Original Article

# Barrier to Access and Dental Care Utilization Behavior with Related Independent Variables in the Elderly Population of Saudi Arabia

*Abed Al-Hadi Hamasha[1,2], Mohammed N. Aldosari[2], Abdulmajed M. Alturki[2], Saud A. Aljohani[2], Ibrahim F. Aljabali[2], Rakan F. Alotibi[2]*

[1]Department of Preventive Dentistry, Faculty of Dentistry, Jordan University of Science and Technology, Irbid, Jordan, [2]Preventive Dental Science Department, College of Dentistry, King Saud bin Abdulaziz University for Health Sciences, Riyadh, Kingdom of Saudi Arabia

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ABSTRACT

**Objectives:** The study aimed to evaluate barriers associated with access and utilization of dental services among the elderly population of Saudi Arabia. **Materials and Methods:** A systematic random sample of 350 elderly people recruited from various gathering places of the elderly including all nursing home residents ($n$ = 73) was included in this study. The data were collected through face-to-face structured interviews related to access and utilization of dental services, and sociodemographic, behavioral, medical, and financial barriers to dental services. Statistical analysis included frequency distributions, chi-squared tests, and regression analysis using the Statistical Package for the Social Sciences (SPSS) program. **Results:** Approximately 37% of the elderly had proper access to and utilization of dental services. Independent variables that affect access and utilization of dental services were low income (odds ratio [OR] = 2.23, confidence interval [CI] = 1.34–3.72), unmarried participants (OR = 3.25, CI = 1.75–6.05), community residents (OR = 5.15, CI = 2.52–10.53), smokers (OR = 1.93, CI = 1.02–3.68), irregular users of toothbrushing (OR = 3.53, CI = 2.09–5.95), no dental insurance (OR = 1.88, CI = 1.06–3.37), and unaffordable price (OR = 2.55, CI = 1.38–4.69) in the bivariate analysis. In logistic regression analysis, the significant variables that were associated with proper access and utilization of dental services were having dental insurance (OR = 2.24, CI = 1.15–3.82), affordable prices (OR = 2.19, CI = 1.21–3.70), brushing regularly (OR = 3.58, CI = 2.01–6.37), higher education (OR = 1.87, CI = 1.10–3.20), and being married (OR = 1.68. CI = 0.97–2.91). **Conclusion:** Lack of perceived need, no dental insurance, unaffordable price, transportation, and fear from dental treatment were the most common significant barriers to dental services.

**KEYWORDS:** *Access, dental services, the elderly, Riyadh, Saudi Arabia, utilization*

## INTRODUCTION

Access to dental care services is an essential aspect of enhancing and maintaining good oral health, which in turn leads to an overall better general health and better quality of life.[1] All groups of people should be permitted to receive the needed dental health-care services despite their financial constraints, health conditions, or residence location.[1] In many developing countries, access to oral health services is very limited compared to many developed and industrialized countries.[2]

The elderly population in Saudi Arabia (persons aged 60 years and older) reached 1.1 million in 2010. They represent 4.4% of the Saudi population and are estimated

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***Address for correspondence:*** Prof. Abed Al-Hadi Hamasha, Preventive Dental Science Department, College of Dentistry, King Saud bin Abdulaziz University for Health Sciences, P.O. Box 3660, Riyadh 11426, Kingdom of Saudi Arabia.
E-mail: hamasha@just.edu.jo



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to reach 6.9% (2.1 million) by 2020.[3] On reviewing the dental literature, only a few studies have been conducted to assess access and utilization of dental services in the geriatric population. However, the studies that focused on the oral health status of the elderly population in Saudi Arabia reveal scarce articles.

The utilization level of dental services was reported to be high among developed countries. It has been reported that access and utilization of dental services of Swedish population reached 80% among elderly people who had visited the dentist in the preceding 12 months of the study.[4] Similarly, in one American study, 70% of elderly people had visited the dentist the year before participants' interview.[5] However, in developing countries, the access and utilization of dental services were limited. Only 34% the Ivory Coast's elderly population utilized dental services properly.[6]

It has been reported that factors associated with improper access and utilization of dental services in adults were cost of treatment, lack of dental insurance, rural residence, male gender, and low income.[7-10] Transportation was reported as a barrier for utilization of dental services by Obeidat *et al.*[1]

Upon reviewing the dental literature related to access and utilization of dental health care services among the Saudi population, we have not found any published studies to address barriers that might affect dental health access and dental services utilization. A noteworthy study was recently published in Abha, Saudi Arabia, related to access and utilization of health-care services among adults not the elderly.[11] Therefore, the aim of this study was to evaluate barriers associated with access and utilization of dental services among the elderly population in Riyadh, Saudi Arabia.

## Materials and Methods

This study involved a cross-sectional, observational prospective examination of the barriers affecting access and utilization of dental services among the geriatric population. Ethical approval was obtained from the IRB Committee of King Abdullah International Medical Research Center, Saudi Arabia (SP17/366/R). The study duration was between February and May 2018.

### Selection of subjects

The target population of this study was either nursing home residents or community dwellers aged 65 years and older who were living in the city of Riyadh, Saudi Arabia. Inclusion criteria included Saudi residents aged 65 years and older. The elderly people who were unable to provide consent and who could not answer interviews were excluded from the study. After proper consultation with the Ministry of Social Development, only one nursing home of the institutionalized elderly population present in Riyadh city was approached by the research team. All residents ($N = 73$) were invited to participate in this study. On the contrary, a systematic random sample of community dwellers was recruited from various gathering places of older people, including shopping centers, malls, mosques, public parks, and residential areas. The fourth elderly subject of any group of gathering was selected starting from the right direction. The sample size was calculated by online sample size calculator for confidence level of 0.95% and confidence interval (CI) of 5 for a population of more than 283 participants. Participants were requested for informed written consent before the interviews.

### Designing

The data were collected through administered questionnaires and interviews. The questionnaire was constructed in English and translated to the Arabic language by official translators. It comprised the following sections: (1) sociodemographic variables related to age, nationality, education, marital status, dental insurance, income, and residence; (2) behavioral variables related to brushing and smoking; (3) medical and health status variables including systemic diseases, psychological diseases, physical disabilities, and use of medications, and (4) access and utilization of dental services barrier variables involving lack of perceived need, no dental insurance, unaffordable price, transportation, dental fear, residence location, and disability. Missing data were avoided if possible by proper planning of the study using interviews in which most questions were answered. A number of acceptable missing data were set before the study.

Three senior dental students from the College of Dentistry conducted all interviews. Students were trained and calibrated on the procedure of asking questions by a faculty member by examining 10 dental patients who attended the College of Dentistry's dental clinics before the commencement of the study. Answers of these 10 interviews in regard to their validity and reliability were assessed and discussed by the research team and necessary adjustments were completed.

### Interviews of the subjects

Dental interviews for community dwellers were conducted while participants were sitting in ordinary chairs in a waiting room. However, dental interviews

for nursing home residents were conducted in a special room provided by the nursing home administrators.

### Operational definitions

The study variables were categorized according to the following operational definitions: participants who visited the dental clinic at least once in the past year from the interview were considered properly utilizing dental services. On the contrary, participants who never visited the dental clinic in the past year were considered improperly utilizing dental services. Income was categorized into (1) average income and below and (2) above average income, based on the Saudi Arabia's average family monthly income, which was stated to be SR11,999 according to the Ministry of Finance, 2017 annual income statistics. Variables that evaluate brushing practices were categorized into (1) regular, if the participants brushed their teeth seven times a week or more; and (2) irregular, if brushing was less than seven times a week.

### Statistical analysis

Collected data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS) database software, version 23 (IBM, Armonk, New York). The significance level (*P* value) was set to be 0.05. Data analysis included frequency distributions (number and percentage) of all categorical variables. Chi-squared tests were used to assess the association between access and utilization of dental services within categories of sociodemographic, behavioral, and medical health status. Regression analysis was conducted to explore the simultaneous effect of factors affecting access and utilization of dental services in the presence of other cofounders.

## Results

The total number of participants in this study was 350 geriatric residents. The participants' age ranged from 65 to 95 years with an average age of 72.3 years; furthermore, approximately 31% of participants were in the above 75 years age category. All participants were males. Approximately 77% were Saudi original and 23% were residents of Saudi Arabia. Most of the participants were retired or unemployed and only 15% were still working.

### Access and Utilization of health-care services

Table 1 presents the frequency distribution of sociodemographic characteristics of study participants. More than three-quarters of study participants were community dwellers and 73 participants were institutionalized in the nursing home present in Riyadh City. More than half of the participants (56%) obtained high school education and higher, and 45% of participants' income was above the Saudi average monthly income (SR12,000). Approximately 63% of participants were married, 34% were widowed, and 3% were single or divorced.

Proper access and utilization of dental services by the participants during the last year of the interview were reported by 127 (37.4%) participants, and 62.6% did not utilize the services properly. Access and utilization of health-care services among different sociodemographic categories are presented in Table 1. Proper access and utilization were significantly higher among nursing home residents (53%) compared to those in community dwellers (33%) as dental services were provided to all nursing home residents in Riyadh. Proper access and utilization of services were also higher among those with higher income (45%) and married participants

**Table 1: Frequency distribution of sociodemographic characteristics by access and utilization of dental services**

| Variable | Category | All samples | | Proper access and utilization | | Improper access and utilization | | $\chi^2$ | *P* value |
|---|---|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | % | | |
| Age | 65–75 years | 236 | 69.4 | 94 | 39.8 | 142 | 60.2 | 2.04 | 0.096 |
| | Above 75 years | 104 | 30.6 | 33 | 31.7 | 71 | 68.3 | | |
| Residence | Community dwellers | 267 | 78.5 | 88 | 33.0 | 179 | 67.0 | 10.261 | 0.001* |
| | Institutionalized | 73 | 21.5 | 39 | 53.4 | 34 | 46.6 | | |
| Education | Less than high school | 151 | 44.4 | 59 | 46.5 | 92 | 43.2 | 0.34 | 0.318 |
| | High school and above | 189 | 55.6 | 68 | 53.5 | 121 | 56.8 | | |
| Income | ≤SR12,000 | 178 | 55.0 | 58 | 31.0 | 129 | 69.0 | 7.13 | 0.005* |
| | >SR12,000 | 153 | 45.0 | 69 | 45.1 | 84 | 54.9 | | |
| Marital status | Married | 210 | 62.7 | 89 | 43.4 | 116 | 56.6 | 9.05 | 0.002* |
| | Unmarried | 125 | 37.3 | 33 | 26.8 | 90 | 73.2 | | |
| Total | | 340 | | 127 | 37.4 | 213 | 62.6 | | |

*Statistically significant using chi-squared tests

(43%) compared to the participants with lower income (31%) and unmarried (27%). However, there was no significant association of access and utilization with age or education of participants.

Frequency distribution of behavioral and health characteristics is presented in Table 2. For behavioral characteristics, approximately 19% of participants were current smokers and only 26% reported brushing their teeth on a daily basis. Most of the participants had systemic diseases (84%) and approximately 12% and 15% reported psychological and physical illness, respectively. Regular medication was daily taken by approximately 70% of participants.

Table 2 also presents access and utilization of dental services within different categories of behavioral and health characteristics. Improper access and utilization of dental services were significantly higher among those who smoke (75%) and those who brush their teeth irregularly (71%). However, no statistically significant associations were observed between proper access and utilization of dental services and the presence of systemic diseases, psychological diseases, physical disability, or use of medications. Community dwellers (odds ratio [OR] = 5.15), those with higher than average income (>SR12,000; OR = 2.23), and married subjects (OR = 3.25) showed significant odds of predicting proper access and utilization of dental services, as shown in Table 3.

Table 4 presents the behavioral and health characteristics related to proper access and utilization of dental services using binary logistic regression analysis. Nonsmokers (OR = 1.93) and those who brush their teeth regularly (OR = 3.53) presented significant odds of predicting proper access and utilization of dental services.

### Barriers to dental services

Participants were requested to report if the following were considered barriers to access and utilization of dental services. The highest reported barrier for obtaining dental services was the lack of perceived dental need (70.2%) followed by no dental insurance (64.5%) and unaffordable price (61.3%). Transportation and dental fear were reported as barriers to dental services by 44.2%

**Table 2: Frequency distribution of behavioral and health characteristics by access and utilization of dental services**

| Variable | Category | All samples | | Proper access and utilization | | Improper access and utilization | | $\chi^2$ | *P* value |
|---|---|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | % | | |
| Smoking | Yes | 65 | 19.2 | 16 | 24.6 | 49 | 75.4 | 5.43 | 0.013* |
| | No | 274 | 80.0 | 110 | 40.1 | 164 | 59.9 | | |
| Brushing | Regular | 88 | 25.9 | 53 | 60.2 | 35 | 39.8 | 26.5 | 0.000* |
| | Irregular | 252 | 74.1 | 74 | 29.4 | 178 | 70.6 | | |
| Systemic disease | Yes | 286 | 84.1 | 107 | 37.4 | 179 | 62.6 | 0.01 | 0.544 |
| | No | 54 | 15.9 | 20 | 37.0 | 34 | 63.0 | | |
| Physical disability | Yes | 50 | 14.7 | 20 | 40.0 | 30 | 60.0 | 0.18 | 0.394 |
| | No | 290 | 85.3 | 107 | 36.9 | 183 | 63.1 | | |
| Psychological diseases | Yes | 39 | 11.5 | 18 | 46.2 | 21 | 53.8 | 1.46 | 0.151 |
| | No | 301 | 88.5 | 109 | 36.2 | 192 | 63.8 | | |
| Medication | Regular | 237 | 69.9 | 91 | 38.4 | 146 | 61.6 | 0.51 | 0.278 |
| | Irregular | 102 | 30.1 | 35 | 34.3 | 67 | 65.7 | | |

*Statistically significant using chi-squared tests

**Table 3: Demographic factors related to proper access and utilization of dental services using binary logistic regression analysis**

| Variables | *B* | SE | Wald | *P* value | Exp(B) | 95% CI for Exp(B) | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| Age: 65–75 vs. above 75 years | 0.277 | 0.297 | 0.871 | 0.351 | 1.320 | 0.737 | 2.363 |
| Residence: community vs. institutionalized | 1.641 | 0.364 | 20.285 | 0.000 | 5.15 | 2.525 | 10.526 |
| Education: high school vs. lower than high school | 0.342 | 0.268 | 1.630 | 0.202 | 1.408 | 0.833 | 2.379 |
| Income: >SR12,000 vs. ≤SR12,000 | 0.804 | 0.260 | 9.542 | 0.002 | 2.23 | 1.340 | 3.717 |
| Married vs. unmarried | 1.179 | 0.317 | 13.832 | 0.000 | 3.251 | 1.747 | 6.051 |
| Constant | 1.186 | 0.874 | 1.843 | 0.175 | 3.274 | | |

*B* = regression coefficient, SE = standard error, Exp(B) = odds ratio, CI = confidence interval

and 35.5% of participants, respectively. The least reported reasons as barriers for dental services were residence location (28.9%) and presence of disability (10.7).

Approximately 73% of those who reported a lack of perceived need utilized dental services improperly. The difference was statistically significant. Improper access and utilization of dental services were significantly associated with no dental insurance, unaffordable price, transportation, and dental fear. However, residence location and presence of disability were not related to the nature of access and utilization of dental services [Table 5]. No dental insurance (OR = 1.88) and unaffordable price (OR = 2.55) showed significant odds of predicting proper access and utilization of dental services as shown in Table 6.

Binary logistic regression analysis was used to evaluate the simultaneous effect of the independent variables that were found significantly associated with the dependent variables access and utilization of dental services. The criteria of inclusion to enter the model as independent variables were set at 0.06 as *P* value, and the exclusion criterion to be removed was set at 0.10. Table 7 presents the best fit logistic analysis model for variables related to access and utilization of dental services. The independent variables that entered the equation at the beginning were residence, income, marital status, smoking, brushing, lack of perceived dental need, no dental insurance, unaffordable price, and dental fear. The significant variables that were found to be associated with the proper access and utilization of dental services were a high perceived need, having dental insurance, affordable prices, brushing regularly, higher education, and being married. These factors explain collectively 25% of the variance of access and utilization of dental services.

## Discussion

Proper access and utilization of health-care services were reported only by 37% of the elderly, and 67% of participants did not utilize the services properly. Lack of access and utilization of health-care services were associated with low income, being unmarried, resident in the community, smoking, and lack of toothbrushing. The reported barriers to access and utilization of health services in descending order were as follows: lack of perceived dental need, no dental insurance, unaffordable price, transportation, dental fear, residence location, and presence of disability. In logistic regression analysis, the variables that were significantly associated with proper access and utilization of dental services were having dental insurance, affordable prices, brushing regularly, higher education, and being married.

The strength of this study was that it was conducted for both institutionalized and noninstitutionalized

**Table 4: Behavioral and health factors related to proper access and utilization of dental services using binary logistic regression analysis**

| Variables | *B* | SE | Wald | *P* value | Exp(B) | 95% CI for Exp(B) | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| Nonsmokers | 0.659 | 0.328 | 4.051 | 0.044 | 1.93 | 1.017 | 3.676 |
| Regular brushing of teeth | 1.262 | 0.268 | 22.200 | 0.000 | 3.53 | 2.087 | 5.952 |
| Have medical condition | 0.170 | 0.416 | 0.166 | 0.683 | 1.185 | 0.524 | 2.679 |
| Have physical disability | 0.003 | 0.349 | 0.000 | 0.994 | 0.997 | 0.503 | 1.978 |
| Have psychological problem | 0.108 | 0.395 | 0.075 | 0.784 | 1.114 | 0.514 | 2.416 |
| Taking medication | 0.115 | 0.329 | 0.123 | 0.725 | 1.122 | 0.589 | 2.137 |
| Constant | 2.804 | 1.101 | 6.489 | 0.011 | 16.508 | | |

*B* = regression coefficient, SE = standard error, Exp(B) = odds ratio, CI = confidence interval

**Table 5: Frequency distribution of barriers for dental services by access and utilization**

| Reported barriers to dental services | *N* (%) recognized the barrier | Proper access and utilization | | Improper access and utilization | | $\chi^2$ | *P* value |
|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | | |
| Lack of perceived need | 238 (70.2) | 78 | 63.9 | 154 | 73.3 | 3.24 | 0.048* |
| No dental insurance | 223 (64.5) | 59 | 46.5 | 159 | 75.0 | 28.19 | 0.000* |
| Unaffordable price | 212 (61.3) | 52 | 40.9 | 158 | 73.6 | 35.69 | 0.000* |
| Transportation | 153 (44.2) | 42 | 33.1 | 106 | 50.0 | 9.24 | 0.002* |
| Fear of dental treatment | 123 (35.5) | 34 | 26.8 | 86 | 40.6 | 6.61 | 0.007* |
| Residence location | 100 (28.9) | 29 | 22.8 | 67 | 31.6 | 3.01 | 0.053* |
| Disability | 37 (10.7) | 11 | 8.7 | 26 | 12.3 | 1.06 | 0.199* |

*Statistically significant using chi-squared tests

**Table 6: Barriers for dental services related to proper access and utilization using binary logistic regression analysis**

| Variables | *B* | SE | Wald | *P* value | Exp(B) | 95% CI for Exp(B) | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| Lack of perceived need | 0.016 | 0.278 | 0.003 | 0.954 | 1.016 | 0.590 | 1.750 |
| No dental insurance | −0.635 | 0.296 | 4.593 | 0.032 | 1.88 | 1.055 | 3.367 |
| Unaffordable price | −0.936 | 0.312 | 9.002 | 0.003 | 2.55 | 1.383 | 4.694 |
| Transportation | −0.103 | 0.303 | 0.116 | 0.734 | 0.902 | 0.498 | 1.633 |
| Fear of dental treatment | −0.259 | 0.270 | 0.925 | 0.336 | 0.772 | 0.455 | 1.309 |
| Residence location | −0.110 | 0.330 | 0.112 | 0.738 | 0.896 | 0.470 | 1.709 |
| Disability | 0.317 | 0.444 | 0.508 | 0.476 | 1.372 | 0.574 | 3.279 |
| Constant | 2.893 | 0.852 | 11.544 | 0.001 | 18.055 | 18.055 | |

*B* = regression coefficient, SE = standard error, Exp(B) = odds ratio, CI = confidence interval

**Table 7: Logistic regression analysis of barriers associated with access and utilization of dental services**

| Variable | *B* | SE | Exp(B) | *P* value | 95% CI for Exp(B) | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| No dental insurance | 0.740 | 0.305 | 2.237 | 0.015 | 1.153 | 3.816 |
| Unaffordable price | 0.786 | 0.303 | 2.192 | 0.009 | 1.212 | 3.698 |
| Brushing irregularly | 1.275 | 0.294 | 3.584 | 0.000 | 2.012 | 6.369 |
| Education, higher | 0.628 | 0.273 | 1.873 | 0.021 | 1.097 | 3.198 |
| Being married | 0.520 | 0.279 | 1.683 | 0.062 | 0.974 | 2.907 |

$R^2$ = 0.247

elderly residents living in the city of Riyadh. Because of cultural and religious reasons, most Saudi elderly live with their families who refused to send their elderly to nursing homes. Therefore, only one nursing home was found in the city of Riyadh, on which all resident of that home participated in the present study.

Nursing home has different types of access problems than community dwellers. As the type and severity of residents' chronic conditions and disabilities are higher in nursing homes, access and utilization of dental services might be compromised by medical conditions. However, Saudi male nursing home residents had a mechanism of treating dental problem and that was reflected in their access to dental treatment.

Because of unavailability of a convenient database of people aged 65 years and older, it was difficult to draw a random sample of Saudi elderly people living in their homes; a convenient systematic random sample was selected from places of worship, public parks, residences, and shopping and entertainments centers. Providing these limitations, generalizing the results of this study to all elderly population in Saudi Arabia should be considered with caution.

This study included male participants. The only available nursing home in Riyadh was for males; in addition, it was also not possible for the all-male research team to examine elderly females in Saudi Arabia due to cultural reasons. Owing to difficulties in reading and maybe understanding questions by older people, all participants were interviewed by team members as interviewing was more feasible and data collection was more accurate than filling questionnaires.

The importance of this study is related to the fact that the elderly people of Saudi Arabia are increasing in number and that they retain more natural teeth in their mouth than before. Therefore, their demand for dental services is expected to rise.[12] This group of the population might have different barriers to access and utilization of dental services compared to other adult or children populations. On review of the relevant current dental literature related to Saudi Arabia, no studies were found to address utilization of dental services among the elderly population. To the best of our knowledge, this is the first study to investigate a different kind of sociodemographic, behavioral, medical, and financial barriers associated with decreased access to and utilization of dental services among the elderly population of Saudi Arabia.

In this study, only 37% of our participants had utilized dental services properly. However, Saudi adults utilize dental services more often (56.7%).[11] As there is no literature review article to compare with, comparison with results of other studies is justified. The percentage of those with proper access in our study was lower than that reported in other studies.[4-6] This could be attributed to the deficiency of oral health awareness and low levels of education.[13] Lack of perceived needs among the elderly population of Saudi Arabia was the most commonly reported barrier to dental services. Of those who did not think

they needed dental treatments, three-quarters were not utilizing dental services properly. This is similar to what was reported by other research,[1,6,11] where a lack of perceived need for dental treatment significantly affected seeking dental care. This figure of low access and utilization of dental services among the elderly population of Saudi Arabia might be reflected in their dental care. Official health policymakers might use these figures to establish a mechanism to increase access and enhance utilization of health-care services among the elderly.

In our study, no dental insurance (65%) and unaffordable price (61%) were from the most commonly reported barriers for utilizing dental services. Among participants who reported no dental insurance and financial constraints as barriers, approximately three-quarters were not utilizing dental services properly. Shortage of money and no insurance were the two most common factors that had a negative association with access and utilization of dental services in other studies.[4,7,14] Furthermore, transportation and fear from dental treatment were also significantly related to the deficiency of access and utilization of dental services. This figure was also reported by other studies.[1,4] Individuals with low income and individuals with poor oral hygiene were found to utilize dental services less often. These results are in agreement with those of others.[9] This might be explained by decreased awareness of oral health.[15] Smokers were less likely to have access and utilization of dental services than nonsmokers. This is in agreement with other studies.[4,7,16] However, this figure of smoking was opposed by Wanyonyi *et al.*[8]

This was a cross-sectional study that provides responses of the elderly at one point in time. The results of this study provide a baseline data for future research of longitudinal nature that might be conducted with several follow-ups by age to provide more accurate outcome and reasons for lack of access and utilization of dental services.

## Conclusion

The elderly people of Saudi Arabia were found to have low access and utilization of dental services. Many sociodemographic, behavioral, medical, and financial barriers were found significantly related to access and utilization of dental services in the elderly population in the bivariate analysis. However, lack of perceived need, no dental insurance, unaffordable price, transportation, and fear from dental treatment were the most common significant barriers to dental services in logistic regression analysis. Furthermore, this research will help dentists and dental auxiliaries to become aware of the common barriers to accessing dental services.

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### Conflicts of interest

There are no conflicts of interest.

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