Oral Health among 35- to 44-Year-Old Iranians

Hossein Hessari^{a, b} Miira M. Vehkalahti^a Mohammad J. Eghbal^b
Heikki T. Murtomaa^a

^aDepartment of Oral Public Health, Institute of Dentistry, University of Helsinki, Helsinki, Finland;

^bDepartment of Community Oral Health, School of Dentistry, Shaheed Beheshti Medical University, Tehran, Iran

Key Words

Oral health, adults • Iran, caries • Periodontal pockets

Abstract

Objective: To investigate the oral health status of 35- to 44-year-old Iranians in relation to gender, place of residence and education. **Subjects and Methods:** In 2002, data (n = 8,301) were collected as part of a national survey using WHO criteria for sampling and clinical diagnoses across 28 provinces by 33 calibrated examiners who performed examinations under a dental light with a WHO probe. The study sample was 8,301; male: 3,625 and female: 4,676; urban: 4,854 and rural: 3,447. Oral health status was assessed by number of decayed (DT), filled (FT) and missing (MT) teeth and by DMFT and need for periodontal treatment [community periodontal index for treatment needs (CPITN)] indices. Gender, age, place of residence and level of education served as socio-demographic information. Estimates were adjusted for the 35- to 44-year-old provincial population. ANOVA, χ^2 test and logistic regression analysis with odds ratios (OR) and their 95% confidence intervals (CI) were the methods of statistical evaluation used. **Results:** The mean number of teeth was 21.5 ± 6.2 , with DMFT: 11.0 ± 6.4 , DT: 2.6 ± 2.7 , and FT: 1.8 ± 3.2 . DT existed in 6,080 (73%) of the subjects and FT in 3,209 (41%). The mean number of FT was greater ($p < 0.001$) among urban residents, women and those with a higher lev-

el of education. Only 1% had a CPITN of 0; 6% exhibited bleeding, 40% had calculus, 43% shallow and 10% deep pockets. Illiterate subjects were more likely to have DT (OR = 1.6, 95% CI = 1.4–1.8) and calculus or periodontal pockets (OR = 6.3, 95% CI = 5.1–7.8). **Conclusion:** The findings indicate an impaired oral health status in Iranian adults, particularly those of low social status and educational level.

Copyright © 2007 S. Karger AG, Basel

Introduction

Oral diseases burden nearly all adults in many industrialized countries [1] and incur heavy financial costs when treated [2]. Filled teeth (FT) dominate most of the high caries experience in industrialized countries, whereas in developing countries, despite their lower caries experience, missing teeth (MT) or decayed teeth (DT) comprise most of this as measured by the DMFT index [3]. For example, 90% of all dentate adults in the UK have at least 1 filled tooth [4] and 63% of Chinese aged 35–44 have dental caries [5]. However, it has been stated that in the future, adults are likely to retain their natural teeth through adulthood [6].

Discrepancies in oral health status reflect behavioural aspects as well as various socio-economic and environmental factors for countries and within population groups

[6]. According to data available, the mean DMFT for adults ranges from 5 to 16, and periodontal problems are common in Eastern Mediterranean region (EMR) countries [3]. In Lebanon [7], 34% of DMFT 16 is due to FT, and in Morocco [3], 55% of it is due to MT. Low-income countries and disadvantaged marginalized societies can afford only limited dental treatments [8], thus resulting in a greater number of MT. Oral health outcomes are related to socio-economic and environmental status as well as levels of income, urbanization and access to health services in the community [6].

Updated data on adults' oral health for the EMR countries are few, and many of them are based on samples that are not representative [9]. Similarly, no national data exist for adult Iranians. In Iran, as a consequence of a high migration rate toward urban areas [10] and a rather high adult illiteracy rate, they may soon be at risk of increased oral diseases. Therefore, the objective of this study was to conduct a national survey to evaluate oral health among adult Iranians aged 35–44 in relation to their gender, place of residence and level of education.

Methods and Materials

The present data were part of a national survey conducted in Iran in 2002 under the supervision of the Oral Health Department at the Ministry of Health and Medical Education and the Iran Centre for Dental Research. The Ethics Committee in the School of Dentistry, Shaheed Beheshti Medical University, and the Oral Health Department, Ministry of Health, approved the present study.

Sampling

The population of Iran in 2002 exceeded 68 million, with 66% living in urban areas. The target population for the present study included all 35- to 44-year-old Iranians living in Iran. Stratified cluster random sampling followed the WHO guidelines [11]. Within each of the 28 provinces, and separately in the capital, Tehran, 15 clusters were defined and divided according to provincial urban/rural ratio. For rural households, subjects were selected from existing lists in governmental health centres and for urban households from lists prepared following a national polio vaccination programme conducted in 1996.

The supreme health authorities of the province sent letters inviting subjects to their nearest dental health centre. Participation was voluntary and as an incentive subjects received a toothbrush and toothpaste. Any subject requiring emergency service was referred to a dentist. The present sample of 8,301 represented 7,552,000 adult Iranians. The mean age of the subjects was 39.4 years. A comparison of the present 35- to 44-year-old Iranians and corresponding census data in Iran is shown in table 1. Of all, 3,625 were male and 4,676 female; 4,854 were urban and 3,447 rural; and 2,421 were illiterate, 4,291 with low, 1,061 with medium and 528 with high level of education.

Table 1. Comparison of 35- to 44-year-olds (n = 8,301) in the sample with the population census 1996 [10] by gender

	Men		Women	
	n = 3,625	national data	n = 4,676	national data
Place of residence				
Urban	57	69	60	68
Rural	43	31	40	32
Education				
Illiterate	18	15	38	32
Low	56	50	48	45
Medium	16	25	10	19
High	10	10	4	4
Total	44	51	56	49

Values are percentages.

Examiners and Calibration

Examiners were in their last year of studies in general dentistry, each having had 10 years of experience as an oral therapist. The examiners received 4 days of training and calibration, including a workshop on theory, a package with written information and instructions, coloured pictures, schematic dental casts of various clinical findings, and a pre-practical and practical phase, with 10–15 subjects examined by each examiner. Final agreement for the 33 examiners, evaluated with kappa values for DMFT, DT, FT, MT, number of teeth and community periodontal index for treatment needs (CPITN) ranged between 0.6 and 0.9.

Data Collection

A brief interview prior to the clinical examination ascertained subjects' date of birth, gender, place of residence (urban or rural) and level of education in 6 categories, later reduced to 4: illiterate, low (primary, secondary or high school), medium (high school diploma) and high (any university education) to minimize reporting bias by the subjects.

Clinical examinations were conducted to record the number of teeth and dental and periodontal status. The instruments, examination procedures and diagnostic criteria followed WHO recommendations [11]. A flat mouth mirror, disclosing tablet and a WHO probe by Dentsply™ were used to examine the subjects under a dental light. Dental status was diagnosed for all teeth except for wisdom teeth. The number of teeth, DT and FT were recorded separately for anterior and posterior teeth. Need for periodontal treatment (CPITN) was described according to the highest score of the index and as mean numbers of sextants containing at least 2 functional teeth with each index score.

Data Processing and Analysis

Data were entered in Epi Info 6 format with check points and by double entry of 10% of the cases. Because the same number of subjects was sampled for each province, the estimates of oral health were adjusted according to the proportion of provincial populations of the corresponding age group [10, 11]. Differences

Table 2. Means of dental health indicators by gender, place of residence and level of education in 35- to 44-year-old Iranians (n = 8,301)

	Subjects	Teeth	Sound teeth	DT	MT	FT	DMFT
Men	3,625	21.7 ± 6.0*	17.4 ± 6.2	2.6 ± 2.6*	6.3 ± 6.0*	1.7 ± 2.9	10.6 ± 6.2
Place of residence							
Urban	2,068	22.0 ± 5.9	17.4 ± 6.2*	2.5 ± 2.7	6.0 ± 5.9	2.1 ± 3.1	10.6 ± 6.2*
Rural	1,557	20.9 ± 6.0	17.5 ± 6.3*	2.7 ± 2.5	7.1 ± 6.0	0.6 ± 1.7	10.5 ± 6.3*
Level of education							
Illiterate	644	19.7 ± 6.7	16.6 ± 7.0	2.7 ± 2.7	8.3 ± 6.7	0.4 ± 1.2	11.4 ± 7.0
Low	2,026	21.2 ± 6.1	17.4 ± 6.4	2.8 ± 2.6	6.8 ± 6.1	1.0 ± 2.2	10.6 ± 6.4
Medium	596	23.0 ± 5.1	17.8 ± 5.8	2.4 ± 2.7	4.9 ± 5.1	2.9 ± 3.3	10.2 ± 5.7
High	359	23.7 ± 4.6	18.2 ± 5.3	1.9 ± 2.4	4.3 ± 4.6	3.6 ± 3.7	9.8 ± 5.3
Women	4,676	21.4 ± 6.5*	16.7 ± 6.5	2.6 ± 2.7*	6.6 ± 6.5*	2.1 ± 3.4	11.3 ± 6.5
Place of residence							
Urban	2,786	21.8 ± 6.3	16.6 ± 6.4	2.5 ± 2.7	6.2 ± 6.3	2.7 ± 3.8	11.4 ± 6.4*
Rural	1,890	20.4 ± 6.6	16.9 ± 6.5	2.9 ± 2.7	7.6 ± 6.6	0.6 ± 1.7	11.1 ± 6.5*
Level of education							
Illiterate	1,777	19.5 ± 7.2	16.3 ± 7.1	2.8 ± 2.7	8.5 ± 7.2	0.4 ± 1.5	11.7 ± 7.1
Low	2,265	21.3 ± 6.3	16.7 ± 6.4	2.8 ± 2.8	6.7 ± 6.3	1.9 ± 3.0	11.4 ± 6.4
Medium	465	24.3 ± 3.8	17.8 ± 5.5	1.9 ± 2.4	3.7 ± 3.8	4.6 ± 4.3	10.2 ± 5.5
High	169	25.2 ± 3.4	16.9 ± 5.1	1.9 ± 2.6	2.8 ± 3.4	6.3 ± 4.5	11.1 ± 5.1
Total		21.5 ± 6.2	17.0 ± 6.4	2.6 ± 2.7	6.6 ± 6.3	1.8 ± 3.2	11.0 ± 6.4

Values are means ± SD. Statistical evaluation by ANOVA, * $p > 0.05$; $p < 0.05$ for all differences between the genders and separately for men and women according to socio-demographic information. All estimates adjusted to reflect the provincial population percentage of the 35- to 44-year-old population.

between the subgroups were evaluated by ANOVA for mean values and by the χ^2 test for frequencies. Logistic regression models were fitted to the data to evaluate the strength of the relationships between factors and oral health indices. The corresponding results were expressed as odds ratios (OR), and their 95% confidence intervals (95% CI) were calculated.

Results

Dental Status

The 35- to 44-year-olds had an average of 21.5 ± 6.2 teeth, 17.0 ± 6.4 of which were sound (table 2). Ten percent of subjects had all their teeth, with higher figures for those who had higher education ($p < 0.001$). DT = 0 was found in 2,221 subjects (27%), 1,287 subjects (16%) had 1 DT, 3,092 (37%) 2–4 DT and 1,701 (20%) more. Intact dentition (DMFT = 0) was found in 158 (2%), 715 (8%) had 1–3 DMFT, 3,458 (42%) 4–10 DMFT and 3,970 (48%) more than 10 DMFT.

Subjects with tooth loss had a higher mean value of DT (2.7 vs. 1.6) and fewer FT (1.7 vs. 2.4). For all subjects, the M component (60%) dominated in the DMFT (DT =

24%, FT = 16%). One or more DT was more likely among rural residents (OR = 1.4, 95% CI = 1.3–1.4) and illiterate subjects (OR = 1.6, 95% CI = 1.4–1.8).

The mean number of FT was greater ($p < 0.001$) among urban residents, women and those with a higher level of education (table 2). Among all subjects, 5,092 (59%) had no FT, 1,549 (20%) had 1–3 and 1,660 (21%) 4 or more. One or more FT was more prevalent among urban than rural residents (50% vs. 18%; $p < 0.001$) and among the highly educated than the illiterate (77% vs. 14%). Posterior teeth dominated (80%) in FT. Of the subjects with current dental caries (DT > 0), 62% had no FT and the rest had a mean FT number of 4.1 ± 3.2 . For those without DT (DT = 0), the mean FT number was 2.9 ± 4.0 . One or more FT was more likely among women (OR = 1.5, 95% CI = 1.3–1.8), urban residents (OR = 3.0, 95% CI = 2.5–3.7) and those with higher levels of education (OR = 2.9, 95% CI = 2.6–3.3).

Periodontal Status

No gingivitis, no calculus and no pocket formation were found only in 1% of subjects having at least 1 sextant

Table 3. Distribution of subjects with at least 1 sextant containing 2 functional teeth or more according to their maximum need for periodontal treatments (CPITN) by gender, place of residence and level of education in 35- to 44-year-old Iranians (n = 7,949)

	Subjects	Healthy	Bleeding	Calculus	Shallow pocket	Deep pocket
Men	3,516	45 (1)	140 (4)	1,294 (37)	1,580 (45)	457 (13)
Place of residence						
Urban	2,006	24 (1)	87 (4)	748 (37)	885 (44)	262 (13)
Rural	1,510	21 (1)	53 (4)	546 (36)	695 (46)	195 (13)
Level of education						
Illiterate	615	3 (0)	14 (2)	208 (34)	291 (48)	99 (16)
Low	1,955	23 (1)	68 (4)	712 (37)	907 (46)	245 (12)
Medium	591	10 (2)	41 (7)	225 (38)	239 (40)	76 (13)
High	355	9 (3)	17 (5)	149 (42)	143 (40)	37 (10)
Women	4,433	68 (2)	244 (5)	1,942 (44)	1,819 (41)	360 (8)
Place of residence						
Urban	2,662	44 (1)	171 (8)	1,174 (42)	1,066 (41)	207 (8)
Rural	1,771	24 (1)	73 (5)	768 (45)	753 (42)	153 (7)
Level of education						
Illiterate	1,625	10 (1)	45 (3)	731 (45)	689 (42)	150 (9)
Low	2,180	35 (2)	121 (6)	945 (43)	912 (42)	167 (7)
Medium	459	14 (3)	59 (13)	186 (41)	165 (36)	35 (7)
High	169	9 (5)	19 (12)	80 (47)	53 (31)	8 (5)
Total	7,949	113 (1)	384 (6)	3,236 (40)	3,399 (43)	817 (10)

Statistical evaluation by χ^2 test; $p < 0.05$ for all differences between the genders and separately for men and women according to socio-demographic information. All percentages adjusted by provincial population percentage of the 35- to 44-year-old population. Figures in parentheses are percentages.

with 2 or more functional teeth and 43% had 1 or more shallow pockets (table 3). The mean number of the sextants according to each CPITN score for the subgroups by socio-demographic information is shown in figure 1. Of the subjects, 90% had no sextant with deep pocket, 5% had 1 and 5% 2–4 such sextants (table 4). One in four (24% of subjects) had no sextants with calculus. The findings showed significant differences for dental and periodontal indices by socio-demographic factors. Having calculus or pocket was more likely to be present among men (OR = 1.8, 95% CI = 1.6–2.0) and illiterate subjects (OR = 6.3, 95% CI = 5.1–7.8).

Discussion

Adults aged 35–44 comprise 13% of the total and 32% of the active population (20–60 years old) in Iran [10]. Increased understanding of the aetiology of major oral diseases today gives a good basis for implementation of oral health programmes [12]. The findings of this study

Fig. 1. Mean numbers of sextants for each need for periodontal treatment (CPITN) code by gender, place of residence and level of education in Iranian 35- to 44-year-olds (n = 7,949).

Table 4. Distribution of need for periodontal treatment (CPITN) scores in 35- to 44-year-old Iranians (n = 7,949) according to number of sextants

	Sextants						
	0	1	2	3	4	5	6
Healthy	73	12	6	4	2	2	1
Bleeding	41	22	15	10	7	4	1
Calculus	24	27	17	13	9	6	4
Shallow pocket	50	17	14	9	6	3	1
Deep pocket	90	5	3	1	1	0	0

Figures are percentages. All estimates adjusted by the provincial proportions of the 35- to 44-year-old population.

indicate that almost all of the subjects suffered from a substantial number of dental and periodontal problems, consistent with worldwide reports for the majority of countries [1].

The present study, performed as part of the disease surveillance through the primary health care system, the Ministry of Health, had a number of intrinsic barriers [4, 13] that included gaining access to distant villages and locating the target subjects in large cities. Nevertheless, Iran's pervasive network of primary health care, covering 95% of rural and 50% of urban areas [14], and the assistance of local health authorities in supplying appropriate transport both contributed a high compliance. An extensive sample, a sufficient number of clusters to cover all subgroups of the population and random sampling using a valid registry list resulted in a representative sample (table 1).

In comparison with the worldwide map on oral health provided by the WHO [2] for 35- to 44-year-olds, Iranian adults were found to have a moderate level of dental caries. The mean number of MT in the present study is higher than that for other EMR countries, except for recent data from Morocco [3] and Lebanon [7], which reported figures similar to ours. The notable differences between Iran and some industrialized countries with similarly high DMFT is highlighted as the dominant proportion of MT (60%) for Iran, compared to high proportions of FT in France (71%) [15], the UK (63%) [5] and Finland (70%) [16]. For urban areas, the proportion of FT to DMFT is still low, regardless of the 1:2,800 dentist/population ratio [10]. In rural areas the low mean number of FT is probably due to economic barriers to access to dental treatments and disparity of dental services. The present findings showing poor oral health and low FT numbers for

rural residents and for those at lower levels of education are consistent with earlier reports [6, 17].

The CPITN recordings have been applied in several studies worldwide [18–21], since it has been recommended by the WHO to increase the international uniformity of epidemiological studies in periodontology. Standard recordings did not include direct measures of tissue destructions, which have been considered as limitation of the index [19, 22]. The low number of healthy sextants may be a reflection of inadequate preventive self-care as well as of professional services. In the present study high calculus rates among both women and men with high education indicate either inefficient periodontal treatments or dentists' lack of appreciation for periodontal care.

The prevalence of deep periodontal pockets (10%) is within the range of worldwide reports for adults [23] and resembles that of Western Europe (9%), and the prevalence of shallow pockets (43%) resembles that of Eastern Europe (45%) [24]. Higher frequencies of periodontal problems among rural residents are consistent with CPITN data from China [4]. Fewer than 20% of Chinese adults exhibit shallow or deep pockets; this is much lower than what current data indicate.

Based on the WHO data bank, the present results contribute to the data available in the EMR [3]. While Iran has enjoyed integrated preventive oral health services since 1995, these services are available only to children and pregnant women [25]. The present findings highlight the need to extend these services to adults. The uneven distribution of dental fillings according to socio-demographic characteristics reflects inequalities in access to care and the high percentage of unhealthy sextants indicates a lack of appreciation of the effectiveness of self-care.

Conclusion

The findings indicate impaired oral health status in Iranian adults, particularly those of low social status and educational level.

Acknowledgements

We thank the WHO offices in the EMR and Tehran; Dr. Saeed Asgari for his administrative support and Dr. Hamid Samadzadeh and Dr. Mohammad R Safavi for their cooperation during the data collection.

References

- Petersen PE, Bourgeois D, Ogawa H, Estupinan-Day S, Ndiaye C: The global burden of oral diseases and risks to oral health. *Bull World Health Organ* 2005;83:661–669.
- 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):3–24.
- World Health Organization: Global oral health data bank. Geneva, World Health Organization, 2004.
- Nuttall N, Steele JG, Nunn J, Pine C, Treasure E, Bradnock G, Morris J, Kelly M, Pitts NB, White D: A Guide to the UK Adult Dental Health Survey 1998. London, British Dental Association, 2001.
- Wang HY, Petersen PE, Bian JY, Zhang BX: The second national survey of oral health status of children and adults in China. *Int Dent J* 2002;52:283–290.
- Petersen PE: Sociobehavioural risk factors in dental caries – international perspectives. *Community Dent Oral Epidemiol* 2005;33: 274–279.
- Doughan B, Kassak K, Bourgeois DM: Oral health status and treatment needs of 35–44-year-old adults in Lebanon. *Int Dent J* 2000; 50:395–399.
- Robert Y, Sheiham A: The burden of restorative dental treatment for children in Third World countries. *Int Dent J* 2002;52:1–9.
- Taani DS: Oral health in Jordan. *Int Dent J* 2004;54(suppl 1):395–400.
- Statistical Centre of Iran: Iran Statistical Yearbook 2002. Tehran, Statistical Centre of Iran, 2002.
- World Health Organization: Oral health surveys – basic methods, ed 4. Geneva, World Health Organization, 1997.
- Bratthall D, Hansel-Petersson G, Sundberg H: Reasons for the caries decline: what do the experts believe? *Eur J Oral Sci* 1996;104:416–422.
- Schwarz E, Zhang HG, Wang ZJ, Lin HC, Lo EC, Corbet EF, Wong MC: An Oral Health Survey in Southern China, 1997: background and methodology. *J Dent Res* 2001;80:1453–1458.
- Website of Ministry of Health of I. R. Iran: <http://www.mohme.gov.ir/>.
- Hescot P, Bourgeois D, Doury J: Oral health in 35–44-year-old adults in France. *Int Dent J* 1997;47:94–99.
- Suominen-Taipale L, Nordblad A, Vehkalahti M, Aronaa A (eds): Suomalaisten aikuisten suunterveys. Terveys 2000-tutkimus (summary in English: Oral health among the Finnish adults. Health 2000 -health examination survey). Publications of the National Public Health Institute B16/2004. Helsinki, Hakapaino Oy, 2004, pp 73–87. http://www.ktl.fi/attachments/suomi/julkaisut/julkaisusarja_b/2004b16.pdf
- Miura H, Araki Y, Haraguchi K, Arai Y, Umenai T: Socioeconomic factors and dental caries in developing countries: a cross-national study. *Soc Sci Med* 1997;44:269–272.
- Bourgeois D, Hescot P, Doury J: Periodontal conditions in 35–44-year-old adults in France, 1993. *J Periodontol Res* 1997;32:570–574.
- Pilot T, Barmes DE: An update on periodontal conditions in adults, measured by CPITN. *Int Dent J* 1987;37:169–172.
- Schurch E Jr, Minder CE, Lang NP, Geering AH: Periodontal conditions in a randomly selected population in Switzerland. *Community Dent Oral Epidemiol* 1988;16:181–186.
- Österberg T, Carlsson GE, Sundh W, Fyhrlund A: Prognosis of and factors associated with dental status in the adult Swedish population, 1975–1989. *Community Dent Oral Epidemiol* 1995;23:232–236.
- Baelum V, Papapanou PN: CPITN and the epidemiology of periodontal disease. *Community Dent Oral Epidemiol* 1996;24:367–368.
- Bourgeois DM, Llodra JC: Health Surveillance in Europe – European Global Oral Health Indicators Development Project. Report Proceedings. Paris, Quintessence International, 2003, p 85.
- Sheiham A, Netuveli GS: Periodontal diseases in Europe. *Periodontol* 2000 2002;29:104–121.
- Pakshir HR: Oral health in Iran. *Int Dent J* 2004;54(suppl 1):367–372.