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ORIGINAL ARTICLE

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Socio-economic and health status as a predictor of apical periodontitis in adult patients in Croatia

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Abstract

Objective: A few studies focused on determinants of apical periodontitis other than technical or biological factors. This research aimed to investigate to what extent socio-economic and health status can predict apical periodontitis in adult patients.

Subjects and Methods: The cross-sectional study included 599 adult patients. Medical history, health habits and socio-economic status of each participant were recorded using a self-administered structured questionnaire. For caries detection, the World Health Organization diagnostic thresholds were used, and oral hygiene level was estimated using plaque index. Periapical index system was used to analyse the periapical status of all teeth. Dental, socio-economic and health-related variables were tested against dependent variable (periapical disease ratio) in a multiple linear regression analysis.

Results: Dental independent variables explained 71.7% of the observed variation in periapical disease ratio ($R^2 = 0.717$; $p < 0.001$). Periapical disease ratio increased with the increase in number of carious teeth, plaque index and number of root-filled teeth, but also with decrease in number of coronal fillings (all $p < 0.001$). Socio-economic and health-related variables accounted for lower portion of variability, 15.5% and 12.9%, respectively (both $p < 0.001$).

Conclusions: Dental variables are more important predictors of periapical status than socio-economic and health-related variables.

KEYWORDS
endodontics, periapical periodontitis, smoking, socio-economic factors

1 | INTRODUCTION

Apical periodontitis (AP) commonly develops when a deep caries lesion exposes the dental pulp allowing oral bacteria to infect the root canal system and cause an inflammatory reaction of tissues surrounding the root (Harjunmaa et al., 2018; Nair, 2006). The disease is usually chronic in nature and irreversible if untreated, but according to the Scandinavian studies, exacerbations are seldom (Eriksen & Bjertness, 1991; Petersson, Håkansson, Håkansson, Olsson, & Wennberg, 1991).

Increasing number of investigations from Europe and other parts of the world indicate that AP is a remarkably prevalent disease among adults (Moreno et al, 2013; Sidaravicius, Aleksejuniene, & Eriksen, 1999; Van der Veken, Curvers, Fieuws, & Lambrechts, 2017; Vengerfeldt, Mändar, Nguyen, Saukas, & Saag, 2017). Frequency of AP varies between populations depending on diversity in caries prevalence, accessibility to dental care and methodological issues such as sampling and measurement differences. However, the reported prevalence of AP is as high as 70% (Sidaravicius et al., 1999).

Endodontic research community has been mostly concerned with microbiology, histopathology, diagnosis and treatment of AP (de Miranda & Colombo, 2018; Kruse, Spin-Neto, Reibel, Wenzel, & Kirkevang, 2017; Kudo et al., 2018; Li, Tong, & Ling, 2018; Ricucci, Loghin, Gonçalves, Rôças, & Siqueira, 2018). Yet, understanding the aetiology of disease requires other information than that related to biological mechanism in the individual. It has been proven that oral health is affected by socio-economic status (SES). This association is not fully understood; however, it has been assumed that socio-economic variables take effect through environmental factors and influence health-related habits and psychosocial stress (Adler & Ostrove, 1999).

Although AP involves local inflammatory reaction with the task of limiting the spread of infection, its effects are not necessarily locally limited. Growing number of studies reporting the connection between AP and systemic diseases led to the development of endodontic medicine. Though such studies offer limited scientific evidence, they suggest a relationship between endodontic variables and systemic conditions such as diabetes mellitus, tobacco smoking, cardiovascular disease (CVD) and adverse pregnancy outcomes (Harjunmaa et al., 2018; Segura-Egea, Martín-González, & Castellanos-Cosano, 2015). To our knowledge, there have been few studies focusing on determinants of AP other than that related to technical or biological issues. Hence, the aim of this study was to disclose the relation of socio-economic and health status with apical periodontitis in adult individuals as well as to quantify to what extent socio-economic, health and dental variables can predict apical periodontitis in adult patients.

2 | METHODS

This study is a part of comprehensive research on AP risk indicators and their influence on the periapical status in adult patients. Initially, sample included 1,072 new patients older than 18 years, presenting consecutively, at the Department of Endodontics and Restorative Dentistry University Dental Clinic of the Rijeka Clinical Hospital Centre, Rijeka, Croatia, within a two-year period (from May 2013 to May 2015). Most of these patients were referred by their general practitioners from three counties, since specialists who work at the clinic are university teachers and only available specialists in endodontics in the respective region. Patients with seven or less remaining teeth, patients who had periodontal disease and patients who received endodontic treatment within the previous two years were excluded (Persic Bukmir et al., 2016). For diagnosis of the periodontal disease presence, criteria previously reported by Machtei et al. were used (Machtei et al., 1992). In addition, individuals with a lack of interest for participation in the study and patients not willing or unable to attend the radiographic examination were excluded. Upon application of these criteria, the final sample comprised 599 participants, 190 male subjects (32%) and 409 female subjects (68%). The Ethical Committee of the Rijeka Clinical Hospital Centre approved the research on 14 February 2013 (003-05/13-01/03). All subjects agreed to participate by signing an informed consent. The research was conducted in agreement with the principles of the World Medical Association Declaration of Helsinki.

The processing in every participant consisted of a clinical and radiological examination. The data regarding each participant's general medical condition, health habits and SES were collected using a self-administered structured questionnaire.

All teeth, except third molars and impacted teeth, were recorded during clinical and radiographic examination. The clinical examination included scoring of caries and restorative treatment experience as well as estimate of oral hygiene level. Plaque index (PI) was evaluated in accordance with Sileness and Löe criteria (Silness & Loe, 1964). Four surfaces of six teeth were examined (16, 12, 24, 36 and 44). To avoid interference with the caries registration, no disclosing tablet or solution was used. After plaque assessment, teeth were cleaned and dried with compressed air, and then examined under standard light with dental mirror and CPI probe. For caries detection, the World Health Organization diagnostic thresholds were used. Caries was defined as cavitated lesion only (WHO, 1997).

Clinical data were collected by one examiner who underwent calibration for clinical diagnosis of dental caries and plaque according to WHO recommendations (Oral Health Surveys & Basic Methods, 1997). Diagnostic intra-examiner reliability was evaluated by double scoring of 30 randomly selected subjects with a time interval of one week for dental caries and 1 hr for dental plaque. Intra-examiner agreement test for clinical diagnosis of dental caries and plaque produced Kappa values of 0.92 and 0.85, respectively.

Periapical status was analysed using orthopantomograms and periapical radiographs of teeth that were diagnosed with periapical lesions or were endodontically treated. A digital orthopantomograph machine (J. Morita Corporation, Veraviewepocs 6716, Kyoto, Japan) and a software (Mediadent V4, Image Level, Nieuwkerkenwaas, Belgium) were used to obtain images. A paralleling technique was applied to take periapical radiographs of respective teeth. For this purpose, Trophy Elitys X-ray apparatus (Trophy Radiologie, Marne-la-Vallee, France) and E-Speed film (Carestream Health, Rochester, NY, USA) were used. Automatic processing of films was applied (Durr Dental, Bietigheim—Bissingen, Germany). The presence of a radio-opaque material in the pulp chamber and/or in the root canals classified the tooth as root-filled. The radiographs were analysed in a darkened room utilizing the negatoscope and magnification (3.5×).

One calibrated observer used the periapical index system (PAI) to analyse the periapical status of all teeth (Ørstavik, Kerekes, & Eriksen, 1986). A PAI score for each tooth was determined by using visual references for the five categories of an ordinal scale (Ørstavik et al., 1986). For definition of periapical status in multirooted teeth, the highest PAI score of all roots was used. According to the PAI system, the scores of an ordinal scale were dichotomized and teeth were classified as periapically healthy (PAI scores 1 and 2) and as having AP (PAI scores 3, 4 or 5).

The course of calibration for PAI system (provided by Dr Ørstavik) included analysis of radiographic images of 100 reference teeth. After each tooth was assigned to one of the five PAI scores, the results were compared to gold standard scores for the reference teeth and a Cohen kappa was calculated. The repeat scoring of radiographs in 30 randomly selected subjects, two months after the first evaluation, assessed intra-examiner agreement. Prior to the second scoring, the observer was recalibrated in the PAI system. Kappa values for inter- and intra-examiner agreement were 0.70 and 0.75.

Three sets of independent variables (dental, socio-economic and health-related variables) were tested against dependent variable in a multiple linear regression analysis. A periapical disease ratio (number of teeth with AP divided by number of present teeth) is an indicator of individual periapical disease experience, and therefore, it was used as an outcome variable (Aleksejuniene, Eriksen, Sidaravicius, & Haapasalo, 2000).

The independent dental variables were number of teeth (1–28), number of teeth with primary caries, number of teeth with secondary caries, number of teeth restored with fillings, number of teeth restored with crowns, plaque index, number of root-filled teeth and number of extracted teeth. Explanatory socio-economic variables were age (continuous variable), gender (male/female), marital status (married/single/divorced/widow), level of education (scale 1 = no formal education–5 = university), number of household members, average monthly income of household (scale 1 = below 1,000 Croatian Kuna [Kn]–8 = above 10,000 Kn), self-assessed economic status of household (scale 1 = significantly below the average–5 = significantly above the average) and urbanization level (urban/suburban/rural area). Explanatory health-related variables were smoking habit (no/occasionally/yes, every day), self-perceived general health (scale 1 = excellent–5 = poor), having dentist who provides dental care through healthcare system (yes/no), number of dental visits during the last year, dental visits to private practice during the last year (yes/no), complementary health insurance (yes/no), systemic disease and medication usage. Categories for the independent socio-economic and health-related variables are listed in the Appendix 1 (Tables A16 and A27).

2.1 | Statistical analysis

The commercial software Statistica 13.0 (Statsoft Inc., Tulsa, OK, USA) was used for statistical calculations, and level of statistical significance was chosen at $p < 0.05$. Lilliefors test was used to test data for normal distribution. Since the data distribution was not normal, as a measure of central tendency and dispersion, a median, interquartile range, and minimum and maximum values were used. Testing the differences between the groups regarding the continuous variables was accomplished by using a Mann–Whitney *U* test.

A backward multiple linear regression analysis was applied for testing of the associations between periapical disease ratio and independent variables. Dummy variables were used instead of nominal (categorical) variables. Prior regression analysis, a correlation analysis between all independent variables was conducted to exclude the influence of collinearity of independent variables. In cases where a Spearman's correlation coefficient between two variables was $\rho \geq 0.7$, one of these variables was omitted from further analysis. In addition, variables with frequency of prevalence under 20 were excluded.

3 | RESULTS

Of the 599 individuals included in this research, 455 (76%) had AP in one or more teeth and periapical disease ratio demonstrated a median value of 7.4% of teeth with AP per person. A summary of the descriptive results regarding dental characteristics on individual level is presented in Table 1. Subjects with and without AP had similar age; however, subjects who had root canal treatment were significantly older than the subjects who had no root canal treatment (Mann–Whitney *U* test; $p < 0.001$; Table 2).

To identify possible determinants associated with AP, a multiple linear regression analysis was applied. Numerous different predictor variables were tested against periapical disease ratio as an outcome variable. The variables demonstrating the best fit are presented in Tables 3, 4 and 5.

TABLE 1 Dental characteristics of investigated individuals

Characteristic	Median	Interquartile range	Min	Max
Number of present teeth	26	24–28	10	28
Number of extracted teeth	2	0–4	0	18
Number of healthy teeth	12	9–16	0	24
Number of carious teeth	5	2–8	0	24
Number of teeth with AP	2	1–4	0	14
Number of root filled teeth	2	0–4	0	10
Number of coronal fillings	10	7–13	0	20
Number of crowns	0	0–4	0	13
Periapical disease ratio (number of teeth with AP divided by number of present teeth)	0.074	0.036–0.154	0	0.6

TABLE 2 Average age of subjects regarding the gender, presence of apical periodontitis and root canal treatment

	Age (years)					
	N	Median	Interquartile range	Min.	Max.	*p*-value
Gender						
Male	190	32	24–43	19	70	0.511
Female	409	35	24–49	19	69	
Apical periodontitis						
No	144	35	26–43	19	69	0.652
Yes	455	33	24–47	19	70	
Root canal treatment						
No	150	27	21–35	19	64	<0.001*
Yes	449	37	27–49	19	70	

Notes. Mann–Whitney *U* test.
*Statistically significant results in emphasis

Among the dental independent variables, caries status, oral hygiene, restorations of tooth crown, extractions and endodontic treatment were found to be significantly associated with AP (Table 3). They explained 71.7% of the observed variation in periapical disease ratio (R^2 = 0.717; p < 0.001). A number of primary caries accounted for major part (unique contribution 14%), followed by number of endodontically treated teeth (11%). Increase in number of primary caries for one increases periapical disease ratio for 0.017, while increase in endodontically treated teeth for one increases periapical disease ratio for 0.019. A negative association was determined for number of coronal fillings, while positive with plaque index, extracted teeth and secondary caries (Table 3).

Several socio-economic variables were found to be significantly associated with AP. They explained 15.5% of the observed variation in periapical disease ratio (Table 4, p < 0.001). Older individuals and males were associated with higher periapical disease ratio and accounted for major part of variability. Their unique contribution is 6.6% and 5.3%, respectively. Increase in age for one year increases periapical disease ratio for 0.002, while males have 0.059 higher ratio than females. On the other hand, if an individual had a higher education and rated economic status of his/her household higher, a lower periapical disease ratio was present. Education and economic status accounted for lower portion of variability of 3.8% and 1%, respectively (Table 4). Increase in education level and economic status decreases periapical disease ratio for 0.012 and 0.030, respectively.

Health-related independent variables explained 12.9% of the observed variation in periapical disease ratio (Table 4, p < 0.001). Dental visit to private practice during last year reduces periapical disease ratio, being the most important predictor, accounting for 4.6% of variability. Persons who have visited private dentist have reduced ratio for 0.055. Cardiovascular disease and smoking habit on daily basis increase periapical disease. Their unique contribution is 4% and 2% and brings an increase in periapical disease ratio for 0.076 and 0.041, respectively. Subjects who had a dentist who provides dental care through health insurance system had a lower periapical disease ratio but accounted for <2% of variability (Table 5).

When variables from all three models were considered in one model, dental variables remained significant predictors. The most important were a number of primary caries and endodontically treated teeth, accounting for 11%–10% of variability. Smoking and visits to private dentist were the only important health variables, while none socio-economic variable was a significant predictor.

TABLE 3 Association of dental variables with periapical disease ratio

Independent variables	*B*	*SE*	*p*	Sr
(Constant)	0.009	0.009		
plaque index	0.020	0.004	<0.001	0.104
N primary caries	0.017	0.001	<0.001	0.379
N secondary caries	0.008	0.001	<0.001	0.204
N fillings	−0.006	0.001	<0.001	−0.153
N root filled teeth	0.019	0.001	<0.001	0.336
N extracted teeth	0.009	0.001	<0.001	0.253

Notes. Explained variance (R^2) = 0.717.
B: unstandardized regression coefficient; *SE*: standard error of *B* coefficient; Sr: semipartial correlation indicates the unique contribution to periapical disease ratio.

4 | DISCUSSION

The intention of the present research was to explore the associations of socio-economic and health-related variables with periapical status in adult patients. This research is a clinic-based study with a sample drawn from patient population of dental clinic. Therefore, AP was found to be more prevalent among the subjects of the present study than what has been reported from other community-based studies with samples comprised of participants randomly selected from the population of the residents of a certain area (Aleksejuniene et al., 2000; Sidaravicius et al., 1999).

Most of the studies involving endodontic epidemiology have determined whether the subject has any teeth with AP and used this

TABLE 4 Association of socio-economic variables with periapical disease ratio

Independent variables	*B*	*SE*	*p*	Sr
Constant	0.142			
Age	0.002	0.000	<0.001	0.256
Gender (0 = female; 1 = male)	0.0594	0.010	<0.001	0.230
Level of education (1 = no formal education–5 = university)	−0.012	0.005	0.011	−0.096
Self-assessed economic status of household (1 = significantly below the average–5 = significantly above the average)	−0.030	0.006	<0.001	−0.196

Notes. Explained variance (R^2) = 0.155.
B: unstandardized regression coefficient; *SE*: standard error of *B* coefficient; Sr: semipartial correlation indicates the unique contribution to periapical disease ratio

TABLE 5 Association of health-related variables with periapical disease ratio

Independent variables	*B*	*SE*	*p*	Sr
Constant	0.180			
Current smoking habit (0 = no or occasionally; 1 = yes, every day)	0.041	0.011	<0.001	0.145
Dentist providing dental care through health insurance system (0 = no; 1 = yes)	−0.0804	0.022	<0.001	−0.138
Dental visit to private practice during the last year (0 = no; 1 = yes)	−0.055	0.010	<0.001	−0.215
Systemic diseases–cardiovascular diseases (0 = no; 1 = yes)	0.076	0.014	<0.001	0.203

Notes. Explained variance (R^2) = 0.129.
B: regression coefficient; *SE*: standard error of *B* coefficient; Sr: semipartial correlation indicates the unique contribution to periapical disease ratio.

as a binary variable to estimate a burden of periapical disease in an individual (Caplan, 2004). However, this means that the estimated burden of periapical disease would be identical for subjects with one AP lesion or multiple AP lesions (Caplan, 2004). Therefore, in the present research, a periapical disease ratio was used as a measure of individual periapical disease experience (Aleksejuniene et al., 2000).

This research demonstrated that dental variables are more important predictors of periapical status than socio-economic and general health-related variables. A number of fillings is the principle predictor whose increase tends to decrease periapical disease ratio. Other two important predictors of increase in periapical disease ratio are increased in a number of endodontically treated teeth and teeth with primary caries. When controlling for all other variables gender, smoking and visits to private dentist are the only important socio-economic and health variables, but less important than dental variables. Present results are in accordance with previously reported studies where it has been demonstrated that dental caries and its related treatments are variables significantly associated with AP (Aleksejuniene et al., 2000; Frisk & Hakeberg, 2006; Kirkevang & Wenzel, 2003). Since AP is a sequela to dental caries, and caries is related to poor oral hygiene, not surprisingly, subjects with higher plaque index and number of carious teeth had worse periapical status. On the other hand, the higher number of restored teeth was related to better periapical status. Coronal restoration may be considered as a final step in endodontic treatment. Together with root canal filling, it prevents bacterial leakage into periapical tissues. Moreover, it was demonstrated that the quality of coronal restoration may have higher impact on periapical health than the quality of the root canal filling (Ray & Trope, 1995).

Root canal treatment involves numerous technically sensitive procedures with a purpose to eradicate root canal infection. Asepsis control, thorough cleaning, shaping and obturation of root canal as well as quality coronal restoration are all prerequisites for a long-term success of root canal treatment. Therefore, the presence of root canal treatment has been already defined as a most important risk indicator for AP in an individual (Kirkevang & Wenzel, 2003). The results of our study agree with these findings, as the number of root-filled teeth positively correlated with the periapical disease ratio.

The results of several previously conducted studies did not demonstrate any correlation between SES and periapical status (Frisk & Hakeberg, 2006; Kirkevang & Wenzel, 2003). Various investigations in this field use an abundance of variables to describe socio-economic disparities in populations, demonstrating little consensus concerning the variables that are most convenient to describe the SES (Frisk & Hakeberg, 2006). As psychosocial stress can be a link

between SES and health status, apart from objective indicators of SES (i.e. occupational status, education and income) analysis should include subjective measures, such as self-assessed economic status of household (Adler, Epel, Castellazzo, & Ickovics, 2000). The present data demonstrated that subjects reporting low economic status of household have higher periapical disease ratio, but the correlation was not very strong. Socio-economic factors are implicated in general and oral health. It is assumed that they express an influence through health-related factors (i.e. diet and dental habits). Since this explains the social gradient established in dental caries prevalence, it can be assumed that the same social gradient could be predictive for AP, too (Adler & Ostrove, 1999; Thomson et al., 2004). Numerous studies have pointed to low education as a risk factor for poor health (Mackenbach et al., 2008; Von dem Knesebeck, Verde, & Dragano, 2006). Unlike Aleksejuniene et al. (2000), who demonstrated an association of high education with apical periodontitis, we found that higher level of education is significantly associated with better periapical status.

Similar to previous studies, age was significantly associated with poor periapical status. It has already been defined as a risk indicator for AP; moreover, the results have shown that the number of teeth with AP tends to increase with each decade for three teeth (Kirkevang & Wenzel, 2003; Persic Bukmir et al., 2016). Present data demonstrated that male subjects have higher periapical disease ratio than women. This finding may reflect the greater conscientiousness of women in usage of dental care and attending check-ups (Persic Bukmir et al., 2016).

Mandatory health insurance users in Croatia have a good accessibility to dental care. The present results demonstrated that almost 96% of the subjects had selected dentist providing dental care through healthcare system. Therefore, it does not surprise that these subjects had lower periapical disease ratio. Still, dental visit to private practice during last year reduces periapical disease ratio, being even more important predictor. It implies that public service does not provide high-quality treatment.

Several studies have emphasized significant association between smoking and AP (Aleksejuniene et al., 2000; Kirkevang & Wenzel, 2003). Recent study demonstrated a strong association between smoking habit and increased number of teeth with AP (Persic Bukmir et al., 2016). Moreover, smokers on average had two teeth with AP more than non-smokers (Persic Bukmir et al., 2016). Present data confirm this relation, showing that daily smoking habit is significantly associated with higher periapical disease ratio. In the present study, 34% of subjects reported to be current smokers. Daily smoking habit accounted only for 2% of variability in the periapical disease ratio, still it remained a significant predictor of periapical disease in the final multiple linear regression model.

Analysis of association between systemic diseases and periapical status revealed a positive correlation between CVD and periapical disease ratio. Several previous studies reported an association between chronic oral infections and CVD (Pasqualini et al., 2012; Willershausen et al., 2009). Mechanisms linking periapical disease to increased CVD risk include a localized inflammatory response to endodontic infection, causing systemic release of cytokines and subsequent harmful vascular effects (Beck, Garcia, Heiss, Vokonas, & Offenbacher, 1996). An et al. reported that subjects with AP were 3.5 times more likely to have CVD than subjects without AP (An, Morse, Kunin, Goldberger, & Psoter, 2016). Since there are studies that have not shown any correlation between poor oral health and coronary heart disease, this issue remains controversial (Frisk, Hakeberg, Ahlqwist, & Bengtsson, 2003; Mattila et al., 2000).

The overall purpose of this investigation was to identify determinants for periapical disease in adult users of specialist dental care. The present data clearly showed that out of three sets of variables, dental parameters had highest explanatory strength for the observed variation in periapical disease ratio. It is not possible to establish a cause–effect relationship through the cross-sectional design of the study. Therefore, a conclusion that the relationship of socio-economic and health-related variables with AP is causal cannot be derived from the present data. Nevertheless, development of prospective studies for revealing such associations should be one of the priorities of endodontic research.

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CONFLICT OF INTERESTS

None to declare.

AUTHOR CONTRIBUTION

Romana Persic Bukmir initiated idea, co-developed research project, collected data, drafted the article and approved the submitted version of the manuscript. Jelena Vidas collected data and approved the submitted version of the manuscript. Diana Mance performed a part of statistical analysis, advised in interpretation of results and approved the submitted version of the manuscript. Sonja Pezej-Ribarić participated in the study design, revised and approved the submitted version of the manuscript. Stjepan Spalj performed substantial statistical analysis and interpretation of the results, critically revised manuscript and approved the submitted version of the manuscript. Ivana Brekalo Prso co-developed the concept of the research revised and approved the submitted version of the manuscript.

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APPENDIX 1

TABLE A1 Socio-economic independent variables

Socio-economic variables			
Variable	**Category**	**Variable**	**Category**
Age		Average monthly income of household	1. Below 1,000 Kn 2. From 1,000 to 2,000 Kn 3. From 2,000 to 3,000 Kn 4. From 3,000 to 4,000 Kn 5. From 4,000 to 5,000 Kn 6. From 5,000 to 6,000 Kn 7. From 6,000 to 10,000 Kn 8. Above 10,000 Kn
Gender	Male/Female		
Marital status	Married/Single/Divorced/Widow		
Level of education	1. No formal education 2. Elementary school 3. High school 4. Academy 5. University	Self-assessed economic status of household	1. Significantly below the average 2. Somewhat below the average 3. Average 4. Somewhat above the average 5. Significantly above the average
Number of household members		Urbanization level	Urban area/Suburban area/Rural area

Note. Kn: Croatian Kuna.

TABLE A2 Health-related independent variables

Health-related variables			
Variable	**Category**	**Variable**	**Category**
Smoking habit	No/Occasionally/Yes, every day	Number of dental visits during the last year	None 1–2 visits 3–4 visits 5–10 visits More than 10 visits
Self-perceived general health	1. Excellent 2. Very good 3. Good 4. Satisfactory 5. Poor	Dental visits to private practice during the last year	Yes/No
Dentist providing dental care through healthcare system	Yes/No	Complementary health insurance	Yes/No
Systemic disease	None Cardiovascular diseases Respiratory system diseases Digestive system diseases Genitourinary system disease Diseases of the blood and blood-forming organs Endocrine diseases Diabetes mellitus Diseases of the musculoskeletal system and connective tissues Disorders of the immune system Allergies Nervous system diseases Mental and behavioural disorders Oncological diseases Infectious diseases Diseases of the skin and subcutaneous tissue Radiation/Chemotherapy	Medication usage	None Medications affecting cardiovascular system Medications affecting respiratory system Medications affecting digestive system Medications affecting genitourinary system Medications affecting blood and blood-forming organs Systemic hormone drugs Insulin and oral antidiabetic medications Medications affecting musculoskeletal system and connective tissues Medications affecting the immune system Allergy medications Medications affecting the nervous system Antipsychotics and sedatives