

Need and Demand of Removable Dentures by Jordanian Adults and Relationship to Socioeconomic Factors

Ziad N AL-Dwairi*

Department of Prosthodontics, Jordan University of Science and Technology, Irbid, Jordan

Abstract

Aim: In Jordan, there is no available studies that investigated the association between complete edentulism and socioeconomic factors. The aim of this study therefore was to assess the need and demand for complete and partial dentures by Jordanian adults and assess the relationship between socio-demographic variables with complete edentulism.

Materials and Methods: The study group consisted of 600 patients. A pilot-tested questionnaire was presented to the participants. The variable studied were: age, gender, education status, economic status, smoking status, dental health insurance and dental preventive attitude.

Results: The results showed that 173 patients (28.9%) were allocated in the 51-60 age bands in contrast to 73 subjects (12.16%) from the 61-70 age group. Among the 600 subjects, 403 (67.17%) needed complete dentures (308 needed upper and lower, 95 needed single complete dentures). Removable partial dentures were needed by 197 (32.8%) of subjects. Of the patients with no education 112 of 308 patients applied for upper and lower complete dentures compared to 18/197 subjects who needed removable partial dentures and 20/95 subjects who needed single complete dentures. Among the 259 subjects with low monthly income of 150 JD, 210 (68.2%) subjects needed upper and lower complete dentures. There was no significant difference in denture demand among patients with dental health insurance ($p > 0.05$). Sixty-five subjects of the 348 with no preventive attitude needed partial dentures in a significant comparison to 283 (81%) who applied for complete dentures ($p < 0.05$). Over 65% of the subjects were smokers with over 74% of them required removable complete dentures.

Conclusion: It is concluded that in addition to addressing the non-disease factors, dental education should be targeted at the un-educated population, and low-income groups to reduce the rate of total edentulism.

Keywords: Dentures; Education; Attitude; Jordan

Introduction

The retention of teeth and the increase in the number of dentate people in the older age group is considered a positive health outcome, despite the challenges in higher demands for dental services, and the impact it will have on the utilization of dental care services and the burden of oral health problems in the future [1-3]. On the other hand, edentulism is considered a poor health outcome and may compromise quality of life [1,3-5].

Complete edentulism is an important but often-overlooked public health issue, especially for the elderly [6,7]. Oral health status plays an important role in the nutrition of adults and older people. Tooth loss has been associated with changes in food taste and food preferences and nutritional deficiency [8,9].

The results of available epidemiological studies on edentulism and tooth loss varied considerably. There is a documented decline of edentulism with still great differences in prevalence between countries, between geographical regions within countries and between groups with various backgrounds [10-16].

The mean number of lost teeth increases with age. In several countries many dentate subjects aged 60 years and over still have reduced dentitions possibly needing prosthodontic treatment. The incidence of tooth loss is low but with geographical variation between age groups, and there is a trend for decreasing incidence over the last decades. A great number of variables are associated with tooth loss, and there is no consensus whether dental disease related or socio-behavioral factors are the most important risk factors. Institutionalized elderly

people have, in general, more compromised oral health, including fewer teeth, than those at the same age living freely [17].

While the rate of total edentulism is decreasing in developed countries, the reverse is the case with developing countries and this had been attributed mainly to the high prevalence of periodontal diseases and caries [18-20]. The prevalence of edentulism stood at 17% in Canada in 1990 and currently rests at 9.7% in the United States for those aged 18 years or older [21,22]. The prevalence of this condition increases dramatically with age, and 33.1% of Americans aged 65 years or older suffer from edentulism; the prevalence in this age group is comparable in various regions of Canada [22-24]. It is clearly this older age group that is most affected and best exhibits the physical consequences that this condition can impose.

Some studies have reported that the incidence of edentulism correlates with educational level and income status, with those in lower levels exhibiting higher risks of becoming totally edentulous [25,26]. Of particular interest are the changes in edentulism that occurred

*Corresponding author: Ziad N. AL-Dwairi, Associate Professor, Department of Prosthodontics, Faculty of Dentistry, Jordan University of Science and Technology, Po Box 3030, Irbid, Jordan, Email: ziadd@just.edu.jo

Received August 28, 2013; Accepted September 04, 2013; Published September 07, 2013

Citation: AL-Dwairi ZN (2013) Need and Demand of Removable Dentures by Jordanian Adults and Relationship to Socioeconomic Factors. Oral Hyg Health 1: 113. doi: 10.4172/2332-0702.1000113

Copyright: © 2013 AL-Dwairi ZN. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

in the population between the ages of 65 and 74. Some authors have suggested that, by the year 2020, less than 15% of the population will be edentulous. This would be in keeping with the decrease in edentulism that has occurred over the past few decades [27]. The problem associated with edentulousness is that it is a common condition which affects 20-25% of the entire adult population, with increasing figures in elderly groups. For example, roughly 1½- 2 million people lack natural teeth in one or both jaws in Sweden. It has also been estimated that 5-10%, about 100,000 adults, of those with edentulism have great difficulties in tolerating dentures for one reason or another. Corresponding figures for the US indicate that there are more than 20 million edentulous people, with 1-2 million subjects that have adaptation problems to removable dentures [28].

Complete edentulism may worsen Obstructive Sleep Apnea (OSA), particularly in subjects who have no respiratory disturbances sleeping with dentures. Edentulism might act by modifying anatomy and function of the pharyngeal airway and of tongue and by favoring inflammatory edema.

Epidemiological studies estimate that edentulism troubles about 18 % of patients older than 60 years and that such prevalence will remain constant over the next 30 years [29]. Considering the high prevalence of OSA in the advanced age, it is conceivable that a consistent number of elderly people is at risk of edentulism-induced worsening of OSA and, consequently, of OSA related morbidity and mortality [30].

In Jordan, there are no available studies that investigated the association between complete edentulism and socioeconomic factors.

The aim of this study therefore was to assess the need and demand for complete and partial dentures by Jordanian adults and assess the relationship between socio-demographic variables with complete edentulism in order to provide baseline information and constitutes the first national evaluation in Jordan for one of the priority WHO oral health problems.

Materials and Methods

This study was performed on patients who applied for complete denture treatment at the Prosthodontic clinic at Faculty of Dentistry / Jordan University of Science and Technology between May 2005 and January 2007. The study group consisted of 600 patients. A pilot tested questionnaire was presented to the participants. The questionnaires were conducted face-to-face between subjects and the author. The questionnaire was constructed from an analysis of the literature detailing variables describing the factors that are associated with complete edentulism.

The variable studied are:

- 1) Age
- 2) Gender: male or female.
- 3) Education: none (no education), primary school, secondary and university.
- 4) Economic status: low Class I (<150JD), medium Class II (150-300JD), high Class III (300-500 JD) or very high Class IV (>500JD).
- 5) Smoking status: current everyday cigarette smokers or persons who had never smoked.
- 6) Dental Health Insurance: with insurance, without insurance.
- 7) Dental preventive attitude: with or without.

Data Analysis

Data were analyzed using SPSS Version 10.0.7 (Statistical Package for the Social Sciences 2000 10.0.7). Cross-tabulations, frequency, calculation of means and chi-square statistics were used for bivariate comparison of categorical variables. P-value of less than 0.05 was considered significant.

Results

Six hundred patients (600) were enrolled in this study (318 males and 282 females) with an age range 31-80 (mean age 55.5 years). Table 1 shows the distribution of patients according to different age groups and gender. One hundred and seventy three patients (28.9%) were allocated in the 51-60 age band in contrast to 73 subjects (12.16%) from the 61-70 age group.

Among the 600 subjects, 403 (67.17%) needed complete dentures (308 needed upper and lower, 95 needed single complete dentures). Removable partial dentures were needed by 197 (32.8%) of subjects (Table 2).

Table 3 shows that 44.2% (42 subjects) and 39% (77 subjects) within the 41- 50 age group applied for single complete dentures and removable partial dentures respectively. On the other hand, 34.7% (107 subjects) who needed upper and lower complete dentures were allocated in 51-60 age groups. No subject needed single complete dentures in 70-80 age band and 3.6% (7 subjects) of 61-70 age band needed removable partial dentures.

Regarding level of education, Table 4 shows that 112 of 308 patients who applied for upper and lower complete dentures had no education compared to 18/197 subjects who needed removable partial dentures

Age group	Number	Percentage
31-40	68	11.33
41-50	155	25.8
51-60	173	28.9
61-70	73	12.16
>70	131	21.81
Gender		
Male	318	53
Female	282	47
Total	600	100

Table 1: Sample distribution by age and gender.

Removable Protheses	Number	Percentage
Upper and lower Complete denture	308	51.4
Single complete denture	95	15.8
Removable Partial denture	197	32.8
Total	73	12.16

Table 2: Demand for complete dentures.

Age group	U/L complete denture N(%)	Single complete denture N(%)	RPD N(%)	Total N(%)
31-40	11(3.6)	17(17.9)	40(20.3)	68(11.33)
41-50	36(11.7)	42(44.2)	77(39.1)	155(25.8)
51-60	107(34.7)	26(27.4)	40(20.3)	173(28.9)
61-70	56(18.2)	10(10.5)	7(3.6)	73(12.16)
>70	98(31.8)	0	33(16.8)	131(21.81)
Total	308(51.4)	95(15.8)	197(32.8)	600(100)

Table 3: Type of denture within each age group.

and 20/95 subjects who needed single complete dentures. On the contrary, 18/308 of patients needed upper and lower complete dentures had a university degree compared to 28/95 who needed single dentures and 70/197 who needed removable partial dentures.

Of the 318 males, 245 needed complete dentures (200 U/L complete and 45 single) and 73 needed removable partial dentures, while 124/282 of females needed removable partial dentures, Table 5.

Table 6 shows that, among the 259 subjects with low monthly income of 150 JD, 210 (68.2%) subjects needed upper and lower complete dentures, while 80 subjects of 187 with a monthly income of 150-300 needed removable partial dentures. Among the 49 subjects with >500 JD monthly income, 28 subjects applied for removable partial dentures and 13 subjects applied for upper and lower complete dentures.

Table 7 shows that of the 600 subjects, 408 had no dental health insurance. Significantly ($p < 0.05$) the majority of patients (72.3%) applied for complete dentures (U/L and single) compared to 113 (28%) who applied for partial dentures. There was no significant difference in denture demand among patients with dental health insurance ($p > 0.05$). Sixty-five subjects of the 348 with no preventive attitude needed partial dentures in a significant comparison to 283 (81%) who applied for complete dentures ($p < 0.05$). There was no significant difference in complete and partial denture demand among subjects with preventive

attitude ($p > 0.05$). 65% of the subjects were smokers with over 74% of them required removable complete dentures. However there was no significant difference on denture demand in the non-smoking group ($p > 0.01$).

Discussion

This study was carried out at the Prosthodontic clinic in the dental teaching center of Jordan University of science and Technology. The center is located in north Jordan at the city of Irbid; the second largest city after the capital Amman. Dental health services are provided in the center for educational purposes and with reduced fees. The unique location and minimal fees paid by patients encourages patients to attend from across the country.

In the present study, over 62% of the studied subjects (377/600) were over 50 years old and over 67% (403/600) of the subjects needed complete dentures in one or both jaws in comparison to 32.8% who needed removable partial dentures.

The older age groups required more of removable complete dentures than the younger age groups who needed more of removable partial dentures. This is in agreement with previous studies [15,16].

Most studies have also shown significant gender difference in edentulism and denture demand with more males becoming edentulous than females [14,31]. This has been attributed to the fact that males are more active than females and do not pay much attention to oral care. In this study, significantly more males required removable complete dentures compared to females who needed more of removable partial dentures.

The majority of our study population belonged to the primary education status, and most subjects in this group required more complete dentures. This is also the case for subjects with no education or with secondary educational status. Subjects with higher educational status (university) needed more of partial dentures. Our study showed that the need for complete dentures decreased with increasing level of education ($p < 0.05$), hence the likelihood of retaining teeth in the mouth becomes higher as the educational level increases. This might be due to the fact that those with higher level of education are more informed about their health needs and may seek dental treatments earlier and more often than those of lower educational status who may only seek dental treatment when there is apparent morbidity. In addition, those of higher educational status are likely to be richer than those of lower educational status. Hence, they are able to afford the cost of dental treatments from time to time [16,26].

In the present study there was a gradient relationship between socio-economic status and denture demand. Over 43 % of subjects were in class I socioeconomic status with a monthly income below 150 JD, with over 68% of them required removable complete dentures. As the monthly income, there was a significant decrease in the demand for complete dentures and an increase in the proportion of subjects who required removable partial dentures. The reason for this may be as a result of the fact that they may not be able to afford the cost of restorative procedures hence they wait until they have lost their set of teeth to have a complete removable denture which is cheaper. In so many intricate ways, socio-economic status tends to affect health behaviors, the environment and social influences an individual is exposed to [32].

A causal association between cigarette smoking and teeth loss has been established in several studies [33-37]. In cross-sectional studies,

Education	Removable Prosthesis			Total
	U/L complete denture N(%)	Single complete denture N(%)	RPD N(%)	
No education	112 (36.4)	20 (21.1)	18 (9.1)	150 (25)
Primary	108 (35)	17 (17.9)	54 (27.5)	179 (29.8)
Secondary	70 (22.8)	30 (31.6)	55 (27.9)	155 (25.8)
University	18 (5.8)	28 (29.4)	70 (35.5)	116 (19.4)
Total	308	95	197	600

Table 4: Denture demand and education.

Gender	Removable Prosthesis			Total
	U/L complete denture N(%)	Single complete denture N(%)	RPD N(%)	
Male	200 (62.9)	45 (14.2)	73 (22.9)	318 (53)
Female	108 (38.3)	50 (17.8)	124 (43.9)	282 (47)
Total	308	95	197	600

Table 5: Denture demand by gender.

Socioeconomic Status (JD)	Removable Prosthesis			Total
	U/L complete denture N(%)	Single complete denture N(%)	RPD N(%)	
150<	210 (68.2)	30 (31.6)	19 (9.6)	259 (43.17)
150-300	65 (21.1)	42 (44.2)	80 (40.6)	187 (31.16)
300-500	20 (6.5)	15 (15.8)	70 (35.6)	105 (17.5)
>500	13 (4.2)	8 (8.4)	28 (14.2)	49 (8.17)
Total	308	95	197	600

Table 6: Denture demand and socioeconomic status.

Removable Prosthesis		Dental health Insurance N(%)		Preventive attitude N(%)		Smoking N(%)	
		Y	N	Y	N	Y	N
		Complete denture	108	295	120	283	293
Partial denture	84	113	132	65	101	96	
Total		192	408	252	348	394	206

Table 7: Edentulous status and socioeconomic factors.

cigarette smoking has also been associated with higher prevalence of edentulousness and fewer remaining teeth [38-40]. The path by which cigarette smoking affects tooth loss is presumed to involve periodontitis. In addition to periodontitis, dental caries may also contribute to the increased risk of tooth loss among smokers [41]. Associations have been reported between cigarette smoking and root caries, coronal caries and periapical periodontitis, although not consistently [40-43].

Over 65% of the subjects in the present investigation were smokers with over 74% of them required removable complete dentures. However there was no significant difference on denture demand in the non-smoking group [44].

Regular dental attendance is more prevalent in high-socio-economic groups and is associated with better oral health outcomes. Attitudes and perceptions influence dental attendance patterns, including anxiety, cost (of dental care) concerns, value placed on restored teeth, and beliefs regarding the importance of regular dental attendance [45-48].

Positive attitudes and perceptions about dental attendance, which are associated with better oral health, tend to be held by high-socio-economic groups [47,48]. People with low socioeconomic status share a greater burden of oral diseases and are less likely to seek dental care on a regular basis leading to more teeth loss and accelerates the transition to the complete edentulous status. In the present study, 58% of the sample had no preventive dental health attitude with only 19% required removable partial dentures and the majority of this group needed complete dentures

The higher prevalence of subjects needed complete dentures without dental insurance than among those with dental insurance may, in part, result from reduced use of preventive and restorative dental services [49]. However, dental insurance in the Jordan is almost entirely employment-based, does not cover most dental procedures; therefore, relatively few persons have dental insurance. Around 68.5 were without dental health insurance and 72% of them needed complete dentures in contrast to only 28 % who needed removable partial dentures within the same group.

This study observed that edentulism is due to a combination of various factors. Poor education has been identified as a major factor in edentulism. So also is the socio-economic status of the patient. These two factors, which are non-disease factors, affect the mortality of teeth arising from disease factors. There is therefore a need for oral health policy formulators to focus on improving the educational and socio-economic status of its citizens with emphasis on disease control in oral health care delivery.

In addition to addressing the non-disease factors, dental education should be targeted at the un-educated population, and low-income groups to reduce the rate of total edentulism.

References

1. AIHW Dental Statistics and Research Unit (1998) Australia's oral health and dental services.
2. Erickson L (1997) Oral health promotion and prevention for older adults. *Dent Clin North Am* 41: 727-750.
3. Jones JA, Adelson R, Niessen LC, Gilbert GH (1990) Issues in financing dental care for the elderly. *J Public Health Dent* 50: 268-275.
4. Miller Y, Locker D (1994) Correlates of tooth loss in a Canadian adult population. *J Can Dent Assoc* 60: 549-555.
5. Slade GD, Spencer AJ (1994) Social impact of oral conditions among older adults. *Aust Dent J* 39: 358-364.
6. Adams C, Slack-Smith LM, Larson A, O'Grady MJ (2003) Edentulism and associated factors in people 60 years and over from urban, rural and remote Western Australia. *Aust Dent J* 48: 10-14.
7. Steele JG, Sanders AE, Slade GD, Allen PF, Lahti S, et al. (2004) How do age and tooth loss affect oral health impacts and quality of life? A study comparing two national samples. *Community Dent Oral Epidemiol* 32: 107-114.
8. Marcenes W, Steele JG, Sheiham A, Walls AW (2003) The relationship between dental status, food selection, nutrient intake, nutritional status, and body mass index in older people. *Cad Saude Publica* 19: 809-816.
9. Lee JS, Weyant RJ, Corby P, Kritchevsky SB, Harris TB, et al. (2004) Edentulism and nutritional status in a biracial sample of well-functioning, community-dwelling elderly: the health, aging, and body composition study. *Am J Clin Nutr* 79: 295-302.
10. Bouma J (1984) On becoming edentulous. An investigation into the dental and behavior reason for full mouth extraction. Thesis Ryksuniversiteit te Grmning
11. Eklund SA, Burt BA (1994) Risk factors for total tooth loss in the United States: longitudinal analysis of national data. *J Public Health Dent* 54: 5-14.
12. Caplan DJ, Weintraub JA (1993) The oral health burden in the United States: a summary of recent epidemiologic studies. *J Dent Educ* 57: 853-862.
13. Hunter JM, Arbona SI (1995) The tooth as a marker of developing world quality of life: a field study in Guatemala. *Soc Sci Med* 41: 1217-1240.
14. Hoover JN, McDermott RE (1989) Edentulousness in patients attending a university dental clinic. *J Can Dent Assoc* 55: 139-140.
15. Marcus PA, Joshi A, Jones JA, Morgano SM (1996) Complete edentulism and denture use for elders in New England. *J Prosthet Dent* 76: 260-266.
16. Esan TA, Olusile AO, Akeredolu PA, Esan AO (2004) Socio-demographic factors and edentulism: the Nigerian experience. *BMC Oral Health* 4: 3.
17. Müller F, Naharro M, Carlsson GE (2007) What are the prevalence and incidence of tooth loss in the adult and elderly population in Europe? *Clin Oral Implants Res* 18 Suppl 3: 2-14.
18. Okoisor FE (1977) Tooth Mortality: A clinical study of causes of loss. *Nig Med Journal* 7: 77-81.
19. Odusanya SA (1987) Tooth loss among Nigerians: causes and pattern of mortality. *Int J Oral Maxillofac Surg* 16: 184-189.
20. Kaimenyi JT, Sachdeva P, Patel S (1988) Cause of tooth mortality at the dental unit of Kenyatta National Hospital of Nairobi, Kenya. *Odontostomatol Trop* 11: 17-20.
21. Locker D, Matear D (2001) Oral disorders, systemic health, well-being and the quality of life. A summary of recent research evidence. Community Dental Health Services Research Unit Report.
22. (2000) Oral health in America: a report of the Surgeon General. *J Calif Dent Assoc* 28: 685-695.
23. Slade GD, Locker D, Leake JL, Wu AS, Dunkley G (1990) The oral health status and treatment needs of adults aged 65+ living independently in Ottawa-Carleton. *Can J Public Health* 81: 114-119.
24. Locker D, Leake JL, Hamilton M, Hicks T, Lee J, et al. (1991) The oral health status of older adults in four Ontario communities. *J Can Dent Assoc* 57: 727-732.
25. Iacopino AM, Wathen WF (1993) Geriatric prosthodontics: an overview. Part I. Pretreatment considerations. *Quintessence Int* 24: 259-266.
26. Brodeur JM, Benigeri M, Naccache H, Olivier M, Payette M (1996) [Trends in the level of edentulism in Quebec between 1980 and 1993]. *J Can Dent Assoc* 62: 159-160, 162-6.
27. Weintraub JA, Burt BA (1985) Oral health status in the United States: tooth loss and edentulism. *J Dent Educ* 49: 368-378.
28. Albrektsson T, Blomberg S, Brånemark A, Carlsson GE (1987) Edentulousness-an oral handicap. Patient reactions to treatment with jawbone-anchored prostheses. *J Oral Rehabil* 14: 503-511.
29. Douglass CW (1990) Prosthodontics. Clinical practice--delivery of services. Review of the literature. *J Prosthet Dent* 64: 275-283.
30. Bucca C, Cicolin A, Brussino L, Arienti A, Graziano A, et al. (2006) Tooth loss and obstructive sleep apnoea. *Respir Res* 7: 8.

31. Suominen-Taipale AL, Alanen P, Helenius H, Nordblad A, Uutela A (1999) Edentulism among Finnish adults of working age, 1978-1997. *Community Dent Oral Epidemiol* 27: 353-365.
32. Adler N, Boyce T, Chesney MA (1999) Socio-economic status and health: The challenge of gradient. *Health and human rights* 3:181-201.
33. Eklund SA, Burt BA (1994) Risk factors for total tooth loss in the United States; longitudinal analysis of national data. *J Public Health Dent* 54: 5-14.
34. Holm G (1994) Smoking as an additional risk for tooth loss. *J Periodontol* 65: 996-1001.
35. Albandar JM, Streckfus CF, Adesanya MR, Winn DM (2000) Cigar, pipe, and cigarette smoking as risk factors for periodontal disease and tooth loss. *J Periodontol* 71: 1874-1881.
36. Ragnarsson E, Eliasson ST, Olafsson SH (1992) Tobacco smoking, a factor in tooth loss in Reykjavik, Iceland. *Scand J Dent Res* 100: 322-326.
37. Hamasha AA, Sasa I, Al-Qudah M (2000) Risk indicators associated with tooth loss in Jordanian adults. *Community Dent Oral Epidemiol* 28: 67-72.
38. Daniell HW (1983) Postmenopausal tooth loss. Contributions to edentulism by osteoporosis and cigarette smoking. *Arch Intern Med* 143: 1678-1682.
39. Linden GJ, Mullally BH (1994) Cigarette smoking and periodontal destruction in young adults. *J Periodontol* 65: 718-723.
40. Axelsson P, Paulander J, Lindhe J (1998) Relationship between smoking and dental status in 35-, 50-, 65-, and 75-year-old individuals. *J Clin Periodontol* 25: 297-305.
41. Ylöstalo P, Sakki T, Laitinen J, Järvelin MR, Knuuttila M (2004) The relation of tobacco smoking to tooth loss among young adults. *Eur J Oral Sci* 112: 121-126.
42. Hahn P, Reinhardt D, Schaller HG, Hellwig E (1999) Root lesions in a group of 50-60 year-old Germans related to clinical and social factors. *Clin Oral Investig* 3: 168-174.
43. Kirkevang LL, Wenzel A (2003) Risk indicators for apical periodontitis. *Community Dent Oral Epidemiol* 31: 59-67.
44. Bergström J, Babcan J, Eliasson S (2004) Tobacco smoking and dental periapical condition. *Eur J Oral Sci* 112: 115-120.
45. Hjert A, Grindeffjord M, Sundberg H, RoÅven M (2001) Social inequality in oral health and use of dental care in Sweden. *Community Dent Oral Epidemiol* 29: 167-174.
46. Jamieson LM, Thomson WM (2006) Adult oral health inequalities described using area-based and household-based socioeconomic status measures. *J Public Health Dent* 66: 104-109.
47. Unell L, Söderfeldt B, Halling A, Birkhed D (1999) Explanatory models for clinically determined and symptom-reported caries indicators in an adult population. *Acta Odontol Scand* 57: 132-138.
48. Riley JL 3rd, Gilbert GH, Heft MW (2006) Dental attitudes: proximal basis for oral health disparities in adults. *Community Dent Oral Epidemiol* 34: 289-298.
49. Bailit H, Newhouse J, Brook R, Duan N, Goldberg G, et al. (1985) Does more generous dental insurance coverage improve oral health? *J Am Dent Assoc* 110: 701-707.