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## Abstract

**Background:** Dental caries (DC) among children is a major public health concern with attendant consequences, including pain, poor growth, and poor school performance. This study aimed to determine the prevalence of dental caries among school children in Bauchi LGA. **Methodology:** A school-based cross-sectional study was conducted from July to November 2023. A total of 600 school children were recruited. The sample size was determined using a statistical formula for cross-sectional studies, and a multi-stage sampling technique was employed to select participants. Ethical clearance was obtained from the Bauchi State Ministry of Health. Clinical examinations were carried out to identify the presence of decayed, missing, and filled teeth (DMFT). Data were analyzed using SPSS version 21.0. **Results:** The prevalence of DC was 275 (45.8%), and the mean DMFT score for the study population was  $1.7 \pm 1.6$ . DC was found to be more common among females ( $p = 0.002$ ). The age-specific prevalence of DC was 65.0% for 7–8 years, 59.8% for 9–11 years, 30.1% for 11–12 years, and 31.5% for 13–14 years. **Conclusion:** The high prevalence of DC among school children in Bauchi LGA highlights the need for collaboration among stakeholders in the education and health sectors to raise awareness and implement policies aimed at improving dental hygiene in schools and communities.

**Keywords:** Dental caries, school children, prevalence, Bauchi LGA

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## Introduction

Dental caries (DC) is defined as “the localised, post-eruptive, pathological process of external origin involving softening of the hard tooth tissue and proceeding to the formation of a cavity.” It remains a significant global public health problem that adversely affects the oral health of children [Chugh et al., 2018](#) [Chugh et al., 2018](#) [Prasai Dixit et al., 2013](#). Studies have shown that DC affects 60–90% of school-aged children worldwide, with the high-

est burden observed in low- and middle-income countries (LMICs) [Fleming & Afful, 2018](#).

The prevalence of DC varies across regions and countries. For instance, in the United States of America (USA), approximately 50% of children aged 6–11 years are affected. In Sri Lanka, prevalence rates of 68.8% among preschool children and 47.5% among school-aged children have been reported, while in India and Pakistan, the prevalence stands at 44% and 51%, respectively [Pandey et al., 2021](#); [Perera et al., 2012](#); [Prasai Dixit et al., 2013](#);

Siddiqui et al., 2021 . Studies in African countries also show varying prevalence rates: 13.3% among school children in Ghana, 15.6% among school-age children in southern Ethiopia, 66% overall in Uganda, and 23% among adolescents in Nigeria Adeniyi et al., 2016; Bassa et al., 2023; Blankson et al., 2022; Ndagire et al., 2020.

The prevalence of DC in any population is influenced by several factors including age, gender, ethnicity, diet, and oral hygiene practices. While prevalence rates have generally declined in high-income countries (HICs), they are rising in many LMICs, largely due to changing lifestyles and dietary patterns Amudha et al., 2021; Chandregowda et al., 2020; Fomete & Adebayo, 2018; Kastenbom et al., 2019; Malele-Kolisa et al., 2019; Okoye & Ekwueme, 2011; Sofola et al., 2014. Unfortunately, most DC cases in LMICs remain inadequately managed because of poor access to oral health services. In countries such as Ghana and Nigeria, the dentist-to-population ratio is about 1 per 40,000, making dental care inaccessible for many Andegiorgish et al., 2017; Chou et al., 2014; Hewlett et al., 2022; Uguru et al., 2020.

Dental caries can cause pain and discomfort, leading to feeding difficulties, tooth loss, delayed language development, poor concentration in school, and financial strain on families. Early detection and treatment are essential to prevent irreversible tooth damage and reduce the cost and time of management Amoroso et al., 2003; Ayele et al., 2013; Maher et al., 1992; Okada et al., 2005.

In Northeast Nigeria, data on the prevalence of DC are limited. Most studies in the country have been conducted in the southern regions. Bauchi State, in particular, has been underrepresented in epidemiological data on DC. The lack of specific studies addressing caries prevalence, severity, risk factors, and preventive behaviors among school children in Bauchi State creates a gap in localized oral health evidence needed for planning targeted interventions.

Therefore, this study aims to determine the prevalence of dental caries among school children in Bauchi Local Government Area (LGA) of Bauchi State. Findings from this study will provide evidence on the prevalence of DC in Bauchi LGA and contribute to creating awareness and guiding policymakers to implement effective oral hygiene pro-

grams and school-based preventive strategies in the area.

## Methods

### Study Design and Setting

A school-based cross-sectional study was conducted in Bauchi Local Government Area (LGA), Bauchi State, Nigeria, between July and November 2023. The study population consisted of primary and secondary school children enrolled in both public and private schools within the LGA. Bauchi LGA is predominantly urban, with diverse socio-economic backgrounds and varying levels of access to oral health services. The study aimed to determine the prevalence of dental caries (DC) and related factors among school-aged children in the area.

### Sampling Procedure

The number of pupils or students ( $n$ ) recruited from each class was determined using proportionate allocation, since the different classes had varying population sizes. The sample size ( $n$ ) was determined using proportionate allocation as follows:

The total number of pupils or students in each class, as obtained from the class register, was used to calculate the sampling interval for participant selection. The sampling interval was determined by dividing the total number of pupils or students in each class by the number of participants to be selected from that class.

### Ethical Considerations

Ethical approval for the study was obtained from the Bauchi State Ministry of Health Ethics and Research Committee vide letter: . Written permission was also obtained from the Chairman, Bauchi State Universal Basic Education Board (BASUBEB) vide letter: , and presented to the management of the selected schools prior to data collection.

Detailed information about the study was provided to the parents or guardians of the selected participants, and written informed consent was obtained from them. In addition, verbal assent was obtained from each pupil or student before enrolment into the study (Appendices VIII and IX). Confidentiality of all information was maintained

$$n = \frac{\text{Total number in the class} \times \text{Total number to be selected from the school (N)}}{\text{Total population in the school}}$$

throughout the study. Participation was entirely voluntary, and no financial or punitive implications were associated with non-participation.

### Data Collection

Data were collected using a pre-tested structured questionnaire, administered through face-to-face interviews conducted by three trained research assistants. Oral examinations were performed by a qualified dentist using a dental probe and mouth mirror to assess dental caries status among participants.

### Data Analysis

Statistical analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 21.0. Descriptive characteristics were summarized using means ( $\pm$  SD) for continuous variables and proportions for categorical variables. The Pearson Chi-square test was used to compare proportions, while Student's *t*-test was applied for comparison of means. A *p*-value  $< 0.005$  was considered statistically significant.

## Results

### Socio-Demographic Characteristics of Study Participants

The mean age of the study population was  $10.7 \pm 2.1$  years. Approximately one-third of the participants, 189 (31.3%), were within the 9–10 years age group. The male-to-female ratio was 1:1.2. The majority of the children were Muslims, 589 (98.2%), and most belonged to the middle socioeconomic class (SEC), 320 (53.3%). A large proportion, 514 (85.7%), attended public schools (Table 1).

Regarding parental characteristics, most mothers were full-time housewives, 392 (65.3%), and had only primary education, 267 (44.5%). Conversely, most fathers were civil servants, 381 (63.7%), with 266 (44.3%) having attained secondary education (Table 1).

### Prevalence of Dental Caries

Among the 600 school children aged 7–14 years in Bauchi LGA, 275 were found to have dental caries, giving a prevalence rate of 45.8%. This distribution is illustrated in Figure 1.

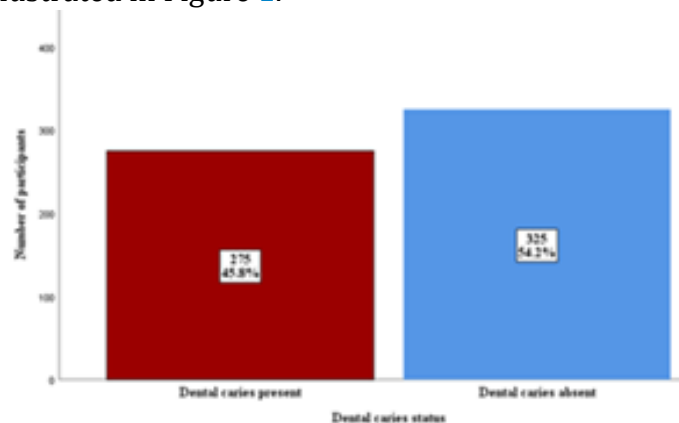


Figure 1: Bar Chart Showing Prevalence of Dental Caries among study participants.

### Estimated DMFT Index of the Study Population

Further assessment of dental status revealed that decay (D) was observed in 225 (37.5%) participants, missing teeth (M) due to caries in 74 (12.3%), and filled teeth (F) in 8 (1.4%). The mean DMFT value of the study population was  $1.15 \pm 1.60$ .

The decayed component accounted for the largest proportion of the DMFT (37.5%), contributing 0.74 to the mean DMFT value. Missing and filled teeth contributed 0.24 and 0.03 to the mean DMFT, respectively (Figure 2).

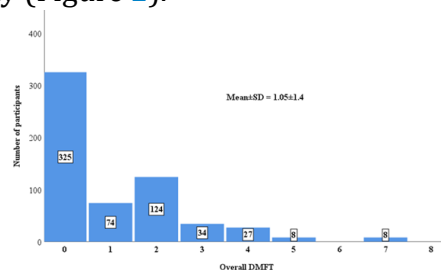


Figure 2: Bar Chart Showing the Overall DMFT Score among Participants.

**Table 1: Socio-demographic characteristics of study participants (n = 600)**

Variable	Freq (n)	Percent (%)
Age group (years)		
7–8	103	17.2
9–10	189	31.5
11–12	143	23.8
13–14	165	27.5
Mean ± SD	10.70 ± 2.1	
Sex		
Male	274	45.7
Female	326	54.3
Religion		
Islam	589	98.2
Christianity	11	1.8
School type		
Private	86	14.3
Public	514	85.7
Social class		
Lower	216	36.0
Middle	320	53.3
Upper	64	10.7
Education of fathers		
None	8	1.3
Primary	98	16.3
Secondary	266	44.3
Tertiary	228	38.0
Education of mothers		
None	0	0.0
Primary	267	44.5
Secondary	227	37.8
Tertiary	106	17.7
Mothers' occupation		
Full-time housewife	392	65.3
Business	204	34.0
Civil servant	4	0.7
Fathers' occupation		
Public servant	381	63.7
Business	173	28.7
Private company	46	7.7
Parent income		
Low	355	59.2
Middle	214	35.7
High	31	5.2

## Association Between Dental Caries and Socio-Demographic Characteristics

The occurrence of dental caries was most common among participants aged 9–10 years (113; 59.8%), females (165; 50.6%), those attending public schools (232; 45.1%), and those belonging to the middle socioeconomic class (141; 44.1%) (Table 2).

## Discussion

In this study, the prevalence of dental caries (DC) was found to be 45.8%. This finding is higher compared to studies carried out in Delta State and Kano State, Nigeria [Okolo et al., 2022](#); [Onyejaka et al., 2021](#). In contrast, the DC prevalence was lower when compared with the study performed by Akaji et al. in southern Nigeria [Akaji et al., 2020](#). This may likely be a result of the different sample sizes used in the various studies and the socio-demographic characteristics of study participants. In addition, other possible reasons for higher DC in this study could include limited access to dentists and a low level of education about oral hygiene, both of which may contribute significantly to the difference in DC prevalence among school children.

Within African countries, the prevalence of DC in this study shares some similarities with other studies. For example, a study conducted among East African countries (Eritrea, Sudan, and Tanzania) and another in Rwanda reported prevalence rates of 45.7% and 42.5%, respectively [Teshome et al., 2021](#); [Uwayezu et al., 2021](#). However, the result is not consistent with the lower prevalence reported in Ghana (13.3%) and Southern Ethiopia (15%) [Bassa et al., 2023](#); [Blankson et al., 2022](#). In contrast, higher prevalence rates were reported in Libya (63.5%) and Uganda (66%) [Alraqiq et al., 2021](#); [Ndagire et al., 2020](#).

The variation in DC prevalence among African countries is likely due to a combination of factors rather than a single cause. Differences in sociodemographic characteristics and attitudes toward oral health play major roles. Therefore, more studies are needed to understand the regional differences in DC prevalence among school children. Such evidence will be crucial for planning effective, country-specific oral health programs.

The mean DMFT score obtained from this

Table 2: Association between dental caries and socio-demographic characteristics

Variable	Caries Present (n=275)	Caries Absent (n=325)	$\chi^2$	p-value
Age group (years)				
7–8	67 (65.0)	36 (35.0)	58.082	<0.001*
9–10	113 (59.8)	76 (40.2)		
11–12	43 (30.1)	100 (69.9)		
13–14	52 (31.5)	113 (68.5)		
Sex				
Male	110 (40.1)	164 (59.9)	6.570	0.010*
Female	165 (50.6)	161 (49.4)		
School type				
Private	43 (50.0)	43 (50.0)	0.702	0.402
Public	232 (45.1)	282 (54.9)		
Social class				
Lower	108 (50.0)	108 (50.0)	2.614	0.271
Middle	141 (44.1)	179 (55.9)		
Upper	26 (40.6)	38 (59.4)		

study was  $1.7 \pm 1.6$ , which is similar to that reported among male school-aged children in Kano ( $1.2 \pm 3.7$ ) [Okolo et al., 2022](#). In other African countries, mean DMFT scores of 3.1 and 2.9 were reported in Sudan and Uganda, respectively, while Libya reported a prevalence of 63.5% and a mean DMFT of 3.7 [Alraqiq et al., 2021](#). In Delta State, South-South Nigeria, the DC prevalence was 22.7% with a mean DMFT of 0.1. In Enugu State, South-East Nigeria, DC prevalence was 58% with a mean DMFT of 2.3, while in Kano State, Northern Nigeria, prevalence was 38% with a mean DMFT of 1.2 [Akaji et al., 2020](#); [Okolo et al., 2022](#). The mean DMFT in this study was lower than that reported by Akaji et al. ( $2.29 \pm 2.83$ ) but higher than that for Delta State (0.10) [Akaji et al., 2020](#); [Onyejaka et al., 2021](#).

In most studies worldwide, higher prevalence of DC is associated with higher mean DMFT scores. However, in the present study, higher DC prevalence was accompanied by a lower mean DMFT, possibly due to skewed distribution of dental caries among the participants—particularly those below 10 years. Overall, the mean DMFT obtained in this study is within the WHO global target for children in this age group ( $DMFT < 3$ ). The findings also reaffirm regional variations in DC prevalence across African countries, likely linked to socioeconomic and demographic disparities.

Conclusion

The findings of this study, revealing a high prevalence of dental caries at 45.8%, provide valuable insights into the oral health status of school children in Bauchi LGA. This situation reflects broader community oral health patterns and highlights the urgent need for comprehensive oral health interventions, particularly for school-aged children who show a notably higher prevalence of caries.

Recommendations

- Interventions to prevent DC should be developed and implemented at the individual, family, clinical, and community levels. These should include:
1. Health education on oral hygiene, dietary habits, and the importance of dental visits should be delivered by teachers during school health talks and Parents-Teachers Association meetings.
  2. Parents should be encouraged to improve the oral hygiene and dietary practices of their children at home—ensuring regular tooth brushing in the morning and before bed, and rinsing after snacks.

3. The Bauchi State Universal Education Board should revisit the school curriculum and incorporate oral health into the School Health Programme.
4. The State Government should provide research grants to identify risk factors and predictors of dental caries across communities, to inform more effective preventive strategies.

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## Limitations

1. Ideally, one school should have been selected from each administrative ward to represent the entire Bauchi LGA population; however, this was constrained by logistical and accessibility challenges.
2. Risk factors and predictors of dental caries were not captured due to limited funding.

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