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Early Childhood Caries and Its Determinants in Qom Province, Iran

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ABSTRACT

Introduction: Early childhood caries (ECC) is a highly prevalent condition that significantly impacts children's general health and quality of life, while also imposing substantial economic burdens on families and healthcare systems. Its treatment is often complex and costly, sometimes requiring sedation or general anesthesia in young children. This study aimed to determine the prevalence of ECC among children aged 12 to 71 months in Qom province in 2022.

Materials and Methods: This cross-sectional descriptive-analytical study included 172 children aged 12–71 months in Qom. Participants were recruited from 15 clusters, including kindergartens and health centers. Children were categorized as toddlers (12–47 months) and preschoolers (48–71 months). Data were collected through clinical oral examinations and structured, face-to-face questionnaires completed by parents or guardians. Caries diagnosis was based on WHO criteria, and plaque was assessed using the Silness & Loe index.

Results: The mean dmft score was 1.46 (SE = 0.27). The overall prevalence of ECC was 26.7%, with 13.6% in toddlers and 48.6% in preschoolers. Visible dental plaque was observed in 49% of children (38.6% of toddlers, 65.9% of preschoolers). ECC prevalence and mean dmft scores were significantly higher in rural areas ($p < 0.009$). A significant association was found between lower fathers' education and higher DMFT scores ($p < 0.05$). Children who consumed sugary snacks and drinks had significantly higher dmft scores ($p = 0.02$) and ECC prevalence ($p = 0.02$).

Conclusion: This study provides a comprehensive snapshot of ECC prevalence and its determinants among 1–5-year-old children in Qom, Iran. The relatively high burden of ECC and its strong association with socio-behavioral determinants such as residence in rural areas, low parental education and poor dietary habits underscore the need for integrated and equity-focused oral health programs.

Keywords: Early childhood caries (ECC); Dmft; Dietary habits; Tooth-brushing; Parental education.

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Introduction

Early childhood caries (ECC), the most common chronic infectious disease in children [1], represents a significant global public health challenge, especially in disadvantaged societies and among refugee and migrant populations from low-income countries [2]. ECC is defined as the presence of one or more decayed, missing (due to caries), or filled tooth surfaces in any primary teeth of a child aged 71 months or younger [3]. Over time, various terms such as "comforter caries" (1911), "milk bottle mouth" (1962), "baby bottle tooth decay," and "nursing caries" have been used to describe this condition, often focusing on bottle-feeding practices [4]. However, the term ECC more accurately reflects its multifactorial etiology, including frequent sugar intake, inadequate oral hygiene, and microbial biofilm accumulation, rather than attributing it solely to bottle use [4].

According to the Global Burden of Disease Study, about 530 million children worldwide suffered from ECC in 2017, highlighting its substantial individual and societal impacts [5]. ECC can impair orofacial functions such as chewing, thereby affecting nutrition and overall health [6]. Additionally, ECC negatively affects the quality of life for both children and their families [7]. Studies have indicated that children with ECC experience a diminished quality of life, and the appropriate treatment improves this by alleviating pain and restoring masticatory function [8]. Children at greater risk include those with special healthcare needs, chronic illnesses, or from families with lower socioeconomic status [9]. Maternal psychological distress and lower educational attainment have also been linked to higher caries rates among children, likely due to their influence on oral health behaviors and access to care [10].

In recognition of the dietary factors contributing to ECC, the World Health Organization (WHO) initially recommended reducing free sugar intake to less than 10% of total daily energy intake in 1989. The updated WHO guidelines advocate for further reducing free sugar intake to less than 5% of total energy intake, if possible [11]. While many international studies have examined the relationship between ECC and factors such as oral hygiene, sugar intake, and socioeconomic status, nationally representative data from Iran, particularly among children aged 1 to 5 years, remain limited. Therefore, this study aimed to assess the prevalence of ECC and its associated determinants among children aged 12 to 71 months in Qom province, Iran, in 2022.

Materials and Methods

Study design and setting

This descriptive-analytic cross-sectional study was conducted in Qom province, Iran, in 2022, to evaluate the prevalence of ECC and its associated contributing factors among children aged 12 to 71 months. A multistage cluster sampling method was employed to ensure representation from both rural and urban populations. A total of 15 public child-centered facilities, including 9 kindergartens and 6 public health centers, were randomly selected as data collection sites. These venues were chosen based on their accessibility to the target age group and their geographic distribution across the province.

Participants

Eligible participants were children of Iranian nationality, aged 12 to 71 months, with no systemic illnesses, special healthcare needs, or disabilities. Parental consent was obtained prior to participation. Children were excluded if they were in the early mixed dentition stage, had erupting permanent teeth, or were uncooperative during the clinical examination. For analysis purposes, children were categorized into two age groups: toddlers (12–47 months) and preschoolers (48–71 months). The minimum required sample size was calculated to be 172 children, based on a 5% significance level ($\alpha = 0.05$), an estimated ECC prevalence of 50%, and a design effect of 2 to account for cluster sampling and to ensure sufficient statistical power for multivariate regression analysis.

Data collection

Data were collected through structured, face-to-face interviews with parents or guardians, along with clinical oral examinations of the participating children. The questionnaire was adapted from previously validated instruments [12,13], and its content validity was reviewed and confirmed by a panel of seven experts in community oral health and pediatric dentistry, following the methodology of Javadzadeh et al. [14]. Additionally, two independent faculty members from an accredited dental school verified the validity of the Persian-translated version of the questionnaire.

The questionnaire comprised three main sections:

1. Demographic and background information: Child's age, gender, residential location (urban/rural), parental education level (illiterate/reading and writing ability/elementary, high school/diploma, bachelor's degree,

and master's/doctorate degree or above), and self-reported economic status (poor, moderate, or excellent).

2. Free sugar consumption: Habits of sugary snack and drink consumption.

3. Oral health-related behaviors: Toothbrushing frequency and use of fluoride-containing toothpaste.

Clinical examination

All clinical examinations were performed by a trained and calibrated dentist. Children aged 12–47 months were examined in the knee-to-knee position, while those aged 48–71 months were examined while seated in a child-sized chair. Caries diagnosis followed the protocol proposed by Evans et al. [15], utilizing a mouth mirror and headlamp, with an explorer used selectively in suspected cases. Routine probing of pits and fissures was avoided to prevent iatrogenic damage. Dental plaque was evaluated using the Silness & Loe Plaque Index [16], hich scores plaque accumulation from 0 (no plaque) to 3 (thick, visible plaque). For analytical purposes, plaque scores were dichotomized into "non-visible plaque" (scores 0 and 1) and "visible plaque" (scores 2 and 3), in accordance with previous studies [17,18].

Calibration

To ensure diagnostic accuracy and consistency, the examiner underwent a structured calibration process under the supervision of an experienced pediatric dentist. Calibration involved three initial training sessions using the Kahoot software platform, presenting various clinical scenarios representing different severities of dental caries and plaque accumulation. A faculty expert in pediatric dentistry supervised these sessions, and the examiner's responses were discussed and refined to align with standardized diagnostic criteria.

Data analysis

Data were analyzed using Stata MP version 17.0 (StataCorp, College Station, TX, USA). Data was weighted by urban/rural residency and age group. Quantitative variables (e.g., dmft scores) were reported as means with standard errors and 95% confidence intervals, while categorical variables were presented as frequencies and percentages. To explore associations between independent variables and binary outcomes (ECC presence), logistic regression models were employed and expressed as odds ratios (ORs) with 95% confidence intervals. For quantitative outcomes such as the dmft index, generalized negative binomial regression models were used, reporting incidence rate ratios (IRRs).

Variables with a p-value < 0.20 in bivariate analyses were included in the multivariable models to control for potential confounding factors. Missing data were minimized through follow-up phone calls. When follow-up was unsuccessful, multiple imputation was applied to preserve data integrity.

Ethical considerations

Ethical approval for the study was obtained from the Ethics Committee of Tehran University of Medical Sciences (IR.TUMS.DENTISTRY.REC.1399.170). Written informed consent was obtained from all participating parents or guardians prior to data collection.

The study adhered to established ethical principles, including:

- Accuracy and integrity in data collection and reporting.

- Respect for participants' rights and protection of confidentiality.

- Researcher neutrality and impartiality in data interpretation.

- Assurance of anonymity in all questionnaire responses and clinical records.

Results

Participants characteristics

A total of 172 children aged 12–71 months were enrolled and examined in this study. Of these, 45.3% (n = 78) were female. Based on age categorization, 58.1% (n = 100) were classified as toddlers (12–47 months), and 41.9% (n = 72) as preschoolers (48–71 months). A total of 61.0% (n = 105) of the children resided in urban areas, while the remainder were from urban settings. Regarding paternal education, 3.7% had elementary education or lower, 31.6% had a diploma or high school degree, 31.9% held a bachelor's degree, and 25.7% had a master's or doctoral degree. Among mothers, 1.9% had elementary education or lower, 24.9% had a diploma or high school degree, 55.9% held a bachelor's degree, and 17.3% had a master's or doctoral degree. A total of 56.4% of families self-reported poor or moderate socioeconomic status (SES), while 43.6% reported good or excellent SES.

Free Sugar consumption

Regarding dietary habits, 9.0% of children never consumed sugary foods or drinks, 26.8% consumed either sugary foods or drinks, and 64.2% consumed both sugary foods and drinks.

Oral health-related behaviors

In terms of tooth brushing frequency, 44.4% of children brushed irregularly or only once per week, 32.5% brushed two to three times per week, and only 23.2% brushed daily. Overall, 47.2% of children used fluoride-containing toothpaste.

Clinical findings

The overall mean plaque score among participants was 1.09±0.12. Rural children had a mean plaque score of 1.79±0.12, compared to 1.06±0.13 among urban children. The overall mean dmft score across all age groups was 1.46±0.27. Toddlers had a mean dmft score of 0.71±0.18, while preschoolers showed a mean score of 2.72±0.56. The total prevalence of ECC in the study population was 26.7%, with 13.6% in toddlers and 48.6% in preschoolers.

Analytic findings

Determinants of dmft score

Bivariate comparisons revealed several significant associations between demographic, behavioral, and clinical variables and ECC outcomes (Table 1). Children residing in rural areas had significantly higher mean dmft scores ($p = 0.02$) and ECC prevalence ($p = 0.01$). Preschoolers (48–71 months) demonstrated significantly higher dmft scores and ECC prevalence compared to toddlers ($p < 0.001$). Higher educational attainment in both mothers and fathers was significantly associated with lower dmft scores and reduced ECC prevalence ($p < 0.05$). Children who consumed both sugary snacks and drinks had significantly higher dmft scores ($p= 0.02$) and ECC prevalence ($p = 0.02$). Toothbrushing frequency: Brushing two to three times per week was associated with significantly lower dmft scores ($p = 0.02$), whereas daily brushing did not offer additional benefit ($p = 0.17$). Use of fluoride-containing toothpaste was associated with significantly lower dmft scores ($p = 0.05$) and ECC prevalence ($p = 0.03$). The presence of visible dental plaque (Plaque Index score ≥ 2) was significantly associated with higher dmft scores ($p = 0.04$) and higher ECC prevalence ($p = 0.01$). All variables with p-values < 0.20 in bivariate analyses were included in the multivariate models.

Multivariate analysis (Table 2) confirmed the following:

Significantly higher dmft scores were found among rural children ($p = 0.02$), preschool-aged children ($p < 0.001$), and children with less-educated parents ($p < 0.05$). Gender ($p = 0.78$) and self-reported SES ($p= 0.20$) were not significantly associated with dmft scores. Sugar consumption, particularly of both sugary snacks and drinks, was significantly associated with higher dmft scores ($p = 0.02$). Visible plaque was significantly associated with higher dmft scores ($p = 0.04$). Children who brushed their teeth two to three times per week had significantly lower dmft scores ($p = 0.02$); however, daily brushing did not further reduce the score ($p = 0.17$). Use of fluoride-containing toothpaste was associated with a lower dmft score (IRR = 3.30, $p = 0.05$).

Determinants of ECC prevalence

In multivariate analyses (Table 3), ECC prevalence was significantly higher among rural children ($p = 0.009$), older children (p-value < 0.05), and those with illiterate parents ($p < 0.05$). There were no significant associations between ECC and gender ($p = 0.75$) or self-reported SES ($p = 0.15$). Children who consumed both sugary snacks and drinks had a significantly higher ECC prevalence ($p = 0.02$). According to the mother's report, the use of fluoride toothpaste was associated with a higher ECC prevalence ($p = 0.03$).

Multivariable analyses revealed: (Table 4)

In the adjusted logistic regression model, the following associations were observed:

Rural residence remained a significant predictor of ECC, with a 12-fold increase ($p = 0.009$). Father's education: Children whose fathers had a high school diploma had significantly lower ECC prevalence than those whose fathers were illiterate ($p = 0.03$). Sugar consumption: only sugary snacks or sugary drinks ($p = 0.03$, OR = 13.2), both sugary snacks and drinks ($p = 0.01$, OR = 28.9). Use of fluoride toothpaste use was significantly associated with higher ECC prevalence ($p = 0.004$).

Table 1. Bivariate association between background variables and the outcome variable (dmft score) using the generalized negative binomial regression model in children under 6 years of age in Qom (n = 172).

Variables	Amount	P-value	Mean dmft	IRR*	Standard error	95% confidence interval	
						Upper bound	Lower bound
Location of residence	Urban	-	1.39	1.00	-	-	-
	Rural	0.02	2.96	2.13	0.58	3.84	1.18
Sex	Female	-	1.40	1.00	-	-	-
	Male	0.78	1.51	1.08	0.29	1.94	0.60
Age group	12-23 months	-	0.01	1.00	-	-	-
	24-35 months	0.001	1.37	108.92	124.42	1284.72	9.23
	36-47 months	0.003	0.79	62.82	71.08	724.04	5.45
	48-59 months	0.001	1.22	97.02	109.74	111.36	8.48
	60-71 months	<0.001	4.24	336.20	361.58	3432.95	32.93
Father's educational degree	Illiterate/reading and writing ability/ elementary school education	-	3.83	1.00	-	-	-
	High school/diploma	0.11	1.48	0.39	0.22	1.30	0.11
	Bachelor's degree	0.03	1.45	0.38	0.15	0.92	0.16
	Master's/doctorate or above	0.001	1.11	0.29	0.08	0.53	0.16
Mother's educational degree	Illiterate/reading and writing ability/ elementary school education	-	2.78	1.00	-	-	-
	High school/diploma	0.50	2.06	0.74	0.32	1.89	0.29
	Bachelor's degree	0.09	1.13	0.51	0.19	1.12	0.23
	Master's/doctorate or above	0.02	0.55	0.20	0.13	0.78	0.05
Self-reported socioeconomic status	Poor or moderate	-	1.81	1.00	-	-	-
	Excellent	0.22	1.08	0.60	0.24	1.41	0.25
Consumption of sugary snacks or drinks	None	-	0.18	1.00	-	-	-
	Either snacks or drinks	0.04	1.23	6.83	5.75	42.04	1.11
	Both	0.02	1.73	9.66	7.99	57.66	1.62
Frequency of tooth brushing	Irregularly, or only once a week	-	0.81	1.00	-	-	-
	Two to three times a week	0.02	2.10	2.57	0.92	5.57	1.19
	At least once each day	0.17	1.80	2.20	1.18	7.03	0.69
Use of fluoride toothpaste	No	-	0.87	1.00	-	-	-
	Yes	0.08	2.12	2.44	1.13	6.61	0.90
Presence of dental plaque	No	-	1.13	1.00	-	-	-
	Yes	0.04	2.23	1.97	0.57	3.67	1.06

Table 2. Multivariate association between background variables and the outcome variable (dmft score) using the generalized negative multivariate regression model in children under 6 years of age in Qom (n = 172).

Variables	Amount	P-value	IRR*	Standard error	95% confidence interval	
					Upper bound	Lower bound
Location of residence	Urban	-	1.00	-	-	-
	Rural	0.001	9.18	4.74	28.02	3.01
Age group	12-23 months	-	1.00	-	-	-
	24-35 months	<0.001	68.69	60.03	453.70	10.40
	36-47 months	0.002	56.75	57.96	515.36	6.25
	48-59 months	<0.001	116.69	102.79	827.19	16.46
	60-71 months	<0.001	759.36	756.40	6531.72	88.25
Father's educational degree	Illiterate/reading and writing ability/elementary school education	-	1.00	-	-	-
	High school/diploma	0.003	0.06	0.05	0.33	0.01
	Bachelor's degree	0.02	0.22	0.13	0.77	0.07
	Master's/doctorate or above	<0.001	0.12	0.03	0.22	0.06
Mother's educational degree	Illiterate/reading and writing ability/elementary school education	-	1.00	-	-	-
	High school/diploma	0.02	8.82	7.33	53.19	1.46
	Bachelor's degree	0.03	5.89	4.19	27.38	1.27
	Master's/doctorate or above	0.45	1.70	1.17	7.50	0.39
Consumption of sugary snacks or drinks	None	-	1.00	-	-	-
	Either snacks or drinks	0.002	11.43	7.14	44.08	2.96
	Both	0.001	27.47	19.85	130.92	5.76
Use of fluoride toothpaste	No	-	1.00	-	-	-
	Yes	0.002	3.30	1.00	6.34	1.72
Presence of dental plaque	No	-	1.00	-	-	-
	Yes	0.02	2.50	0.88	5.35	1.17

Table 3. Bivariate association between background variables and the outcome variable (ECC prevalence) using the logistic regression model in children under 6 years of age in Qom (n = 172).

Variables	Amount	P-value	ECC relative prevalence	Odds ratio	Standard error	95% confidence interval	
						Upper bound	Lower bound
Location of residence	Urban	-	25.6	1.00	-	-	-
	Rural	0.009	50.5	2.97	1.06	6.40	1.38
Sex	Female	-	25.08	1.00	-	-	-
	Male	0.75	27.5	1.09	0.29	1.96	0.61
Age group	12-23 months	-	0.3	1.00	-	-	-
	24-35 months	0.001	24.6	128.95	147.36	1522.58	10.92
	36-47 months	0.003	17.1	81.46	96.65	1057.05	6.28
	48-59 months	< 0.001	36.4	226.21	247.97	2415.51	21.18
	60-71 months	< 0.001	61.0	618.57	695.28	7014.28	54.55

Variables	Amount	P-value	ECC relative prevalence	Odds ratio	Standard error	95% confidence interval	
						Upper bound	Lower bound
Father's educational degree	Illiterate/reading and writing ability/ elementary school education	-	62.8	1.00	-	-	-
	High school/diploma	0.06	18.9	0.14	0.31	1.06	0.02
	Bachelor's degree	0.06	27.4	0.22	0.16	1.08	0.05
	Master's/doctorate or above	0.07	29.8	0.25	0.18	1.17	0.05
Mother's educational degree	Illiterate/reading and writing ability/ elementary school education	-	42.5	1.00	-	-	-
	High school/diploma	0.27	26.2	0.48	0.31	1.91	0.12
	Bachelor's degree	0.34	29.9	0.58	0.32	1.91	0.18
	Master's/doctorate or above	0.09	14.9	0.24	0.19	1.33	0.04
Self-reported socioeconomic status	Poor or moderate	-	31.5	1.00	-	-	-
	Excellent	0.15	21.5	0.59	0.20	1.24	0.28
Consumption of sugary snacks or drinks	None	-	3.9	1.00	-	-	-
	Either snacks or drinks	0.06	20.08	6.55	5.96	46.80	0.92
	Both	0.02	32.3	11.89	10.89	86.02	1.64
Frequency of tooth brushing	Irregularly, or only once a week	-	16.0	1.00	-	-	-
	Two to three times a week	0.05	36.7	3.05	1.57	9.25	1.01
	At least once each day	0.17	32.9	2.58	1.66	10.37	0.64
Use of fluoride toothpaste	No	-	11.34	1.00	-	-	-
	Yes	0.03	41.5	4.60	2.77	16.92	1.25
Presence of dental plaque	No	-	21.6	1.00	-	-	-
	Yes	0.11	38.8	2.31	1.12	6.58	0.81

Table 4. Multivariate association between background variables and the outcome variable (ECC prevalence) using the regression model in children under 6 years of age in Qom (n = 172).

Variables	Amount	P-value	Odds Ratio*	Standard error	95% confidence interval	
					Upper bound	Lower bound
Location of residence	Urban	-	1.00	-	-	-
	Rural	0.009	12.6	10.45	75.69	2.09
Age group	12-23 months	-	1.0	-	-	-
	24-35 months	0.04	52.2	13.1	166.7	1.6
	36-47 months	0.09	19.3	5.4	88.0	0.4
	48-59 months	0.03	76.6	21.2	300.9	1.9
	60-71 months	0.02	322.6	95.5	1913.0	5.4

Variables	Amount	P-value	Odds Ratio*	Standard error	95% confidence interval	
					Upper bound	Lower bound
Father's educational degree	Illiterate/reading and writing ability/elementary school education	-	1.00	-	-	-
	High school/diploma	0.03	0.02	0.04	0.65	0.00
	Bachelor's degree	0.05	0.06	0.08	1.06	0.00
	Master's/doctorate or above	0.08	0.05	0.08	1.41	0.00
Consumption of sugary snacks or drinks	None	-	1.0	-	-	-
	Either snacks or drinks	0.03	13.16	13.80	126.77	1.37
	Both	0.01	28.94	32.87	336.73	2.49
Use of fluoride toothpaste	No	-	1.00	-	-	-
	Yes	0.004	7.83	4.60	27.89	2.20

Discussion

The primary aim of this study was to assess the prevalence of early childhood caries (ECC), the mean dmft score, and associated risk factors among children aged 12 to 71 months in Qom province, Iran, in 2022. ECC remains a major global public health concern, especially in low- and middle-income countries, due to its negative impact on children's health, development, and quality of life. Understanding its epidemiology is essential for designing effective prevention strategies and informing oral health policy. An important strength of this study was the use of structured interviews conducted by trained personnel, which helped ensure consistency in data collection and minimized bias due to parental literacy levels. Our findings showed that approximately one-third of children aged 1–5 years in Qom had ECC, with an overall mean dmft score of 1.46. This prevalence is higher than reported in many high-income countries—such as Sweden (11.4%) [19], Italy (7–19%) [19], England (6.8–12%) [20], and Japan (20.6%) [20]; but lower than figures some other developing contexts, such as Saudi Arabia (mean dmft: 4.13) [21]. These comparisons underscore the intermediate but still concerning burden of ECC in Iran and highlight the need for expanded preventive and treatment services, particularly among underserved rural populations. Consistent with previous research [22], children residing in rural areas in our study had significantly higher ECC prevalence and dmft scores than their urban counterparts. These disparities may be attributed to limited access to dental care, lower parental awareness, and fewer preventive resources in rural settings. Targeted interventions in these communities are urgently needed. As expected, ECC prevalence and dmft scores were higher among older children (preschoolers), reflecting the cumulative nature of dental caries over time. Parental education, especially maternal education, was inversely associated with both ECC and dmft scores, consistent with global evidence [23] [24,25]. Parents with higher education levels may be more aware of preventive measures and better able to support their children's oral hygiene and dietary habits.

While toothbrushing frequency is widely recognized as a key preventive behavior against ECC [26], our study did not find a significant association between brushing frequency and ECC prevalence. This aligns with some prior studies [27,28], but contrasts with others [24]. Possible explanations include recall bias, overreporting of brushing frequency by parents (social desirability bias), ineffective brushing techniques, or insufficient adult supervision. Notably, about 50% of children in the study population brushed irregularly or not at all, far below levels reported in high-income countries, which may explain the lack of observed protective effect. The use of fluoride-containing toothpaste was significantly associated with higher ECC prevalence and dmft scores, which is in contrast with findings from systematic reviews by Marinho and Twetman et al. [29,30]. This highlights the weak point of cross-sectional studies, which may be due to higher use of fluoride after being involved with caries. Regarding dietary habits, over 64% of children consumed both sugary snacks and drinks, and only 10% avoided them entirely. Children with higher sugar intake had significantly greater ECC prevalence and dmft scores, reaffirming the established causal link between dietary sugars and dental caries [23,31,32]. These findings re-

inforce the need for national dietary guidelines and parental counseling focused on reducing sugar exposure in early childhood. The presence of visible dental plaque, particularly thick plaque (score 3), was also significantly associated with both ECC and dmft scores, emphasizing the role of effective plaque control and parental supervision of oral hygiene in young children.

Interestingly, no significant relationship was observed between self-reported socioeconomic status and ECC or dmft. This may be due to potential reporting bias, the relatively homogeneous SES distribution in the sample, or the subjective nature of self-report. It's also possible that SES influences ECC indirectly, through pathways such as parental education and access to care, rather than directly. To control for confounding, age was adjusted in the regression models. The study faced several logistical challenges due to the COVID-19 pandemic, including reduced access to health centers and parental concerns about in-person contact. To mitigate this, the research team used child-friendly equipment and adhered strictly to safety protocols, which enhanced participation and ensured the validity of data collection.

Conclusion

This study provides a comprehensive snapshot of ECC prevalence and its determinants among 1–5-year-old children in Qom, Iran. The relatively high burden of ECC and its strong association with socio-behavioral determinants such as residence in rural areas, low parental education and poor dietary habits underscore the need for integrated and equity-focused oral health programs. Children in rural areas and those with less educated parents appear to be at particularly very high risk. Future interventions should prioritize these vulnerable groups and emphasize parent-centered education, healthy nutrition, and fluoride-based preventive strategies to reduce the burden of ECC in Iran.

Conflict of Interest

There is no conflict of interest to declare.

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