Health-related lifestyle behaviours, socio-demographic characteristics and use of dental health services in Greek adults.

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Objective. To investigate the association between certain socio-demographic characteristics, health-related lifestyle behaviors and the use of dental services in Greek adult population. ***Basic research design***. A total of 1,005 adults from all the geographical areas of Greece were randomly selected and interviewed. Gender, age, place of residence, marital and socioeconomic status, educational level, obesity, smoking, physical inactivity, adherence to Mediterranean diet were recorded and associated with the use of dental services. ***Results.*** Almost one half of the participants (47%) visited a dentist during the past 12 months. Only 31.7% of the visits were for a regular dental check up. Subjects belonging to high socioeconomic status were 1.86 times more likely to visit a dentist in the past 12 months, while those aged more than 56 years and with low educational level were less likely to visit a dentist in the past 12 months with odds ratios equal to 0.63 and 0.73, respectively. Physically inactive (OR=0.59; 95% CI: 0.38-0.93) and obese subjects (OR=0.48; 95% CI: 0.24-0.97) were less likely to visit the dentist for a regular dental check up. Additionally, high socioeconomic status and healthier diet were associated with greater likelihood for visiting the dentist for a regular dental check up. ***Conclusions.***Socio-demographic factors including age, education and social status are strong determinants of dental health services utilization in Greece. In addition, health-related lifestyle behaviors and conditions such as healthy diet, physical activity and obesity might be good predictors of regular check up or symptomatic dental visits.

Key words: Dental utilization, Greek adults, lifestyle behaviors, Mediterranean diet, obesity, physical activity, socio-demographic factors,

Introduction

The most prevalent oral diseases, dental caries and periodontal diseases, are greatly determined by behavioral factors. Further, it is well known that various socioeconomic factors affect oral health behavior and lifestyle of the individuals. The above suggest that oral diseases encompass interplay of biological, behavioral, socio-economic and cultural factors (Petersen, 2003; Petersen 2005; Petersen *et al* 2005b).

Dental health services utilization, in terms of frequency and regularity, is a significant oral health behavior towards better oral health. Research outcomes have shown that individuals, who visit a dentist regularly, tend to have less untreated teeth and better oral health, as well as, a better chance for preventing disease, than those who visit a dentist only symptomatically (Richards and Ameen, 2002; Stahlnacke *et al*. 2005).

Dental health services utilization has been a subject of continuous dental research in order to bring to light its potential determinants. Anderson and Newman (1973), in their model, suggested that three factors affect individuals' health care seeking behavior: Predisposing factors (socio-demographic, education, attitudes and beliefs towards health etc), Enabling factors (income, health insurance, etc.) and Illness level. According to this, it has been shown that the utilization of dental services is related to factors such as income, dental insurance, oral health indicators, level of education, age, gender and supply of dentists per capita. In later years, societal, environmental (living and working

conditions), structural (structure and function of dental health service system) and psychological factors were also considered to affect dental services utilization (Petersen and Holst, 1995). Recently, aspects concerning health-related lifestyle behaviors (healthy diet, smoking, physical activity etc) were included in the exploration of the dental health services utilization patterns (Oesterberg *et al*, 1998; Locker, 2001; Scheutz and Heidmann, 2001; Kosteniuk and D'Arcy, 2006; Wu, 2007).

In Greece, oral health care for adults is primarily delivered by private dental practitioners. Private expenditures for dental services possess the greatest percentage of the private expenditure for medical services thus absorbing an important part of the total health expenditure of the household budgets. These findings in combination with the high costs of dental treatment, the extremely low public sector dental expenditure and the inexistence of private dental health insurance, seem to have important implications in the consumption of dental services in Greece, showing signs of social inequalities in the use of dental services (Koletsi-Kounari *et al*, 2007).

Greek literature on patterns of adult dental services utilization is limited. In two recent studies (Zavras *et al*., 2004; Hellenic Dental Association, 2005), it was reported that utilization of dental health services depends upon income and people with higher incomes tend to utilize dental services more frequently. In addition, it was found that the reason for visiting the dentist is associated with the educational level; as the educational level increases so does the percentage of people visiting the dentist for prevention

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(Zavras *et al*., 2004; Hellenic Dental Association, 2005). In both studies, dental service utilization follows an age-related pattern where dental visits decrease as age increases. These findings support Anderson and Newman's model concerning the predisposing and enabling factors that affect individual health care seeking behavior.

The purpose of this study is to improve our understanding of the patterns of dental utilization in Greece investigating the association between certain socio-demographic characteristics, health-related lifestyle behaviors and the use of dental services, in adult responders.

Material and Methods

A national household survey was conducted from September 14th to October 4th 2006. The survey population consisted of 1,005 individuals, aged 18 years old or more. The survey covered urban areas (2,000 or more inhabitants) and rural areas (less than 2,000 inhabitants) of the country and each of the 13 geographical regions. Participants were fluent speakers of the Greek language.

According to the last Population Census the survey population consists of approximately 8,880,924 individuals. Respondents were selected by means of a three stage, proportional to size sampling design. At the first stage, a random sample of building blocks was selected proportionally to size based on the 2001 Population Census of the National Statistical Service of Greece. At the second stage, in each selected area of blocks, the households to be interviewed were randomly selected by means of systematic sampling. Any person or group of persons living in a separate housing unit was considered as a 'household' unit. At the third stage, in each household, a sample of individuals aged 18 years old or older was selected by means of simple random sampling. A number of 458 individuals (10.01% of all contacts) were not eligible to participate in the survey due to nationality or age (below 18 years). A total number of 1,005 effective interviews were completed. Effective response rate reached 44.5%. The sample was representative of the Greek population in terms of age and residency. Thirty-two percent of completed questionnaires (n=322) were back-checked either by phone or by household visits so as to ensure proper completion. All questions were pre-tested via a pilot study.

The socio-demographic questions included age, gender, marital status, residency, educational level and social class (ESOMAR index calculated on the basis of each individual's job category and level of education (A/B (upper), C1 (upper middle), C2 (lower middle) and D/E (lower)) and it was summed up into three social categories: A/B-C1, C2 or D/E). Current smokers were defined as those who smoked at least one cigarette per day. Physical activity was evaluated using the International Physical Activity Questionnaire (IPAQ) (Craig *et al*., 2003) and was graded in qualitative terms as sedentary (physically inactive) (score on IPAQ less than 30), moderate (score on IPAQ from 30 to 59.5) and vigorous (score on IPAQ more than 60). Subjects with score on IPAQ less than 30 were characterized as physically inactive. Height and weight of participants were self-reported. BMI was calculated as weight (in kilograms) divided by height (in meters) squared. Based on the World Health Organization classification, overweight was defined as BMI between 25 and 29.9 kg/m^2, and obesity was defined as BMI $\geq$30 kg/m^2.

The evaluation of nutritional habits was based on a validated food frequency questionnaire (Goulet *et al*., 2003). We asked all participants to report the average intake (per day or week) of several food items that they consumed (during the last 12 months). Then, the frequency of consumption was quantified approximately in terms of the number of times per month a food was consumed. Thus, daily consumption was multiplied by 30 and weekly consumption was multiplied by four, and a value of 0 was assigned to food items rarely or never consumed. A partial score varying from 0 to 4 was attributed to each of the 11 components of the Mediterranean pyramid. The total dietary score could therefore vary between 0 and 44 points. A score of 44 implied that an individual's food pattern would be fully compatible with the typical Mediterranean diet.

Continuous variables are presented with mean and standard deviation while quantitative variables are presented with absolute and relative frequencies. For the comparisons of the proportions of subjects who visited a dentist during the past 12 months or who had a regular dental check up visit, chi-square tests were used. Student's t-tests were computed for the comparison of Mediterranean diet mean score between two groups. In order to find independent factors associated with dental health services utilization, a stepwise multiple logistic regression analysis (p for removal was set at 0.1 and p for entry was set at 0.05) was conducted. Adjusted odds ratios with 95% confidence intervals were computed from the results of the logistic regression analyses. Analyses were conducted at 999 participants with full data for all variables. All p values reported are two-tailed. Statistical significance was set at 0.05 and analyses were conducted using SPSS statistical software (version 13.0). Ethical approval for the study was obtained from the Centre for Health Services Research, Medical School, University of Athens.

Results

Sample characteristics are presented in Table 1. Almost one half of the participants (47%) visited a dentist during the past 12 months. From those, only 31.7% visited the dentist for a regular dental check up, while the majority of them (43.6%) visited the dentist because of pain. In univariate analysis (Table 2) visiting a dentist during the past 12 months was significantly associated with lower ages, urban areas, smoking, high educational level and high socioeconomic status. Furthermore, the proportion of those who visited the dentist in the past 12 months was lower for physically inactive and obese subjects. As far as it concerns the reason for visiting a dentist univariate analysis (Table 3) showed that the proportion of individuals that visited the dentist for a regular check up was greater for lower ages, subjects from urban areas, and those with high educational level or high socioeconomic status. In contrast, the aforementioned proportion was lower for physically inactive and obese subjects. Also, subjects who visited the dentist for a regular check up had a greater mean dietary score. When variable analysis was conducted with stepwise elimination procedure (Table 4) it was found that age group, socioeconomic status and educational level were independent predictors for the "use of dental services in the past 12 months". Subjects belonging to high socioeconomic status were 1.86 times more likely to visit a dentist in the past 12 months. Also, participants aged more than 56 years had

37% lower likelihood to visit a dentist in the past 12 months compared to those aged from 18 to 36 years. Furthermore, individuals with low educational level had 27% lower likelihood to visit a dentist in the past 12 months. Multiple analysis with dependent variable the referral to a dentist for a regular dental check up (Table 5) revealed that physical inactivity, obesity, dietary habits and socioeconomic status were independently associated with the reason for the dental visit. Physically inactive and obese subjects had lower likelihood to visit a dentist for a regular dental check up in the past 12 months with odds ratios equal to 0.59 (95% CI: 0.38-0.93) and 0.48 (95% CI: 0.24-0.97) respectively. Also, participants belonging to high socioeconomic status had 1.95 times greater odds for a regular dental check up visit. And lastly, increased score on dietary pattern which indicates healthier diet was associated with greater likelihood for visiting the dentist for a regular dental check up (OR=1.04, 95% CI: 1.00 - 1.07).

Table 1. Sample characteristics

	n	*%*
Gender		
Men	483	48.1
Women	522	51.9
Age		
18-36	348	34.6
37-56	324	32.2
57-99	333	33.1
Family status		
Married	646	64.3
Single	244	24.3
Divorced/Windowed	115	11.4
Residence		
Urban	750	74.6
Rural	255	25.4
Smoking		
No	572	56.9
Yes	433	43.1
Obese		
No	820	83.6
Yes	161	16.4
Physical inactive		
No	570	60.2
Yes	377	39.8
Mediterranean diet score	26,6	6.2
Educational status		
≥7 years	671	66.8
<7 years	334	33.2
Socioeconomic status		
A/B-C1	867	88.6
C2/D/E	112	11.4
Use of dental services in the past 12 months		
No	529	53.0
Yes	470	47.0
Reason for dental visit		
Other	321	68.3
Regular dental check up	149	31.7

Discussion

The present study examined the association between certain socio-demographic characteristics, health-related lifestyle behaviors and the use of dental services in a Greek adult population. The sample was representative in terms of age and residency. Utilization of dental services was measured as dental visits in the last 12 months and the reason for visiting a dentist was considered in two ways: regular check up and symptomatic visit. The socio-demographic characteristics concerned gender, age, marital status, geographical location, educational status and socioeconomic status, while the health-related lifestyle behaviors concerned smoking, physical activity, adherence to the typical Mediterranean diet as well as obesity.

The data of this study showed that less than the half of the sample population (47%) visited a dentist during the past 12 months. This percentage is lower compared to similar data obtained from adults in some countries (Kelly *et al*, 2000; Manski *et al*, 2001; Bagewitz *et al*, 2002; Petersen *et al*, 2004; Kosteniuk and D'Arcy, 2006) but agrees with those obtained from a Portuguese study (Gomez *et al*, 2008). It has been suggested a high rate of dental services utilization has a positive effect on oral health (Richards and Ameen, 2002; Stahlnacke *et al*, 2005) – despite the fact that it may have negative outcome, as well (Locker, 2001). In Greece, the low rate of dental service utilization may correspond to the great needs for dental care in adults that were revealed in a recent epidemiologic study (Hellenic Dental Association, 2005).

For a person who regularly visits a dentist, it is assumed, that he is prevention oriented and cares about his/her own oral health. In the present study, the results revealed that only three out of ten adults of the study population can be characterized as regular users, and this finding agrees with the results obtained from previous Greek studies (Zavras *et al*, 2004; Hellenic Dental Association, 2005). The low percentage of adults who visit the dentist regularly matches with the low percentages of people who have other poor oral health habits, like low frequency of brushing (Hellenic Dental Association, 2005).

The frequency as well as the regularity of dental visits, in the present study, was found to be strongly associated with certain socio-demographic factors. Persons of higher education level and higher socio-economic status are more likely to visit the dentist frequently and on a regular basis. These findings agree with the findings of previous Greek studies (Zavras *et al*, 2002; Zavras *et al* 2004; Hellenic Dental Association, 2005). The socio-economic factor probably includes income which is an enabling factor for the utilization of dental services. There is scientific evidence that family income is a strong determinant of deprivation and health inequalities and is directly related to the expenditure for dental care and utilization of dental services. In the USA, low-income families have lower utilization rates of dental services than in middle and high-income families and the gap in use rates between these groups has widened during the last 20-year period (Manski *et al*, 2001). The socio-economic conditions in relation to the structure and function of the dental care system in Greece may explain, in some respect, the low rate of dental services utilization in Greek adults. Furthermore, taking into consideration that equality in health services is the right to use services regardless of

Table 2. Proportions of subjects visiting a dentist during the past 12 months according to demographics, health behaviours and socioeconomic characteristics

| | Use of dental services in the past 12 months | | | | |
| | No | | Yes | | p |
	n	%	n	%	χ² test
Gender					
Men	265	55.3	214	44.7	0.150
Women	264	50.8	256	49.2	
Age					
18-36	162	46.8	184	53.2	<0.001
37-56	159	49.2	164	50.8	
57-99	208	63.0	122	37.0	
Family status					
Married	342	53.4	299	46.6	0.382
Single	121	49.8	122	50.2	
Divorced/Windowed	66	57.4	49	42.6	
Residence					
Urban	379	50.8	367	49.2	0.019
Rural	150	59.3	103	40.7	
Smoking					
No	318	56.1	249	43.9	0.023
Yes	211	48.8	221	51.2	
Obese					
No	416	51.0	399	49.0	0.026
Yes	97	60.6	63	39.4	
Physical inactive					
No	277	49.1	287	50.9	0.017
Yes	215	57.0	162	43.0	
Mediterranean diet score, mean (SD)	26.4	(6.4)	26.7	(6.0)	0.352*
Educational status					
≥7 years	319	47.8	348	52.2	<0.001
<7 years	210	63.3	122	36.7	
Socioeconomic status					
A/B-C1	63	37.5	105	62.5	<0.001
C2/D/E	466	56.1	365	43.9	

*Student's t-test

socio-economic conditions, the results obtained from the present study suggests that social inequalities in dental health services utilization do exist in Greece.

Concerning age, in the present study, dental services utilization was significantly higher in younger ages and these results are in accordance with those derived from previous Greek studies (Zavras *et al*, 2004; Hellenic Dental Association, 2005) suggesting that utilization of dental services is age related. Data from international literature have also shown that utilization is low in older ages and this may be attributed to several factors such as access to care, insurance status, dentate status and the belief that oral dysfunction is a natural consequence of aging. However, in some countries increasing use of dental health services by older adults has been reported and this may be attributed to the decrease of edentulousness and the retention of more teeth as well as to the improvements made in the access to dental services (Manski *et al*, 2001; Petersen *et al*, 2004; Ahacic and Thorslund, 2008).

As far as the demographic factors of gender, geographical location and marital status are concerned, no significant relationships were found with the use of dental health services, in the present study. On the contrary, results from previous studies concerning gender have shown that women are more likely to be frequent and regular dental services users than men (Scheutz and Heidmann, 2001; Kosteniuk and D'Arcy, 2006) and those with single marital status utilized dental services more frequently (Bagewitz *et al*, 2002).

Socio-demographic factors include much more than income; they also include beliefs and attitudes towards oral health and prevention as well as lifestyle behaviors. Oral diseases seem to be closely linked to lifestyle behaviors. Individuals, who do not take care of their health, overeat, smoke, are physically inactive etc, are not likely to take care of their oral health and only infrequently access the dental health services. The health-related lifestyle behaviors examined in this study included smoking habits, healthy food consumption (Mediterranean diet score), physical activity and obesity. These health-related lifestyle behaviors, that represent modifiable risk factors for prominent chronic diseases such as cardiovascular diseases, diabetes, cancer, obesity etc, are also risk factors for oral diseases (Sheiham and Watt, 2000). The analysis of these behaviors uncovered some significant associations between them and the use of dental services.

Healthy diet and physical activity are health-related lifestyle behaviors which are reported to promote general and oral health. Interestingly, the results of the present study,

Table 3. Proportions of subjects visiting a dentist for a regular dental check up according to demographics, health behaviours and socioeconomic characteristics

	Other		Regular		p
	n	%	n	%	χ^2 test
Gender					
Men	148	69.2	66	30.8	0.714
Women	173	67.6	83	32.4	
Age					
18-36	118	64.5	65	35.5	0.014
37-56	106	64.6	58	35.4	
57-99	97	78.9	26	21.1	
Family status					
Married	208	69.8	90	30.2	0.213
Single	76	62.3	46	37.7	
Divorced/Windowed	37	74.0	13	26.0	
Residence					
Urban	241	65.7	126	34.3	0.021
Rural	80	77.7	23	22.3	
Smoking					
No	173	69.2	77	30.8	0.654
Yes	148	67.3	72	32.7	
Obese					
No	263	65.9	136	34.1	0.008
Yes	52	82.5	11	17.5	
Physical inactive					
No	184	63.9	104	36.1	0.006
Yes	123	76.4	38	23.6	
Mediterranean diet score, mean (SD)	26.4	(5.9)	27.7	(6.2)	0.022*
Educational status					
≥7 years	219	63.1	128	36.9	<0.001
<7 years	102	82.9	21	17.1	
Socioeconomic status					
A/B-C1	56	53.8	48	46.2	<0.001
C2/D/E	265	72.4	101	27.6	

*Student's t-test

Table 4. Odds ratios (OR) and 95% confidence intervals (CI) derived from stepwise multiple logistic regression analysis with dependent variable the "use of dental services in the past 12 months".

	OR(95% CI)	p
Age (years)		
18-36	1.0‡	
37-56	0.96(0.70-1.31)	0.779
57-99	0.63(0.44-0.91)	0.013
Educational status		
≥7 years	1.0	
<7 years	0.73(0.54-0.99)	0.046
Socioeconomic status		
C2/D/E	1.0	
A/B-C1	1.86(1.30-2.68)	0.001

‡ indicates reference category

Table 5. Odds ratios (OR) and 95% confidence intervals (CI) derived from stepwise multiple logistic regression analysis with dependent variable the "regular dental check up".

	OR(95% CI)	p
Physically inactive		
No	1.0	
Yes	0.59(0.38-0.93)	0.022
Mediterranean diet score	1.04(1.00-1.07)	0.036
Obese		
No	1.0	
Yes	0.48(0.24-0.97)	0.040
Socioeconomic status		
C2/D/E	1.0	
A/B-C1	1.95(1.21-3.14)	0.006

‡ indicates reference category

showed a strong relationship between adults engaged in prevention oriented behavior, in terms of regularity of dental health services utilization, and higher Mediterranean diet scores. On the other hand, adults who are physically inactive are less likely to visit the dentist regularly. Our results are in accordance with results from previous studies associating regular dental visits with healthy diet and physical activity (Oesterberg *et al*, 1998; Scheutz and Heidmann, 2001; Wu, 2007). These findings suggest that healthy lifestyles that incorporate healthy diet and physical activity may be important predictors for dental health services utilization.

Obesity is one of the most common health problems related to lifestyle today and is strongly associated with high-fat, energy-dense diets and sedentary lifestyles; characteristics which show unhealthy behavior. The results of the present study revealed noticeable associations between obese adults and symptomatic dental visits, and this may strengthen, to some respect, the suggestion that individuals engaged in one type of unhealthy behavior are likely to show a similar behavior in other areas.

Conclusions

The results found in the present study expanded on previous work and advanced dental care utilization knowledge concerning Greek adults. The percentage of the sample population who visited a dentist the previous year is 47%. Socio-demographic factors including age, education and social status are strong determinants of dental health services utilization in Greece. In addition, health-related lifestyle behaviors and conditions such as healthy diet, physical activity and obesity might be good predictors of regular check up or symptomatic dental visits. The findings of the present study indicate the need to implement oral health education programs in Greece and to integrate them to national health programmes giving emphasis to the common risk factors approach for oral health and other chronic diseases.

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