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An Association between the Socio-Economic Indicators and the Periodontitis in the Republic Of Macedonia.

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ABSTRACT

The epidemiological data talk about the great representation of the gingivo-periodontal diseases, that's why the WHO stresses the need to make researches for the diseases' determinants, whereby the socio- economic determinants are distinguished as important. The aim of this work is to determine the association between the most important socio-economic indicators (income, education, way of life) and the periodontal disease. In order to realize this goal, at the Clinic of Oral Pathology and Periodontology at UDCC "St. Pantelejmon" in Skopje and other three private dental offices a cross-sectional study was done in a period of 3 months. The study included 420 patients coming at the Clinics and the private dental offices for a check and treatment. A survey was realized with all the patients, where the questions were asked about the way of life and socio-economic status. With all the examined we were determining the Ramfjord index. The collected information were elaborated by the use of Statistica 7.0 for Windows and SPSS 17.0, using Pearson Chi-square. We have registered statistically significant association (p=0.00000) between the income, educational degree and way of life on one side and the Ramfjord's index on other side. The concept of lifestyle is something more than behavior; it is a way of life and studied as broadly as possible. From this study we concluded that there is a strong association of lifestyle, education level, and socioeconomic position with periodontal diseases. People having lower income, are rare visitors in dental offices, because there aren't any preventive measurements done on them and no control on the periodontal disease's improvement.

Keywords: periodontitis, education, lifestyle, income, Ramfjord index.

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INTRODUCTION

Within the history of medical sciences, the oral diseases have been monitored separately from other diseases. But, in the last decade, in global frames an effort is made for recognition of oral health as an integral part of the general health [1]. It's so because the mouth hole has got a lot of functions, such as: taking food, talking, social contacts and an outlook. Therefore, the need of clear scientific evidence contributing the information and supporting the creators of health policy for improving the oral health are more than needed today. The area of social health determiners, including the oral health, is maybe the most complex and most challenging of all the rest of the determiners. It deals with the key aspects of people's life and the working circumstances, as well as their way of life [2]. There's an evidence that the population inside a country as well as in other different countries in Europe with a low socio-economic status is in worse oral health than those with a better socio-economic status [3]. These socio-economic disparities about the oral health are a big challenge for the health policy not only for the most disparities being considered as injustice, but for the fact that the oral diseases 'consequences of the poor could be reduced, so the oral health state of the population in general could become better [4, 5].

Macedonia is located in the Central Balkans, bordering Bulgaria, Greece, Albania, Serbia and Kosovo, covering an area of 25,713 km2. The country seceded peacefully from Yugoslavia after an independence referendum, held in September 1991. According to the 2002 census, the country's population was 2,022,547. Data on the declared ethnic affiliation from the 2002 census reported that 64.1% of the population identify themselves as Macedonians, 25.17% as Albanians, 3.95% as Turks, 2.66% as Roma, 1.78% as Serbs, 0.84% as Bosniacs, 0.48% as Vlachs and 1.04% others. 467.257 of the population lives in the capital city of Macedonia, Skopje. [6]

The caries and the periodontitis belong to the most abundant diseases in the modern civilization. Apart from the caries, the epidemiological data talk about the great representation of the gingivo-periodontal diseases [7], that's why the WHO stresses the need to make researches for the diseases' determinants, whereby the socio-economic determinants are distinguished as important [8]. Periodontal diseases has got a multi factor etiology. There exist a lot of risk factors, in association to the periodontal diseases. Besides the bad oral hygiene, smoking, age, diabetes, the socio-economic status of the individual could be a possible risk factor for initiation and progress of the periodontal disease.

In some studies [9-11] it is said that the education, the way of life and the socio-economic rank influence the periodontal disease. Socio-economic status is usually seen through the income the individual has, the influence in the society and obviously the degree of education the individual has.

A lot of studies [12-18] have determined the differences in the periodontal health as depended on the economic status of the individual. Some of these studies have been designed as cross-sectional studies, aiming to determine the influence of the social-economic indicators among the periodontal health [12-14]. The results of these studies have shown that with the people belonging to lower social layers the periodontal disease has been more represented, as well as an advance of the disease.

Boillot et al. [19] based on the literature analysis for the role of the educative indicator on the periodontal status, have concluded that the low rank of education means a serious risk factor for a chronic periodontal disease. The lower education is strongly connected to the undersize care for the periodontal health [20], with a higher index of weight [21], irregular visit to a dentist [22] and non-suitable oral health care [23]. All this leads towards bad oral-hygiene habits and a bigger layer of dental plaque [24]. Hansen et al. [25], still point to a group of individuals with a low education, where the risk for an increase of the periodontal disease has been decreased after the tuition for changing the oral health's habits. Many studies emphasize that the concept of healthy life is directly associated to the health [26]. These studies show that people leading healthy life have less problems with their teeth and gingival, than people leading unhealthy life. In his study, Rupasree shown (27) the positive correlation between the way of life and the periodontitis is proved. Rajala et al. [28] have come to similar results, which emphasize the positive association between the dental health and the healthy life's indicators.

The aim of this work is to determine the association between the most important socio-economic indicators (income, education, way of life) and the periodontal disease.

MATERIAL AND METHODS

In order to realize this goal, at the Clinic of Oral Pathology and Periodontology at UDCC "St. Pantelejmon" in Skopje and other three private dental offices (located in the estate of Chair and Shuto Orizari) a cross-sectional study was done in a period of 3 months (March, April and May, 2013). The study included 420 patients coming at the Clinics and the private dental offices for a check and treatment. The research covered patients of both sexes, regardless their present periodontal status. They were chosen by chance, but for the examination we needed their agreement. The criteria needed for the patients to be involved into the research were: to be older than 35; to have more than 15 teeth in their mouth;

A survey was realized with all the patients [29], where the questions were asked about the way of life and socio-economic status. The survey questionnaire was filled with the questions from the survey [30] about income, living conditions, realized by the State statistics Institute of Republic of Macedonia.

A Survey Questionaire

Sex, age, place of living: urban/rural area
    1) Lifestyle

Habits about smoking

- doesn't smoke (stopped more than 2 years ago)   1
- smokes regularly (occassionaly)   -1
-

Physical activity

- does some physical exercises   1
- not any physical activity   -1

Habits in nuitrition

- eats vegetables and uses cold-pressed oil or butter   1
- eats vegetables and doesn't use any cold-pressed oils or butter and doesn't eat sweets   0
- eats vegetables and doesn't use any cold-pressed oils or butter and eats sweets   -1
- doesn't eat vegetables, doesn't use any cold-pressed oils or butter and eats sweets   -1
- uses cold-pressed oils or butter and doesn't eat sweets and doesn't eat vegetables   0

Consuming alcohol

- doesn't drink any alcohol   1
- moderately drinks alcohol (less than 7 drinks a week)   0
- great consumer of alcohol(more than 7 drinks a week)   -1

Healthy way of life (2-4)   **Unhealthy way of life (-4-1)**

    2) Income
-individual income   _____
-family income   _____
    3) Education
a)without any education b)Primary education   c)Secondary education   d)High education

With all the examined we were determining the Ramfjord index [31]:
1-weak to moderate gingivitis to some parts of the gingival
2- weak to moderate gingivitis to some parts of the gingival around the whole tooth
3-strong gingivitis, expressive flush, bleeding, ulceration
4-a distance from the enamel-cement joints to the bottom of the socket up to 3 mm

5- a distance from the enamel-cement joints to the bottom of the socket from 3-6 mm

6- a distance from the enamel-cement joints to the bottom of the socket over 6 mm

Statistical method

The collected information were elaborated by the use of Statistica 7.0 for Windows and SPSS 17.0, using Pearson Chi-square.

RESULTS

There were 420 respondents involved in the study. 48.8% of them male, 51.2% female (table 1). The average age of respondents is 53.5+- 11.5 years. The difference in percentages registered between the sexes and the difference registered in their average age between the male and the female isn't statistically significant for >0.05. It is a homogeneous group in terms of sex.

Table no. 1. Description of the average age and sex of respondents, involved in the study.

age	No.	%	minimum	maximum	SD
total	420	53.5	35.0	77.0	11.5
male	205	53.2	35.0	77.0	11.9
female	215	53.7	35.0	75.0	11.0

The most of the respondents, 51.4% have got the Ramfjord's index 5. Then 35.7% with Ramfjord's index 4. 5.2% of the respondents have got Ramfjord's index 2. The rest of the modalities of Ramfjord's index (1,3 and 6) are present under 4.5% (table 2). The involvement in percentages registered between the Ramfjord's index 5 vs the rest of the modalities, is statistically significant for p=0.0000.

Table no. 2. Distribution of respondents according Ramfjord's index

Ramfjord's index	No.	%
Gingivit weakly marked to medium in some parts of the gingival (1)	6	1.4
Gingivit weakly marked to medium in some parts of the gingival around the whole tooth (2)	22	5.2
Gingivit strongly marked with extreme flush, bleeding, ulcers (3)	7	1.7
Distance from the enamel-cement joints to the bottom of the socket up to 3 mm (4)	150	35.7
Distance from the enamel-cement joints to the bottom of the socket from 3-6 mm (5)	216	51.4
Distance from the enamel-cement joints to the bottom of the socket over 6 mm (6)	19	4.5
Total	420	100.0

We have registered statistically significant association between the way of life and the Ramfjord's index (Pearson Chi-square: 50.2193, p=0.000000). The difference in percentages registered among the respondents with index values from Ramfjord 5 and 6, who have healthy way of life, against the respondents with same Ramfjord's indexes, who have unhealthy way of life, is statistically significant up to p=0.0000.

Table No.3 Distribution of respondents according way of life and Ramfjord's index

Ramfjord	unhealthy	healthy	total
1	4	2	6
2	3	19	22
3	0	7	7
4	65	85	150
5	132	84	216
6	19	0	19
total	223	197	420

We have registered statistically significant association between the respondents' income, marked in quintiles and the Ramfjord's index (Pearson Chi-square: 94.1481, p=0.000000). at 73.1% of the respondents, belonging to people with low income or without any (quintile 1 and 2), the index value by ramfjord 5 and 6 are registered, while at 51.5%, where people with medium income belong (quintile 3) the index value by Ramfjord

5 and 6 are registered . The difference in percentages registered between the respondents with Ramfjord's index values 5 and 6, belonging to quintiles 1 and 2, vs the respondents with same index values by Ramfjord, belonging to quintile 3, is statistically significant up to p=0.004. The difference in percentages registered between the respondents with Ramfjord's index 5, belonging to quintiles 1 and 2, vs the respondents with same index values by Ramfjord, belonging to quintile 4 and 5, is statistically significant up to p=0.004.

Table No. 4. Distribution of respondents according total annual family income and Ramfjord's index.

Ramfjord	quintile1	quintile 2	quintile 3	quintile 4	quintile 5	Total
1	0	0	0	0	6	6
2	0	5	2	7	8	22
3	0	1	0	0	6	7
4	10	13	31	24	72	150
5	36	29	30	56	65	216
6	12	2	5	0	0	19
total	58	50	68	87	157	420

We have registered statistically significant association between the educational degree and the Ramfjord's index (Pearson Chi-square: 128.702, p=0.00000). The difference in percentages registered between the respondents without education and with Ramfjord's index values 5 and 6, against the respondents with all the rest educational degrees, having index values by Ramfjord 5 and 6, is statistically significant up to p=0.0000.

Table No.5 . Distribution of respondents according the educational degree and Ramfjord's index.

Ramfjord	without	primary	secondary	high	total
1	0	0	2	4	6
2	0	0	11	11	22
3	0	1	0	6	7
4	0	18	78	54	150
5	17	55	125	19	216
6	3	14	2	0	19
total	20	88	218	94	420

DISCUSSION

When talking about the socio-economic factors as risky factors for the periodontal disease, there exist numerous opposite viewpoints in the literature today. Some of the studies do support the viewpoint that different socio-economic aspects have got an important role in the appearance and the development of the periodontal disease [32, 33]. On the other hand, in other studies, the socio-economic aspects as risk factors for the periodontology, are denied [34, 35].

In The Republic of Macedonia, the epidemiology of the periodontal disease hasn't been examined a lot. Even less attention is paid to the social epidemiology of this very frequent disease. That's why, the need of studies' implementation, where the periodontal status is correlated to the socio- economics viewpoints, is more that obvious.

The need of such studies' implementation in our country becomes bigger these years, having in mind the bigger social stratification of the population. The social stratification in The Republic of Macedonia has become a lot more current after the former Federal Republic of Yugoslavia's disintegration and the independence of The Republic of Macedonia. For the last twenty years, the country has been going through a long transitional period, when a lot of people have lost their jobs and the unemployment rate has increased. That's why the number of the poor has increased and the number of individuals belonging to the so called middle class has decreased. By the minimal personal income rise, The Republic of Macedonia, compared to the countries in the surrounding, with a minimal net personal income of 8.050 denars (c. 150 euro) is placed at the last place [36]. This information, all by itself gives the socio-economic characteristics and conditions our people live in.

These changes present in the society, have reflected the health system in our country as well. If in the past, all health services, including the dental were free of charge, today the dentistry is almost private (37). The increase of the poverty from one side and the smaller opportunity for access to free dental services on the other, do influence the oral health, as well as the periodontal health, as in integral part of oral health.

In the periodontal epidemiological studies the indexes mainly used are community periodontal index of treatment needs (CPITN) and Ramfjord's index. Although the CPITN- index is mostly used in greater number of studies, we have decided to use the Ramfjord's index for more reasons. The CPITN- index was firstly designed to evaluate the needs from the periodontal treatment [38]. It was based on the theory, known in that period of time, that the periodontitis is a disease with a predictive, continuous and slow progress. Having the newer knowledge in mind about the etiology and pathogenesis of the periodontal disease, the CPITN- index for the needs of the periodontal treatment of the population, is not secure. With this index, the loss of periodontal attachment isn't measured, either. The Ramfjord's index, although older in date, includes the measurement a distance from the enamel-cement joint to the bottom of the socket, which determines the loss of the periodontal attachment. This index is practical and fast to perform, as it includes only six representative teeth in the mouth as a whole. Even bigger motivation to use the Ramfjord's index in our study was a research from Najah [39], done in the year 2010. During the research the author has determined that even when the Ramfjord's teeth are examined as well as when all the teeth in the mouth, there isn't any significant difference between the values acquired for the periodontal status.

On the basis of the data received for the Ramfjord's index distribution (table no.2), we couldn't conclude for the pass of the periodontal disease in The Republic of Macedonia, although a relatively big number of respondents have been asked. Even if we make such conclusions, that'd mean that 91,7% of the population in Macedonia older than 35 are representatives of the periodontal disease , as such a big percentage of the respondents have got the index values of 4, 5 and 6 according Ramfjord. Nevertheless, our selected sample of the respondents is representative to determine the influence of the socio-economic indicators and the way of life on the periodontal health, not a representative to determine the prevalence of periodontitis in The Republic of Macedonia.

To determine the way of life at the respondents, a survey questionnaire was realized, where besides about smoking and alcohol, there were questions connected to the nutrition and the physical activity. By their suitable scoring, we got a total score, through which we evaluated if a certain respondent leads a healthy way of life or not. Our results (table no. 3) have shown that there exists a statistically significant association between the way of life (healthy or unhealthy) and the Ramfjord's index (Pearson Chi-square: 50.2193, p=0.000000). Our results correspond the Rupasree [27], Revicki [40] and Rajala [28] findings. The authors' researches determinate the association among the bad habits, the unhealthy way of life and the worse periodontal health. The greatest number of our respondents, who lead unhealthy way of life, smoke and drink alcohol. The individuals drinking and smoking a lot, besides the harmful effects to these bad habits, some bad oral-hygienic habits are noticed. That enables a bigger amount of bacteria biofilm at their teeth's surface. The way of life is also dependent to the way and habits in people's diet. In individuals which are eating softer and less abrasive food can be noticed more amount of dental plaque. On the other side, the nutritive texture of the food influences the periodontal health. If you don't consume enough natural minerals and vitamins, having an anti-oxidative action, which could be reflected negatively to your repair-regenerative processes of periodontal tissues. The harmful effects of the free radicals are proved to exist in the pathological development of the periodontal disease. Because of all these, we consider that the worse clinical characteristics at our respondents leading unhealthy life are due to the bad effects of smoking, drinking alcohol, as well as the lack of antioxidants, through the diet.

The total income-monthly/a year and the economic activity status, are final for the socio-economic status and the individual position of the person in the society. In order to rank the respondents by their income, we've decided to group them in five quintiles, a methodology used by our State statistics institute (SSI), in accordance to the recommendations by the European statistics system. That is, the total income of all the members in a family is given annually. Having in mind the annual income of the family as a whole, the individual could be found in any of the five quintiles. The distribution of the respondents were made on the basis of the following scale: annual income of the family, from 0-100.000 denars-quintile 1; annual income in the family from 100.001-200.000 denars-quintile 2; quintile 3 predicts annual income in the family from 200.001-300.000 denars; in the quintile 4 there belong the respondents whose annual income are from

300.001-400.000 denars, while if the total annual income in the family overcomes 400.001 denars, the respondent belongs to the quintile 5, where 61,5 denars is 1 euro.

In table 4 the distribution of the respondents by their total annual income and Ramfjor's index is given. We've registered statistically a significant association between the respondents' income given in quintiles and Ramfjord's index (Pearson Chi-square: 94. 1481, p=0.000000). Significantly bigger percentage of respondents, with a moderate and advanced periodontitis, belonging to the quintiles 4 and 5 are considered to be due to the selective sample of respondents. That is, the biggest number of the respondents involved in the study are patients with a periodontal disease, who visit the Clinic of Oral Pathology and Periodontology, who control the disease regularly. Not an individual in this very group of respondents, was not registered with the highest index value of Ramfjord 6. People having lower income are rare visitors at the dental offices. The reason for this is not only the price of the dental services, but not having a habit for a visit to a dentist, which is in relation to their education. A large number of the individuals with low income, do not have time to visit a dentist, because of their preoccupation to find solutions to fulfilling their living needs. That's why, these people are less educated and motivated to oral hygiene holding, by the dentists. On the other hand that leads to increased gingival inflammation and a periodontal diseases' progress. The survey made by the State statistics institute in The RM, in the year 2010, has shown that 12,6% of the total respondents (12,7% from the urban, 12,5% from rural environment) have had a non-satisfied need for a dental check or treatment. Even 72% of the respondents, do note that the main reason for not visiting a dentist, is not being able to pay for the service. i.e. they think that the service is too expensive. [3]

The educational level of a certain individual is very often used as a socio- economic indicator, even more than the income. All adults could be estimated and classified on the basis of their education, which is significantly more different than their occupation. With the biggest number of people over the age of 25, the level of education remains fixed, unlike the income, which could vary during life. The information about the educational degree are used to make difference among people having higher position in the society and the people having lower position on the social ladder. The educational level depends on the number of years the individual has spent in an educational institution (primary, secondary, high). It is an accepted opinion that there exists a positive correlation between the educational level and the oral health's status. It's obvious that the individuals with higher educational level, could easier understand and accept the information about oral health and its advancement information.

The respondents' distribution, in accordance to their educational level and the Ramfjord's index are presented in table no. 5. We have registered a statistically significant association between the educational degree and Ramfjord's index (Pearson Chi-square: 128.702, p=0.00000). Our results are in accordance to the results got by Zini et al. [41], which examined the influence of the socio-economic factor, smoking and the dental plaque upon the periodontal health, with residents of Jerusalem at the age of 35-44. The authors determined that the respondents with lower educational level have got a more advanced periodontal disease. During the examination, the association among the lower educational level, smoking and the most of the plaque, was registered. On the basis of the statistics analysis of the results, the authors do underline that the education is the best indicator to value the socio- economic status of the individual. Rupasree [27] has come to similar results, he was examining the influence of the way of life and the education to the periodontal health, with 1350 respondents. In relation to the education, the author has made a conclusion that the respondents having a higher level of education, have a lower step of periodontal disease. The association between the educational degree and the periodontal disease's advance is been determined in many other studies [42, 43], but there exist such ones, where this association isn't discovered [44-46].

On the basis of our results' analysis about the educational influence upon the periodontal health, we do think that the educational level has serious implications upon the health in general as well as upon the health of the periodontal tissues. With the individual having higher educational level, there are higher standards of oral hygiene registered, which influence keeping the periodontal tissues in good condition. The fact that is characteristic with our population is that they ask for a treatment of a periodontal disease pretty late, when the disease is an advanced phase. The reason is that they aren't informed enough about the nature, the characteristics and the consequences the disease leaves. Without any doubts, the dentists have got their fault as well. Nevertheless, the reason can be found in the low educational level. It's more expressive with the adults, as our target group was. Namely, just 22,4% of our respondents are high educated.

For the disease's control, the patients' motivation for keeping oral hygiene and regular control checks for maintaining the results acquired, the so called Re-call. It's expected for the high educated people to understand the importance of the need for regular control checks better, in order to improve their periodontal health and that there is more motivation to keep their oral hygiene.

CONCLUSIONS

The concept of lifestyle is something more than behavior; it is a way of life and studied as broadly as possible. From this study we concluded that there is a strong association of lifestyle, education level, and socioeconomic position with periodontal diseases.

People having lower income, are rare visitors in dental offices, because there aren't any preventive measurements done on them and no control on the periodontal disease's improvement.

The worse periodontal health at our respondents with lower educational level is due to: not enough information on the nature and the consequences of the periodontal disease, more are smokers in this segment of the population, not enough motivation to keep oral hygiene, as well as not understanding the importance of the regular control checks for keeping their periodontal health.

REFERENCES

[1]   Petersen PE. The World Oral Health Report 2003: continuous improvement of oral health in the 21st century-the approach of the WHO Global Oral Health Programme. *Community Dent Oral Epidemiol* 2003, 31(Suppl 1): 3-23.
[2]   Wilkinson R, Marmot M: Social determinants of health. The solid facts. WHO Regional Office for Europe,Copenhagen, 2003.
[3]   Petersen PE: The world health report 2003. WHO, Geneva, 2003.
[4]   Kunst A, Mackenbach J. Measuringsocio-economic inequalities in health.WHO, Regional office for Europe,Copenhagen, 1997.
[5]   Gluck G M, Morgenstein W M: Jong'scommunity dental health. Mosby,2003.
[6]   Census of population, Households and dwellings in the Republic of Macedonia, 2002 – BOOK XI. Accesedat: http://www.stat.gov.mk/publikacii/knigaXI.pdf
[7]   Albandar JM, Rams TE. Global epidemiology of periodontaldiseases: an overview. Periodontology 2000, 2002; 29:7–10.
[8]   Petersen P. Kwan S. Equity, social determinants andpublic health programmes – thecase of oral health. Community Dent Oral Epidemiol 2011;39(6):481-7.
[9]   Sanders AE, Slade GD, Turrell G, John Spencer A, Marcenes W. The shape of the socioeconomic-oral health gradient: Implications for theoretical explanations. Community Dent Oral Epidemiol. 2006;34:310–9.
[10]   Borrell LN, Lynch JW, Neighbors H, Burt BA, Gillespie BW. Is there homogeneity in periodontal health between African Americans and Mexican Americans? Ethn Dis. 2002;12:97–110.
[11]   Borrell LN, Taylor GW, Woolfolk MW, et al. Factors influencing the effect of race on established periodontitis prevalence. J Public Health Dent. 2003;63:20–29.
[12]   Caplan DJ, Weintraub JA. The oral health burden in the United States: a summary of recent epidemiologic studies. J Dent Educ. 1993;57:853–862.
[13]   White BA, Caplan DJ, Weintraub JA. A quarter century of changes in oral health in the United States. J Dent Educ. 1995;59:19–57.
[14]   Rozier RG, Hughes JT, Ramsey D. The epidemiology of dental diseases in North Carolina. J Public Health Dent. 1981;41:14–24.
[15]   Rozier RG, Beck JD. Epidemiology of oral diseases. CurrOpin Dent. 1991;1:308–315.
[16]   Brown LJ, Swango PA. Trends in caries experience in US employed adults from 1971–74 to 1985: cross-sectional comparisons. Adv Dent Res. 1993;7:52–60.
[17]   Brown LJ, Wall TP, Lazar V. Trends in caries among adults 18 to 45 years old. J Am Dent Assoc.2002;133:827–834.
[18]   Oral Health in America: A Report of the Surgeon General. Rockville, Md: National Institute of Dental and Craniofacial Research, National Institutes of Health; 2000.

[19]   Boillot A et all. Education as a Predictor of Chronic Periodontitis: A Systematic Review with Meta-Analysis Population-Based Studies. PLoS One. 2011; 6(7): e21508.

[20]   Alwaeli HA, Al-Jundi SH. Periodontal disease awareness among pregnant women and its relationship with socio-demographic variables. Int J Dent Hyg. 2005;3:74–82.

[21]   Molarius A, Seidell JC, Sans S, Tuomilehto J, Kuulasmaa K. Educational level, relative body weight, and changes in their association over 10 years: an international perspective from the WHO MONICA Project. Am J Public Health. 2000;90:1260–68.

[22]   Lang IA, Gibbs SJ, Steel N, Melzer D. Neighbourhood deprivation and dental service use: a cross-sectional analysis of older people in England. J Public Health. 2008; 30:472–78.

[23]   Petersen PE, Aleksejuniene J, Christensen LB, Eriksen HM, Kalo I. Oral health behavior and attitudes of adults in Lithuania. ActaOdontol Scand. 2000; 58:243–48.

[24]   Zini A, Sgan-Cohen HD, Marcenes W. Socio-economic position, smoking, and plaque: a pathway to severe chronic periodontitis. J ClinPeriodontol. 2011;38:229–35.

[25]   Hansen BF, Bjertness E, Gronnesby JK, Eriksen HM. Changes in periodontal treatment needs. A follow-up study of Oslo citizens from the ages of 35 to 50 years. J Periodontal Res. 1995;30(6):410–7. (65)

[26]   Wiley JA, Camacho TC. Lifestyle and future health: Evidence from the Alameda county study. Prev Med. 1980;9:1–21.

[27]   Rupasree G, Vijay KC. Effect of lifestyle, education and socioeconomic status on periodontal health. ContempClin Dent. 2010; 1(1): 23–26.

[28]   Rajala M, Honkala E, Rimpela M, Lammi S. Tooth brushing in relation to other health habits in Finland. Community Dent Oral Epidemiol. 1980;8:391–5.

[29]   Abel T. Measuring health lifestyles in a comparative analysis: Theoretical issues and empirical findings. SocSci Med 1991;32:899-908.

[30]   State statistics institute of The Republic of Macedonia. A survey of income and living conditions, 2010. Skopje , May 2013.

[31]   Ramfjord SP. Indices for prevalence and incidence of periodontal disease. J Periodont. 1959; 30: 51-59

[32]   Halling, A. &Bengtsson, C. Number of teeth and proximal periodontal bone height in relation to social factors. Swedish DentalJournal 1984; 8: 183–191.

[33]   Brown LF, Beck JD. & Rozier RG. Incidence of attachment loss in communitydwelling older adults. Journal of Periodontology 1994; 65: 316–323.

[34]   Gelskey, S. C., Young, T. K. & Singer, D. L. Factors associated with adult periodontitis in a dental teaching clinic population. Community Dentistry and Oral Epidemiology 1998; 26: 226–232.

[35]   Moore PA, et al. Type 1 diabetes mellitus and oral health: assessment of periodontal disease. Journal of Periodontology 1999; 70: 409–417.

[36]   Eurostat. Erupean social statistic, 2013 edition. Luxembourg, Publications Office of the European Union, 2013

[37]   Ivanovski K. Kokolanski V. Peshevska S. Concept in doing dental health work with a special review on the net of dental offices in The Republic of Macedonia. Healthcare 2013; 17 (3): 12-17.

[38]   Ainamo, J., Bamies, D. E., Beagrie. G., Cutress, T., Martin, J. &Sardo-Infirri, J. Development of the Worid Health Otganization (WHO) Community Periodontal Index of Treatment Needs (CPITN). *International Dental Journal 1982;* 32: 281-291,

[39]   Najah A, Seham S, Raghad F. *The usefulness of Ramfjord teeth to represent the full-mouth pocket depth in epidemiological study MDJ, 2010:* 7, 272-275.

[40]   Revicki D, Sobal J, DeForge B. Smoking status and the practice of other unhealthy behaviors' Fam Med. 1991;23:361–4.

[41]   Zini A, Sgan-Cohen HD, Marcenes W. Socio-economic position, smoking, and plaque: a pathway to severe chronic periodontitis. J ClinPeriodontol. 2011; 38: 229–35.

[42]   Douglass, C, W,,Gillings, D,, Sollecite, W, & Gammon, M, National trends in the prevaience and severity of the periodonlal diseases. *Journal of the American Denta!Association 1983;* 107, 403-12.

[43]   Markkanen, H,,Rajaia, M, &Paunio, K, Periodontai treatment need of the Finnish popuiation aged 30 years and over. *Community Dentistry and Oral Epidemiology* 1983; 11: 25-32,

[44]   Hansen Bp. Bjertness. E, &Gjermo P. Changes in periodontal disease indicators in 35-year-old Oslo citizens from 1973 to 1984, *Journal of Clinical Periodontology* 1990; 17: 249-254.

[45]   Hansen. B, F. & Johansen, J, R, Periodontai treatment needs of 35-year-oId citizens in Osio, *Journal of Clinical Periodontology* 1977; 4, 263-271,

[46]   Beck JD, Koch GG, Offenbacher S. Incidence of attachment loss over 3 years in older adults—new and progressing lesions. Community Dent Oral Epidemiol. 1995;23:291–296.