Coll. Antropol. **29** (2005) 1: 127–132
UDC 616.34-089.28(497.5)
Original scientific paper

Epidemiological Study on Removable Denture Deliveries in Different Districts of Croatia, 1996–2001 and 2002

Renata Poljak-Guberina[1], Asja Čelebić[1], Adnan Ćatović[1] and Ognjen Živković[2]

[1] Department of Prosthodontics, School of Dental Medicine, University of Zagreb, Zagreb, Croatia
[2] Orthopedic Clinic Božidarevićeva, Zagreb, Croatia

A B S T R A C T

Aim of this study was to determine the prevalence of removable denture (complete and partial) deliveries through Croatian Public Health Service (covered by insurance) in different districts of Croatia and to compare the two periods: 1996 to 2001 and 2002. Number of dentures delivered was obtained from Croatian Institute for Health Insurance for the district of Zagreb, Rijeka, Split and Karlovac. Information of the population living in the same districts was obtained from the National Institute for Statistics. The percentage of fully edentulous inhabitants varied from more than 13% to more than 20%, dependent on the district, while the percentage of partial edentulism reconstructed with removable partial dentures varied from more than 13% to more than 30%. The highest percentage (average for living population) of complete and removable partial dentures was delivered in Zagreb in the both observed periods. In all districts, the number of complete denture wearers increased in 2002, except in Split. The percentage of removable partial denture deliveries increased significantly in all examined districts. Partial and complete denture deliveries increased in higher percentage in population younger than 70 years than in older population. The percentage of metal framework removable partial dentures increased significantly in all districts. The prevalence of removable denture deliveries increased, especially in patients younger than 70 years. This was attributed not only to the consequences of the 1991–1995 war, the migrations from rural to urban areas, decrease of economic status, but also to the new rules of the Croatian Insurance System.

Key words: *Croatia, removable dentures, population*

Introduction

Denture is an artificial substitute for missing natural teeth and adjacent tissues. It is divided into fixed partial dentures (restorations permanently attached to natural teeth) and removable dentures, partial or complete.

Numerous investigations in different developed countries showed the gradually decreasing percentage of adults wearing removable dentures. Epidemiological data vary in different countries[1–17].

An epidemiological survey in Naples, Italy showed that 60% of elderly people were totally edentulous and an additional 14% were edentulous in one jaw. Only 44% of the edentulous in both yaw wore complete dentures[1].

Similar results were obtained in Athens, Greece[2], in Orebo, Sweden[5] and in Helsinki, Finland[8]. In Great Britain, Scotland, Ireland and Walles[9] and Netherlands[10] 25–35% of population older than 18 years was edentulous. In Japan, Kitakyushu, the percentage of edentulous people 65 years old was 27% and increased with age to 56% in the 85 year and older groups[3]. In Adelaide, Australia, in population older than 60 years 3/4 of them wore one or two dentures[4], as in USA[6].

Edentulousness varies with the availability and accessibility of dental care.

A significant increase in prevalence of edentulousness is correlated with increasing age[1–8,11–13]. Edentulousness is also dependent on gender. Women have more missing teeth than men[12,13]. Comparisons among race-ethnicity categories indicate that Mexican-Americans are less likely to use dentures than either of their

Received for publication August 9, 2004

non-Hispanic counterparts and it is less frequently to wear dentures by whites than by black people[13,14].

The cost for dental care is very important for 52% of the population in Southern Sweden, especially for men, those with low education, and those wearing removable denture[15,16]. Smoking was found to be associated with edentulousness in the 35–44 year olds[5]. Total loss of teeth is more often found in the maxillae than in the mandible[17].

While in developed countries prevalence of need for removable partial or complete dentures declines, in less developed countries the need for removable partial or complete dentures is still increasing[11,14].

There are no epidemiologic studies on edentulosness in Croatia or the percentage of patients with removable complete or partial dentures. Therefore, the aim of this study was to register complete and partial denture deliveries in two different periods in different districts of Croatia and to compare our data with those in other countries.

Materials and Methods

Number of complete or partial removable dentures delivered in a period from 1996 to 2001 year and in 2002 was obtained from Croatian Institute for Health Insurance for the districts of Zagreb, Rijeka, Split and Karlovac. Population size living in the mentioned districts was obtained from the National Institute for Statistics.

Totally 771,386 patients received removable, partial or complete denture. During a period from 1996 to 2001 year 620,940 patients received removable dentures and during 2002, 150,446 patients received removable dentures.

We calculated the percentages of complete denture and partial denture deliveries as average per population of the district. The data for removable partial dentures were divided in three groups: acrylic removable partial dentures with less than 10 teeth, acrylic removable partial dentures with more than 10 teeth and metal framework removable partial dentures. The cost for the above mentioned dentures are covered by the Health Insurance in Croatia, so few edentulous people use the service in private practice where they are obliged to pay the whole cost. Therefore, we considered the data obtained from the Croatian Health Insurance representative for the mentioned population. We divided patients in two age groups (less than 70 years and more than 70 years). Statistical analysis was performed by SPSS 12 for Windows, SPSS Inc., Chicago, Illinois. Descriptive statistics was calculated and a significance of the difference was assessed by chi-square test.

Results

Complete and removable partial denture deliveries during 2 periods (1996–2001 and 2002) in all 4 districts (Rijeka, Split, Karlovac Zagreb) is presented in percentages (Figure 1). In district of Karlovac deliveries of removable complete dentures increased, as well as of removable partial dentures (χ^2=10.55, df=1, p<0.01). The same was in district of Zagreb (χ^2=12.38, df=1, p<0.01) and the district of Rijeka (χ^2=9.26, df=1, p<0.01). Only in district of Split deliveries of complete dentures de-

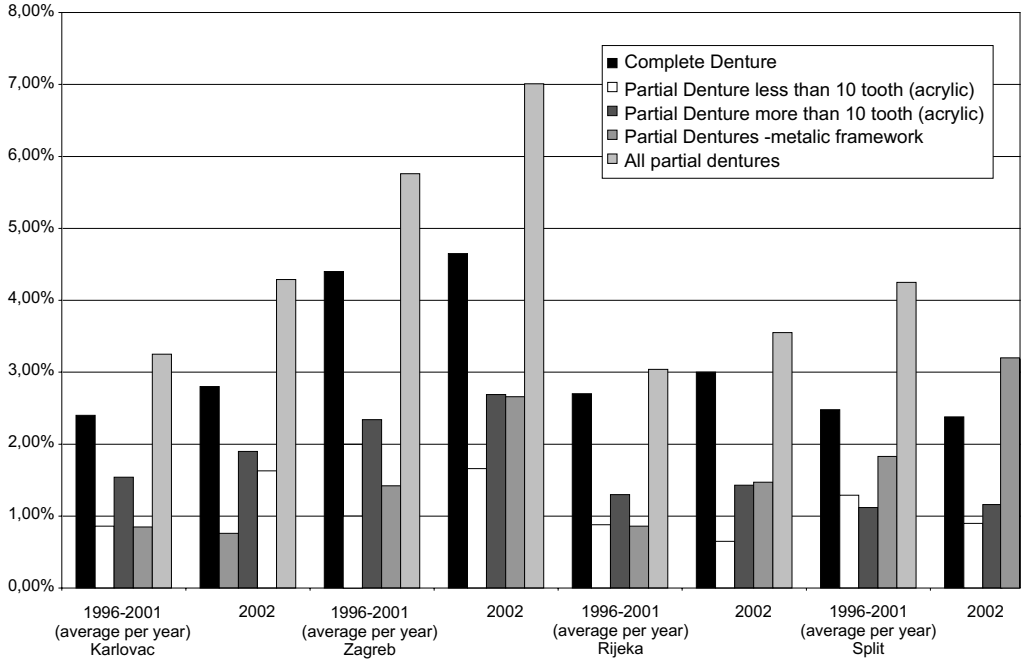

Fig. 1. Delivery of complete and removable partial dentures in four districts of Croatia in two time intervals; (for the period 1996–2001 average per year is calculated).

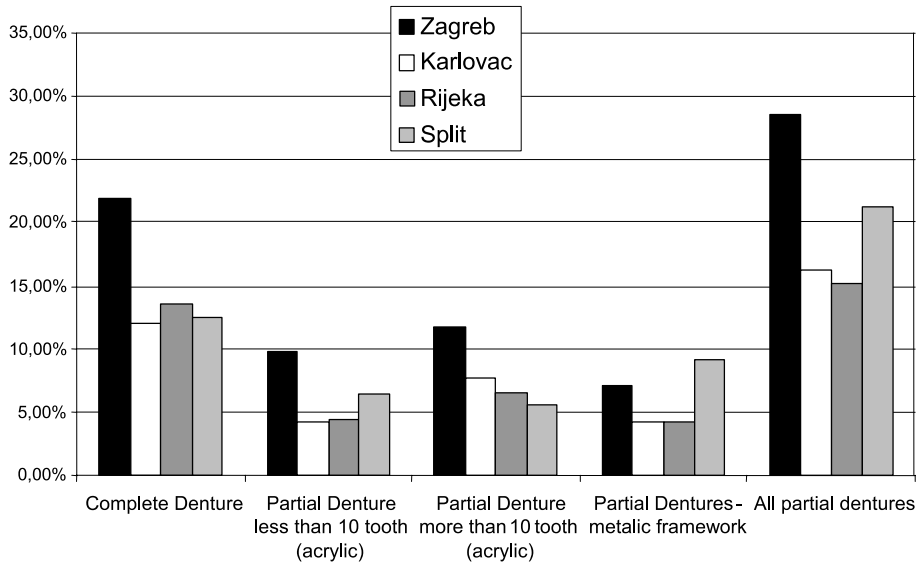

Fig. 2. Proportion of population with dentures (obtained from Croatian Insurance Health System) in different districts of Croatia.

creased, but deliveries of removable partial dentures increased, respectively (χ^2=8.23, df=1, p<0.01).

Approximation of population with denture needs (through Croatian Institute for Health Insurance) in the same districts is presented in the Figure 2. Complete denture need in district of Zagreb is almost twice than in Rijeka, Karlovac and Split. Partial denture need is also higher in Zagreb than in Rijeka, Karlovac and Split, respectively.

Percentage of delivered dentures in 2 different time periods (1996–2001 and in 2002 year), dependent on the age of the patient is presented in the Figure 3. In all districts percentage of complete and partial denture deliveries significantly increased in patients younger than 70 years, except for complete dentures in Split (the percentage remained the same). In patients older than 70 years the percentage of complete dentures decreased in Zagreb and Split, while in Rijeka and Karlovac the percentage remained the same. In patients older than 70

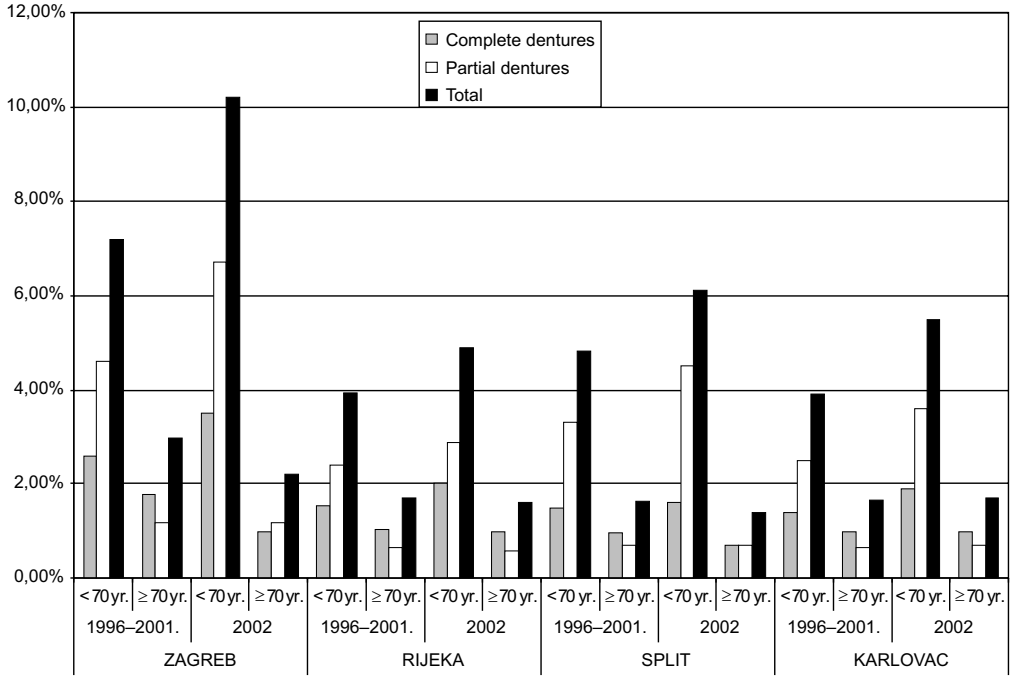

Fig. 3. Delivery of complete and partial removable denture dependent on the age of the patient in different districts of Croatia (for the period 1996–2001 average per year is calculated).

years the percentage of removable partial dentures remained almost the same in all districts.

Discussion

The research on the removable denture deliveries or the approximation of edentulism in the population of Croatia has not been made yet.

We assessed data on removable denture deliveries in different districts of Croatia, the cost being covered by Croatian Health Insurance. Croatian Health Insurance allows new removable denture replacement every five years. Only a small percentage of removable dentures are delivered by private dentists, as the cost for the dentures is fully covered by the Croatian Health Insurance. Therefore, we might give insight that the data on the 5-year period denture deliveries (1996–2001 year) approximate the percentage of fully and partially edentulous population in Croatia, i.e. the percentage of partially or fully edentulous population could be only higher than our data, as probably each individual does not replace existing dentures every five years.

The districts of Zagreb, Rijeka, Karlovac and Split include both, urban and rural population, because rural population in surrounding villages is also included in the data obtained from Croatian Health Insurance. However, urban population predominates.

According to the obtained data, the percentage of fully edentulous inhabitants varies from more than 13% in Karlovac to more than 20% in Zagreb (Figure 1 and 2). The percentage of partially edentulous inhabitants who need removable denture varies from more than 15% in Rijeka to more than 28% in Zagreb (Figure 1 and 2). However, this is only an approximation, the real percentage is higher as all edentulous patients do not make new dentures every five years, or maybe they pay a private dentist for the cost. However, some individuals may not make any dentures at all.

The percentage of fully edentulous population is relatively high, compared to some other countries. However, data are not fully comparable, as some studies were made on elderly people living in institutions, or the percentage of edentulism was assessed from the sample of different age[4,5,8,11]. Studies of elderly population showed higher percentage of edentulism than it was recorded in our study[4,5,8,11]. Hiidenkari et al.[18], in Finnish urban area found the edentulism comparable to our results. In USA less edentulism was registered (20% of population)[13], as well as in Hong Kong[19] and Bangladeshi population living in England[20]. Our data indicate that 33% to more than 50% of population were partially or fully edentulous, dependent on different district. In one study[9] of adults 16+ edentulousness in England/Walles, Scotland and Ireland was compared. Scotland had the highest level of edentulousness (2/5 of population), which was similar to our results and Ireland the lowest (1/4 of population), which was less than in our study. However, among institutionalized elderly population the data on fully or partially edentulousness show significantly higher percentage (up to 4/5 of population) than in any other population study[1–3,21].

We tried to compare two different time periods (1996–2001 and 2002 year) to study the prevalence of full and partial denture deliveries (Figure 3). The highest percentage (average for living population) of removable complete and partial dentures was registered in Zagreb in the both observed periods.

However, the percentage of removable complete and partial denture deliveries significantly increased in 2002 in patients younger than 70 years in all districts. It is disappointing that in younger population the percentage of both, removable and complete denture deliveries increased in all districts of Croatia.

Estimates based on national epidemiologic survey data in USA indicate that edentulism has declined by 10% every decade and that only 90% of edentulous adults obtain and wear complete dentures[6]. Bouma[22] reported gradually decreasing percentage of adults wearing complete dentures in the Netherlands, but he concluded the same as Douglas in USA[6], that the need for prosthetic treatment will not diminish.

Increase of removable denture deliveries in population younger than 70 years in all districts in Croatia could be ascribed to the consequences of the 1991–1995 war-dependent migrations (refugees) of rural population to cities and/or low social and economic standard, which reflected dental health care, as well. Other factors may have played a complementary role, too. Babić-Banaszak at al.[23] stated that war consequences are reflected in self-perceived health, physical ability, and emotional and mental health of the entire population, especially in younger age groups, those with lower education, and lower income.

From the analyzed data, it is obvious that the delivery of metal-framework designed removable partial dentures increased among different types of partial dentures (Figure 1). This could be attributed to a new Croatian Health Insurance rules from 2001[24], concerning dental care. Turek[25] stated that after democratic changes in 1990 and the declaration of independence in 1991, Croatia inherited an archaic system of economy, similar to all the other post-communist countries, which had especially negative effects on the health system. In a relatively short period, in spite of the war, and in a complex, socially and ethically delicate area, Croatian Health Insurance Institute had successfully carried out the rationalization and control of spending, without lowering the level of health care or negatively influencing the vital statistics data. However, our data do not support the above mentioned report. The Insurance covered a cost for 4 units of fixed partial dentures in adults 18+ before 2001[26]. After that, the Insurance covered a cost of only 3 units of fixed partial dentures in adults older than 70 years. Croatian Health Insurance does not cover the cost for fixed partial dentures any more. At the other hand, the Insurance covers the full cost of removable partial dentures, including metal-frame designed removable partial denture. Therefore, many individuals

with indication for fixed partial dentures, due to low economic standard wear metal-framework removable partial denture instead, which is actually lowering of the level of health care in this field. However, many other European countries also do not cover the cost of many aspects of dental care.

We should not neglect the cost for the dental care, as it is important for half of Swedish people, especially those wearing removable dentures who could not afford fixed partial denture because of the high costs[16]. The same is confirmed by Kronstrom et al[27].

Socio-economic conditions highly correlate with edentulousness. The men who were not married or were cohabiting showed the poorest values, as well as women who were widows showed the highest prevalence of edentulousness[5]. In urban areas, edentoulousness is twice smaller than in rural areas[10,28].

Trends of increasing the number of full, as well as of partial edentulism in individuals younger than 70 years in 4 districts in Croatia (Zagreb, Split, Rijeka and Karlovac) is ascribed to the decrease of economic status due to the 1991–1995 war and a number of refugees who moved from rural to urban areas[29–31]. Increase of delivery of metal-framework designed partial dentures is ascribed to a new restrictive insurance policy in Croatia. Patients requiring fixed partial dentures receive removable metal-framework partial dentures instead, as the cost for removable partial dentures is fully covered by insurance, opposite, costs for fixed partial dentures must be covered by a patient.

Trends in our Insurance system should support prevention of full and/or partial edentulism and should also take care about preventive measures in prosthetic rehabilitation, which is not currently fulfilled, according to patient's rights.

It would be also interesting to compare influence of gender differences and socio-economic status on edentulousness in future studies.

Acknowledgements

To the Department of Statistics of Croatian Health Insurance for the data of removable denture deliveries. To the Croatian Ministry of Science for the support of the projects 0065014 and 0065015.

REFERENCES

1. ANGELILLO, I. F., G. SAGLIOCCO, S. J. HENDRICKS, P. VILLARI, Community Dent. Oral Epidemiol., 18 (1990) 216. — 2. KARKAZIS, H. C., A. E. KOSSIONI, Eur. J. Prosthodont. Restor. Dent., 1 (1993) 157. — 3. MIYAZAKI, H., R. SHIRAHAMA, I. OHTANI, N. SHIMADA, T. TAKEHARA, Community Dent. Oral Epidemiol., 20 (1992) 297. — 4. SLADE, G. D., A. J. SPENCER, E. GORKIC, G. ANDREWS, Aust. Dent. J., 38 (1993) 373. — 5. PALMQVIST, S., Swed. Dent. J., 32 Suppl. (1986) 1. — 6. DOUGLAS, C. W., A. SHIH, L. OSTRY, J. Prosthet. Dent., 87 (2002) 5. — 7. Spanish Geriatric Oral Health Research Group. Int. Dent. J., 51 (2001) 228. — 8. NEVALAINEN, M. J., T. O. NARHI, P SIUKOSAARI, K. SCHMIDT-KAUNISAHO, A. AINAMO, J Oral Rehabil., 23 (1996) 722. — 9. CLARKSON J. J., D. M. O'MULLANE, Dent. Oral. Epidemiol., 11 (1983) 317. — 10. BOUMA J., R. M. SCHAUB, F. VAN DE POEL, Community Dent. Oral Epidemiol., 14 (1986) 345. — 11. MOSKONA, D., I. KAPLAN, Gerodontology, 12 (1995) 95. — 12. HIIDENKARI, T., T. PARVINEN, H. HELENIUS, Community Dent. Health., 13 (1996) 215. — 13. REDFORD, M., T. F. DRURY, A. KINGMAN, L. J. BROWN, J. Dent. Res., 75 (1996) 714. — 14. DOLAN, T. A., G. H. GILBERT, R. P. DUNCAN, U. FOERSTER, Community Dent. Oral Epidemiol., 29 (2001) 329. — 15. PALMQVIST, S., B. SODERFELDT, M. VIGILD, Community Dent. Health., 18 (2001) 16. — 16. BAGEWITZ, I. C., B. SODERFELDT, S PALMQVIST, K. NILNER, Swed. Dent. J., 24 (2000) 155. — 17. TAKALA, L., P. UTRIAINEN, P.ALANEN, Community Dent. Oral Epidemiol., 22 (1994) 254. — 18. HIIDENKARI, T, T. PARVINEN, H. HELENIUS, Community Dent. Oral Epidemiol., 25 (1997) 367. — 19. LIN, H. C., E. F. CORBET, E. C. LO, H. G. ZHANG, J. Dent. Res., 80 (2001) 1491. — 20. PEARSOM N., R. CROUCHER, W. MARCENES, M. O'FARRELL, Int. Dent. J., 51 (2001) 23. — 21. BENGTSSON, A., T. OLSSON, N. RENE, G. E. CARLSSON, U. DAHLBOM, H. BORRMAN, J. Oral Rehabilitat., 23 (1996) 520. — 22. BOUMA, J., Ned. Tijdschr. Tandheelkd., 96 (1989) 344. — 23. BABIĆ-BANASZAK, A., L. KOVAČIĆ, L. KOVAČEVIĆ, G. VULETIĆ, A. MUJKIĆ, Z. EBLING, Croat. Med. J., 43 (2002) 396. — 24. Pravilnik o ortopedskim i drugim pomagalima. Hrvatski Zavod za zdravstveno osiguranje. 15.05. 2000. — 25. TUREK, S., Croat. Med. J., 40 (1999) 143. — 26. Pravilnik o stomatološkim pomagalima 2118, Član 25. NN br. 108., Zagreb, 23.12. 1996. — 27. KRONSTROM, M., S. PALMQUIST, T. ERIKSSON, B. ZODERFELDT, G. E. CARLSSON, Acta Odontologica Scand., 55 (1997) 265. — 28. STINI, W. A., Coll. Antropol., 27 (2003) 23. — 29. PRLIĆ, L., Z. EBLING, K. GLAVINA, R. GMAJNIĆ, G. VULETIĆ, L. KOVAČIĆ, M. TOKALIĆ, Coll. Antropol., 28 (2004) 345. — 30. SUJOLDŽIĆ, A., A. DeLUCIA, R. BUCHEGGER, R. TERZIĆ, I. BEHULI, Z. BAJRAMI, Coll. Antropol., 27 (2003) 431. — 31. BEGOVAC, I., B. BEGOVAC, V. RUDAN, Coll. Antropol., 27 (2003) 135.

R. Poljak-Guberina

Vramčeva 24, 10000 Zagreb, Croatia
email: celebic@sfzg.hr

EPIDEMIOLOŠKO ISTRAŽIVANJE IZRADE POMIČNIH ZUBNIH PROTEZA U RAZLIČITIM REGIJAMA HRVATSKE, 1996.–2001. I 2002.

S A Ž E T A K

Cilj rada bio je utvrditi broj pacijenata s protezama (totalnim i djelomičnim) koje su izradili na teret Fonda zdravstvenog osiguranja u različitim regijama Hrvatske i usporediti dva različita razdoblja: 1996.–2001. i 2002. Podaci o broju pacijenata dobiveni su od Fonda zdravstvenog osiguranja za područje Zagreba, Rijeke, Splita i Karlovca. Podaci o broju stanovnika u istom periodu u određenim regijama dobiveni su od Nacionalnog instituta za statistiku. Postotak potpuno bezubog stanovništva varira od preko 13% do preko 20%, ovisno o regiji, dok postotak djelomično bezubog stanovništva sanirano djelomičnim pomičnim protezama varira od preko 13% do preko 30%. Najveći postotak nosilaca totalnih i djelomičnih proteza zabilježen je u Zagrebu u oba perioda. U svim regijama osim Splita povećao se broj totalnih proteza u 2002. Postotak djelomičnih proteza značajno se povećao u svim regijama. Povećao se broj nosilaca totalnih i djelomičnih proteza značajnije u populaciji mlađoj od 70 godina, nego kod starijih od 70 godina. U svim regijama značajno se povećao broj metalnih pomičnih proteza. Porast nosilaca pomičnih proteza, naročito mlađih od 70 godina možemo objasniti posljedicom rata 1991–1995, migracijom ruralnog stanovništva u urbane regije, padom ekonomskog statusa, te novim pravilima Fonda zdravstvenog osiguranja Hrvatske.