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# Prevalence and Demographic Insights in Public Dental Clinics in Jazan, Saudi Arabia

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**Background:** In Saudi Arabia, particularly the Jazan region, a high prevalence of caries is reported among children, while adult data remain limited. This study aimed to assess the sex, age, and prevalence distribution of dental caries among adults in the Jazan region, Saudi Arabia.





**Material/Methods:** A cross-sectional study assessed dental caries among walk-in patients from 4 dental centers in Jazan region, using the WHO Oral Health Assessment Form (2013). Seven trained dentists conducted examinations, ensuring interrater reliability (Cronbach alpha=0.7). Sociodemographic data and Decayed, Missing, and Filled Permanent Teeth (DMFT) scores were collected and analyzed by tooth type, dental arches, and sides of arches. Data were analyzed using STATA/SE 15.1, using descriptive statistics, ANOVA, and *t* tests. Statistical significance was set at  $P \leq 0.05$ .

**Results:** Of 312 participants, 94.6% were women. Caries prevalence was highest in the 26-30 year age group (24.4%), and overall was 94.6%. Maxillary arch had higher caries prevalence (91.3%) than mandibular arch (84.9%), with molars most affected. DMFT scores were lowest in the 19-25 age group ( $9.33 \pm 5.23$ ) and highest in 36-40 group ( $13.42 \pm 4.94$ ). Participants over 50 years showed significant tooth loss ( $6.09 \pm 5.51$ ). There was a significant difference and association between the presence of caries and arch type with age groups ( $P=0.005$ ,  $P=0.002$  with ANOVA).

**Conclusions:** Widespread prevalence of dental caries in the Jazan region was found, affecting diverse demographics. Findings stress the need for preventive care, early intervention, and tailored treatments to address age-specific and sex-related differences, to improve overall oral health outcomes.

**Keywords:** **Dental Caries • Prevalence • Saudi Arabia • Age Distribution • Sex Distribution • DMF Index**

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## Introduction

The World Health Organization (WHO) reported that dental disease is the most common of all oral diseases [1]. In the last 20 years, studies have revealed a high prevalence of dental caries in children and adolescents [1,2]. In many countries, dental caries is still prevalent [3]. Dental caries affects 60% to 90% of children and adults worldwide [4]. This review reviews recent studies on the prevalence of dental caries in Saudi Arabia, highlighting trends, demographic factors, and regional variations. Recent studies indicate that dental caries remains highly prevalent in Saudi Arabia. The prevalence of dental caries among children aged 12 to 15 years is reported to be around 72% [5]. The overall prevalence among younger children, particularly those in primary dentition, is even higher, often ranging between 74% and 90% [5,6]. These figures suggest that despite various public health initiatives, dental caries continue to be a pervasive problem. There is significant regional variation in the prevalence of dental caries within Saudi Arabia. For instance, in Riyadh, the prevalence among school children has been reported to be as high as 92.3%, whereas in Abha, it is about 52% [5]. These variations can be influenced by differences in diet, fluoride levels in drinking water, access to dental care, and socio-economic factors.

Several studies have shown that age and behavioral factors significantly influence the prevalence of dental caries. In a study focusing on children aged 6 to 12 years in the Hail and Tabuk regions, a high prevalence of caries was noted, with a mean Decayed, Missing, and Filled Permanent Teeth (DMFT) score of around 7.81 [5,6]. Behavioral factors, such as frequency of tooth brushing, sugar consumption, and frequency of dental visits, were found to be strongly associated with caries prevalence. Children who brushed their teeth less frequently and consumed a greater amount of sugary foods had higher rates of caries [6].

Despite the high prevalence of dental caries, efforts are being made to address this issue. The Saudi Ministry of Health has implemented various programs aimed at improving oral health, including school-based dental health education programs and campaigns promoting regular dental check-ups. However, the persistence of high caries rates indicates that these efforts need to be expanded and possibly restructured to be more effective [5,7].

The data available from many countries show a clear increase in dental caries [8]. The increase in dental caries affects both primary and permanent teeth of children and adults. Dental caries is closely linked to socio-economic status, poor oral hygiene perceptions by mothers, and untreated dental caries in preschoolers, in many countries [9-11]. Children with severe dental caries weigh less and eat less food than usual. Poor oral

hygiene, low socioeconomic standing, insufficient exposure to fluoride, and poor feeding habits are the main risk factors of caries among infants [12,13].

In many countries, dental caries is on the rise. The increase in dental caries affects children and adults [6]. It is important to evaluate the oral health of adults, because it provides important data for planning dental services and generates information on the outcomes of dental treatment provided during the lifetime of the population [7]. Dental caries was found to be most prevalent in individuals aged 18 to 34 years [14]. The lack of preventive care in health insurance and the inadequate awareness of the importance of dental health among adults are thought to have contributed to this outcome. Dental caries is more common in adults due to the cumulative nature of the disease. Sugar consumption is clearly linked to dental caries. Dental caries is also linked to socioeconomic status, with high rates of prevalence among the poorer and more disadvantaged groups [15]. The most common risk factors of caries among Saudi infants, children, and primary and secondary school students are poor oral hygiene and low socioeconomic status [16,17].

As rural socioeconomic development increases, the differences in caries prevalence between rural and urban areas narrow. The prevalence of caries was higher in rural areas than in urban areas [18], due to a lower level of education in oral health and socioeconomic status. Studies conducted in the past have shown that poor oral health among children is a major cause of dental caries [19].

Toothbrushing has been linked to a significant reduction in the risk of dental caries [2,18-20]. In the National Diet and Nutrition Survey, children with better oral hygiene showed less caries. Those who started brushing earlier or received adult assistance also showed less caries. Brushing alone is not effective in preventing caries [21]. It is generally accepted that positive results are due to fluoride toothpastes. Sugar consumption has been cited as a contributing factor to caries in a multi-factorial context [22]. *Streptococcus mutans* and poor oral health are powerful predictors for caries [23,24].

Studies were conducted in different cities of Saudi Arabia, in the Abha [5], Hail, and Tabuk regions [6] and in Riyadh [7,16] and Madinah [17], to assess the DMFT scores among sex and different age groups, but no study investigated and assessed the DMFT scores among adults, particularly in the Jazan province. Therefore, in this study, we aimed to evaluate and compare the prevalence and distribution of sex, age group, dental arches, and arch side of dental caries in 312 walk-in patients at 4 dental clinics in Jazan, Saudi Arabia. Also, this study will aid in the needs assessment of awareness programs and funding focused on preventing dental caries. Furthermore, this study will help determine the need for health promotion and

education programs that target the groups at risk of dental caries, based on their sociodemographic and oral health factors.

## Material and Methods

### Study Design and Ethical Consideration

This study used a cross-sectional design to assess the caries status (DMFT) of walk-in patients at 4 dental healthcare clinics in the Jazan region. The oral health status was recorded based on the WHO Oral Health Assessment [25]. Ethical approval for the study was obtained from the Jazan Health Ethics Committee, Ministry of Health (No. 2209) and Jazan University, Saudi Arabia (REC-44/07/518). Informed consent was obtained from all participants prior to their inclusion in the study.

### Sample Size Calculation and Inclusion Criteria

A total of 312 walk-in patients were selected from 4 pre-determined locations: Aleban Hospital, Almuwassam Hospital, Prince Mohammed Bin Nasser Hospital, and the Dental College at Jazan University. The sample size was calculated using a 95% confidence interval, with an upper limit of 0.55, lower limit of 0.45, standard error of 0.02551, and proportion of 0.5. The included patients were from both sexes, over 18 years old, and were present at the day of examination at any of the included dental clinics. Third molars in all forms (partially or completely impacted, extracted, and congenitally missing) were excluded from the survey.

### Study Setting and Interrater Reliability Tests

Seven trained dentists conducted the examinations in person at the 4 dental healthcare clinics in Jazan province. The 4 healthcare centers represented various governmental clinics in different areas of Jazan province. To ensure interrater reliability, all 7 dentists examined 5 patients prior to the actual data collection (Cronbach alpha=0.7).

### Data Collection

The patients were assessed using an Arabic translation of the standardized WHO Oral Health Survey assessment form (2013). The data collection involved a comprehensive in-person survey that took approximately 10 min to complete. The survey included an information sheet about the study and required patients to sign an informed consent form before proceeding.

The survey gathered detailed sociodemographic information, including sex (male or female) and age, which was divided into 7 groups (19-25, 26-30, 31-35, 36-40, 41-45, 46-50, and >50 years). Additionally, oral health variables were collected, focusing

on the presence of caries according to sex and age. The distribution of dental caries was recorded on teeth for the maxillary and mandibular arches. Caries prevalence was also examined on the right and left sides of the arch, to identify any asymmetry.

Further data included DMFT scores and caries prevalence according to the type of tooth. This included assessments of central incisors, lateral incisors, canines, first and second premolars, and first and second molars, providing a comprehensive overview of dental health across various tooth types and locations within the arch. In addition, intervention urgency of the patients was examined and screened and recorded as follows: no treatment needed, preventive or routine treatment needed, prompt treatment needed, urgent treatment needed due to pain, and presence of patients with medical/dental treatment (systemic condition). Data were meticulously entered by one examiner and reviewed by another to ensure accuracy. The confidentiality of patient information was strictly maintained, with data stored in a secure room at the Dental College of Jazan University and disposed of after the study's conclusion.

### Data Analysis

Data were analyzed using STATA/SE 15.1. Socio-demographic data were analyzed using measures of central tendency and dispersion, and frequencies were calculated. Mean comparisons between different groups (sex, age groups, arch type, arch side, and other oral health variables) were performed using ANOVA and *t* tests. The analysis aimed to identify significant differences in oral health status among the different groups. The sample size calculations were based on a 95% confidence interval, ensuring a robust and representative sample. Statistical significance was set at *P* of ≤0.05.

## Results

### Patient Characteristics

In this study, 312 patients were examined (**Figure 1**). There was a significant sex disparity, with women comprising 295 (94.6%) of the patients. In terms of age distribution, most patients were in the 26-30 year age range, accounting for 76 (24.4%) individuals of the total sample. This group was closely followed by those in the 36-40 and 46-50 year age groups, each including 50 participants (16.0%) of the sample. The 19-25 age group was the smallest, with 27 patients (8.7%), while 33 patients were over 50 years (10.6%).

### Association of Caries Prevalence with Sex and Age Groups

The analysis of caries presence based on sex and age, shown in **Table 1**, indicates that sex had no significant effect on the

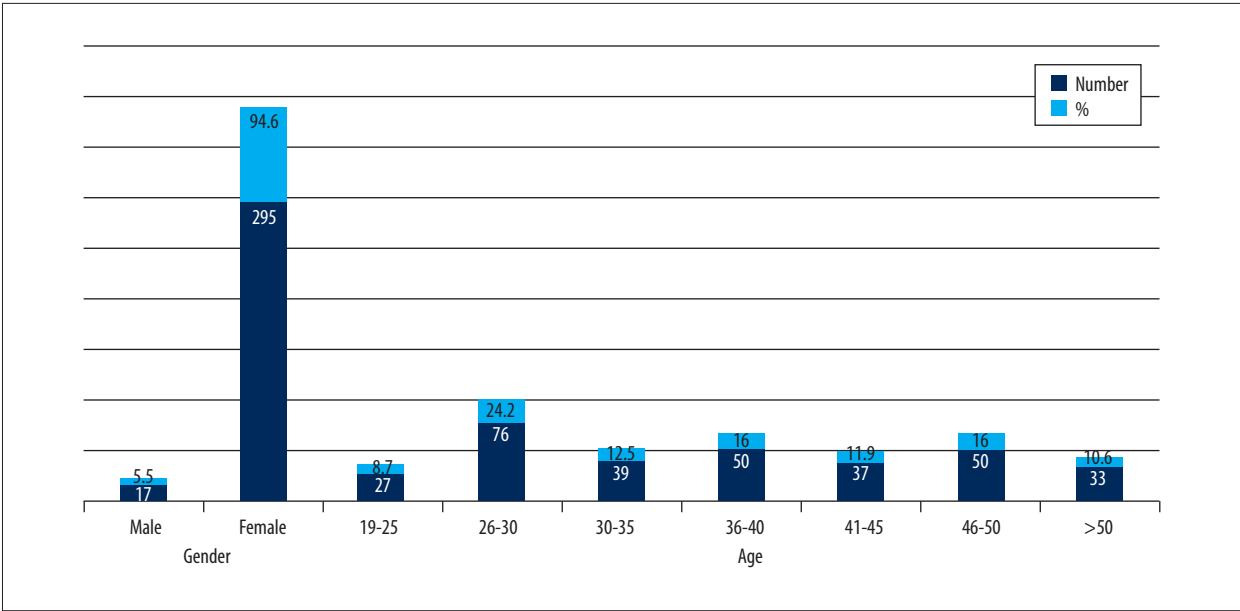


Figure 1. Patient characteristics.

Table 1. Caries presence according to sex and age groups.

Caries		No n (%)	Yes n (%)	Total N (%)	P value
Sex	Male	1 (0.3)	16 (5.1)	17 (5.4)	0.624
	Female	16 (5.1)	279 (89.4)	295 (94.6)	
Age (y)	19-25	0 (0.0)	27 (8.7)	27 (8.7)	0.005*
	26-30	1 (0.3)	75 (24.0)	76 (24.4)	
	30-35	1 (0.3)	38 (12.2)	39 (12.5)	
	36-40	2 (0.6)	48 (15.4)	50 (16.0)	
	41-45	1 (0.3)	36 (11.5)	37 (11.9)	
	46-50	7 (2.2)	43 (13.8)	50 (16.0)	
	>50	5 (1.6)	28 (9.0)	33 (10.6)	

\* Indicates statistical significance.

prevalence of dental caries, using the *t* test, with  $P=0.624$ , whereas by using the ANOVA test, age was a significant factor in caries risk ( $P=0.005$ ). The findings showed a clear pattern, with younger age groups, especially those aged 26-30 years, exhibiting a higher caries prevalence, at 76 (24.4%), than their older counterparts.

Association of Caries Prevalence and Arch Type

As shown in Table 2, the analysis indicated that the distribution of dental caries across maxillary and mandibular arches was not affected by sex, with men and women exhibiting similar caries prevalence rates in these areas ( $P=0.639$  and  $P=0.276$ , respectively, using *t* tests. Clearly, there was a higher overall prevalence of caries in the maxillary arch, at 285 (91.3%), than

in the mandibular arch, at 265 (84.9%). Using the ANOVA test, age was a significant determinant in the distribution of caries, with both arches showing statistically significant differences across various age groups ( $P=0.001$  for maxillary,  $P=0.002$  for mandibular arches), underscoring the fact that dental caries presents a universal challenge but varies significantly with age.

Association of Caries Prevalence with Arch Sides

Table 3 demonstrates that the prevalence of dental caries is nearly identical on the right and left sides of the oral cavity, each displaying a prevalence rate of 282 (90.4%), among the 312 patients studied. When examining caries distribution by sex, there was a slight variation, with men having a marginally higher prevalence on the right side, 16 (5.1%), than on the

**Table 2.** Distribution of dental caries in relation to dental arch.

Caries		n	Maxillary arch n (%)	Mandibular arch n (%)
Sex	Male	17	15 (4.8)	16 (5.1)
	Female	295	270 (86.5)	249 (79.8)
	Total	312	285 (91.3)	265 (84.9)
	P value		0.639	0.276
Age groups	19-25	27	24 (7.7)	26 (8.3)
	26-30	76	73 (23.4)	70 (22.4)
	30-35	39	38 (12.2)	34 (10.9)
	36-40	50	48 (15.4)	43 (13.8)
	41-45	37	36 (11.5)	33 (10.6)
	46-50	50	40 (12.8)	38 (12.2)
	>50	33	26 (8.3)	21 (6.7)
	Total	312	285 (91.3)	265 (84.9)
	P value		0.001	0.002

\* Indicates statistical significance.

**Table 3.** Dental caries prevalence on right and left side of arch.

		n	Right side n (%)	Left side n (%)
Sex	Male	17	16 (5.1)	14 (4.5)
	Female	295	266 (85.3)	268 (85.9)
	Total	312	282 (90.4)	282 (90.4)
Age group	19-25	27	26 (8.3)	25 (8.0)
	26-30	76	73 (23.4)	71 (22.8)
	30-35	39	37 (11.9)	36 (11.5)
	36-40	50	47 (15.1)	47 (15.1)
	41-45	37	35 (11.2)	36 (11.5)
	46-50	50	39 (12.5)	43 (13.8)
	>50	33	25 (8.0)	24 (7.7)
	Total	312	282 (90.4)	282 (90.4)

left side, 14 (4.5%), while women had a slightly higher prevalence on the left side, 286 (85.9%), than on the right side, 282 (85.3%). The data also showed a consistent pattern of caries distribution across age groups, showing no disparity between the 2 sides of the oral cavity, although minor differences were observed in the 26-30 age group.

**Association of DMFT and Caries Prevalence According to Type of Tooth**

**Table 4** shows a detailed analysis of DMFT scores and caries prevalence across different types of teeth in the maxillary and mandibular arches. In the maxillary arch, out of 623 central incisors examined, there were 107 (17.17%) caries, 8 (1.28%)



**Table 4.** Decayed, missing, and filled teeth, and caries prevalence according to arch and tooth type.

Type of tooth	Maxillary arch	Caries n (%)	Missing n (%)	Filled n (%)	Mandibular arch	Caries n (%)	Missing n (%)	Filled n (%)
Central incisors	623	107 (17.17)	8 (1.28)	46 (7.38)	624	7 (1.12)	16 (2.56)	3 (0.48)
Lateral incisor	622	99 (15.92)	13 (2.09)	2 (0.32)	624	12 (1.92)	9 (1.44)	1 (0.16)
Canine	617	57 (9.24)	12 (1.94)	10 (1.62)	623	20 (3.21)	5 (0.80)	10 (1.61)
First premolar	595	327 (54.96)	105 (17.65)	88 (14.79)	616	239 (38.80)	65 (10.55)	56 (9.09)
Second premolar	610	348 (57.05)	54 (8.85)	54 (8.85)	613	278 (45.35)	123 (20.07)	100 (16.31)
First molar	622	348 (55.95)	53 (8.52)	51 (8.20)	618	306 (49.51)	75 (12.14)	93 (15.05)
Second molar	506	127 (25.10)	175 (34.58)	7 (1.38)	505	127 (25.15)	175 (34.65)	18 (3.56)

missing teeth, and 46 (7.38%) filled teeth. In the mandibular arch, of the 624 central incisors examined, 7 (1.12%) had caries, 16 (2.56%) were missing, and 3 (0.48%) were filled. Of the 622 lateral incisors in the maxillary arch that were examined, 99 (15.92%) had caries, 13 (2.09%) were missing, and 2 (0.32%) were minimally filled. In the mandibular arch, 12 (1.92%) of the 624 lateral incisors had caries, 9 (1.44%) were missing, and 1 (0.16%) was filled. Canines had a lower incidence of caries in both arches with 617 maxillary canines showing 57 (9.24%) had caries, 12 (1.94%) were missing, and 10 (1.62%) were filled. In the mandibular arch, of the 623 canines examined, 20 (3.21%) had caries, 5 (0.80%) were missing, and 10 (1.61%) were filled.

First premolars in the maxillary arch had a high caries prevalence. Of the 595 examined, 327 (54.96%), 105 (17.65%), and 88 (14.79%) had caries, were missing, and were filled, respectively. In the mandibular arch, of the 616 examined premolars, 239 (38.80%), 65 (10.55%), and 56 (9.09%) had caries, were missing, and were filled. Second premolar exhibited the highest caries prevalence. In the maxillary arch, 348 (57.05%) of 610 second premolars had caries, 54 (8.85%) were missing or filled. In the mandibular arch, 278 (45.35%) of 613 second premolars had caries, 123 (20.07%) were missing and 100 (16.31%) were filled. Similarly, of 622 first molars in the maxillary arch 348 (55.95%) had caries, 53 (8.52%) were missing, and 51 (8.20%) were filled. Of first molars in the mandibular arch, 306 (49.51%) of 618 had caries, 75 (12.14%) were missing, and 93 (15.05%) were filled. Finally, in the 506 second molars in the maxillary arch, 127 (25.10%) had caries, 175 (34.58%) were missing, and only 7 (1.38%) were filled. The mandibular arch closely mirrored this: 127 (25.15%) of 505 examined

had caries, 175 (34.65%) were missing, and 18 (3.56%) were filled, as shown in **Table 4**.

**Correlation of DMFT and Caries Prevalence According to Sex and Age Groups**

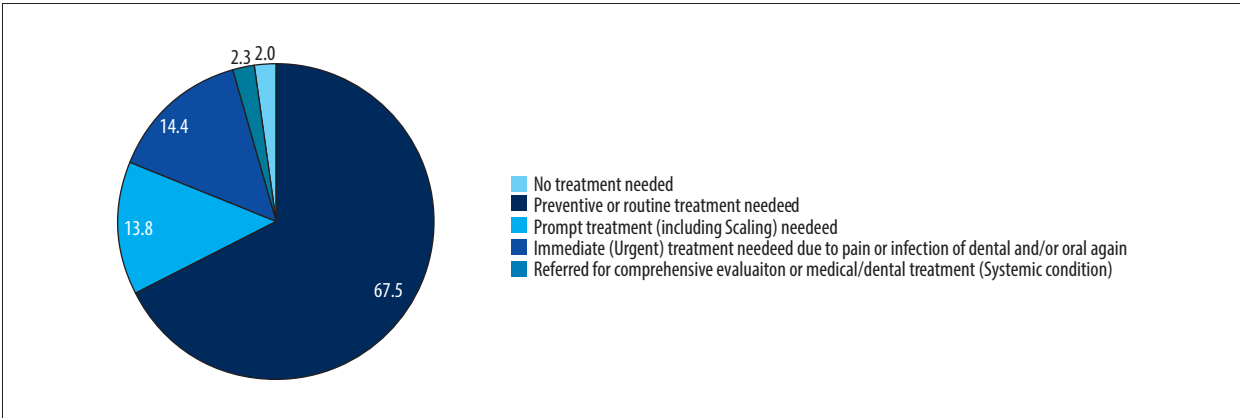
**Table 5** shows a high caries prevalence among both sexes, with a marginal difference between men (94.1%) and women (94.6%), indicating minimal sex disparity in dental health outcomes. In relation to the mean and  $\pm$ standard deviation, men demonstrated a slightly lower average DMFT score ( $12.35\pm7.60$ ) than did women ( $12.45\pm5.25$ ), suggesting comparable levels of dental decay and treatment experiences across sexes. The analysis across age groups shows the lowest DMFT scores in younger adults (19-25 years), at  $9.33\pm5.23$ , pointing to less accumulated dental decay, whereas middle-aged adults (36-40 years) had the highest dental health burden, with a DMFT score of  $13.42\pm4.94$ . Patients over 50 years of age showed significant tooth loss ( $6.09\pm5.51$ ) and moderately high DMFT scores ( $13.09\pm6.74$ ), emphasizing the effects of aging on dental health. With a caries prevalence of 94.6% across all age groups and a mean DMFT score of  $12.44\pm5.39$ , the data highlight the widespread issue of dental caries.

**Intervention Urgency of the Patients**

Regarding the urgency of intervention among the patients, most patients, 211 (67.5%), required only preventive or routine treatment, and 45 (14.4%) needed urgent treatment due to pain or infection, as shown in **Figure 2**.

**Table 5.** Decayed, Missing, and Filled Teeth (DMFT) scores and caries prevalence according to sex and age groups.

			Decayed	Missing	Filled	DMFT	(%) Caries prevalence
			Mean (±SD)	Mean (±SD)	Mean (±SD)	Mean (±SD)	
Sex	Male	17	10.53 (7.43)	0.71 (1.26)	1.12 (7.60)	12.35 (7.60)	94.1
	Female	295	7.40 (4.42)	3.12 (3.64)	1.93 (2.51)	12.45 (5.25)	94.6
	Total	312	7.57 (4.67)	2.98 (3.59)	1.88 (2.53)	12.44 (5.39)	94.6
Age group	19-25	27	7.11 (3.70)	1.37 (3.53)	0.85 (1.20)	9.33 (5.23)	8.7
	26-30	76	9.30 (5.21)	1.43 (1.50)	1.45 (2.11)	12.18 (5.12)	24.0
	30-35	39	8.10 (5.53)	2.23 (1.92)	2.26 (3.03)	12.59 (4.55)	12.2
	36-40	50	7.54 (4.32)	3.30 (3.38)	2.58 (3.04)	13.42 (4.94)	15.4
	41-45	37	7.76 (3.33)	3.40 (4.05)	1.67 (2.15)	12.84 (4.92)	11.5
	46-50	50	6.08 (4.43)	4.12 (3.45)	2.50 (2.72)	12.70 (5.89)	13.8
	>50	33	5.45 (5.09)	6.09 (5.51)	1.55 (2.40)	13.09 (6.74)	9.0
	Total	312	7.57 (4.67)	2.98 (3.59)	1.88 (2.53)	12.44 (5.39)	94.6



**Figure 2.** Intervention urgency of the patients.

## Discussion

In this study, we aimed to evaluate and compare the prevalence and distribution of dental caries in 312 walk-in patients in 4 dental clinics in Jazan, Saudi Arabia, by sex, age group, dental arches, and arch side. The percentage of female patients was significantly higher than that of male patients, at 94.6% and 5.4%, respectively. Despite this disparity, the analysis indicated no significant effect of sex on the prevalence of dental caries, which aligns with previous research that found no significant sex differences in caries prevalence [6]. However, this contrasts with studies, such as by Orfali et al, that reported a higher prevalence of caries among female than male patients [26], suggesting that dental caries can exhibit some predilection for sex in different age groups or populations.

In Saudi Arabia, the General Authority of Statistics, 2023 [27] stated that over 60% of the population were adults and seniors,

yet there is a scarcity of studies focusing on the dental health condition of this demographic group [14]. Moreover, no research has been discovered that specifically targets this demographic in Jazan, Saudi Arabia. The analysis of caries presence in this study based on sex and age indicated that age is a significant factor in caries risk, while sex is not. Younger age groups, particularly patients aged 26-30 years, showed a higher prevalence of caries than did older age groups, which is similar to a study in Kosovo which found that the highest percentage of patients diagnosed with caries were aged 18-34 years [20]. This suggests that younger adults may have higher caries risk due to lifestyle factors, dietary habits, or less consistent dental care. Some studies report the DMFT index instead of the prevalence of dental caries. Although certain research indicates a decline in the occurrence of dental caries in individuals between the ages of 25 and 64 years in various nations, including Turkey and Nigeria [28,29], another study found that 26% of dental caries cases in the United States

in adults between the ages of 20 and 64 were untreated, accounting for over 92% of cases [30]. Dental caries remains the leading cause of tooth extraction among various Saudi populations in Saudi Arabia [14], particularly among the subpopulation from the Jazan region [31,32].

Among adults aged 30-45 years, the prevalence of dental caries was reported to be 89.2%, with a mean DMFT score of 13.24, in a study conducted in Al-Ahsa in 2005 [14]. Similarly, older individuals face significant oral health challenges, as indicated by a DMFT score of 24.3. The alarming prevalence of caries across all age groups in Saudi Arabia is considerably higher than that observed in many other countries [14]. Farsi found in Jeddah, that the DMFT of individuals aged 18-40 was 12.51% [33]. While Atieh found that individuals aged 60-90 years in the Dammam Metropolitan area had a DMFT score of 20.7% [34]. The DMFT scores were higher than those reported in other countries, such as India, China, and Turkey [35].

In the present study, the distribution of dental caries across maxillary and mandibular arches revealed no significant sex differences. However, the overall prevalence of caries was higher in the maxillary arch than in the mandibular arch. This finding contrasts with a study among children younger than 5 years, which found that caries was more prevalent in the mandibular arches [36]. Age remains a significant determinant, with both arches showing statistically significant differences across various age groups, highlighting the universal challenge of dental caries and its variation with age.

In the present study, the analysis of caries distribution in the oral cavity showed a nearly identical prevalence rate among patients, regardless of sex and age. Minor variations between sexes show men had a slightly higher caries prevalence on the right side than the left, while women had a slightly higher prevalence on the left side than the right. Specifically, men had caries prevalence rates of 40.34% on the right side and 40.91% on the left side, whereas women had rates of 34.38% and 35.63% on the right and left sides, respectively [36]. The most prominent occurrence of caries was observed in the 26-30 age group. These findings highlighted the necessity for personalized dental care approaches. Overall, there was a high prevalence of caries among both sexes, with minimal differences (men at 94.1% and women at 94.6%), and comparable DMFT scores. The lowest DMFT scores were found in younger adults (19-25 years), at  $9.33 \pm 5.23$ , while middle-aged adults (36-40 years) had the highest DMFT scores, at  $13.42 \pm 4.94$ . Additionally, patients over 50 years of age showed significant tooth loss ( $6.09 \pm 5.51$ ) and moderately high DMFT scores ( $13.09 \pm 6.74$ ), highlighting the cumulative effect of aging on dental health.

A detailed examination of DMFT scores and caries prevalence across different types of teeth in both arches indicated

that molars had the highest caries prevalence. In the maxillary and mandibular arch, the first molars and second molars were the most affected teeth by caries, which was similar to studies among different ages [37-39]. This emphasizes the need for focused preventive and restorative efforts on molars, which are more susceptible to decay due to their morphology and function.

Regarding the urgency of intervention among patients in this study, most patients (67.5%) required only preventive or routine treatment. This is similar to a study in Croatia, which found that most patients (62.0%) cited routine examinations as the reason for their last visit to the dental office [40], with only 14.4% needing urgent treatment, due to pain or infection. This percentage is lower than that in a study in Saudi Arabia, in which over half of the patients used dental healthcare services primarily for emergency reasons [41]. These findings highlight the critical importance of preventive dental care and early intervention to reduce the necessity for urgent treatments.

Overall, this study highlighted the widespread issue of dental caries, with a high prevalence across all demographics. These findings emphasize the critical need for comprehensive dental health strategies that focus on preventive care, early intervention, and treatments, to address the specific needs of different age groups and sexes. By targeting these areas, dental health professionals can improve outcomes and reduce the burden of dental caries on the population.

This study's strengths include the use of the WHO Oral Health Assessment Form for Adults, ensuring standardized and comprehensive data collection. The detailed analysis of caries prevalence across different age groups, sexes, and tooth types offers valuable insights into specific areas requiring targeted preventive and restorative efforts. Identifying the most significant and affected teeth and areas in the oral cavity highlights the need for focused preventive measures on these teeth and areas. This study also provides essential information for designing age-specific dental health strategies and interventions, emphasizing the widespread issue of dental caries in the Jazan region and indicating the need for comprehensive public health strategies. These findings are valuable for policymakers and healthcare providers in improving oral health outcomes.

Future research should aim for a more balanced sex representation and include larger sample sizes for enhanced data robustness. Longitudinal studies are recommended to better understand caries progression and the impact of various risk factors. Expanding studies to multiple regions across Saudi Arabia would provide a more comprehensive understanding of national oral health. Additionally, public health strategies should prioritize preventive care, particularly for molars, and promote regular dental check-ups, especially among younger adults.



The findings indicate the necessity for comprehensive dental health strategies focused on preventive care, early intervention, and tailored treatments, to address the specific needs of different age groups and sexes. Public health initiatives should aim to improve oral hygiene practices, increase access to dental care, and promote regular dental check-ups. By targeting these areas, dental health professionals can improve outcomes and reduce the burden of dental caries, ultimately enhancing the overall oral health and quality of life for individuals in the Jazan region.

This study had limitations. One limitation was the significant sex imbalance, with 94.6% of patients being women, which limits the generalizability of the findings to the male population. Additionally, the cross-sectional design restricted the ability to establish causal relationships between variables, and the focus on a single region (Jazan) might not represent the broader population of Saudi Arabia. Self-reported data could introduce bias due to inaccurate recall or social desirability, and a larger sample could provide more robust data and enhance the statistical power of the study.

## Conclusions

The study underscores the high prevalence of dental caries among adults in the Jazan region, with particularly high DMFT

scores across all demographics. Despite the higher number of female participants, sex did not significantly affect caries prevalence, aligning with some previous studies but contradicting others that suggest sex differences in specific populations.

Age emerged as a significant factor, with younger adults, particularly those aged 26-30 years, exhibiting higher caries prevalence, due to lifestyle and dietary habits.

The high caries prevalence in molars highlights the need for targeted preventive and restorative efforts, as these teeth are more susceptible to decay, due to their morphology and function. The prevalence of dental caries was symmetrical between right and left sides as well as maxillary and mandibular arches. Most of the patients required only preventive or routine treatment, and few needed urgent treatment due to pain or infection.

## Ethical Approval

This study protocol was reviewed and approved by Jazan Health Ethics Committee, Ministry of Health (No. 2209).

## Declaration of Figures' Authenticity

All figures submitted have been created by the authors, who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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