/uploads/files/dir22/dir1/15_0.php
 33. Pūrienė A. Lietuvos odontologija visuomenės sveikatos požiūriu. (Odontology in Lithuania in public health context.) Darbų apžvalga, pateikta habilitacijos procedūrai. Vilnius: Vilniaus universitetas; 2008. Available from: URL: [http://www.mf.vu.lt/Documents/MFT/MFT_2008-11-19_4\(541\).doc](http://www.mf.vu.lt/Documents/MFT/MFT_2008-11-19_4(541).doc)
 34. Maniokas K, Degutis M, Ramonaitė A, Davidavičius A. Gerovė ir demokratija: socialiniai-ekonominiai skirtumai ir pasitenkinimas demokratija Lietuvoje. (Wellbeing and democracy: socio-economic differences and satisfaction with democracy in Lithuania.) Tyrimo ataskaita. Vilnius: Europos socialiniai, teisiniai ir ekonominiai projektai; 2004. Available from: URL: http://www.estep.lt/downloads/structure/Ataskaita_20041213.doc

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