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Economic inequalities in dental care utilizations in Iran: Evidence from an urban region

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Abstract

Background: Health utilization inequality is a major concern for health policymakers. Equality in utilization of services is very important for having a healthy society. The aim of this study was to describe inequality in dental care utilization in Iran, Therefore, concentration index, its curve, and the predictors of inequality in utilization of dental services and their spending were calculated.

Methods: Data of a health utilization survey which previously had been gathered in Shiraz, Iran were used for this study. Tobit and Poisson estimators were used to estimate utilization and out of pocket models. Furthermore, concentration index and curve was calculated to show inequality in dental care utilization.

Results: High inequalities was found in dental care utilization in Iran (concentration index=0.19). In the utilization model, the relationship between income and utilization was positive. People with higher income could utilize more services. Being covered by insurance increased the probability of dental care utilizations too.

Conclusion: Policy makers must find solutions like increase the coverage of dental insurances to decrease inequality in dental care utilization.

Keywords: Dental Services, Inequality, Concentration index, Concentration curve, Shiraz.

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Introduction

Decreasing inequality in heath access is one of the main goals of health systems. However complete equality in utilization of health services is impossible but policymakers try to find solutions to decrease inequalities as well as possible (1). It seems that the current health system in Iran has decreased inequalities in some health subsections like public health, vaccination etc., but some others still have large amount of inequalities. One of these health subsections is dental services (2).The World Health Organization's global oral program has emphasized that dental health is essential for health and quality of life (3). Dental services are highly demanded, though usually are not covered by basic insurances. Because of high prices, access to dental services is very hard and so dental diseases problems are still a major issue in developing countries (4). Higher incidence of dental diseases have been also observed in both developed and less developed regions (2). In Iran's health system, the main insurers have not completely covered dental services and the patients must pay high amounts of money form their pockets. Some complementary health insurances have covered dental services, but these insurances are not available for all of the population. Recently, efforts have been

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done for increasing the coverage of dental services by Ministry of Health but they are not entered into implementation phase. Inequalities in the utilization of dental services have been studied in several countries but the evidence of Iran is scarce. In this study, we try to show the amount of inequality in dental health utilizations and the determinants of it in dental services utilization and expenditures in an urban region of Iran.

Methods

This was a cross sectional study. Data of an individual health utilization survey which had been gathered in 2012 were used for this study. These data contained 1575 samples which had been gathered scientifically in 9 municipality regions of Shiraz, Iran. All of the utilization and out of pocket expenditures data were gathered in the period of one month. Concentration index and curve were calculated in this study. Also, percentages of dental utilization and out of pocket health expenditures were calculated in income quintiles. A Tobit regression for estimating out of pocket expenditures for dental utilization and a Poisson regression for estimating the determinants of dental care utilization were used in this study. The Tobit regression was used for out of pocket expenditures model because we had some OOP data with 0 value which could not be added in the regression and OLS method would lead to sample selection bias (5). In the utilization model, because of the count form of dependent variable (utilization) the best estimator was Poisson regression. The out of pocket and utilization models are shown blew. The out of pocket regression contained two parts.

If the $oop_i^* > 0$, then: $oop_i = \beta_0 + \beta_1 age_i + \beta_2(edu = 1)_i + \beta_3(edu = 2)_i + \beta_4(edu = 3)_i + \beta_5(edu = 4)_i + \beta_6(edu = 5)_i + \beta_7(mar = 1)_i + \beta_8(mar = 2)_i + \beta_9 income_i + \beta_{10}(ins = 1)_i + \beta_{11}(gen = 1)_i + \beta_{12}(smk = 1)_i + u_i$

And if $oop_i^* \leq 0$, then $oop_i = 0$

Where $dent_i^*$ was the latent variable and $dent_i$ was the observed one.

oop was the dependent variable of out of pocket expenditures of dental services utilization, age was the age of individuals, edu was the level of education of each individual and contained6 values, from illiterate to higher academic degrees, marriage was the marriage status of the person and contained 3 values of 0:married, 1: divorced or widow, 2: not married yet, income was the income of the head of the family, ins was the insurance variable and if this variable was 1, this meant that people was covered by insurance; gen was the gender variable(being male in this study), smk was the smoking status of individuals (1= smoker) and U_i was the residual.

For estimating the utilization model we used Poisson regression estimator. The dependent variable of the model was in the form of count. An assumption in count dependent variables is that y_i has a Poisson distribution (5). The utilization model is shown blew:

$$\begin{aligned} den_i = \beta_0 + \beta_1 age_i + \beta_2(edu = 1)_i \\ + \beta_3(edu = 2)_i \\ + \beta_4(edu = 3)_i \\ + \beta_5(edu = 4)_i \\ + \beta_6(edu = 5)_i \\ + \beta_7(mar = 1)_i \\ + \beta_8(mar = 2)_i \\ + \beta_9 income_i \\ + \beta_{10}(ins = 1)_i \\ + \beta_{11}(gen = 1)_i \\ + \beta_{12}(smk = 1)_i + u_i \end{aligned}$$

Where "den" was the dependent variable of utilization dental services. Other variables were similar to dental out of pocket model. Concentration index and concentration curve was used in this study to show the amount of inequality in dental services usages. Concentration index is the twice area between the utilization curve and the 45 degree line. In the individual level data like this study, CI could be calculated as blew:

Table 1. Descriptive statistics: utilization and out of pocket in 6 quintiles

Quintiles	Variable	OBS	Mean	S.D	Min	Max
1st Quintile	Utilization	339	0.1268437	.5372121	0	7
	OOP	339	210619.5	142081.1	0	20000000
2nd Quintile	Utilization	288	0.1701389	.5431332	0	4
	OOP	288	146284.7	994199.8	0	15000000
3rd Quintile	Utilization	213	0.1690141	.5135682	0	4
	OOP	213	186261.7	1038393	0	13000000
4^{th} Quintile	Utilization	237	0.2827004	.8734771	0	10
	OOP	236	213966.2	833977.8	0	10000000
5^{th} Quintile	Utilization	301	0.2890365	.687638	0	5
	OOP	301	249103	1425022	0	18000000
6^{th} Quintile	utilization	196	0.3418367	.7092681	0	3
	OOP	196	281938.8	89220.8	0	9000000

$$c = \frac{2}{n.\mu}\sum_{i=1}^{n} x_i R_i - 1$$

where: x_i was the utilization score of i_{th} individual. Each of the n individuals were ranked according to their family income, beginning by the poorest family (6).

Results

Descriptive statistics

Table 1 shows the results of dental utilization and dental out of pocket expenditures in 6 income quintiles. As shown in the table, dental services usages were lower in the 1st, 2nd and 3rd income quintiles. So, the poorest people used lower dental services and there was inequality in favor of more rich persons.

Concentration index in the utilization of dental services was 0.1957 with the standard error of 0.038.The standard error showed that the result is significant. Figure 1 shows the concentration curve of dental service utilization. As shown in the figure, utilization curve was blew 45 degree line and it meant that inequality was in favor of higher income people.

Results of regressions

Table 2 shows the results of out of pocket dental expenditures, using Tobit estimator and the results of dental utilization using Poisson regression. In the out of pocket expenditures model, income had a positive relationship with out of pocket variable.

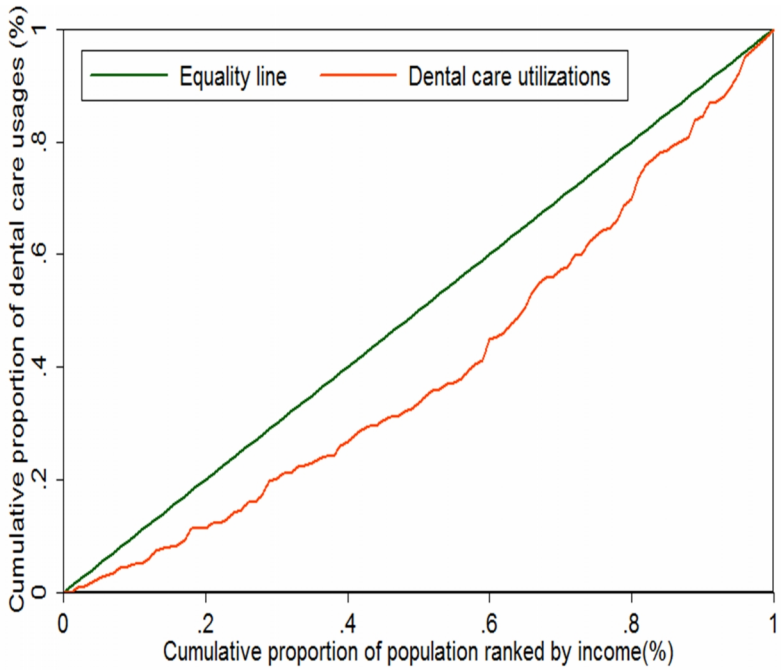

Fig. 1. Concentration curve for dental care utizilation ranked by income

Table 2. The results of out of pocket and dental utilization models

Models	Out of pocket dental expenditures		Dental utilizations	
variable	Coefficient	Standard error	Coefficient	Standard error
Age	1109.779	1464.601	0.0085547*	0.0050403
Edu=2	31714.47	105390.3	0.6384792	0.3926933
Edu=3	84715.67	98327.46	0.0405905	0.4111509
Edu=4	80454.92	90395.45	0.3109676	0.3660358
Edu=5	150126.5	92201.11	0.7337211**	0.367147
Mar=1	-76712.01	71754.61	-1.079113**	0.3624362
Mar=2	38105.83	41902.42	0.2965609**	0.144383
Income	0.0396663**	0.0201883	$1.22* 10^{-07}$**	$5.38* 10^{-08}$
Ins=1	88643.38	55064.11	0.7519435**	0.234355
Gen=1	9949.421	32173.39	0.0349145	0.111252
Smoke=1	97682.58**	42332.13	-0.0799254	0.1622207
Constant	-738951.4**	127404	-3.185082	0.4842052
Sigma	404016.4**	21780.69	-	-
Pseudo R2	0.0037		0.0364	
Log likelihood	-3558.0538		-937.96855	

*Significant at 90% (week relationship)
** Significant at 95% (strong relationship)

Also the results showed that if the person were smoker, the probability of paying more for dental services would increase. In the utilization model, higher education and income had positive relationship with dental care utilization, being divorced or widow had negative effect and not married yet had positive relationship with utilization of dental services. Also being insured increased the probability of utilization of dental services. Age had a week relationship with the probability of dental services' usage. This relationship was positive too. Other variables did not have any relationships. In the Tobit model, sigma was significant so the similarity of the Tobit model with ordinary least square (OLS) could not be accepted. Thus, if the model was estimated with OLS, it was faced with sample selection bias. The pseudo R^2 statistics showed the goodness of fit in the models. For out of pocket model, the pseudo R^2 was 0.0037 and for dental utilization model, it was 0.0364.

Discussion

In this study, concentration index was 0.1957 and described the high inequality in dental care utilization in the studied region. Somkotra et al., in a study done in Thailand assessed dental care utilization among children after the universal coverage achievement. They calculated CI as 0.069 which showed more equal distribution of dental care utilization rather than Iran (7). Celeste et al in a study, described trends in socioeconomics disparities in utilization of dental care in Brazil and Sweden. They found decline in utilization of dental services in the period of 1986-2002 in both countries and declare that these declines were the result of improvement in oral health. They concluded that there were still disparities in dental care utilization. Also, higher socioeconomic people, utilized more dental services(8). In a study done by List in 14 European countries, inequality in the utilization of dental services was described. Concentration index for each country was calculated for this purpose. He divided dental services into 4 subcategories of "any treatment", "preventive treatment", "operative treatment" and "preventive with operative treatments". Poland had the highest inequality with CI 0.3092 (preventive treatment) and Germany had the lowest inequality with CI 0.0254 (all treatments) (9). Baldani et al in a study done in Brazil, assessed the rule of determinates on dental care utilization and found the amount of inequality in low income children. They found that 31% of children did not have dental visits at al., (10). Piovesan et al., in another study done in Santa Maria, Brazil, assessed 12 years old school children dental health and its utilization. A Poisson regression model was used for this purpose. They found that children with lower socioeconomic statuses

utilized the services less frequently. Also, a public-private assessment showed that children with higher status were less likely to use public services (11).

Income had positive relationship with both out of pocket for dental services and health utilization. People with higher income had more ability to pay for their health so by increasing income, the probability of utilization would increase (12). By increasing in utilization of services, because of the low insurance coverage of dental services, out of pocket expenditures for dental services would increase too. From these models it could be indicated that there was inequalities in distribution of dental utilization between rich and poor. Also there was difference in out of pocket payments in different income groups. In utilization model, higher education had positive relationship with dental utilization. People with higher level of education had more awareness about the benefits of health services so they consumed more services (13,14). Covering by insurance had positive relationship with dental care utilization, but no significant relationship with out of pocket. Insurance services would decrease the price of services so people would be able to pay more for dental services. As said earlier, some services like dental care are price elastic and a little decrease of the prices will increase the utilization (15). Dental out of pocket spending did not change after the cover by insurance. This was because the willingness to pay of people did not change after being insured and they paid for dental services after coverage by insurance as much as before coverage. So, the spending for dental services was similar for uninsured and insured people, but in insured people, the prices were lower and they could buy more dental services (16,17). In a study done in Sweden in 2001, Hjern et al., found that low educational level and being born outside of Sweden had relationship with dental problems (18). In a study done by Okullo et al., in Uganda, inequalities in oral health and oral health service utilization in students was surveyed. They found that students with higher educated parents had lower dental problems. Also they found that students living in urban regions had less oral problems too (19). In another study done in South Africa the authors found the predictors of disparities in preventive dental visits (PDV) in 2003 and 2004. They found that having insurance increased the probability of using preventive dental care. Also, living in urban regions and level of education had positive effect on PDV service utilization. In this study, they found that there was a gap between black and white people in covering medical insurances and the reason of more PDV utilization by whites was the higher insurance coverage of them (20). Pizarro et al in Catalonia, Spain surveyed utilization of dental care in 2001 and 2002. They found that age, gender, social class, and health insurance coverage had statistically relationship with dental care service utilization. They assessed the effects of insurance coverage on dental care utilization specially and found that by increasing in insurance coverage, utilization would increase too (21). This study was done in an urban population where geographical access for dental services was easy. Similar studiesin both urban and rural regions of Iran seem inevitable.

Conclusion

Utilization of dental care services in Iran is unequal. People with higher income consume more dental services and the poor do not have the financial ability of utilization of these services. Health policy makers must find solutions to decrease inequality in dental care utilization. For example health insurers must increase the coverage of dental services. Covering dental services will decrease the inequality and increase the financial access of the poor for dental services. This study had some limitations. Data were gathered in an urban region which could not show the inequality in whole of the country. Also no other evidence for Iran was available to compare the results of this study with others.

Clinical relevance

Dental services utilization has an unequal distribution in Iran. The poor consume less dental services than the rich. Insurance coverage will increase the utilization of the poor as well as the rich. So, the inequality in utilization of dental services will decrease when insurances pool the financial risk of dental service utilization. The rule of health insurances to decrease the inequality is very important and some new mechanisms should be designed for increasing the utilization of dental services in Iran.

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References

1. Roberts M, Hsiao W, Berman P, Reich M. Getting health reform right: a guide to improving performance and equity. United Kingdom: Oxford university press 2008; p 352.

2. Sisson KL. Theoretical explanations for social inequalities in oral health. Community Dent Oral Epidemiol 2007;35(2):81-8.

3. 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(1):3-24.

4. 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(9):661-9.

5. Rezaei S, Bazyar M, Fallah R, Chavehpour Y, Rad EH. Assessment of Need and Access to Physician and Hospital Beds: A Cross Sectional Province Based Study in Iran. Shiraz E Med J 2015; 6(6):e26351.

6. Kakwani N, Wagstaff A, Van Doorslaer E. Socioeconomic inequalities in health: measurement, computation, and statistical inference. J Econom 1997;77(1):87-103.

7. Somkotra T, Vachirarojpisan T. Inequality in dental care utilisation among Thai children: evidence from Thailand where universal coverage has been achieved. Int Dent J 2009;59(6):349-57.

8. Celeste RK, Nadanovsky P, Fritzell J. Trends in socioeconomic disparities in the utilization of dental care in Brazil and Sweden. Scand J Public Health 2011;39(6):640-8.

9. Listl S. Income-related inequalities in dental service utilization by Europeans aged 50+. J Dent Res 2011;90(6):717-23.

10. Baldani MH, Antunes JLF. Inequalities in access and utilization of dental services: a cross-sectional study in an area covered by the Family Health Strategy. Cad SaudePublica 2011;27:s272-s83.

11. Piovesan C, Antunes JLF, Guedes RS, Ardenghi TM. Influence of self-perceived oral health and socioeconomic predictors on the utilization of dental care services by schoolchildren. Braz Oral Res 2011;25(2):143-9.

12. Gerdtham UG. Equity in health care utilization: further tests based on hurdle models and Swedish micro data. Health Econ 1997;6(3):303-19.

13. Gaskin DJ, Dinwiddie GY, Chan KS, McCleary R. Residential segregation and disparities in health care services utilization. Med Care Res Rev 2011;69(2):17.

14. Wall TP, Vujicic M, Nasseh K. Recent trends in the utilization of dental care in the United States. J Dent Educ 2012;76(8):1020-7.

15. Meyerhoefer CD, Zuvekas SH, Manski R. The demand for preventive and restorative dental services. Health Econ 2014;23(1):14-32.

16. Hole AR, Kolstad JR. Mixed logit estimation of willingness to pay distributions: a comparison of models in preference and WTP space using data from a health-related choice experiment. Empir Econ 2012;42(2):445-69.

17. Tambor M, Pavlova M, Rechel B, Golinowska S, Sowada C, Groot W. Willingness to pay for publicly financed health care services in Central and Eastern Europe: Evidence from six countries based on a contingent valuation method. SocSci Med 2014;116:193-201.

18. Hjern A, Grindefjord M, Sundberg H, Rosén M. Social inequality in oral health and use of dental care in Sweden. Community Dent Oral Epidemiol 2001;29(3):167-74.

19. Okullo I, Åstrøm A, Haugejorden O. Social inequalities in oral health and in use of oral health care services among adolescents in Uganda. Int J Paediatr Dent 2004;14(5):326-35.

20. Ayo-Yusuf IJ, Ayo-Yusuf OA, Olutola BG. Health Insurance, Socio-Economic Position and Racial Disparities in Preventive Dental Visits in South Africa. Int J Environ Res Public Health 2013;10(1):178-91.

21. Pizarro V, Ferrer M, Domingo-Salvany A, Benach J, Borrell C, Pont A, et al. The utilization of dental care services according to health insurance coverage in Catalonia (Spain). Community Dent Oral Epidemiol 2009;37(1):78-84.