

Original Article

Inequality in dental expenditures among Iranian households: A cross-sectional survey using the National Health Accounts

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ABSTRACT

Background: Recently, inequality in dental care has become increasingly popular in both developed and developing countries as a matter of health policy. Thus, the aims of this study were examining inequality in dental care expenditures and assessing the effects of insurance coverage and other variables on these services.

Materials and Methods: In this cross-sectional and descriptive-analytical study, we used secondary data of the National Health Accounts that has been conducted in 2008 in Iran. The sample size was 17,239 households in all over the country. All analyses were performed by Stata software using Mann–Whitney test and logistic regression. $P < 0.05$ was considered statistically significant. To determine inequality in dental services, the concentration index (CI) was used.

Results: CI for total dental expenditures was 0.315 and for orthodontics was 0.6. Findings showed that out-of-pocket expenditure for dental care was progressive and there was a significant relationship between total dental expenditure with residence areas (odds ratio [OR] = 1.3; $P > 0.001$), complementary insurance coverage (OR = 1.3; $P > 0.001$), family size (OR = 1.46; $P > 0.001$), and income (OR = 1.3; $P > 0.001$).

Conclusion: Dental expenditures were progressive in Iran, and the rich have paid more share for these services. It seems that implementing insurance programs, changes in the financing of dental care, development of insurance basic benefits package, supporting programs for the poor, adopting educational policies, and promoting oral health for vulnerable people can have an effective role in decreasing inequality in using dental services.

Key Words: Dental, economics, health-care inequality, health expenditure, out-of-pocket costs

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INTRODUCTION

In both developed and developing countries, health expenditure has a very important role in a nation's health and economic growth.^[1]

Equity in health care is a very important issue,^[2] and inequalities in health care, disparities, and inequities

are important indicators of health in every community that provide information for decision-making and intervention implementation to reduce preventable morbidities and mortalities.^[3] It has been proved that limited access to dental care and economic barriers

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in utilization have strong effects on oral health and its equity.^[4] Recently, inequality in dental care has become increasingly popular in both developed and developing countries as a matter of health policy.^[5,6] On the other hand, recent studies have shown interest in understanding the reason behind private out-of-pocket expenditures (OPEs) in developing countries.^[7]

In industrialized countries, about 5%–10% of annual public health expenditure spent on oral health, which imposes a major financial burden to the government.^[8] Devlin and Richardson in a study of the distribution of household expenditure on health care in New Zealand showed that high-income groups pay six times more than low-income groups for dental services.^[9] However, pro-rich inequality in dental care utilization has been found in both developed and developing countries.^[10,11]

Studies show that poorer people have poor oral health and there is little chance that these people go to the dentist or have insurance coverage.^[3,7,12] Furthermore, inadequate coverage of health insurance causes a large burden of oral diseases carried upon people who are socioeconomically deprived.^[13] When poorer households allocate a greater share of their income on health, financing is inequitable.^[14]

Financial barriers to treatment are one of the reasons behind the low demand for professional dental care.^[15] Oral disease treatment is often expensive and in most industrialized countries is known as the 4th disease that is most expensive to treat.^[6] Low public financing for dental care in most countries, and little access to public dental services, forced families to finance oral health by out of pocket and often has led them into private sector.^[16] This is very important and significant, mainly because out of pocket should be known as less efficient and equitable.^[17]

Oral care can be divided into two general categories: (1) medical treatment and (2) restorative and preventive services. There are many factors that determine the use of this service. The use of medical treatment by children and adults is often associated with the presence of pain. This condition is more prevalent in people with lower socioeconomic status.^[18] Employment, geographical, and socioeconomic statuses are the main three variables that affect access and utilization of dental care.^[19] Petersen *et al.* in the study of global burden of oral diseases and risks to oral health showed that

developing countries pay little attention to preventive and restorative care. In children and adults who suffer from dental pain, most of the dental care is limited to tooth extraction.^[20] Allin noted that the main causes of inequality in dental care utilization are income and dental insurance coverage.^[21] It is known that financing of dental care through public or private insurance is a key determinant in the use of dental care.^[22] Reducing inequality in oral health among different socioeconomic groups is stated as one of the main goals of the oral health in the World Health Organization (WHO).^[6] Because dental problems can cause pain, dysfunction of chewing and other related problems affects the quality of life,^[23,24] and also according to studies, global burden of oral diseases based on disability-adjusted life years is similar to tuberculosis or malaria burden;^[25] therefore, it is necessary to be considered the importance of dental care. Thus, the aim of this study was examining inequality in dental care expenditures and assessing the effects of insurance coverage and other variables on expenditure of dental services.

MATERIALS AND METHODS

This study is a cross-sectional and descriptive-analytical survey using secondary data that were extracted from the National Health Accounts (NHA) survey in 2008 in Iran. The study population was 17,239 households that were selected through stratified cluster sampling method.

Data were collected by the Ministry of Health with NHA questionnaires in 2008 with cooperation of the Department of Health Economics in the National Institute for Health Research. The data collection tool was a household health expenditure questionnaire which was accordance with the standards of the European System of Health Accounts and the WHO standards and localized by health economists and health professionals. The questionnaire was categorized into three sections: general characteristics of household, household health expenditures, and household socioeconomic or income status. In this study, we used the data of the first section (general characteristics of household) and the dental care expenditure in the second section of questionnaire. Hence, we examine dental OPE of households with using this data source. It must be noted that in this questionnaire, households were asked to their health expenditure in the last month.

To answer the questions about inequality in dental expenditure discussed above, we used concentration curve (CC) and concentration index (CI). The CC plots the cumulative percentage of OPE payment on the Y-axis, against a cumulative percentage of the population, ranked by a welfare indicator (income), from the poorest to the wealthiest, on the X-axis. In other words, it plots shares of the health variable against quintiles of the living standard variable (income). If we want to answer the questions about inequality in dental expenditure and assessing financial burden of dental care, if everyone, irrespective of income, paid exactly the same amount of OPE, thus the burden of out-of-pocket dental expenditures would be distributed equally. In this case, the CC will coincide with a 45° line, the so-called line of equality. In contrast, if OPE would take lower value, the CC would lie below the line of equality, this situation shows a progressivity of the OPE burden in dental expenditure and indicating that the health variable is more concentrated among the rich, so the CI takes on a positive value. If the CC is above the 45° line, indicating that the health variable is more concentrated among the poor, the CI takes on a negative value.^[7,12]

CI is used as a measure of socioeconomic inequality and is derived from the CC. The CI is a measure of how equally a health variable is distributed across a population ranked by income level.^[26] This index is directly related to the CC and is defined as twice the area between OPE and the 45° equality line. The index is between -1 and 1. A negative amount of this index from 0 to -1 demonstrates the regressivity of OPE by indicating to what extent the poorer people have a larger burden in paying for dental care. A positive direction from 0 to 1 demonstrates that OPE for dental care is progressive and indicating to what extent the wealthier hold a larger burden of OPE.^[3,14,27]

In the next stage of research, we analyze the factors affecting the dental care expenditures (economic status of households, total household health expenditure, place of residence, family size, number of household members, basic insurance, and supplementary insurance). All the analyses were performed using Stata 14.0 (StataCorp. 2015. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP). $P < 0.05$ was considered statistically significant. To analyze the inequality in dental care, we used Distributive Analysis Stata Package software

(DASP), especially designed to perform distributive analysis in Stata software^[28] and CI analysis with 0.95 significance level.

RESULTS

Sample characteristics

60% of the households lived in urban and 40% lived in rural area. Among studied families, 84.1% of them have basic health insurance (76.6% of urban and 95.5% of rural families) and only 13.5% of them were covered by complementary health insurance (20.8 of urban and 4.7 of rural families) ($P < 0.001$). Furthermore, the result of the study showed that most of the families had ≤ 4 members. Table 1 reports the demographic profiles of the study sample households.

Income distribution showed that most of the households (61.5%) in urban area were in second quintiles (2,000,000–5,000,000 Rials) and in rural area were in first quintiles (61.9%) [Table 1].

Dental expenditures

The results indicated that only 5% of the households (visiting a dentist in the past 1 month) visited a dentist for orthodontic services [Table 1]. Furthermore, the amount of out-of-pocket dental

Table 1: Demographic characteristics of the Iranian population

Variables	n (%)
Area of residence	
Urban	10,335 (60)
Rural	6904 (40)
Household size	
≤ 4	10,407 (60.4)
> 4	6832 (39.6)
Insurance status	
Have	14,510 (84.1)
Not have	2729 (15.9)
Complementary insurance	
Have	1956 (13.5)
Not have	12,557 (86.5)
Monthly income (Rials)	
$< 200,000$	7022 (41.2)
2,000,000-5,000,000	8706 (51.1)
5,000,000-10,000,000	1134 (6.7)
10,000,000-20,000,000	134 (0.8)
$> 20,000,000$	30 (0.2)
Dental visit	
Have	2352 (13.6)
Not have	14,887 (86.4)
Type of dental visit in the past month	
Orthodontics	81 (0.5)
Total	2352 (13.6)

Table 2: Mean of households' dental expenditure in the last month in Iranian Rials

Type of service	Total expenditure		Mean±SD		P
	Urban	Rural	Urban	Rural	
Orthodontia	32,384,000	4,680,800	3133±64,097	678±27,949	>0.001
Total dental services	186,542,037	45,660,885	18,050±123,871	6614±57,672	>0.001

SD: Standard deviation

expenditures for these services in urban area was different in comparison with rural area. Zero dental expenditure was reported by 86.4% of the households in the past 1 month. Table 2 illustrates the expenditure of dental services.

Concentration curve and concentration index

The distribution of dental expenditure among different quintiles based on concentration indices and CC indicated a positive value for dental expenditures [Table 3], and thereby, CC lies below the line of equality [Figure 1]. This shows a progressivity of the OPE in dental expenditure and indicating that the health variable (oral health) is more concentrated among the rich. IN other words utilization of dental services was more among rich. Thereby, the rich bear a large burden of out-of-pocket dental expenditures either in urban or rural areas.

It should be considered that there are significant differences between progressivity, and orthodontia expenditures are more progressive than others. On the other hand, the rich spend more for this service. Table 3 illustrates this situation [Table 3].

Spatial variation

The spatial variation in concentration indices is reported in Table 3. Overall, there is some variation between rural and urban areas.

Concentration indices of dental expenditures in terms of area residence of households indicated that progressivity of orthodontic services expenditure in both urban and rural households was much more compared to other services, so that the rich both in urban and rural areas had a greater share of payments for this type of service.

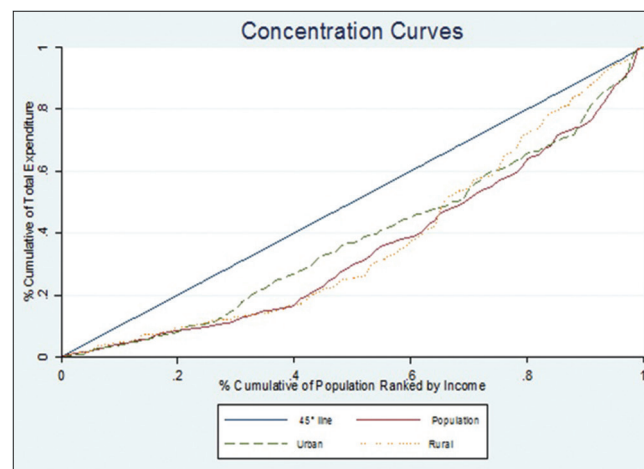
Impacts on household out-of-pocket expenditures for dental care

To find the factors affecting households OPE for dental care, we used logistic regression. The findings from these analyses in the households showed that there is a significant relationship between the area of residence, supplementary However, there was no significant relationship between households' basic insurance coverage and the expenditure of these services ($P = 0.059$) [Table 4].

Table 3: Inequality by type of service and area of residence

Type of service	Area of residence	CI	SE	LB	UB
Orthodontics	Urban	0.553	0.084	0.389	0.719
	Rural	0.401	0.169	0.07	0.733
	Total	0.6	0.07	0.462	0.737
Total	Urban	0.266	0.044	0.18	0.351
	Rural	0.218	0.056	0.109	0.328
	Total	0.315	0.034	0.249	0.381

SE: Standard error; CI: Confidence interval; LB: Lower bound; UB: Upper bound

**Figure 1:** Dimensions: 1228 × 690 horizontal resolution: 96 dpi vertical resolution: 96 dpi.

DISCUSSION

One of the main goals in all health-care systems is equal access to health-care services such as dental care.^[29]

This study intends to help us about understanding the dental expenditure and its distribution in Iran by providing a comprehensive assessment of OPE in dental care. The findings of this study provide several interesting viewpoints about OPE for dental care of Iran.

We found that out-of-pocket dental expenditures are progressive in Iran. This result is in line with previous studies conducted in low-income transitional countries.^[3,29]

Table 4: Factors affect outofpocket dental expenditures

Variable	OR (SE)	
	Orthodontic expenditures	Total dental expenditures
Residence		
Urban	1.49 (0.46)	1.3** (0.07)
Rural	Base	Base
Complementary health insurance		
Have	1.81* (0.48)	1.3** (0.09)
Not have	Base	Base
Household size		
≤4	Base	Base
>4	1.22 (0.299)	1.46** (0.074)
Monthly income		
<2,000,000	Base	Base
2,000,000-5,000,000	3.75** (1.47)	1.3** (0.08)
>5,000,000	9.67** (4.26)	1.78** (0.17)

** $P > 0.001$; * $P > 0.05$. OR: Odds ratio; SE: Standard error

Likewise, we found that only 4% of the households visited the dentist for orthodontic services. Furthermore, 16% of the households' dental expenditures were related to these services. Rezaei *et al.* indicated that the prevalence of dental care utilization among Iranian households was 4.67% (95% confidence interval: 4.46–4.88%).^[30] Manski *et al.* showed that 4.5% of high-income households have orthodontic visits, while only 1.7% of low-income households have orthodontic visits.^[31] Whereas, a survey of Children's Dental Health in the UK revealed that among 15-year-old children with lower socioeconomic status, there was a greater need for orthodontic services than those in higher socioeconomic class.^[32] Yee and Sheiham showed that most of the dental services in developing countries were an emergency.^[33] Furthermore, in developing countries, more referrals for dental services are limited to tooth extraction.^[20]

The value of the CI was 0.315 for total households' dental expenditures. The positive value of this index reflects that dental expenditures are more concentrated among the rich and thereby were progressive. Rezaei *et al.* suggested a higher concentration of dental care utilization among socioeconomically advantaged households (Cn = 0.2522; 95% confidence interval: 0.2258–0.2791) in Iran.^[30] Telford *et al.* showed that most of the dental services are focused among people with high socioeconomic class.^[34] However, Habibov showed that OPE for some dental care services in Tajikistan is more regressive.^[7] Lu *et al.*'s study in high-income countries in Asia (Hong Kong, Taiwan,

and South Korea) revealed that dental care in Hong Kong and Taiwan is more concentrated among the rich and the distribution of these services was progressive. This is due to the direct impact of income and the correlation between income and other nonincome factors such as education and private insurance (in Hong Kong) and the difference in residence area (in Taiwan) and dental services.^[35] Considering the results of present study, poor households pay a lower amount of OPE for dental services. In spite of more need for dental services in individuals who have risk factors such as poor diet, low levels of education and health, etc. using dental services was lower in this group. This maybe because of lower socioeconomic condition or lack of insurance coverage.

Another interesting finding with regard to inequality in dental expenditure is that orthodontic services are more concentrated among those in the upper socioeconomic classes. This result was confirmed in other studies.^[7,36] Telford's study showed an extreme concentration of orthodontic services among people with higher socioeconomic class, whereas all of restorations and extractions have been concentrated in the lower socioeconomic class.^[34] It should be noted that while orthodontic treatments have aesthetically significant, the clinical importance of those services should not be neglected.

From a rural–urban perspective, there was a significant relationship between dental expenditure and households' residential area ($P < 0.001$), so that urban families were more likely to expose with dental expenditure than rural families (odds ratio = 1.3). This difference may be due to several factors such as greater access of urban families to different types of dental services and higher levels of socioeconomic condition in urban households compared to rural households. Onwujekwe *et al.* showed that urban households spend more than rural households for health services.^[37] Mehrara and Fazaeli confirmed that there was greater inequality in rural areas compared to urban areas in the financing of health expenditures.^[38]

Based on the results of this study, dental expenditure was progressive and thereby more concentrated among the rich. Furthermore, there was a significant positive relationship between the complementary insurance coverage and expenditures of dental services, so that households with complementary health insurance were 1.3 times more than households without complementary insurance on the exposure of dental expenditure. Hobdell *et al.* found that lack of

insurance coverage was associated with a reduction in dental visits.^[39] It seems that covering some dental services by complementary insurance reduces households' out-of-pocket dental expenditures and thereby encourages them to use dental services, so that those who have more access have higher use of health care compared to those without insurance coverage. Locker *et al.* noted that with financing by a third party, financial barriers to dental services have been reduced.^[40] It is stated that financing by the third party affected the amount of out-of-pocket dental expenditure of households and generally improved limited access to services. Although the elimination of financial barriers of health care is an important step in improving access to dental care, it is not enough alone. Because access to these services depends on factors such as access to providers, consumer behavior, and third parties as well.^[12] The studies that were done in Thailand showed that after the implementation of comprehensive insurance coverage, the rich are more exposed to catastrophic health-care expenditures than poor. This may be due to the fact that the rich are looking for more expensive health services and private sector or use unnecessary services.^[41,42] Widström and Eaton showed that health insurance encourages households to use more and sophisticated health services and therefore increases the risk of exposure with catastrophic health expenditure.^[8]

Furthermore, there was a significant association between income and dental expenditure, so that by increasing household income, the chances of them to spend money to receive dental care were increased. This finding shows that demand for dental services increased by increasing family income. Indeed with increasing households' income, they spend a higher percentage of their income for dental services (maybe mainly more expensive services). A study conducted in 2011 by Quiñonez and Grootendorst in Canada showed that middle and low-income households were very sensitive to changes in the financing of dental services, and there was a high probability that those who pay OPE for dental services have reported severe pain or delay treatment.^[5]

Limitation

This study presents essential evidence of inequality in dental care utilization among Iranian households. However, there were some limitations that should be considered when interpreting the results of the study. Considering that the study is cross-sectional in design, thus, we cannot establish any causal effect

between dental care utilization and its determinants. Furthermore, other factors such as the number of dentists in each province, distribution of dental services, and oral health status (need) might be affecting dental care utilization. These factors are not included in the analysis.

CONCLUSION

The findings of this study revealed that OPEs for dental services were progressive and thereby concentrated among rich and wealthy people. This may be due to the fact that most of these people visited dentist particularly for orthodontic and cosmetic surgeries. Among the variables studied, we found that there were significant relationships between household income statuses, having a complementary insurance and family size with dental expenditures. Therefore, reducing income inequality, implementation of insurance policies, changes in the financing policy of these cares, supportive programs for the poor, development of insurance basic benefits package, implementation of prevention programs for vulnerable people to prevent them from later expensive injuries are some suggested policies to reduce inequality in using dental services.

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Conflicts of interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or non-financial in this article.

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