A cross-sectional investigation of the relationship between complementary health insurance and frequency of dental visits in 15 to 64 years old of Tehran population, Iran, a secondary data analysis (urban HEART-2)

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Abstract

Background: This study aimed to investigate the relationship between complementary health insurance and frequency of dental visits.

Methods: The present study was performed using the Urban Health Equity Assessment and Response Tool (Urban HEART). A cross-sectional study was conducted in Tehran (Iran) to assess inequalities in health status among different socioeconomic and ethnic groups, genders, geographical areas, and social determinants of health. Out of 20,320 records retrieved from the original study with dental information, 17,252 had both dental insurance and dental visit information. Complementary health insurance as the main independent variable had three categories (i.e., basic insurance, with complementary medical coverage, and with dental coverage). The frequency of dental visits during the last year as a dependent variable had also three categories (i.e., no visit, one, and two, or more dental visits in the last year). In this study, in addition to investigating the relationship between complementary health insurance and frequency of dental visits, potential covariates that may affect the mentioned relationship were evaluated in the regression model. Statistical analyses included simple and multiple multinomial logistic regression considering the sampling method and sampling weights.

Results: The mean age of 17,252 participants (Tehran citizens) was 39.36 years; 49.4% were women, 86.0% had only basic insurance, 7.2% had complementary medical insurance, and 6.8% had complementary dental insurance. Of all subjects, 43.8% reported no dental visit, 26.1% reported one, and 30.1% reported two or more dental visits during the last year. The frequency of dental visits was lower in people who had basic insurance than others such that the odds ratio (OR) was 0.73 (p-value < 0.001) for one visit and 0.68 (p-value < 0.001) for two or more visits in the last year. The frequency of dental visits was also positively associated with dental brushing, toothpaste use, high educational level, being married, having more than 20 teeth, and having dental pain.

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Background

Dental caries is the most common non-communicable disease in the world [1]. Although regular dental visits are important in decreasing the frequency of decayed, missing-filled index (DMFT) index [2], there are some barriers in this regard. According to the findings of some previous studies, the high cost of dental services is the most common reason for the low frequency of dental visits [3, 4]. Financial status and level of income affect the frequency of dental visits in both developed and developing countries [5–7]. In low and middle-income countries, inequities in health care utilization and out-of-pocket expenses are common; thus, the national health care systems try to facilitate benefiting from dental care in several ways such as insurance development [8]. In this regard, the World Health Organization (WHO) is one of the pioneers of improving health insurance [9]. Individual and social factors can influence the percentage of coverage and quality of health insurance. It has been evidenced that factors such as personal and national income [10], health insurance literacy [11], and socioeconomic status [12] can affect the insurance coverage percentage.

Insurance coverage varies from country to country. For instance, in 2008, 46 million of the United States population were not covered by any kind of health insurance [13]. In addition, in the USA the number of children without dental insurance was 2.6 times more than the number of children without medical insurance [14]. In Turkey, in 2006, although the majority of Turkish people (85%) were covered by some health service program, some of them did not have any insurance coverage.

Insurance coverage is important because it can affect health behaviors. Based on the National Survey of U.S. Children’s Health, Lewis et al. announced that less than half of children without dental insurance received preventive dental care visit in the previous year – i.e., in 2007 [14]. This result is in contrast with results of Yu et al., who reported that dental insurance has a significant role in children’s dental services utilization such as preventive dental visits [15]. However, insurance is not the sole factor to assess the quality of dental care in a society such that other factors such as oral health behaviors, age, sex, and level of education can also affect the oral health status [16].

Iran, having an oil-dependent economy, is among the lower-middle-income group countries [17]. The results of a national survey in 2009 revealed that the share of dental care was 15.5% of the total health costs of Iranian households [18]. A cross-sectional study in Iran investigated the relationship between dental insurance and the type of service received by Iranian dentate adults in 2011. Results showed that more than half of Tehranian citizens with dental insurance had a dental visit within the past 12 months [12].

In 2007, there were 71,330,916 health insurance booklets in Iran that exceeded the total population of the country (i.e., 70,495,000), because some people had two types of insurance while some others did not have any type of insurance coverage [19].

There are four large social insurance funds in Iran. Under the supervision of the Ministry of Cooperation, Labor, and Social Welfare, these funds are responsible for defining packages of basic health benefits and annual tariff adjustments for public and private sectors [18]. The most important insurance companies in Iran are Medical Health Care Services (MSIF) and Social Security Organization (SSO). MSIF is a governmental corporation that covers approximately 35 million people (i.e., government employees, rural households, students, lawyers, physicians and any non-insured volunteers) and the SSO is a non-governmental company with 28 million coverage subjects including formal workers and their families. There are also smaller insurance companies like Armed Forces medical services insurance [18]. MSIF and SSO cover the following basic dental cares for free: Dental visiting (including oral hygiene instruction, examination, and diagnosis, prescribing drugs and radiology, and requesting laboratory tests) tooth extraction, fissure sealant, fluoride therapy, and tooth scaling, and root planing.

Applicants of advanced dental services should buy complementary dental insurance or pay out of pocket [18]. In addition to the percentage of people with health insurance coverage, quality of insurance coverage is an important factor; for example, insurance with and without dental coverage has different effects. Results of a cohort study showed that routine dental prophylaxis in people with dental coverage insurance was 52% more than patients without dental coverage [20]. Muddassir Siddiqui (2013–2014), through a “Dental Health Screening Program Report” based on the different types of insurance (i.e., Private, Family Health, and First Nation and Inuit Branch), reported that students with dental coverage had better oral health [21].

Conclusion: Having dental insurance increases the frequency of dental visits but the association between dental insurance and dental visits was independently influenced by other predictors.

Keywords: Dental insurance, Dental visit, Dental pain
Although there are a large number of related articles evaluating the relationship between general health insurance and related outcomes, studies on the relationship of dental insurance and oral and dental health determinants are limited especially in Iran as a developing country. Thus, the present study was conducted to investigate the relationship between types of complementary health insurance and the frequency of dental visits as a determinant of oral health utilization in 15–64 years old population of Tehran as independent variables.

Methods
Following the first round of Urban Health Equity Assessment and Response Tool project (Urban HEART) in 2008, the second round (Urban HEART-2) was conducted on November 2011, within the main framework of WHO Center for Health Development (Kobe Center) to track the changes over time. The present study is a secondary data analysis of the second round of Urban HEART-2 study. The main study aimed to measure inequalities in socio-economic determinants and health status in Tehran [22]. Data analysis of the present study was performed from December 2016 to April 2017. Ethics approval was obtained from the Research and Planning Center of Tehran Municipality in 2011 and Ethics Committees of Iran University of Medical Sciences. Although in Urban HEART-2 survey data gathering was conducted via a questionnaire, keeping the name of subjects, images, audiovisual recordings or videos relating to an individual person in private, in the first page of the questionnaire participants over the age of eighteen provided an informed written consent for participation in the project and publication of results [16, 23].

Tehran as the capital and the largest city of Iran is the 23rd most populated city in the world. The area of this metropolis is about 730 km² such that it makes up about 16% of the total population of the country [24]. Tehran is divided into 22 municipal districts and 370 neighborhoods. Socioeconomic status, lifestyle characteristics, and other health determinants are diverse in different districts of the city [24].

The Ethics Committee of Tehran University of Medical Sciences approved this study. The participants signed informed consent forms prior to participation in the study [16].

Since the age and sex distribution was not proportionate to the population of Tehran, we used the analysis of the complex sample of SPSS software to ensure the generalize ability of the results to the Tehran population. To define the complex sample plan, we used 22 districts and 368 neighborhoods as the first and second sampling strata, respectively. Due to security issues, six neighborhoods were not available and multi-stage random sampling was performed for the remaining 368 neighborhoods [22]. We used blocks as a cluster. The weighting of each respondent was calculated and applied to the age and sex categories of each district. Weighting was based on the national census in 2011 [25].

The original data were collected using three sets of questionnaires collecting the information of 34,000 households (118,000 individuals). Inclusion criteria were being Tehran’s citizen, the ability to understand the questionnaires, and ability to answer the questions. All of 22 districts of the municipality and 368 neighborhoods of Tehran were considered as sample size. GIS maps and software used to select households randomly. Five two-day training workshops of 1240 interviewers were held to train them on how to communicate with the citizens and encourage them to participate in the survey. In Urban HEART-2 study, there were three types of questionnaires; type 1 questionnaires were completed by all selected households in the blocks and the type 2 ones (involving oral health questions) were completed by selected individual in each household. The selected individual was the available person who had the most information about the oral health status of household.

More than 24,400 participants responded to the oral health questionnaire consisting of the utilization of dental services, oral health behaviors (using toothbrush and toothpaste), and the number of teeth. According to the purpose of the study, which was assessment of the relationship of dental insurance and utilization of dental services (number of dental visits in the last year), data cleaning was performed based on two main variables: complementary health insurance and number of dental visits in the last year.

After removing records with missing and invalid data from 24,400 initial oral health-related datasets of urban HEART-2 in Tehran, 17,252 subjects remained for data analyses (response rate = 70.7).

In the present study, sociodemographic characteristics (i.e., gender, age, marital status and education), complementary health insurance, oral health behaviors (i.e., toothbrush and toothpaste usage), having functional dentition (i.e., participants with more than 20 teeth in their oral cavity were considered to have a functional dentition), and having dental pain were considered as demographic and independent variables. On the other hand, the number of dental visits in the last year (as a dental service utilization index) was considered as the dependent variable.

Dental visit as a dependent variable was defined as a categorical variable with three categories (i.e., no dental visit, one, and two or more dental visits in the last year). Complementary health insurance as the main independent variable was defined as a categorical variable with three categories (i.e., basic insurance, with complementary health insurance, and other health behaviors (number of dental visits in the last year), data cleaning was performed based on two main variables: complementary health insurance and number of dental visits in the last year.

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have been associated with dependent variables were tested in a simple multinomial logistic regression and all comparisons with \( P \leq 0.20 \) were selected for multiple regression analysis. These variables are as follows: Education, Marital status, Behavior (Toothpaste usage and Toothbrushing), Number of teeth, and Dental pain. \( P \)-values less than 0.05 were deemed statistically significant in multiple regression analysis [26]. We checked the probable interactions between tooth brushing and toothpaste usage as well.

**Results**

The study subjects consisted of 17,252 people from citizens of Tehran. The sociodemographic characteristics, oral health behavior, and dental pain of the study population are presented in Table 1. Population age range was between 15 and 64 years, with the mean age being 39.36 years; 49.4% \((n = 7858)\) were women and 64.9% \((n = 12,358)\) were married; 34.2% \((n = 5230)\) had college education. Of the total subjects, 86.0% \((n = 14,709)\) were with no complementary insurance while 7.2% \((n = 1298)\) had only complementary medical insurance without dental insurance and 6.8% \((n = 1245)\) had complementary dental insurance as well. Prevalence of no dental visit in last year was 43.8% \((n = 7572)\) while 26.1% \((n = 4462)\) visited a dentist only once and 30.1% \((n = 5218)\) visited a dentist twice or more during this time. Tooth brushing and toothpaste usage were high among subjects as 92% of them announced that they brush their teeth every day (one or more times) and use toothpaste regularly. Prevalence of having functional dentition (more than 20 teeth) was 91.8% \((n = 14,010)\) and prevalence of having dental pain in the last year was 27.2% \((n = 4702)\).

Distribution of frequency of dental visit as the main dependent variable of our study among predictor variable is shown in Table 2.

| Variables                          | N   | Percentage |
|-----------------------------------|-----|------------|
| Demographic                       |     |            |
| Gender                            |     |            |
| Male                              | 7858| 49.4%      |
| Female                            | 9394| 50.6%      |
| Education                         |     |            |
| Under high-school diploma         | 6173| 32.6%      |
| High-school diploma               | 5796| 33.1%      |
| College education                 | 5230| 34.2%      |
| Marital status                    |     |            |
| Married                           | 12,358| 64.9% |
| Separated or divorced             | 967 | 4.8%       |
| Single                            | 3734| 30.3%      |
| Dental insurance                  |     |            |
| Basic insurance                   | 14,709| 86.0% |
| With complementary medical coverage| 1298| 7.2%       |
| With dental coverage              | 1245| 6.8%       |
| Behavior                          |     |            |
| Frequency of dental visits        |     |            |
| No visit                          | 7572| 43.8%      |
| One visit                         | 4462| 26.1%      |
| Two or more visits                | 5218| 30.1%      |
| Toothpaste usage                  |     |            |
| Regularly                         | 15,709| 92.3% |
| Not regularly                     | 1427| 7.7%       |
| Tooth brushing                    |     |            |
| No                                | 1447| 8.2%       |
| Once or more                      | 15,805| 91.8% |
| Number of teeth                   |     |            |
| Less than 20                      | 1570| 8.2%       |
| More than 20                      | 14,010| 91.8% |
| Dental pain                       |     |            |
| No                                | 12,549| 72.8% |
| Yes                               | 4702| 27.2%      |

*aConsidering sampling weights (age and gender by districts)*
1.28, CI: 1.14–1.44, p-value< 0.001) was higher among married people in comparison to others. Data analysis showed that dental visit was lower in people without dental insurance in the last year.

The results of unadjusted complex samples logistic regression showed that people who had basic insurance in comparison with people with dental complementary insurance, visited a dentist less frequently for both states of dental visit: one visit (OR = 0.73, CI: 0.60–0.88; p-value< 0.001) andtwice or more visits (OR = 0.68, CI: 0.56–0.82; p-value< 0.0011) during the last year.

According to the results, there was no significant difference between numbers of the dental visit in people with medical complementary insurance compared to those with basic insurance in once (p-value = 0.14) and twice or more dental visit (p-value = 0.34).

The dental visit was significantly higher in people with better oral health behavior (once a day and twice or more a day brushing, and regular toothpaste usage). The frequency of once per year dental visit (OR = 0.44, CI: 0.36–0.53; p-value< 0.001) and twice or more per year (OR = 0.57, CI: 0.49–0.68; p-value = 0.00) was higher in people with once or more time daily brushing. Also, the regular toothpaste users visit a dentist once per year and higher than those who were not regular toothpaste users (OR = 0.48, CI: 0.40–0.58; p-value < 0.001) or have twice or more visits per year (OR = 0.60, CI: 0.50–0.73; p-value < 0.001).

The dental visit was significantly greater in people with functional dentition (more than 20 teeth). During the last year, people with less than 20 teeth in their oral cavity in comparison to people with more than 20 teeth had less one-time dental visit (OR = 0.61, CI: 0.51–0.73; p-value < 0.001).

### Table 2 Frequency distribution of dental visits according to the predictor variables

| Variables                      | Frequency of dental visits |
|--------------------------------|----------------------------|
|                                | No visit n (%) | Once ayear n (%) | Twice or more per year n (%) |
| **Demographic**                |               |                  |                              |
| Gender                         |               |                  |                              |
| Male                           | 3475 (44.2)   | 2040 (26)        | 2343 (29.8)                  |
| Female                         | 4097 (43.6)   | 2422 (25.8)      | 2875 (30.6)                  |
| **Education**                  |               |                  |                              |
| Under high-school diploma      | 3103 (50.3)   | 1420 (23)        | 1650 (26.7)                  |
| High-school diploma            | 2488 (42.9)   | 1546 (26.7)      | 1762 (30.4)                  |
| College education              | 1964 (37.6)   | 1481 (28.3)      | 1785 (34.1)                  |
| **Marital status**             |               |                  |                              |
| Married                        | 5243 (42.4)   | 3207 (26)        | 3908 (31.6)                  |
| Separated or divorced          | 487 (50.4)    | 214 (22.1)       | 266 (27.5)                   |
| Single                         | 1752 (46.9)   | 988 (26.5)       | 994 (26.6)                   |
| **Dental insurance**           |               |                  |                              |
| Basic insurance                | 6606 (44.9)   | 3770 (25.6)      | 4333 (29.5)                  |
| With complementary medical coverage | 498 (38.4) | 357 (27.5) | 443 (34.1) |
| With dental coverage           | 468 (37.6)    | 335 (26.9)       | 442 (35.5)                   |
| **Behavior**                   |               |                  |                              |
| Toothpaste usage               |               |                  |                              |
| Not regularly                  | 854 (59.8)    | 244 (17.1)       | 329 (23.1)                   |
| Regularly                      | 6674 (42.5)   | 4191 (26.7)      | 4844 (30.8)                  |
| Tooth brushing                 |               |                  |                              |
| No                             | 875 (60.5)    | 234 (16.2)       | 338 (23.4)                   |
| Once or more                   | 6697 (42.4)   | 4228 (26.8)      | 4880 (30.9)                  |
| **Number of teeth**            |               |                  |                              |
| Less than 20                   | 798 (50.8)    | 291 (18.5)       | 481 (30.6)                   |
| More than 20                   | 5982 (42.7)   | 3765 (26.9)      | 4263 (30.4)                  |
| **Dental pain**                |               |                  |                              |
| Pain                           | 649 (27.6)    | 630 (26.8)       | 1075 (45.7)                  |
| No pain                        | 6923 (46.5)   | 3831 (25.7)      | 4143 (27.8)                  |
The present study is aimed to investigate the relationship between types of complementary health insurance and the frequency of dental visits as a determinant of oral health utilization in 15 to 64 years old of Tehran population as independent variables. The results showed that the frequency of dental visits was significantly more in people with complementary dental insurance, those with regular tooth brushing and toothpaste usage habits, married individuals, having more than 20 teeth, and people with experience of dental pain.

The strong points and limitations of the main study (i.e., Urban HEART-2) were evaluated and secondary data were analyzed:

- In addition to the cross-sectional design of the study, time limitation of data collection (25 days...
across 22 districts of Tehran) led to enormous pressure on field surveyors. As a result, 8 neighborhoods (out of 374) were omitted from data collection due to non-residential or military blocks;

- Long and detailed questions made some respondents refrain from completing questionnaires.
- The time of the survey was from morning to noon (day time) and thus mainly woman (> 60%) responded to the personality questionnaires. In Urban HEART-2, the same households or blocks that had been involved in Urban HEART-1 were not followed.

Various strategies have been developed to modify the mentioned limitations that are available in the Urban HEART-2 papers [22].

In the present study, despite the large sample size, missing data posed a limitation. As mentioned, more than 24,400 participants responded to the oral health questionnaire consisting of utilization of dental services, oral health behaviors (using toothbrush and toothpaste), and number of teeth. According to the purpose of the study, which was evaluation of the relationship between dental insurance and utilization of dental services, data cleaning was performed based on two main variables: complementary health insurance and number of dental visits in the last year. After removing records with missing and invalid data, 17,252 subjects remained for data analyses (response rate = 70.7). The high number of missing data could affect the results of the study considered as a limitation.

Other predictors that were not evaluated in our study, such as the reason for dental visit avoidance, should be considered independently to clarify the significant relationship between dental visits and dental insurance. This

### Table 4 Relationship between frequency of dental visits and independent variables in Tehran citizens (multivariable data analysis)

| Demographic | Once a year vs. no visit | 2 and more visits vs. no visit |
|-------------|-------------------------|-------------------------------|
| **OR**      | **95%CI**                | **P-value**                   | **OR** | **95%CI** | **P-value** |
| Education   |                         |                               |        |           |             |
| Under high-school diploma | 0.70 | 0.61–0.8 | < 0.001 | 0.60 | 0.52–0.69 | < 0.001 |
| High-school diploma       | 0.84 | 0.74–0.96 | 0.01    | 0.76 | 0.67–0.86 | < 0.001 |
| College education         | 1.00 | 1.00      |         | 1.00 | 1.00      |         |
| Marital status            |                         |                               |        |           |             |
| Married                  | 1.29 | 1.13–1.47 | < 0.001 | 1.39 | 1.22–1.58 | < 0.001 |
| Separated or divorced     | 1.04 | 0.81–1.32 | 0.78    | 1.15 | 0.87–1.51 | 0.32    |
| Single                   | 1.00 | 1.00      |         | 1.00 | 1.00      |         |
| Dental insurance          |                         |                               |        |           |             |
| Basic insurance           | 0.78 | 0.64–0.95 | 0.01    | 0.79 | 0.65–0.96 | 0.02    |
| With complementary medical coverage | 0.90 | 0.69–1.17 | 0.42    | 1.01 | 0.77–1.32 | 0.96    |
| With dental coverage      | 1.00 | 1.00      |         | 1.00 | 1.00      |         |
| Behavior                 |                         |                               |        |           |             |
| Toothpaste usage          |                         |                               |        |           |             |
| Not regularly             | 0.70 | 0.57–0.88 | < 0.001 | 0.86 | 0.67–1.1 | 0.24    |
| Regularly                | 1.00 | 1.00      |         | 1.00 | 1.00      |         |
| Tooth brushing            |                         |                               |        |           |             |
| No                       | 0.57 | 0.46–0.7 | < 0.001 | 0.60 | 0.49–0.75 | < 0.001 |
| Once or more             | 1.00 | 1.00      |         | 1.00 | 1.00      |         |
| Number of teeth           |                         |                               |        |           |             |
| Less than 20              | 0.69 | 0.57–0.83 | < 0.001 | 0.83 | 0.71–0.98 | 0.03    |
| More than 20              | 1.00 | 1.00      |         | 1.00 | 1.00      |         |
| Dental pain               |                         |                               |        |           |             |
| Pain                     | 1.87 | 1.6–2.19 | < 0.001 | 3.23 | 2.77–3.78 | < 0.001 |
| No pain                  | 1.00 | 0.64–0.95 | 1.00    | 0.65–0.96 |         |

*Adjusted odds ratios were calculated by multiple multinomial logistic regressions considering complex sample analysis
can be considered as another limitation of our study and should be addressed in future studies.

Some studies confirmed the positive effect of the dental visit on various components of oral and dental health such as better dental status, tooth loss, and higher oral health-related quality of life [27, 28].

In the present study, there was no significant difference between age and sex in oral health utilization (frequency of dental visits). In agreement with our findings, Blasi et al. (2018) in the US found that there was no association between dental care utilization and age and gender [29]. In some studies, significant differences were identified between demographic status (age and sex) and dental care utilization in various social groups. Nazliel et al. (2012) announced that there were no gender-based differences in frequency of dental visits in elderly population in Ankara [30].

Our results showed that the frequency of yearly dental visit was higher in people with university education. One study in Brazil showed that the probability of dental service utilization was higher among people with more than 8 years of education [31]. Another study in South Korea revealed that higher level of education was associated with a higher prevalence of preventive dental visits [32]. Also, in the middle-aged and elderly population of northeast China, the level of education was positively associated with the frequency of dental visits [33]. Elsewhere, a positive relationship has been reported between the frequency of dental visits and educational level [34, 35]. Our results showed that married people had more dental visits during the last year. In agreement with our results, some studies have shown that the frequency of dental visits was influenced by marital status [36, 37] while some others did not report such a correlation [38, 39].

Our results showed that people with dental insurance had more dental visits during the last year. Dental insurance has been addressed as a factor with a positive association with the use of dental services [40]. For decades, dental researchers mentioned that there was a relationship between dental insurance and frequency of dental visits. Manski et al. (1987) reported that dental insurance is an essential predictor of dental care utilization [41]. To date, the relationship between dental insurance and frequency of dental visits has been a matter of debate [42].

In a previous study, 82% of the population with dental insurance had dental visits at least twice a year [43] while in our study, 62% of the population with dental insurance visited a dentist at least once during the last year. Most previous studies have acknowledged the significant relationship of dental insurance with frequency of dental visits but some studies suggest the role of more important factors. One study reported that having health insurance did not ensure more frequent dental visits [44].

In our study, oral health behaviors such as toothbrushing and toothpaste usage were evaluated. The results showed that the mentioned two variables had a significant effect on the final model (independently and with no interaction) and consequently both of them were positively correlated with the frequency of dental visits. The results of some studies were in line with our findings while some others were not. Hill et al. showed that the pattern of dental visits was associated with the frequency of tooth brushing [45]. In a study in Santiago (Chile), Lopez et al. reported that behavioral factors were independently related to the frequency of dental visits [46].

The results of a Brazilian study showed that there was a positive relationship between functional dentition and frequency of dental visits in the previous 12 months, which confirmed our results [47]. Evaluation of determinants of dental service utilization in a community-dwelling elderly Japanese population showed that the higher number of remaining teeth was a significant predictor of dental care utilization during the last year as a regular dental visit was associated with a higher number of existing teeth [48].

Several studies confirmed the significant relationship between dental pain and dental visit and addressed a strong association between dental visits and dental pain [49, 50].

Given that Iran is considered a low-middle income country and because of a considerable share of dental care from the total health cost of each household (15.5%), dental insurance can increase dental visits. Also, it can change the present treatment-based approach of dental visits to a prevention-focused one, leading to the improved oral health status and reduced costs of dental care.

It is noteworthy that other predictors, such as the reason of dental visit avoidance, were not evaluated in our study and thus should be considered independently to clarify the significant relationship of dental visits and dental insurance and addressed in future studies.

**Conclusion**

In agreement with our study, other studies have demonstrated that dental insurance has a positive association with dental service utilization. Based on the obtained results, individuals with dental insurance were more likely than their uninsured counterparts to visit a dentist; however, this association was independently influenced by other predictors. Development of dental insurance should be considered in Iran and concurrently other factors of dental visits.
avoidance should be evaluated and eliminated. Finally, the development of dental insurance leads to an increase in the frequency of dental visits. In this regard, further attempts are needed to shift insured people from treatment focused dental visits to a preventive focused one.

Abbreviation
Urban HEART: Urban Health Equity Assessment and Response Tool

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Authors’ contributions
MRB made contributions to the conceptual design of the work, helped in the acquisition, analysis, and interpretation of data and also drafted the work and revised early drafts and submitted the manuscript. MAL as the representative of the Social and Cultural Affairs Deputy of the Municipality of Tehran made substantial contributions to the conceptual design of the work, questionnaire designing, data collection, and data entry. HHF made a substantial contribution to acquisition, analysis, and interpretation of data and helped in writing the paper. AJ had a strong role in supervision of project and made contributions to the conceptual design of the work and drafted the work and substantively revised it. All authors read and approved the final manuscript.

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Availability of data and materials
Based on a mutual agreement between researchers and Social and Cultural Affairs Deputy of the Municipality of Tehran, the datasets used and/or analyzed during the present study are not publicly available. However, it will be available from the corresponding author for a reasonable request.

Ethics approval and consent to participate
The present study was approved by the Ethics Committee of Tehran University of Medical Sciences.

Consent for publication
Not Applicable.

Competing interests
The authors declare that there are not any competing interests.

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