Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Impact of Early Childhood Oral Health on Quality of Life: A Cross-sectional Study Based on Family Perception

María Dolores López García
University of Murcia, Hospital Morales Meseguer
Inmaculada Gómez-Ríos
University of Murcia, Hospital Morales Meseguer
Clara Serna-Muñoz
clara.serna@um.es

University of Murcia, Hospital Morales Meseguer
Yolanda Martínez-Beneyto
University of Murcia, Hospital Morales Meseguer
Antonio José Ortiz-Ruiz
University of Murcia, Hospital Morales Meseguer
Amparo Pérez Silva
University of Murcia, Hospital Morales Meseguer

Research Article

Keywords: Early Childhood Caries, ECOHIS, Nyvad Criteria, Oral Health, Family Perception, Pediatric Dentistry

Posted Date: August 3rd, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10449514/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background

Early Childhood Caries (ECC) remains the most prevalent oral pathology in children, linked with significant consequences on daily life. ECC is primarily triggered by an imbalance in the oral microbiome due to excessive sugar consumption and poor hygiene. This study evaluates the impact of oral health on preschool children's quality of life, through family perception using the ECOHIS scale and clinical classification by Nyvad criteria.

Methods

A cross-sectional analytical study was conducted involving 46 children aged 0–6 years treated at the University Dental Clinic of Morales Meseguer Hospital. Each child underwent a clinical oral examination based on Nyvad criteria, and their caregivers completed the Early Childhood Oral Health Impact Scale (ECOHIS). Statistical analysis included Chi-square tests and Cramer's V.

Results

Among caregivers, 70% were women; 48% had basic education, 17% intermediate, and 35% higher education. Most ECOHIS responses were "Never" or "Almost never." Clinically, 47.8% of children were either caries-free or had inactive lesions. No significant association was found between ECOHIS scores and caregiver age or education ($p > 0.05$). However, child age and caries severity (Nyvad) showed a strong association (Cramer's $V = 0.55$, $p < 0.01$): older children had more severe caries.

Conclusion

Family perception, as measured by ECOHIS, did not correlate with caregiver age or education. However, caries severity significantly increased with child age. These findings emphasize the need for targeted preventive strategies and greater awareness among caregivers, regardless of educational background.

INTRODUCTION

The World Health Organization (WHO) defines oral health as the condition of the mouth, teeth, and orofacial structures that enables individuals to perform essential functions such as eating, breathing, and speaking, while also contributing to psychosocial well-being, self-esteem, and social interaction, free from pain or discomfort (1). Oral health is a dynamic condition that evolves throughout the life course and constitutes a fundamental component of overall health, facilitating integral development and active participation in society from early childhood (2). In this regard, several studies have shown that oral

health alterations during the first years of life may negatively affect children's physical, emotional, social, and cognitive development, influencing behavior, learning, and overall quality of life (3).

Among the most prevalent conditions affecting the pediatric population, early childhood caries remains a major public health concern. This condition is defined as the presence of one or more decayed (cavitated or non-cavitated) tooth surfaces, teeth missing due to caries, or filled teeth in any primary tooth in children under six years of age (4). Beyond localized oral damage, early childhood caries has been associated with systemic and functional consequences, including nutritional deficiencies, difficulties with mastication and speech, sleep disturbances, and reduced academic performance (5).

The development of dental caries is a multifactorial process involving interactions between the oral microbiome, dietary factors, and host-related behaviors. The oral microbiome comprises a diverse community of microorganisms that play a key role in maintaining oral homeostasis and protecting against external pathogens (6). Although *Streptococcus mutans*has traditionally been considered a primary etiological agent of dental caries, scientific evidence has produced inconsistent findings regarding its causal role in the disease process (7–10). The reduced presence or even absence of *S. mutans* and *Lactobacillus* species in some carious lesions has contributed to the development of the ecological plaque hypothesis, which proposes that caries arises from a functional imbalance in the oral biofilm. This imbalance is promoted by frequent consumption of fermentable carbohydrates and insufficient salivary remineralization (11, 12).

From this perspective, contemporary approaches to caries prevention and management emphasize non-invasive strategies aimed at controlling modifiable risk factors, particularly the reduction of dietary sugar intake, in order to maintain a balanced oral biofilm capable of resisting critical pH drops (13). In this context, diet plays a crucial role, as high sugar consumption promotes the production of exopolysaccharides and favors the predominance of an acidogenic and aciduric microbiome, thereby contributing to enamel demineralization (14). Regular consumption of sugar-sweetened beverages and ultra-processed foods, together with inappropriate feeding practices during early childhood—such as nocturnal bottle-feeding with sugar-containing liquids—significantly increases the risk of caries development in children (15, 16).

Behavioral factors also play an important role in children's oral health. Inadequate oral hygiene habits increase the risk of developing carious lesions and other dental pathologies. These conditions may, in turn, contribute to the development of fear or anxiety related to dental treatment, particularly among children with previous negative experiences, leading to avoidance of dental visits and further deterioration of oral health. This situation may create a vicious cycle involving poor oral hygiene, dental fear, and disease progression (17). Furthermore, parental overprotection may hinder children's cooperation during dental treatment, thereby negatively affecting therapeutic outcomes (18).

Parents' perceptions and knowledge regarding their children's oral health are key determinants in the prevention of early childhood caries. Educational interventions targeting parents have proven effective in reducing the incidence of this condition, particularly when implemented during pregnancy (19).

Moreover, parental educational level has been significantly associated with the occurrence of early childhood caries, with higher prevalence reported among children whose parents have lower educational attainment. This association may be explained by economic constraints, reduced access to dental services, and lower prioritization of oral health during childhood (20–22). These inequalities are further exacerbated by the high cost of dental treatments, which disproportionately affects socioeconomically vulnerable populations (5, 23).

In this context, assessing the impact of oral health on the quality of life of children and their families is particularly relevant. The Early Childhood Oral Health Impact Scale (ECOHIS) is a validated instrument based on parents' and caregivers' perceptions that allows the evaluation of both the impact of oral health problems and the experience of dental treatment. This tool facilitates the planning of public health programs and supports a comprehensive approach to pediatric oral health (3, 24, 25). In addition, the clinical diagnosis and monitoring of carious lesions require standardized assessment systems. The Nyvad criteria, described in 1999, constitute a validated method that combines visual and tactile examination to classify caries lesions according to their severity and activity. This approach enables the identification of dynamic changes in lesions over time and allows evaluation of the response to therapeutic interventions, provided that appropriate clinical conditions—such as adequate tooth cleaning and surface drying are ensured (26, 27).

The present study aims to evaluate the impact of oral health in early childhood from the family perspective, considering that understanding parents' and caregivers' perceptions is essential for strengthening preventive strategies, identifying barriers to oral health care, and promoting improved oral health and quality of life in the long term.

MATERIALS AND METHODS

Ethical considerations and study design

The study protocol was approved by the Research Ethics Committee of the University of Murcia (approval number M10/2024/449). An analytical cross-sectional design was adopted. The study was conducted at the University Dental Clinic of Hospital Morales Meseguer.

Study population and selection criteria

The study population consisted of children aged 0 to 6 years presenting erupted teeth who attended the University Dental Clinic of Hospital Morales Meseguer. Written informed consent was obtained from parents or legal guardians prior to participation. Children were excluded if their parents or caregivers were illiterate or unable to complete the questionnaire.

A total of 46 parent–child pairs were included in the study. Participants were recruited from patients receiving dental care through the Master's Program in Integrated Pediatric Dentistry and the Integrated

Pediatric Dentistry clinical course of the undergraduate Dentistry program between November 2024 and March 2025.

ECOHIS questionnaire

In the first phase of the study, parents or legal guardians completed the Early Childhood Oral Health Impact Scale (ECOHIS) questionnaire. The Spanish version translated from the original English instrument published in 2007 was used (28). No modifications were made to the structure or terminology of the questionnaire, and all items from the original version were retained. The translated version was reviewed by the Teaching Unit of Integrated Pediatric Dentistry at the University of Murcia.

The questionnaire was administered in person by the investigator and collected once completed. Responses were recorded and stored in a Microsoft Excel database.

The ECOHIS questionnaire consists of 13 items divided into two domains: a child impact section (9 items) and a family impact section (4 items). Response options include “Never,” “Hardly ever,” “Occasionally,” “Often,” “Very often,” and “Don’t know” **(**Table 1**).**

Table 1
Early Childhood Oral Health Impact Scale (ECOHIS)

1	**How often has your child had pain in the teeth, mouth, or jaw?**
2	Did your child have difficulty drinking hot or cold beverages?
3	Did your child have difficulty eating certain foods?
4	Did your child have difficulty pronouncing some words?
5	Did your child miss preschool, daycare, or school?
6	Did your child have trouble sleeping?
7	Was your child irritable or frustrated?
8	Did your child avoid smiling or laughing when with other children?
9	Did your child avoid talking with other children?
10	Was your child upset?
11	Did your child feel guilty?
12	Did you or another family member miss work due to your child’s dental problems or treatments?
13	¿Has your child had dental problems or treatments that had a financial impact on your family?

Clinical examination and Nyvad classification

In the second phase of the study, and following the provision of informed consent by the parent or legal guardian, each child underwent a clinical intraoral examination. Five surfaces were evaluated for each tooth: mesial, distal, buccal, lingual/palatal, and occlusal.

When carious lesions were detected, lesion activity (active or inactive), the presence or absence of cavitation, and lesion appearance and color were recorded. Clinical assessment was performed according to the Nyvad criteria (27), which classify caries lesions into seven codes based on lesion severity and activity **(**Table 2**).**

Table 2
Nyvad caries codes

0	**Sound surface (no caries lesion).**
1a	Active caries lesion, intact surface (white/brown spot, rough surface).
1b	Inactive caries lesion, intact surface (white/brown spot, smooth and hard surface).
2a	Active caries lesion with surface discontinuity (cavitation), rough and soft surface
2b	Inactive caries lesion with surface discontinuity (cavitation), smooth and hard surface.
3a	Active caries lesion adjacent to a restoration (recurrent caries)
3b	Inactive caries lesion adjacent to a restoration, smooth and hard margins.

Statistical analysis

Statistical analysis was performed using Jamovi software (version 2.6) (29). Continuous variables were described as mean ± standard deviation (SD) when normally distributed and as median with interquartile range when non-normally distributed. Categorical variables were summarized using descriptive statistics and expressed as absolute frequencies and percentages.

Comparisons between categorical variables were performed using the Chi-square test when appropriate. Associations between variables were assessed using Pearson's Chi-square (χ^2) test. A p-value < 0.05 was considered statistically significant. The strength of associations between categorical variables was evaluated using Cramer's V coefficient.

RESULTS

Descriptive analysis

A total of 46 parents were invited to participate in the study, and informed consent was obtained from all participants. All respondents completed the ECOHIS questionnaire in full.

Regarding parental sex, 70% of respondents were female and 30% were male. In terms of educational level, 22 parents had a basic educational level (48%), 8 reported a medium educational level (17%), and

the remaining 16 had a higher educational level (35%) (Fig. 1).

The responses for the 13 ECOHIS questionnaire items showed that “Never” was the most frequent response, whereas the options “Often” and “Very often” were reported less frequently. In the second phase of the study, which included the clinical examination of the 46 children, the following results were obtained. Regarding age distribution, 36 children were between 4 and 6 years of age (78%), while the remaining 10 children were between 0 and 3 years of age (22%) (Fig. 2).

With respect to the highest Nyvad code recorded, 22 children (47.8%) presented no caries lesions or only inactive lesions, corresponding to codes 0, 1B, 2B, and 3B. Twenty children (43.5%) presented active lesions associated with a risk of symptom development, corresponding to codes 2A and 3A, while the remaining four children presented active caries lesions without symptoms, corresponding to code 1A (Fig. 3).

Regarding dentition status, the children examined presented a mean of 18.2 primary teeth (± 2.6), with a range of 10 to 20 and a median of 20. In contrast, the mean number of permanent teeth was 0.9 (± 2.2), with a range of 0 to 12 and a median of 0, indicating that most children had not yet begun permanent tooth eruption (Fig. 4).

Analysis of combined variables

The relationship between caregiver age and responses to the 13 ECOHIS items was analyzed using Chi-square tests. No statistically significant differences were observed for any of the questionnaire items (all p-values > 0.05)

Similarly, Chi-square tests were used to evaluate the association between parental educational level and ECOHIS responses. No statistically significant associations were identified for any of the questionnaire items ($p > 0.05$ for all comparisons).

Finally, the association between child age and the highest Nyvad code recorded was examined using the Chi-square test. A statistically significant association was observed between these variables ($\chi^2 = 13.94$; $p < 0.01$). The Cramer’s V coefficient was 0.55, indicating a strong association. All children aged 0–3 years (100%) were classified in category 0. In contrast, among children aged 4–6 years, responses were distributed across all three categories, indicating that older children were more likely to be classified into higher Nyvad code categories.

DISCUSSION

The results of the present study showed that none of the variables related to the ECOHIS questionnaire were associated with statistically significant differences (all $p > 0.05$). However, a significant association was observed between child age and the severity and activity of caries lesions, as assessed by the Nyvad criteria ($p < 0.001$), with higher caries codes recorded among older children. Consequently, the null

hypothesis (H0) was rejected only for the relationship between caries lesions and child age, partially supporting the alternative hypothesis (H1). In contrast, because no statistically significant associations were found between ECOHIS responses and caregiver age or educational level, the null hypothesis was not rejected for these comparisons.

With regard to participant characteristics, 70% of the parents or caregivers who completed the ECOHIS questionnaire were women, indicating a predominance of maternal participation. This finding may reflect the traditionally greater involvement of mothers in children's oral health care. In this regard, Alshammari et al. (30) reported that fathers often have limited knowledge of their children's oral health status and tend to seek dental care primarily in emergency situations, suggesting that mothers assume a greater role in oral health management. The results of the present study are consistent with these findings, as a predominantly female representation was observed among respondents. Similarly, Zhang et al. (31), using structural equation modeling, found that the association between oral health status and shared health-related behaviors was stronger between mothers and children than between fathers and children.

Nevertheless, recent research suggests a gradual shift in paternal roles, with increasing involvement of fathers in childcare and health-related responsibilities (32–34). For example, Balasooriyan et al. (32) reported higher levels of paternal engagement and highlighted the importance of incorporating fathers' perspectives into research on children's oral health. Likewise, Zaborskis et al. (33), comparing survey data collected in 2010–2011 and 2023, observed a significant increase in fathers' participation in their children's oral health care, including a greater frequency of dental visits initiated by male caregivers. However, paternal involvement may vary substantially depending on sociocultural factors such as country of residence, employment conditions, and prevailing cultural norms, which may represent a contextual limitation of the present study (35).

In the present study, parental educational level was not significantly associated with ECOHIS questionnaire responses ($p > 0.05$), suggesting that the perceived impact of children's oral health on quality of life was not influenced by parental educational attainment in this sample. However, previous studies have reported heterogeneous findings. Minervini et al. (36), using the Italian version of the ECOHIS, identified an inverse association in which parents with higher educational levels reported lower ECOHIS scores, whereas unemployed parents reported higher scores. Similarly, Pakkehesal et al. (37) found significant associations between parental educational level and ECOHIS responses, indicating a differential impact on children's oral health–related quality of life. Yang et al. (38) also reported lower ECOHIS scores among mothers with higher educational levels, suggesting better perceived family quality of life; however, no significant differences were observed according to fathers' educational level, possibly due to the lower participation of fathers in the sample. In contrast, the Slovenian validation study of the ECOHIS did not identify an association between parental educational level and questionnaire scores, concluding that this variable did not act as a predictor in that population (39).

Another variable analyzed in the present study was caregiver age. No statistically significant association was observed between caregiver age and ECOHIS responses, which is consistent with findings from

previous studies (3, 40). In a psychometric evaluation involving 371 mothers, similar ECOHIS scores were reported regardless of whether the mothers were younger or older than 30 years, suggesting no direct relationship between caregiver age and children's oral health–related quality of life (3).

Likewise, Nuñez-Contreras et al. (40), in a study involving 202 preschool children, did not identify significant differences in ECOHIS scores according to caregiver age. However, other studies have reported contrasting findings. Yang et al. (38) found that younger caregiver age was associated with worse ECOHIS outcomes, indicating a greater negative impact on children's oral health–related quality of life. Similarly, Martins-Júnior et al. (41) reported that higher maternal age was associated with better oral health–related quality of life in children, possibly due to greater caregiving experience and confidence. These discrepancies suggest that the relationship between caregiver age and ECOHIS outcomes may be influenced by contextual and sociodemographic factors, which should be considered in future research.

With respect to the clinical findings, the present study demonstrated a statistically significant association between child age and caries severity, as assessed using the Nyvad criteria. These results indicate that older children tend to present more severe carious lesions. Recent literature supports this observation. Machiulskiene et al. (42), in a study of children aged 5–6 years, found that six-year-old children exhibited a higher number of caries lesions compared with five-year-olds, as well as a higher prevalence of inactive lesions. Similarly, Ferro et al. (43) observed that the risk of caries lesions increased with child age. This pattern may be explained by cumulative exposure to cariogenic factors, such as prolonged exposure to a sugar-rich diet and longer tooth retention in the oral cavity.

Although the present study did not identify specific family-related barriers affecting the establishment of adequate oral health practices in children, previous research has highlighted several limiting factors. Walsh et al. (44), through interviews with parents of children aged 0–36 months, identified anticipatory anxiety related to dental visits as one of the main barriers to seeking early dental care. Additionally, Sabbagh et al. (45) reported that economic barriers were a major obstacle to the use of dental services, potentially due to the predominantly private financing of dental care in the country. Similarly, Quiroga et al. (46) found that while financial constraints limit access to dental care among families with lower socioeconomic status, lack of time was the primary barrier among families from higher socioeconomic strata.

Several limitations of this study should be acknowledged. First, the relatively small sample size (n = 46) limits the external validity and generalizability of the findings. Second, the categorization of child age into only two groups may have obscured more nuanced age-related differences. Third, the cross-sectional design precludes the establishment of causal relationships. Finally, as the study was conducted at a single hospital, potential sociocultural differences across populations could not be explored.

Future studies should consider including larger sample sizes, incorporating additional sociodemographic variables such as socioeconomic status or nationality, and employing longitudinal designs to assess changes in perceived quality of life following the diagnosis and management of caries lesions.

In conclusion, no association was found between ECOHIS responses and caregiver age or educational level. In contrast, a significant relationship was observed between child age and the presence and severity of caries lesions, with both frequency and severity increasing with age. Most parents reported a minimal perceived impact of oral health on their children's daily lives, regardless of the presence of carious lesions. Clinical evaluation using the Nyvad criteria confirmed the absence of active caries lesions in children aged 0–3 years and a significant increase in inactive lesions among children aged 4–6 years. Nevertheless, the study was unable to conclusively identify family-related barriers that hinder the establishment of adequate oral hygiene practices in early childhood.

DECLARATIONS

CONFLICT OF INTEREST:

The authors declare no conflict of interest.

FUNDING:

This research received no specific funding.

Author Contribution

Author contributions: APS conceptualized the project. APS and MDLG collected the data, analyzed it, and led the drafting of all versions of the manuscript. AJOR managed the project. CSM, IGR, and YMB performed external analyses of the collated findings. All authors contributed substantially to the project.

ACKNOWLEDGEMENTS:

not applicable.

Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

REFERENCES

1. World Health Organization. Informe sobre la situación mundial de la salud bucodental: hacia la cobertura sanitaria universal para la salud bucodental de aquí a 2030. Ginebra: OMS; 2022.

2. Morata Alba J, Morata Alba L. Salud bucodental en los niños: ¿debemos mejorar su educación? Rev Pediatr Aten Primaria. 2019;21:e173–8.
3. Silva BNS, Campos LA, Marôco J, Campos JADB. The Early Childhood Oral Health Impact Scale (ECOHIS): psychometric properties and application on preschoolers. PeerJ. 2023;11:e16035.
4. Zou J, Du Q, Ge L, Wang J, Wang X, Li Y, et al. Expert consensus on early childhood caries management. Int J Oral Sci. 2022;14:35.
5. Mendoza AAH, Tellez KSP, Silva CR, de Guerrero A, Lopez YGT, Rupaya PC. Factors associated with oral health relatedquality of life in preschoolers from an Andean community. Rev Estomatológica Hered. 2023;33(1):26–33.
6. Arweiler NB, Netuschil L. The Oral Microbiota. In: Schwiertz A, editor. Microbiota of the Human Body. Advances in Experimental Medicine and Biology. Volume 902. Cham: Springer International Publishing; 2016. pp. 45–60.
7. Guo L, Shi W. Salivary Biomarkers for Caries Risk Assessment. J Calif Dent Assoc. 2013;41(2):107–18.
8. Colombo NH, Pereira JA, Da Silva MER, Ribas LFF, Parisotto TM, Mattos-Graner RDO, et al. Relationship between the IgA antibody response against Streptococcus mutans GbpB and severity of dental caries in childhood. Arch Oral Biol. 2016;67:22–7.
9. Spatafora G, Li Y, He X, Cowan A, Tanner ACR. The Evolving Microbiome of Dental Caries. Microorganisms. 2024;12(1):121.
10. Dinis M, Agnello M, Cen L, Shokeen B, He X, Shi W, et al. Oral Microbiome: Streptococcus mutans/Caries Concordant-Discordant Children. Front Microbiol. 2022;13:782825.
11. Belda-Ferre P, Alcaraz LD, Cabrera-Rubio R, Romero H, Simón-Soro A, Pignatelli M, et al. The oral metagenome in health and disease. ISME J. 2012;6(1):46–56.
12. Moreno Abello GC, Lara Hernández LC. Caries dental: de la placa ecológica a las decisiones clínicas. Univ Odontol. 2020;39.
13. Pitts NB, Twetman S, Fisher J, Marsh PD. Understanding dental caries as a non-communicable disease. Br Dent J. 2021;231(12):749–53.
14. Liu Y, Ren Z, Hwang G, Koo H. Therapeutic Strategies Targeting Cariogenic Biofilm Microenvironment. Adv Dent Res. 2018;29(1):86–92.
15. Martínez Contreras CI. Relación entre el consumo de azúcar como factor de riesgo para el desarrollo de caries temprana de la infancia en niños preescolares: revisión sistemática. Santiago de Chile: Universidad de Chile, Facultad de Odontología; 2022. p. 21.
16. Barrera Wellmann FA, Cantuarias Cordero CD. Uso de biberón como factor de riesgo asociado a la aparición de caries temprana de la infancia. Santiago: Universidad Mayor; 2023.
17. Vera Z, Cordero AJD, Alejandra A. Asociación del miedo a la consulta odontológica con hábitos de higiene oral y caries dental reportados por los padres en niños y adolescentes. Lima: Universidad Peruana de Ciencias Aplicadas; 2023.

18. Ortiz Malusin IO. Valoración de tipos de comportamiento según la escala de Frankl presentados en los pacientes atendidos en la Clínica de Odontopediatría UNIANDES, periodo 2019–2020. Colombia: Universidad Regional Autónoma de los Andes; 2020.
19. Silva Roman IG. Conocimiento sobre caries de primera infancia (ECC) en padres/cuidadores de los Centros de Educación Inicial de Sunampe, Chincha, Ica-Perú, 2024. Lima: Universidad Peruana Cayetano Heredia; 2024.
20. Chen L, Hong J, Xiong D, Zhang L, Li Y, Huang S, et al. Are parents' education levels associated with either their oral health knowledge or their children's oral health behaviors? A survey of 8446 families in Wuhan. BMC Oral Health. 2020;20:203.
21. Lam PPY, Chua H, Ekambaram M, Lo ECM, Yiu CKY, RISK PREDICTORS OF EARLY CHILDHOOD CARIES INCREMENT—A SYSTEMATIC REVIEW AND META-ANALYSIS. J Evid-Based Dent Pract. 2022;22(3):101732.
22. Goswami S, Tseveenjav B, Kaila M. Non-utilization of oral health services and associated factors among children and adolescents: an integrative review. Acta Odontol Scand. 2023;81(2):105–18.
23. Ballo L, Arheiam A, Marhazlinda J. Determinants of caries experience and the impact on the OHRQOL of 6-year-old Libyan children: a cross-sectional survey. BMC Oral Health. 2021;21(1):320.
24. Contaldo M, Della Vella F, Raimondo E, Minervini G, Buljubasic M, Ogodescu A, et al. Early Childhood Oral Health Impact Scale (ECOHIS): Literature review and Italian validation. Int J Dent Hyg. 2020;18(4):396–402.
25. Almutairi S, Scambler S, Bernabé E. Family functioning and preschool children's oral health-related quality of life. Community Dent Oral Epidemiol. 2023;51(2):292–300.
26. Escobar A, Rojas-Gualdrón DF, Velez LF, Santos-Pinto L. Developing diagnostic skills from preclinical dental education: Caries detection and assessment using e-learning assisted practice. J Dent Educ. 2022;86(10):1382–9.
27. Nyvad B, Baelum V. Nyvad Criteria for Caries Lesion Activity and Severity Assessment: A Validated Approach for Clinical Management and Research. Caries Res. 2018;52(5):397–405.
28. Pahel BT, Rozier RG, Slade GD. Parental perceptions of children's oral health: The Early Childhood Oral Health Impact Scale (ECOHIS). Health Qual Life Outcomes. 2007;5:6.
29. The jamovi project. (2024). jamovi. (Version 2.6) [Computer Software]. Retrieved from https://www.jamovi.org
30. Alshammari FR, Alsayed AA, Albakry M, Aljohani M, Kabbi H, Alamri H. Evidence based recommendations to improve the children oral health in Saudi Arabia. Saudi Dent J. 2022;34(6):431–44.
31. Zhang Y, Li KY, Lo ECM, Wong MCM. Structural equation model for parental influence on children's oral health practice and status. BMC Oral Health. 2020;20(1):56.
32. Balasooriyan A, Van Der Veen MH, Bonifácio CC, Dedding C. Understanding parental perspectives on young children's oral health (≤ 4 years) growing up in a disadvantaged neighbourhood of Amsterdam, the Netherlands: an exploratory study. BMC Public Health. 2024;24(1):627.

33. Zaborskis A, Razmienė J, Razmaitė A, Andruškevičienė V, Narbutaitė J, Bendoraitienė EA, et al. Twelve-Year Changes in Pre-Schoolers' Oral Health and Parental Involvement in Children's Dental Care: Results from Two Repeated Cross-Sectional Surveys in Lithuania. Children. 2024;11(11):1380.
34. Suokko H, Tolvanen M, Virtanen J, Suominen A, Karlsson L, Karlsson H, et al. Parent's self-reported tooth brushing and use of fluoridated toothpaste: Associations with their one-year-old child's preventive oral health behaviour. Community Dent Oral Epidemiol. 2023;51(2):311–7.
35. Ogordi PU, Azodo CC. Child dental patient accompanying person: a cross-sectional study. Saudi J Health Sci. 2016;5(2):72–5.
36. Minervini G, Franco R, Marrapodi MM, Di Blasio M, Ronsivalle V, Cicciù M. Children oral health and parents education status: a cross sectional study. BMC Oral Health. 2023;23(1):787.
37. Pakkhesal M, Riyahi E, Naghavi Alhosseini A, Amdjadi P, Behnampour N. Impact of dental caries on oral health related quality of life among preschool children: perceptions of parents. BMC Oral Health. 2021;21(1):68.
38. Yang L, Zhao S, Zhu Y, Lai G, Wang J. Oral health-related quality of life and associated factors among a sample from East China with severe early childhood caries: a cross-sectional study. BMC Oral Health. 2023;23(1):837.
39. Likar Ostrc L, Frankovič S, Pavlič A. The Development and Evaluation of the Slovenian Version of the Early Childhood Oral Health Impact Scale (ECOHIS-SVN). Slov J Public Health. 2023;62(4):173–81.
40. Núñez-Contreras J, Hofer-Durán P, Sinsay-Schmeisser J, Zaror C. Impacto de las Condiciones Sociodemográficas y Orales en la Calidad de Vida Relacionada a la Salud Oral en Preescolares de Temuco, Chile. Int J Odontostomatol. 2021;15(2):503–12.
41. Martins-Júnior PA, Vieira-Andrade RG, Corrêa-Faria P, Oliveira-Ferreira F, Marques LS, Ramos-Jorge ML. Impact of early childhood caries on the oral health-related quality of life of preschool children and their parents. Caries Res. 2013;47(3):211–8.
42. Mačiulskienė V, Razmienė J, Andruškevičienė V, Bendoraitienė E. Estimation of Caries Treatment Needs in First Permanent Molars of Lithuanian 5–6-Year-Old Children, Based on Caries Lesion Activity Assessment. Medicina (Mex). 2 de marzo de. 2020;56(3):105.
43. Ferro R, Benacchio L, Besostri A, Olivieri A. Early Childhood Caries in a Preschool-based Sample in Northeast Italy: Socioeconomic Status and Behavioral Risk Factors. Int J Clin Pediatr Dent. 2023;15(6):717–23.
44. Walsh O, Chauhan A, Trinh MV, et al. Parents' perceived barriers and enablers to providing optimal infant oral care. BMC Public Health. 2025;25:1292.
45. Sabbagh HJ, Aljehani SA, Abdulaziz BM, Alshehri NZ, Bajkhaif MO, Alrosini SK, et al. Oral Health Needs and Barriers among Children in Saudi Arabia. Int J Environ Res Public Health. 2022;19(20):13584.
46. Garnica Quiroga JC. Percepción de padres y cuidadores sobre barreras en salud bucal en primera infancia: estudio piloto. Bogotá: Universidad El Bosque; 2023.

Figures

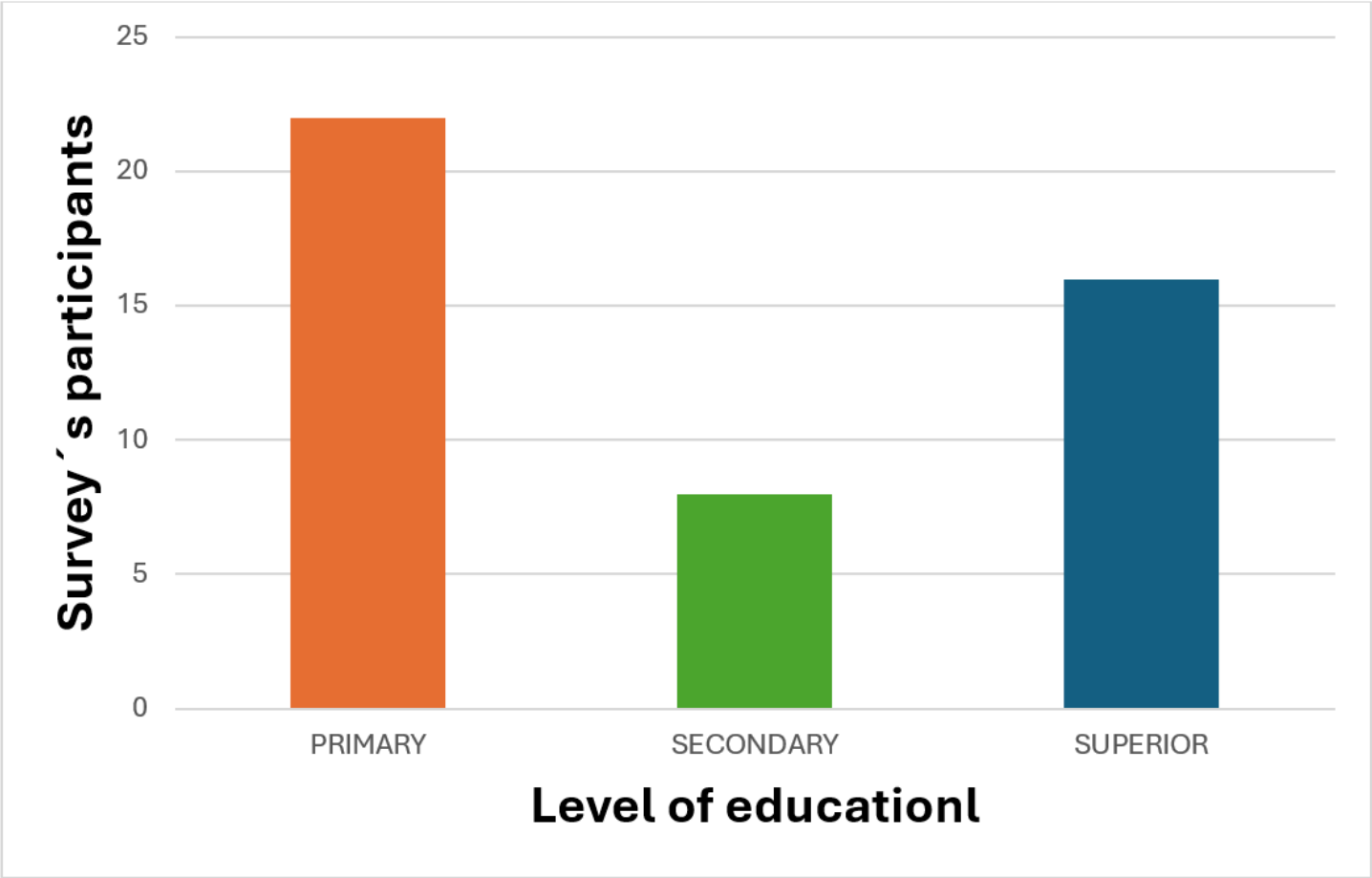


Figure 1

Distribution of individuals by educational level.

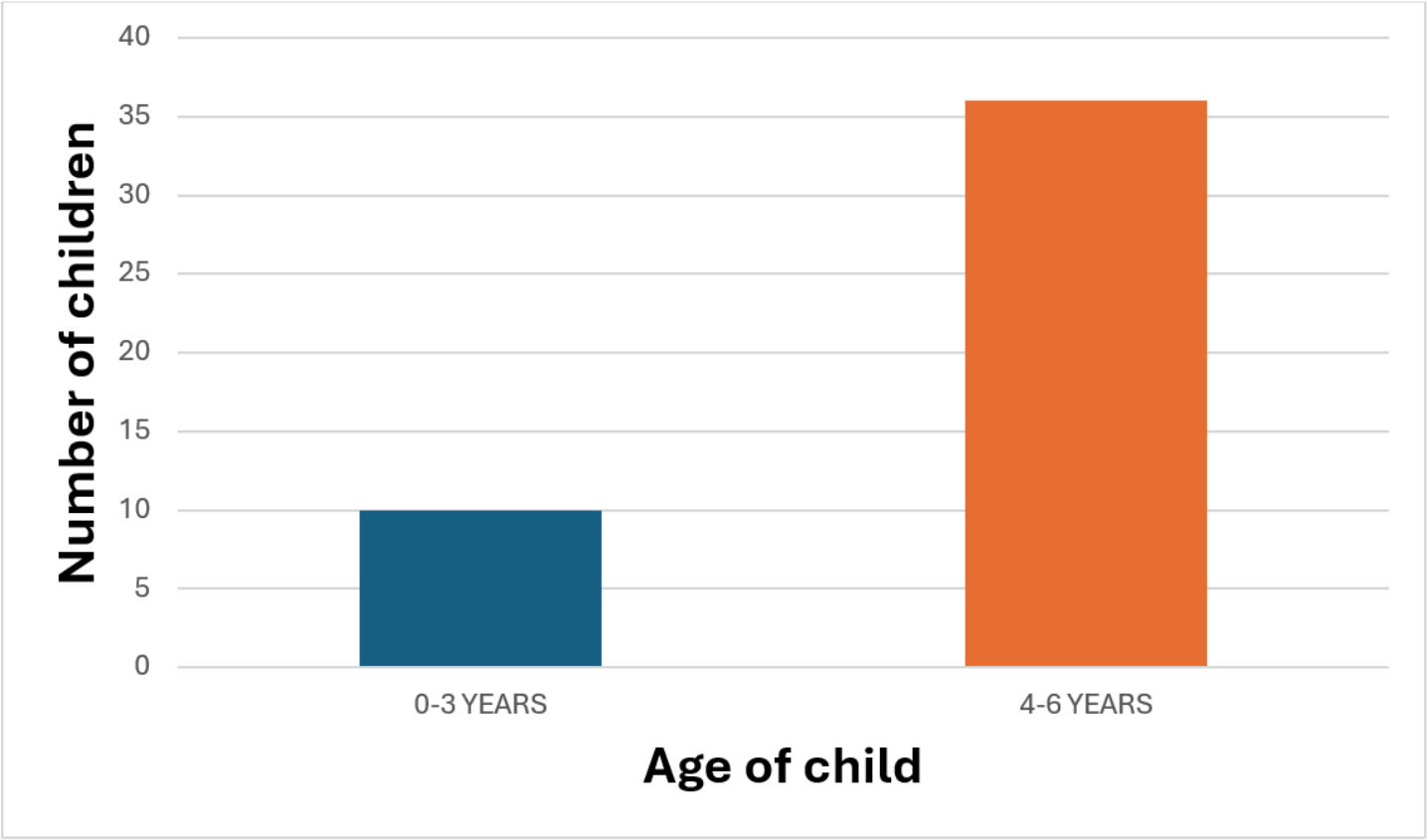


Figure 2

Distribution of children by age

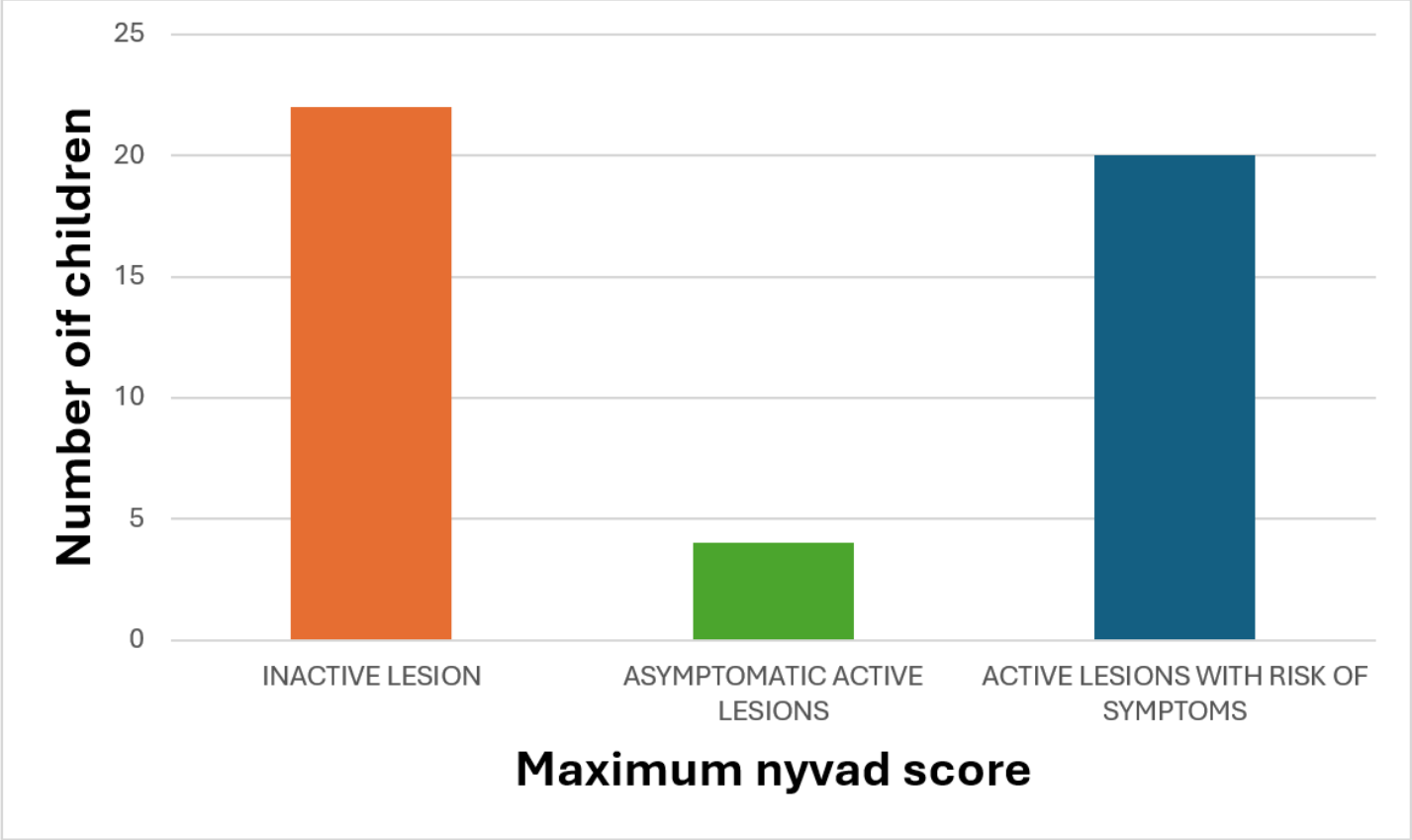


Figure 3

Distribution of children by Nyvad codes

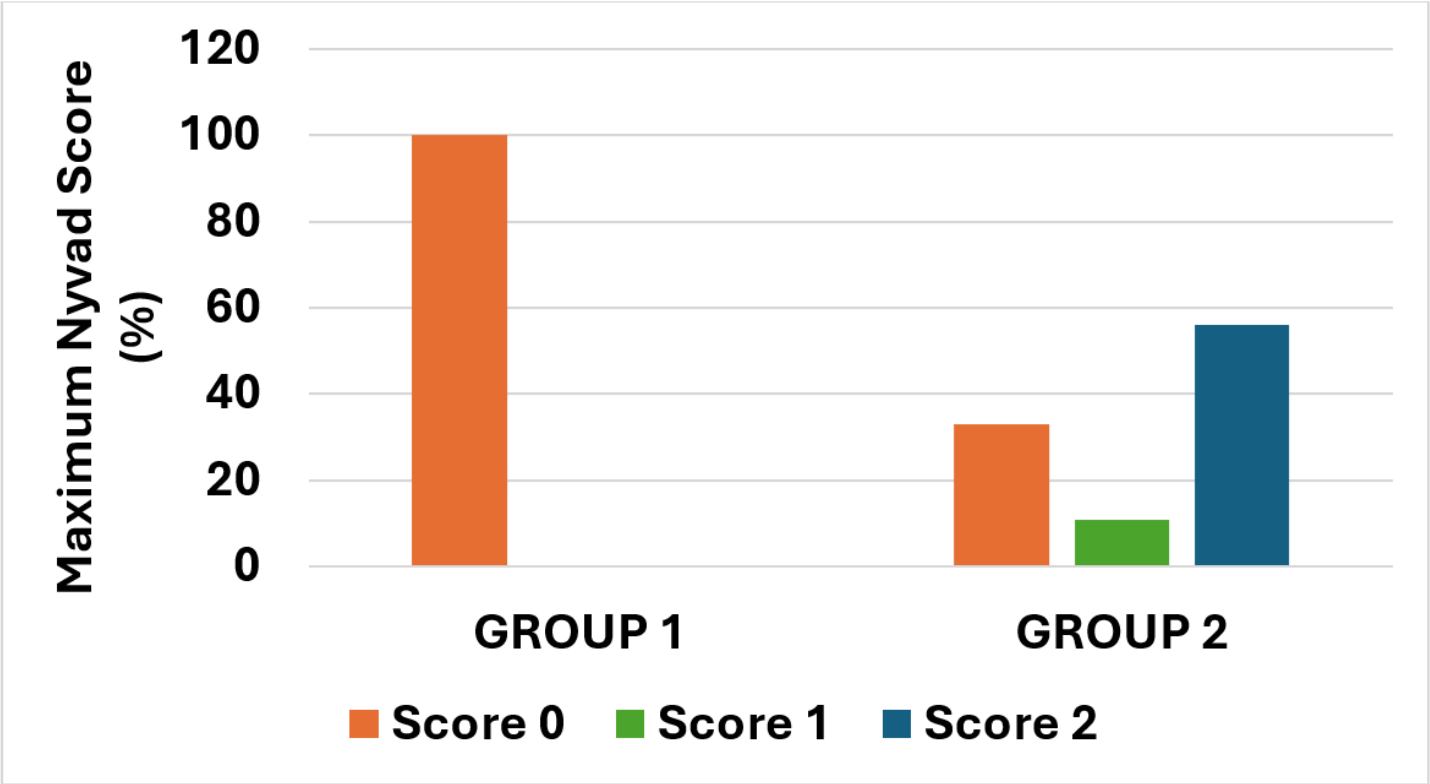


Figure 4

Distribution of the highest Nyvad code by age group