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What determines utilization of dental care services? The case of Iran

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Original Article

Abstract

BACKGROUND AND AIM: Identifying the factors affecting utilization of dental services is one of the best ways to improve the health status. This study aimed to investigate the effective factors on utilization of dental services.

METHODS: In this cross-sectional study, 1185 household heads were selected randomly, and using a researcher-made questionnaire based on World Health Organization (WHO) Global Health Survey and Andersen behavioral model, and through multivariate logistic regression, the predictors of visiting a dentist during 1 year ago were investigated in 2017. The households' income inequality in utilization of dental services was analyzed using concentration indices (CIs) and Pearson chi² in STATA software.

RESULTS: The predictor of dental visit during 1 year ago for men was having decayed teeth [odds ratio (OR) = 1.3, P = 0.030], and the predictors for women were lower ages (OR = 0.8, P = 0.001 for 19-29 years old and so on), having 32 natural teeth (OR = 0.7, P = 0.020), and employment (OR = 1.3, P = 0.048). The common predictors were increase in education level (OR = 1.4, P = 0.001 for men, and OR = 1.7, P = 0.001 for women with university degree), brushing (OR = 1.9; P = 0.001 for women, and OR = 1.3; P = 0.040 for men), and having supplementary insurance (OR = 1.7, P = 0.001 for men, and OR = 1.9, P = 0.001 for women). Being burdensome of dental care costs during 3 years ago (CI: -0.074, P = 0.001), avoiding visiting a dentist during 1 (CI: -0.501, P = 0.001) and 3 (CI: -0.501, P = 0.001) years ago because of its costs, and failure to do all dentistry recommendations during 3 years ago (CI: -0.516, P = 0.001) happen more frequently among the poor. Moreover, the poor used all dental services such as scaling (CI: -0.638, P = 0.001), filling (CI: -0.458, P = 0.001), and root canal (CI: -0.524, P = 0.001) less than the rich.

CONCLUSION: Dental health status is negatively affected by population socio-economic situation; therefore, it is necessary to implement policies to improve access to dental services among the undeserved.

KEYWORDS: Utilization; Dental Care; Iran

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Dental diseases, although preventable, are the most chronic diseases in the world. So that, more than 3 billion people suffer from untreated dental decay. Periodontal diseases have a very negative impact on life quality.¹ Treatment of dental diseases is expensive and

considerable, so that the costs amount to US\$ 442 billion worldwide.² A high attention has been paid to socio-economic inequality in accessing and utilization of dental care services in different countries. For example, Borrell and Crawford reported difference in prevalence of periodontal diseases on the

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basis of income, education, and race in United States (US).³ Sabbah et al. stated worse self-reporting of dental health among people with low education and income.⁴ Wamala et al. indicated the correlation between poor socio-economic situation and decrease in using dental care and poor dental health status.⁵

A systematic review and meta-analysis study indicated that deteriorating socio-economic situation increased dental decay.⁶ One of the main causes of this is poor access to dental care because of direct out of pocket for dental care.⁷ However, out of pocket payment for dental care is usually higher than medical care, so that inequality in using dental care is higher than medical care.⁸ Therefore, people are forced to spend their limited resources in food and shelter,⁹ but if families spend catastrophically high proportion of their income in health care, high horizontal inequality happen.¹⁰ Although different researchers in different countries have studied the relation between socio-economic situation and access to dental care,¹¹⁻¹³ there is not a thorough study in Iran.

On the basis of a national survey of dental health, administered by dental health office of Iran health ministry, in which educated dentists examined dental health situation of people all over the country, dental health indices of people of Kerman City-located in the south east of Iran- were in the mean of the country. For example, only about the adults who were the age group of this study, the percentage of edentulous in 35-44 years old age group in Kerman was 3.6% and in Iran was 4.0, the mean of decayed, missed and filled teeth (DMFT) index in 65-74 years old age group was 27.73% and in Iran was 25.71%, and the percent of population who needed dental care in 65-74 years old group in Kerman was 54.5 and in Iran was 45.9%. Other indices are similar, too.¹⁴ So, Kerman is in the mean or near mean of the country in terms of many dental indices.

Moreover, the type of services provided by public centers is the same in different

provinces; also the private sector delivers same services along the country. The services tariff is the same along the country and is coordinated and determined by health ministry, and the services covered and administered by health insurances are the same all over the country.¹⁵ Thus, because of these similarities between different cities of Iran, we selected Kerman as a representative of Iran population to investigate the effect of socioeconomic inequality on utilization of dental services.

Methods

The data of this descriptive-analytical study were collected in 3 first months of 2017. Kerman city population was 534441 people on the basis of Iran 2012 census. The Cochran formula was used to estimate the needed samples. Since there was no previous study about utilization of dental care in Iran, we put P-value equal to 0.5 to obtain the most sample size. Therefore, the sample size was estimated 1065, and to increase the accuracy, 1158 people were entered to the study.

The questionnaires were completed by visiting house to house. The participants were head of households with every type of socio-economic status. If one household head did not respond to the trained interviewers, the next household head was entered to the study to obtain exactly 1158 completed questionnaires. The samples were selected through multi-stage random sampling. All of the households in Kerman are covered by 35 health centers. Therefore, proportional to the population covered by each center, the number of samples for each center was determined. For each health center, one house was selected randomly on the basis of municipality plaque. After completing the first questionnaire for the first house, by moving to the right of the first house door, other questionnaires were completed. This process was performed for other health centers. The interviewers were undergraduate students of Kerman University of Medical Sciences who were

trained before the onset of the study.

The researcher-made questionnaire was used for collecting data. This questionnaire was designed by the study researchers based on World Health Organization (WHO) questionnaire of "Global Health Survey, 2003" for assessment of health systems performance¹⁶ and also Andersen behavioral model.¹⁷ In Andersen behavioral model, using health services is a function of predisposing, enabling, and need factors. The predisposing factors were demographic variables (age and gender), social situation (education level and employment), and attitudes and beliefs (brushing). The enablers were supplementary insurance and income rate, and lastly the need factors were the number of natural teeth, decayed teeth, and using dentures. The effect of these factors on visiting a dentist during last year was measured using multiple logistic regression. The adjusted odds ratio (AOR) was obtained with 95% confidence interval (CI).

In the next step, the situation of dental services utilization among the rich and the poor households' heads was investigated using following questions:

Q1: How often do you visit a dentist for check-up? 1- Never 2- Only when necessary 3- Less than once a year 4- Once a year 5- More than once a year

Q2: When was the last time you visited a dentist? 1- Never 2- I do not remember 3- More than 5 years ago 4- 3-5 years ago 5- 1-3 years ago 6- Less than one year ago

Q3: If you used dental care during 3 years ago, has been its cost burdensome for you? 1- Yes 2- No

Q4: Have you avoided or postponed visiting a dentist during 3 years ago because of its costs? 1- Yes 2- No

Q5: Have you avoided doing all your dentist' recommendations because of their costs? 1- Yes 2- No

Q6: Have you avoided or postponed visiting a dentist during 1 year ago because of its costs? 1- Yes 2- No

Q7: If the response of Q6 is yes, for which

following services did you avoid visiting a dentist? 1- Examination and radiography 2- Scaling and preventive services 3- Filling 4- Prosthesis 5- Extracting 6- Dental surgery 7- Root canal 8- Tooth infection 9- Orthodontic 10- Other services.

Content validity, experts' opinions, and literature review were used to confirm the questionnaire validity. Test-retest method was used to confirm reliability, so that 10 participants were selected and the questionnaires were presented to them. After 15 days, the questionnaires were presented to them, again. The calculated Cronbach's alpha coefficient was 85%; so, the questionnaire reliability was confirmed. The level of difficulty, the degree of mismatch, ambiguity in the expressions, and shortcomings in the meaning of the words were assessed to confirm face validity of the questionnaire. For this, 20 questionnaires were completed by the target group under the supervision of the researchers.

Equivalent household income was categorized as follows: < 10, 10-30, 30-50, > 50 million Rials (Iran monetary unit). The exchange rate for the US dollars and Iranian Rial at the time of this study was one US dollar being equal to 37340 Iranian Rial. On the basis of age, the participants were classified into 6 categories: 19-29, 30-39, 40-49, 50-59, 60-69 and > 70 years old. Moreover, the family members were classified into 2, 3, 4, 5, 6, 7, 8 members.

Concentration index (CI) is one of the ways to measure inequality in health care.⁹ The concentration curve depicts the cumulative percent of health against the cumulative percent of their economic situation. The amount of CI is in the range of -1 to +1. If the considered health situation distributes equally between persons with different socio-economic situation, the concentration curve coincides on the 45-degree line and its value becomes zero. When the concentration curve locates above the 45-degree line, the CI becomes negative which means the concentration of considered health index in the poor, and when it locates

below the line 45 degree, the CI becomes positive which means the concentration of considered health index in the rich. The least amount which concentration curve can take is -1 which means all of health is located in the hands of the poor, and the most amount which concentration curve can take is +1 which means all of health is located in the hands of the rich.¹⁸

CI is obtained from the following equation:

$$2\sigma_r^2 \left(\frac{y_i}{\mu} \right) = \alpha + \beta r_i + \varepsilon_i$$

y_i is the considered health utilization index, μ is its mean, r_i is the fractional rank of individual $i = i/n$ in the living standard distribution. $i = 1$ is for the poorest person in the distribution and $i = n$ is for the richest person in the distribution. σ_r^2 is the variance of the fractional rank and β as an estimation of CI obtained from the ordinary least squares estimation.⁹

The situation of dental utilization and its relation with predisposing and empowering variables were assessed using Pearson chi² and

CI. The CI method was used to quantify the degree of socioeconomic inequality in dental care use. P-values under 0.05 were considered as statistically significant. All analyses performed using STATA software (version 13.1, Stata Corp, College Station, TX, USA).

Before collecting the data, the written permission and ethical code were obtained from the Ethical Committee of Kerman University of Medical Sciences (Ethical code number: IR.KMU.REC.1395.363). Also, before completing the questionnaires, the consent of participants was obtained. This study was performed on the basis of Helsinki Declaration.

Results

As table 1 indicates, dental visit has not been significantly higher or lower than the reference age group for men during 1 year ago, but dental visit has decreased significantly by increasing in women age during 1 year ago, so that the most dental visit occurred in 19-29 years old age group (OR = 0.8, P = 0.001). In both genders, dental visit increased by increase in education and income level during 1 year ago.

Table 1. The effect of predisposing, enabling, and need factors on visiting a dentist during 1 year ago

Variables	Men (n = 956)			Women (n = 202)			
	OR	95% CI	P	OR	95% CI	P	
Age (year)	19-29	Ref		Ref			
	30-39	1.0	0.7-1.1	0.860	0.8	0.6-0.9	0.001
	40-49	1.2	0.9-1.3	0.210	0.8	0.6-1.0	0.010
	50-59	1.0	0.9-1.1	0.660	0.7	0.6-0.7	0.010
	60-69	1.1	0.9-1.3	0.190	0.5	0.3-0.7	0.001
	+70	1.2	0.9-1.3	0.300	0.6	0.5-0.7	0.001
Education	< High school	Ref		Ref			
	High school	1.3	1.1-1.5	0.040	1.4	1.3-1.5	0.001
	University	1.4	1.2-1.6	0.001	1.7	1.5-2.0	0.001
Income (US dollar)	267-803	Ref		Ref			
	803-1339	1.3	1.0-1.6	0.020	1.3	1.0-1.7	0.030
	> 1339	1.4	1.1-1.6	0.001	1.6	1.4-1.9	0.001
Employment	Not in employment	Ref		Ref			
	In employment	1.0	0.9-1.3	0.810	1.3	1.0-1.5	0.050
Brushing	Less often or never	Ref		Ref			
	Once a day or more	1.3	1.0-1.5	0.050	1.9	1.6-2.2	0.001
Dentition status	All 32 teeth	Ref		Ref			
	Some decayed	1.3	1.0-1.6	0.030	0.7	0.5-1.0	0.020
	Edentulous	0.8	0.7-1.0	0.030	0.8	0.6	> 0.999
Supplementary insurance	No	Ref		Ref			
	Yes	1.7	1.4-2.0	0.001	1.9	1.6-2.2	0.001

OR: Odds ratio; CI: Confidence interval

Table 2. Concentration index and Pearson chi² of income inequality in visiting a dentist

Variable	Estimate	SE	LB	UB	Pearson chi ²	P
Question 1	0.107	0.006	0.094	0.118	664.938	0.001
Question 2	0.111	0.003	0.104	0.117	589.508	0.001
Question 3	-0.070	0.008	-0.090	-0.058	229.923	0.001
Question 4	-0.501	0.015	-0.531	-0.470	780.267	0.001
Question 5	-0.516	0.016	-0.548	-0.484	702.035	0.001
Question 6	-0.503	0.015	-0.533	-0.472	825.778	0.001

SE: Standard error; LB: Lower bound; UB: Upper bound

Q1: How often do you visit a dentist for check-up? Q2: When was the last time you visited a dentist? Q3: If you used dental care during 3 years ago, has been its cost burdensome for you? Q4: Have you avoided or postponed visiting a dentist during 3 years ago because of its costs? Q5: Have you avoided doing all your dentist' recommendations because of its costs? Q6: Have you avoided or postponed visiting a dentist during 1 year ago because of its costs?

P-values under 0.05 were considered as significant ($P < 0.05$).

For example, the OR of dental visit in men and women with university education was 1.4 ($P = 0.001$) and 1.7 ($P = 0.001$), respectively, which was higher than the reference group during 1 year ago. Moreover, the OR of dental visit in household heads with income level higher than US\$1339 was 1.4 ($P = 0.001$) and 1.6 ($P = 0.001$) for men and women, respectively.

Dental visit in the employed men was not significantly different from the unemployed men during 1 year ago, but in employed women dental visit has been significantly higher than others (OR = 1.3, $P = 0.048$). The persons with regular brushing visited a dentist significantly more than others in 1 year ago, which this ratio was higher among women (OR = 1.9, $P = 0.001$) compared to men (OR = 1.3, $P = 0.040$).

The persons with dentures visited a dentist significantly less than the persons with 32 natural teeth during 1 year ago. The men with decayed teeth visited a dentist significantly more than the men with 32 natural teeth (OR = 1.3, $P = 0.030$), but the women with decayed teeth visited a dentist significantly less than the women with 32 natural teeth (OR = 0.7, $P = 0.020$). The persons with supplementary insurance visited a dentist significantly more than others during 1 year ago, which this visit was higher in women (OR = 1.7, $P = 0.001$) than men (OR = 1.9, $P = 0.001$) (Table 1).

As table 2 and its concentration curve in figure 1 indicate, the concentration curve of question 1 "How often do you visit a dentist

for check-up?" and question 2 "When was the last time you visited a dentist?" have located below the 45-degree line and their CI are positive, which means the participants with higher income visit a dentist in shorter time periods than others.

Furthermore, the curves of questions 3, 4, 5, and 6 have located above the 45-degree line (and their CI are negative), so that in question 3 "If you used dental care during 3 years ago, has been its cost burdensome for you?" the cost of dental services for the participants with lower income had been more burdensome than others. In question 4 "Have you avoided or postponed visiting a dentist during 3 years ago because of its costs?" the participants with lower income avoided visiting a dentist during 3 years ago more than others. In question 5 "Have you avoided doing all your dentist' recommendations because of its costs?" the participants with lower income avoided doing all of the dentist' recommendations because of its costs compared to others. And finally, in question 6 "Have you avoided or postponed visiting a dentist during 1 year ago because of its costs?" the participants with lower income avoided visiting a dentist during 1 year ago because of its costs more than others (Table 2, Figure 1).

As table 3 and its concentration curve in figure 2 indicate, the participants with lower income avoided utilization of all dental services including examination and radiography, scaling and preventive services, filling, prosthesis, extracting, dental surgery,

Table 3. Concentration index and Pearson chi² of inequality in utilization of dental care services

Variable	Estimate	SE	LB	UB	Pearson chi ²	P
Examination	-0.7470	0.084	-0.912	-0.582	14.212	0.003
Scaling	-0.6380	0.074	-0.785	-0.492	19.484	0.001
Filling	-0.4580	0.042	-0.541	-0.374	76.650	0.001
Prosthesis	-0.4720	0.055	-0.580	-0.365	43.688	0.001
Extracting	-0.6067	0.090	-0.784	-0.429	18.381	0.001
Dental surgery	-0.4520	0.108	-0.665	-0.240	25.402	0.001
Root canal	-0.5240	0.022	-0.567	-0.481	30.698	0.001
Tooth infection	-0.7260	0.116	-0.953	-0.498	12.121	0.007
Orthodontic	-0.4820	0.044	-0.568	-0.396	49.135	0.001
Other services	-0.4880	0.075	-0.635	-0.341	15.071	0.002

SE: Standard error; LB: Lower bound; UB: Upper bound
 P-values under 0.05 were considered as significant (P < 0.05).

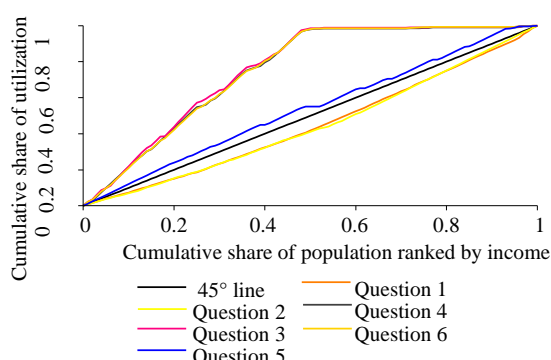


Figure 1. Concentration curve of income inequality in visiting a dentist

Q1: How often do you visit a dentist for check-up? Q2: When was the last time you visited a dentist? Q3: If you used dental care during 3 years ago, has been its cost burdensome for you? Q4: Have you avoided or postponed visiting a dentist during 3 years ago because of its costs? Q5: Have you avoided doing all your dentist' recommendations because of their costs? Q6: Have you avoided or postponed visiting a dentist during 1 year ago because of its costs
 The curves of questions 3, 4, 5, and 6 have located above the 45-degree line and other curves have located under the 45-degree line.

root canal, tooth infection treatment, orthodontic, and other services more than the participants with higher income. In other words, there was inequality in utilization of dental care services in favor of the rich (Table 3 and Figure 2). P-value columns in table 2 and 3 indicate that the difference between the poor and the rich in visiting and utilization of dental care services is significant statistically.

Discussion

This was the first study in Iran which

comprehensively investigated the relation between predisposing, enabling, and need factors in utilization of dental services among men and women, and also studied households' income inequality in utilization of dental services. As results indicated, the men' age had no significant effect on dental visit during 1 year ago, but in women by increasing age, dental visit decreased during 1 year ago. Suominen et al. studied the trend of dental utilization from 2000 to 2011. They resulted that women used dental services more than men, and also dental utilization decreased by increasing age in both genders.¹⁹

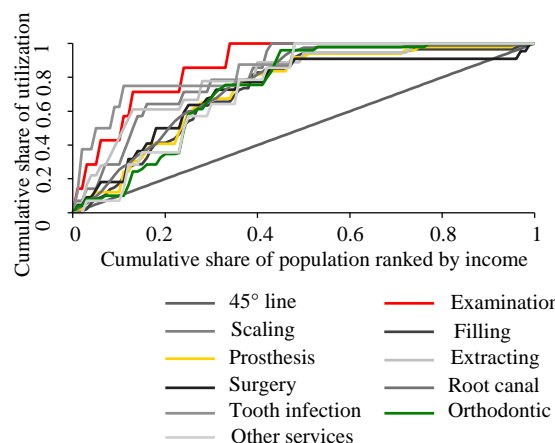


Figure 2. Concentration curve of inequality in utilization of dental care services

All curves have located above the 45-degree line.

This study indicated that dental visit increased by increasing in education level. A study by Ueno et al. on 1201 Japanese community residents aged 55-75 years who

completed a self-administered questionnaire in 2005 indicated that increasing in education level could enhance health literacy and decrease the inequalities in dental health.²⁰ On the basis of the results, there is high amount of socio-economic inequality in utilization of dental care services in Iran. Although based on 2014 Iran Health Evolution Plan, free basic health insurance coverage has been provided for all uninsured Iranians, in this package dental insurance has been neglected.²¹ As results indicated, the persons with lower income visited a dentist for check-ups very less than the rich, passed more time period from their last visit, the cost of dental services was more burdensome for them, avoided dental care in 1 and 3 years ago more than others, and lastly utilized all dental care services very less than the rich. Real universal coverage can improve the utilization and access to dental care services. Matsuyama et al. examined the relationship between older Japanese' income and dental prosthesis utilization in 2013; they stated that providing free dental care was possibly an effective method to remove inequality in utilization of dental care.²²

Health financing systems based on tax, and public and private insurances can protect people against health costs. These systems do this through sharing costs between persons with different needs and health status.²³ Because of long waiting lists, few covered services by insurances, and high co-payment, adults' access to dental care services is limited in Australia. These policies suppress demand for dental care and encourage people to visit a dentist only when they have severe dental problems which finally leads to poor dental indicators.²⁴ However, it is necessary to promote the dental health culture and literacy, improve life style, and use educational-preventive programs about brushing, flossing and regular dental examination.

The impact of socio-economic situation and dental health behaviors on dental health is inevitable. On the basis of Ghorbani and Peres study, the poorest population, those

with lower than 12 years education, those who brush less than 2 times a day, and lastly those who do not use dental floss daily are among those with high number of nonreplaced extracted teeth.²⁵ Therefore, in order to improve dental utilization, the authorities should consider different socio-economic and cultural variables when introduce different dental services and design public programs.^{26,27}

The results indicated that when encountered with less income, men more than women avoided visiting a dentist. One of the reasons is that men in less income situations bear more stress and psychological pressure; so, they are more likely to seek family livelihood rather than receiving dental care. On the other hand, in general, women seek health care more than men.²⁸

Current study's data were collected through self-reporting. Studies have indicated that self-reporting measures are a suitable alternative for clinical and administrative data in the field of health care utilization. In addition, there is little variation about conformity between self-reported measures and registered data on using services in different socio-economic groups.²⁹

About the limitations of this study, we can say that firstly, although Kerman City -due to the circumstances described in the introduction section- can be a good representative of Iran population, it is better to extract the samples from all over the country in the future studies. In order to benchmarking, it is recommended that the characteristics of financing, insurance, and organizing dental care services in successful countries be studied.

Secondly, this study is survey-based and cannot interfere with cause and effect relationship. In other words, it is not possible to extract the exact causes of dental utilization using these types of studies. Thirdly, there may be some type of reporting bias about the services which have been used during 1 year ago, but regarding few number of dental visits during the last year, people usually do not

forget the last time they visited a dentist and they recall their expenditures on dental utilization. Therefore, there is no problem in this regard and if there was probably a recall bias, that would be for all respondents.

Conclusion

In spite of different dental health programs in the country, there is high socio-economic inequality in utilization of dental health services in favor of deserved people. Thus, it seems necessary to revise dental health programs at the country level to decrease these differences. Dental health policies such as implementing effective programs which support low socio-economic groups and also

developing insurance coverage among undeserved people are important factors to increase the utilization of dental services.

Conflict of Interests

Authors have no conflict of interest.

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