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Assessment of Oral Health Literacy of Parents Regarding Their Children's Oral Health: A Cross-Sectional Study

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Background: The American Dental Association defines oral health literacy as the degree to which individuals have the capacity to obtain, process, and understand information and services that allow them to make appropriate decisions about oral health. Parental oral health literacy influences children's dental health, as parents' knowledge and practices play a key role in prevention. The present study aimed to evaluate oral health literacy among 692 parents of children aged 2 to 12 years using the Health Literacy Dental Scale-14 (HeLD-14) and child oral health using the Decayed, Missing, and Filled Teeth (DMFT) index.

Material/Methods: This cross-sectional study included 692 parents of children aged 2 to 12 years. Data were collected via a purposefully developed self-administered questionnaire assessing demographics and parent-child oral health knowledge and practices. Children's dental caries were measured using the DMFT index, and quantitative data were analyzed using chi-square tests, correlations, and regression models.

Results: Participants' OHL scores were significantly different by sex, residential area, and employment status ($P<0.05$). This study established a significant negative relationship between parental oral health literacy and mean DMFT scores, with a correlation coefficient of -0.41 at $P<0.001$. The DMFT scores of participants in the urban zone were lower than those from the rural areas ($P=0.002$).

Conclusions: Children's oral health is closely linked to parental knowledge and practices. Higher parental OHL correlates with lower DMFT scores, and targeted education, especially for rural or low-literacy parents, can improve children's oral health outcomes.

Keywords: Child Care • Cross-Sectional Studies • Dentistry • Health Literacy • Oral Health Parents

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Introduction

Oral health literacy (OHL), defined as individuals' understanding of fundamental concepts regarding their oral health, is critical in predicting oral health outcomes; this is especially the case among children, whose dental care decisions and actions are dependent on their parents [1]. OHL includes the ability of an individual to obtain, understand, and use basic health knowledge in the process of making relevant decisions in areas of health [2]. In the area of children's dental health, change lies in parental knowledge and behavior because the parents are responsible for creating an oral hygiene schedule, choosing dental appointments, and providing babies with preventive dental care [3]. Because children's oral health reflects the knowledge and practices of their parents or caregivers, it is important to analyze parental OHL to address the larger issue of oral health inequalities and to improve the prognosis of young people.

Children's oral health is a public health concern; dental caries is among the world's most prevalent non-communicable diseases among children [4]. Despite having modifiable causes, dental caries continues to be a major health problem across industrialized and developing countries, since untreated decay can cause discomfort, infection, and other systemic health complications [5]. The early progression of carious lesions is associated with poor hygiene, infrequent visits to a dentist, and inadequate preventive measures, which depend on parents' knowledge and practices [6]. Therefore, assessment of parents' OHL is useful to understand how they view and approach their child's oral health needs and to identify any gaps in their knowledge that may be filled by the promotion of future oral health interventions.

OHL has been proven to have a positive association with children's oral hygiene practice and oral health behavior, whereby higher parental OHL translates to better children's oral hygiene and fewer dental problems [7,8].

Although a substantial body of research has examined OHL, little is known about how specific OHL indicators are associated with children's oral health outcomes across different community groups. Parents play a pivotal role in shaping their children's oral health behaviors, such as the timing of the first dental visit, supervision of brushing, dietary practices, and utilization of preventive dental care. Understanding parental OHL can therefore provide insights into children's dental caries risk and overall oral health status. The primary aim of this study is to assess the level of parents' OHL and examine its relationship with their children's dental caries, measured using the Decayed, Missing, and Filled Teeth (DMFT) index. Additionally, the study explores how demographic factors, including place of residence, education level, and employment status, influence parental OHL and oral health practices. Parental OHL was measured using the Health Literacy in Dentistry Scale (HeLD-14), a validated 14-item questionnaire assessing communication, understanding, utilization, access, support, and receptivity. Higher scores reflect better literacy and are expected to correlate with lower DMFT scores in children [9].

The current literature suggests that childhood caries affect nearly 50% of children under 12 years of age worldwide and remain a major public health concern. A bibliometric review by Zhai et al analyzed 2178 publications from 2003 to 2023, using CiteSpace to identify global research trends and collaborations. The results indicate a 3-fold increase in research output over the past 2 decades, led primarily by the United States and Brazil. International collaboration has expanded significantly, involving 108 countries worldwide. Key challenges include persistent socioeconomic disparities, limited access to treatments, such as silver diamine fluoride, and the complex influence of the oral microbiome on the disease. Despite growing research efforts, the burden of this disease remains disproportionately high in low- and middle-income countries. The study highlights the need to translate research into practice and develop targeted interventions and policies to reduce global inequalities in childhood caries [10]. Therefore, in the present study, we aimed to evaluate OHL among 692 parents of children aged 2 to 12 years using the HeLD-14 and child oral health using the DMFT index.

Material and Methods

Ethical Considerations

This study was approved by the Institutional Ethics Committee (EC-217/PERIO/ND35/2024(a)). The participants volunteered for the present study, and written informed consent was obtained after we explained the study protocol, significance, and methodology. Specific precautions were taken to ensure participant identity remained undisclosed; all information also had to be anonymized in the analysis phase.

Study Design

The primary purpose of this cross-sectional study was to assess the degree to which parents' OHL affected their children's dental health. Data were collected during a 6-month period from 692 participants at selected pediatric dental clinics and community health facilities.

Study Population

The inclusion criteria for participation in this study were (1) parents or primary caregivers of children up to 12 years of age, (2) understanding of the study language(s), and (3) willingness

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Table 1. Demographic characteristics of participants.

Demographic characteristics		n (%)	*P* value
Sex	Male	257 (37.2)	0.041*
	Female	435 (62.8)	
Residence	Urban	495 (71.5)	0.003**
	Rural	197 (28.5)	
Employment status	Employed	472 (68.2)	0.012*
	Unemployed	220 (31.8)	

* Indicates values are statistically significant, where * $P<0.05$; ** $P<0.01$.

to give written informed consent. Parents whose children had significant systemic disease of the body or tissues affecting the oral tissues were excluded, as were parents with physical or mental disabilities that would prevent compliance in the study.

Sampling Method

This study used the stratified random sampling technique in choosing participants for the study, to give equal representation of individuals of different socioeconomic classes. Participants were recruited from outpatient departments of pediatric dental clinics and from community-based oral health education and outreach programs. The study population was selected using a stratified sampling method to ensure adequate representation of key subgroups. Stratification was performed based on criteria including the age group of children, type of school (government or private), geographic area (urban or rural), and socioeconomic status, as these criteria are known to influence children's oral health outcomes and parental OHL, thereby minimizing selection bias and improving representativeness.

Data Collection

Data were gathered through a 2-step process, as follows.

Questionnaire-Based Survey

A structured, validated questionnaire was used to assess parental OHL, with responses recorded using multiple-choice and Likert-scale options. The questionnaire included sections on parent and child data, general information, and knowledge and practices. Parent and child data were collected via Google Forms, allowing participants ample time to complete the questionnaire. Incomplete responses were excluded from analysis. Confidentiality was ensured through anonymization and secure data storage. The study protocol and methodology were explained to participants before obtaining consent. General information, including socio-demographic characteristics such as age, sex, education level, employment status, and place of residence (rural or urban) was collected (**Table 1**).

Data on knowledge and practices included 15 questions focusing on parents' understanding and behaviors regarding their child's oral health, including the timing of the first dental visit and initiation of oral cleaning; factors contributing to dental caries and malaligned teeth; supervision of tooth brushing, choice of toothpaste, brushing techniques, and frequency of toothbrush replacement; dietary habits affecting oral health; and attitudes toward professional dental care for primary teeth, use of mouthguards, and fluoridated toothpaste (**Table 2**).

Clinical Oral Health Assessment

Oral health assessments were conducted by a single calibrated dental examiner trained in pediatric oral examination techniques. Caries in permanent and primary teeth were evaluated using the DMFT index, while overall oral hygiene was assessed with the Oral Health Index-Simplified, which are both internationally validated measures. Examinations were standardized, following strict infection control protocols, using sterile instruments, dental mirrors, and applicators under adequate lighting. Findings were systematically recorded on structured datasheets, detailing carious, missing, and filled teeth as well as oral hygiene status, ensuring consistent, reliable, and comprehensive evaluation of each child's oral health. The DMFT index is recommended by the World Health Organization for oral health surveys and is useful for evaluating disease burden, treatment needs, and overall oral health status in populations.

Data Entry and Quality Control

To maintain quality of measurements in terms of interobserver variation, training and calibration sessions were conducted for all the researchers and clinical examiners. To ensure validity and reliability, the survey instrument was administered to a pilot sample of 20 individuals, and changes were made depending on their feedback. To minimize errors during data analysis and to ensure data accuracy and reliability in the collected data, double data entry was performed. Two independent individuals entered the collected data separately into identical data entry templates. The 2 datasets were then compared

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Table 2. Parental knowledge, attitudes, and practices regarding children's oral health.

Question	Response options	Number of responses (n)	Percentage (%)
1. When should be the first visit of your child to dentist?	– When first tooth erupts	150	21.7%
	– When all milk teeth erupt	200	28.9%
	– When all permanent teeth erupt	100	14.5%
	– Don't know	242	35.0%
2. When should you start cleaning your child's mouth?	– When first tooth erupts	243	35.1%
	– When all milk teeth erupt	200	28.9%
	– When all permanent teeth erupt	50	7.2%
	– Don't know	199	28.8%
3. Do you know when the first tooth erupts in the oral cavity?	– 6-9 months	300	43.3%
	– After 1 year	100	14.5%
	– Within 1 year	150	21.7%
	– Don't know	142	20.5%
4. Which of the following factor/s lead to mal-aligned teeth?	– Genetics	100	14.5%
	– Thumb sucking	50	7.2%
	– Mouth breathing	150	21.7%
	– All of the above	392	56.6%
5. Do you supervise your child's tooth brushing?	– Yes	542	78.3%
	– No	150	21.7%
6. Which of the following factor/s causes dental caries/cavities?	– Germ/bacteria	100	14.5%
	– Excess sugar/sweets	50	7.2%
	– Sticky food	103	14.9%
	– All of the above	439	63.4%
7. Do you know poor oral health can lead to poor general health?	– Yes	500	72.3%
	– No	192	27.7%
8. What will you prefer in case of milk teeth?	– Consult general dentist	200	28.9%
	– Consult pediatric dentist	250	36.1%
	– Leave as it is milk teeth	100	14.5%
	– Don't know	142	20.5%
9. Do you think your child should wear a mouthguard while playing?	– Agree	300	43.3%
	– Disagree	200	28.9%
	– Neither agree nor disagree	192	27.7%
10. Do you think use of fluoridated toothpaste prevents tooth decay?	– Agree	400	57.8%
	– Disagree	150	21.7%
	– Neither agree nor disagree	142	20.5%

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Table 2 continued. Parental knowledge, attitudes, and practices regarding children's oral health.

Question	Response options	Number of responses (n)	Percentage (%)
11. Which method do you teach your child for brushing their teeth?	– Horizontal/scrubbing	300	43.3%
	– Circular	200	28.9%
	– Combination	100	14.5%
	– Method doesn't matter	92	13.3%
12. When do you take your child to dentist?	– Every 6 months	200	28.9%
	– Every year	150	21.7%
	– When it is required	250	36.1%
	– Not regularly	92	13.3%
13. When do you change your child's toothbrush?	– Every 6 months	225	32.5%
	– Every year	100	14.5%
	– Every month	55	7.9%
	– When bristles fray out	312	45.1%
14. When do you give sweets to your child?	– In between meals	200	28.9%
	– During meals	150	21.7%
	– Before going to bed	100	14.5%
	– Don't know	242	35.0%
15. Your first course of action when your child complains of toothache?	– Give painkiller	150	21.7%
	– Consult dentist	400	57.8%
	– Stop sweets	50	7.2%
	– Don't know	92	13.3%

using data validation tools. In cases in which discrepancies were identified between the 2 datasets, the original data collection forms were reviewed. The discrepancy was resolved by referring back to the source document, and corrections were made accordingly. This verification process minimized transcription errors and enhanced data integrity.

Statistical Analysis

In the present study, statistical analyses were done using the Statistical Package for the Social Sciences (SPSS version 26.0, IBM Corp, Armonk, NY, USA). Participants' demographic data, OHL scores, and clinical variables were presented using frequency distributions, percentages, means, and standard deviations. The association between OHL and clinical oral health indices was analyzed using chi-square tests and Pearson correlation coefficients. Binary logistic regression analysis was used to identify potential predictors of child oral health practices and condition based on OHL. The level of significance was established at $P<0.05$.

Results

The demographic details of participants were as follows. A total of 692 participants were included in the study. Sex distribution was significant ($P=0.041$), with 62.8% female and 37.2% male participants. The difference in place of residence was also significant ($P=0.003$), with 71.5% living in urban areas and 28.5% in rural areas. The difference in employment status was significant ($P=0.012$), with 68.2% employed and 31.8% unemployed participants (**Table 1**).

Table 2 shows that parental knowledge regarding children's oral health was limited. Only 21.7% knew a child's first dental visit should occur by the first tooth or first birthday, and 35.1% were aware that oral care should begin with the eruption of the first tooth. Additionally, only 43.3% correctly identified the first tooth eruption age as 6 to 9 months.

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Table 3. Knowledge and practices of parents regarding oral health of their children.

Question	Correct responses (%)	*P* value
Child's first dental visit	21.7	**0.023***
Initiation of oral hygiene	35.1	**0.019***
Malaligned teeth factors	56.2	**0.002****

* Indicates values are statistically significant, where * *P*<0.05; ** *P*<0.01.

Table 4. Practices of parents regarding the oral health of their children.

Practice		n (%)	*P* value
Supervision of brushing	Yes	542 (78.3)	**0.031***
	No	150 (21.7)	
Awareness of caries causes	Correct (All factors)	439 (63.4)	**0.005****
	Incorrect	253 (36.6)	
Toothbrush replacement frequency	When bristles fray	312 (45.1)	**0.016***
	Every six months	225 (32.5)	

* Indicates values are statistically significant, where * *P*<0.05; ** *P*<0.01.

Table 5. Statistical analysis of clinical findings of study participants.

Oral health indicators	Mean±SD	*P* value
Overall Decayed Missing Filled Teeth (DMFT) index score	2.8±1.2	
Decayed Missing Filled Teeth (DMFT) index score in urban living	2.5±1.1	**0.002****
Decayed Missing Filled Teeth (DMFT) index score in rural living	3.2±1.3	

* Indicates values are statistically significant, where * *P*<0.05; ** *P*<0.01.

Parental Knowledge and Practices

Knowledge of factors contributing to malaligned teeth was moderate, with 56.2% of parents correctly identifying genetic factors, thumb sucking, and mouth breathing as causes (*P*=0.002). Overall compliance with daily oral hygiene was good, as 78.3% of parents assisted their children with tooth brushing. Knowledge of dental caries etiology was moderately high, with 63.4% recognizing bacteria, excessive sugar, and sticky foods as causative factors (*P*=0.005). Preventive practices, however, were less consistent: 36.1% of parents reported taking their child to the dentist, when necessary, while only 28.9% adhered to the recommended twice-yearly visits. Toothbrush replacement practices were suboptimal, with 45.1% replacing brushes when bristles were worn and 32.5% replacing them every 6 months, which may not adequately prevent plaque accumulation. Correct responses to questions about the first dental visit and initiation of oral hygiene were limited, with only 21.7% and 35.1% of parents answering correctly, respectively, highlighting gaps in knowledge regarding recommended early childhood oral care (**Tables 2-4**).

Oral Health Status of Children (DMFT) and Its Association With Parenteral OHL

The children's dental health, assessed using the DMFT index, is summarized in **Table 5**. Half of the children had DMFT scores of 1 or lower, indicating adequate preventive care, while the overall mean DMFT score was 2.8±1.2, reflecting a moderate level of decay. Significant differences were observed based on residence: children living in urban areas had lower mean DMFT scores (2.5±1.1) than did children living in rural areas (3.2±1.3, *P*=0.002), suggesting better access to dental services and preventive care in urban areas. Two key hypotheses were tested: parental OHL and children's oral health outcomes are influenced by demographic predictors, and factors such as age, education, and employment significantly predict parental literacy and practices. Education level was the strongest predictor (*P*<0.001), followed by urban residence (*P*=0.005) and employment status (*P*=0.032). These findings indicate that higher parental education level, urban living, and active employment status enhance OHL, which in turn improves children's oral health (**Table 6**).

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Table 6. Significant predictors of parental oral health literacy and child oral health outcomes.

Predictor	*P* value
Education status of parent	0.001
Urban living	0.005
Employment status	0.032

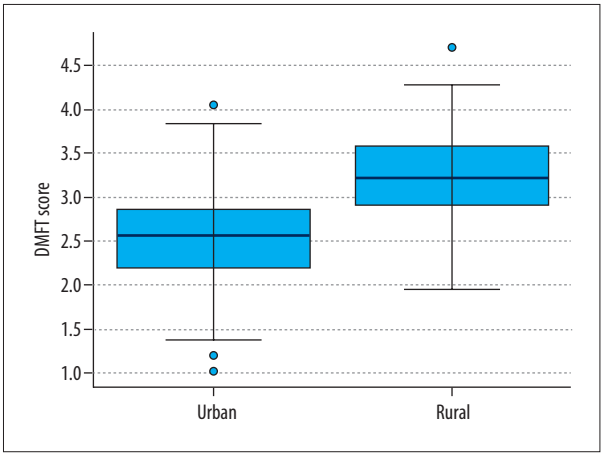

Figure 1. Box-and-whisker plot illustrating the distribution of Decayed, Missing, and Filled Teeth (DMFT) index scores among urban and rural children.

The evaluation of DMFT averages of children in urban and rural areas through the box plot shows a significant difference in oral health of children by area. The result further showed that the median DMFT score was lower among children in urban areas than in children in rural areas, suggesting improved oral health status among children in urban areas. Also, more variation was displayed in low DMFT scores among children in urban areas, which might indicate that oral health practices and access to dental care were relatively better in the urban areas. These findings highlight both external influences, for example, factors linked to the availability and familiarity with dental services, which are often more prevalent in urban settings (**Figure 1**).

As shown in the scatter plot (**Figure 2**), there was an inverse relationship between parental OHL, measured by the HeLD-14, and children's dental caries, expressed as DMFT scores. Higher parental HeLD-14 scores were associated with lower DMFT scores in children, indicating that greater parental understanding of oral health corresponds to better child oral health. The color gradient overlay highlights the distribution of HeLD-14 scores and emphasizes that lower DMFT values are concentrated among children of parents with higher literacy scores. This relationship was statistically significant (r=-0.41, *P*<0.001), suggesting that improving parental OHL could contribute to a reduction in childhood dental caries.

Discussion

OHL has been identified as a major determinant of the prevention and control of dental diseases in children [11]. Parental knowledge and practices play a major role in a child's oral health, since informed parents are more likely to apply effective preventive measures [12]. In this study, we assessed parental OHL in relation to children's oral health and DMFT scores and found that demographic factors, including sex, residence, and employment, influence OHL, with higher parental awareness associated with better child oral health. We identified

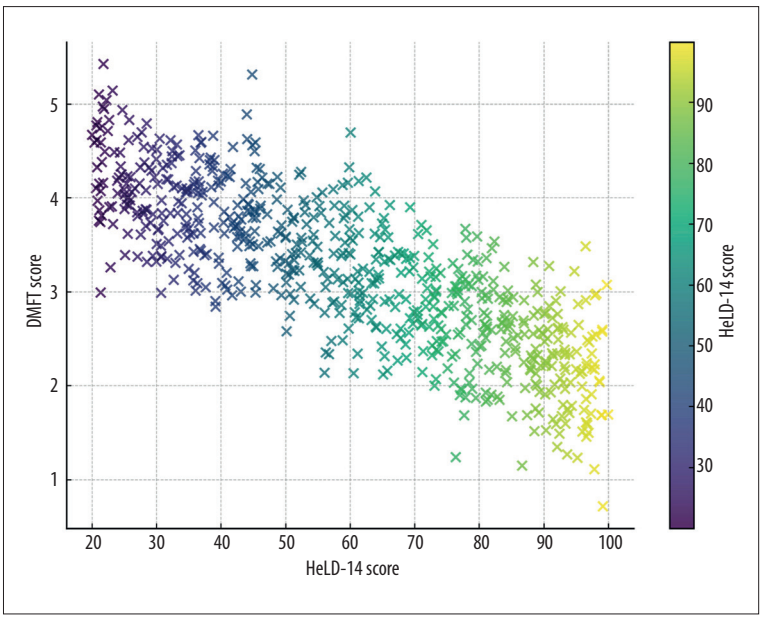

Figure 2. Scatter plot illustrating the relationship between Health Literacy in Dentistry (HeLD-14) scores and Decayed, Missing, and Filled Teeth (DMFT) index scores among study participants.

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significant differences in OHL by parent sex, which is consistent with prior research showing women generally have higher oral health knowledge and attitudes than men [13,14]. In the present study, responses revealed a statistically significantly higher proportion of female than male participants, at 62.8% and 37.2% respectively, *P*=0.041. Increased female participation could be explained by the usual responsibilities of women in the role of caregivers and decision-makers in matters concerning family health. The place of residence was also statistically significant in determining OHL, as parents in urban areas had a higher OHL than those in rural areas (*P*=0.003). This aligns with literature showing urban access to dental and educational services improves OHL, while rural populations often face greater care-practice gaps and poorer oral health outcomes [15-17]. Parental employment status significantly influenced OHL (*P*=0.012), as employed parents often access healthcare benefits, enabling greater preventive oral care for their children, compared with self-employed or unemployed parents. [12]. These findings support the need to establish interventions that will improve OHL among the targeted population by demographic group. A study assessing parents' knowledge of children's oral health revealed widespread gaps. Only 21.7% correctly identified the timing of the first dental visit (*P*=0.023), and 35.1% knew when to start fluoride use (*P*=0.019). The American Academy of Pediatric Dentistry recommends the first dental visit by 6 months after the first tooth or by the child's first birthday [18,19]. The present study highlights a lack of parental awareness regarding early dental care, emphasizing the need for greater education. Initiating proper oral hygiene in young children is essential to establish lifelong healthy habits. Only 35.1% of parents knew when to begin oral hygiene practices, underscoring the need for awareness campaigns. Evidence shows that children whose parents implement early brushing and regular dental check-ups have a significantly lower risk of developing dental caries [6]. The result also showed that parents had better understanding in the aspects of etiologic factors of malaligned teeth, with 56.2% correctly identifying thumb sucking, mouth breathing, and genetics as causes, compared with only 28.3% among the children (*P*=0.002). Even though this response rate was higher, it also means that there is still a lack of knowledge that may result in a wrong perception about the formation of malaligned teeth. Other prior research indicated that, by informing the parents about the causes of malalignment, there might be reduced cases of orthodontic issues in children, for instance due to controlling factors such as thumb sucking or breathing through the mouth [20]. These findings suggest that while the public has a moderate level of understanding, there are areas in which many could benefit from improved education, particularly regarding early dental visits and initial oral hygiene practices. To inform parents about these risk factors, we could consider giving parents practical advice on how to change their oral health behaviors for the benefit of their children.

A survey on supervisory and preventive practices revealed that most parents (78.3%) supervised their children's tooth brushing as an important factor in prevention of dental caries. This corresponds with the findings by other authors who noted that parental supervision of children's brushing practices is important for young children to adequately and correctly brush their teeth [21,22]. Although many parents attended supervised dental appointments, one-third remained unaware of the causes of caries. While 63.4% recognized bacteria, only 50% identified sugar, and 61.1% sticky foods as contributors (*P*=0.005). The frequency of changing the toothbrush is crucial; 45.1% of parents replaced brushes when bristles frayed, aligning with modern dental health guidelines for effective plaque removal [23]. Only 32.5% of parents replaced their child's toothbrush every 6 months, which is suboptimal. The study also revealed a disparity in oral health between children living in urban or rural areas: urban children had a mean DMFT of 2.5, and rural had a score of 3.2 (*P*=0.002), reflecting better access to dental services, preventive care, and oral health education in urban areas [24]. However, barriers such as a limited number of dentists, lack of educational resources, and insufficient oral health programs, along with cultural and dietary factors, contribute to a higher prevalence of tooth decay and poorer oral health among rural populations [25]. The findings of this study highlight the need for targeted efforts to strengthen dental care provisions in rural areas and increase the rates of prevention-oriented behaviors, along with parents' OHL. Further studies are needed to identify the barriers faced by rural populations in accessing dental care and to determine how these challenges can be effectively addressed.

This study had limitations. As a cross-sectional study, it was conducted at a single time point, and there was no follow-up.

Clinical Significance

This study highlights the critical role of parental OHL in influencing children's oral health outcomes. Since parents are the primary decision-makers regarding children's diet, oral hygiene practices, and utilization of dental services, inadequate parental OHL can contribute to delayed dental visits, poor preventive practices, and a higher prevalence of dental caries. By identifying the association between parental OHL and children's oral health status, this study provides evidence supporting the incorporation of OHL assessment into routine pediatric dental practice. Clinicians can use this information to design tailored communication strategies, reinforce preventive counseling, and implement early interventions targeted at families with limited OHL.

Public Health Significance

From a public health perspective, dental caries in children remains highly prevalent globally, particularly in low- and

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middle-income settings where disparities in access to care persist. The findings of this study underscore parental OHL as a modifiable social determinant of health. Strengthening parental knowledge and decision-making capacity through community-based education programs, school health initiatives, and primary healthcare integration can significantly reduce disease burden.

Furthermore, improving OHL aligns with preventive health policies aimed at reducing healthcare costs, minimizing treatment needs, and improving children's overall quality of life. This study supports the development of targeted public health strategies that address socioeconomic inequities and promote early preventive behaviors.

Conclusions

The present study highlights parental OHL as a key determinant of children's oral health outcomes. Significant variations in parental OHL across sex, residential location, and employment status contribute to disparities in dental health, with lower OHL associated with higher DMFT scores. The findings emphasize the need for targeted, evidence-based educational interventions, particularly among rural and low-literacy populations. Promoting awareness of early dental visits, timely initiation of oral hygiene practices, and consistent preventive behaviors, such as supervised brushing and appropriate toothbrush replacement, can substantially reduce the burden of dental caries and improve overall oral health in children.

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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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