

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 3, March 2026



This article/work is licensed under CC by 4.0 Attribution

<https://eurekaoa.com/index.php/5>

COMPARATIVE ANALYSIS OF INDEX SYSTEMS FOR ASSESSING DENTAL CARIES IN PRIMARY TEETH OF CHILDREN

Rikhsieva Dilorom Furkat qizi

Assistant PhD Department of Prevention of Dental Diseases
Tashkent State Medical University

Abstract

Relevance: Various indexing systems play an important role for dentists in assessing the condition of hard dental tissues and conducting scientific epidemiological studies. Among these systems, identifying the most effective indices remains an actual issue in modern dentistry.

Objective: To conduct a comparative analysis of the dmft, ICDAS-II, and CAST indices in evaluating the condition of primary teeth in preschool children.

Materials and Methods: The study included 315 children aged 3–6 years attending state preschool educational institutions in the Tashkent region. A clinical epidemiological examination was performed using the dmft, ICDAS-II, and CAST indices to assess dental caries in primary teeth.

Results: The mean caries intensity among children aged 3–6 years was 4.16 ± 0.23 according to the dmft index, while the values obtained using CAST and ICDAS-II were 4.85 ± 0.24 and 5.47 ± 0.24 , respectively.

Conclusion: A high prevalence and intensity of dental caries were observed among children aged 3–6 years. Comparative analysis of the assessment indices demonstrated that ICDAS-II and CAST systems provide more detailed detection of early caries lesions and allow deeper analysis of the stages of tooth damage compared with the traditional dmft index.

Keywords: Primary teeth caries, caries assessment indices, caries epidemiology.

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 3, March 2026



This article/work is licensed under CC by 4.0 Attribution

<https://eurekaoa.com/index.php/5>

Introduction

Dental caries is considered one of the most widespread chronic diseases affecting the global population. In addition, dental caries of primary teeth is among the most common diseases in early childhood, with more than 560 million children worldwide affected by early childhood caries [1]. To evaluate caries processes in scientific studies, various diagnostic and assessment indices have been proposed. One of the most widely used systems is the DMFT index, recommended by the World Health Organization (WHO), which records the number of decayed, missing, and filled teeth. For primary dentition, the dmft index is used, providing information about both past and present dental status [2].

By the end of the 20th century, several new assessment indices were proposed, including the Filled and Sound Teeth Index (FS-T) [3], the T-Health index [4,5], the PUFA index (pulp-ulcer-fistula-abscess) [6], the International Caries Detection and Assessment System (ICDAS) [7,8], and the CAST index (Caries Assessment Spectrum and Treatment) [9]. Recent studies indicate that one of the major challenges in modern dentistry is improving dental caries prevention. In this context, the use of diagnostic and assessment systems capable of detecting early stages of caries plays a crucial role. Comparative analysis of these systems helps dentists achieve more accurate diagnosis of dental diseases and develop effective preventive strategies [10,11].

Aim of the Study

To compare modern and traditional indices used to assess the intensity of dental caries in primary teeth among preschool children, and to evaluate their applicability in clinical and epidemiological practice.

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 3, March 2026



This article/work is licensed under CC by 4.0 Attribution

<https://eurekaoa.com/index.php/5>

Materials and Methods

The study was conducted among children attending state preschool educational institutions in the Tashkent region. A total of 315 children aged 3–6 years were included in the study.

The following indices were used to evaluate caries processes in primary teeth:

- dmft/dmfs (Decayed, Missing, Filled Teeth / Surfaces)
- ICDAS-II (International Caries Detection and Assessment System)
- CAST (Caries Assessment Spectrum and Treatment Index)

The dmft index was first proposed in 1938 by the Swedish dentist Gustav Palmer and was later adapted by the World Health Organization for international use [12].

The dmft index does not include early enamel caries at the white-spot stage, discoloration of enamel tissues, or defects caused by fluorosis. Within the index: d (decayed) indicates untreated carious lesions in primary teeth,

f (filled) indicates the number of filled primary teeth,

m (missing) indicates teeth extracted due to complications of caries.

The dmft index assesses teeth, whereas dmfs assesses tooth surfaces.

One limitation of this index is that it does not consider early carious lesions, does not differentiate between complicated and uncomplicated caries, and may include teeth extracted for reasons other than caries (such as orthodontic treatment or periodontal disease).

The ICDAS index was first developed in 2001 by a group of dental epidemiologists [13], allowing a more comprehensive evaluation of caries processes. In 2009, the system was improved by the Coordinating Committee, resulting in ICDAS-II, which allows not only the assessment of crown caries but also the registration of restorations, sealants, and other dental conditions [14].

One disadvantage of the ICDAS system is the complexity of its application in large epidemiological studies, as it requires calibration of examiners and is more time-consuming. However, it allows the detection of early caries lesions such as white or pigmented spots, which cannot be detected using the dmft index.

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 3, March 2026



This article/work is licensed under CC by 4.0 Attribution

<https://eurekaoa.com/index.php/5>

In 2011, researchers from Radboud University and the University of Brazil proposed the CAST index (Caries Assessment Spectrum and Treatment) for epidemiological studies [15].

The CAST index covers all stages of caries development, including:

- enamel caries
- dentin caries
- pulp involvement
- periodontal complications (abscesses, fistulas)
- extracted teeth

Unlike ICDAS-II, the CAST system does not require complex equipment, dental chairs, or air-drying devices and can be performed using basic instruments such as a dental mirror, probe, and cotton rolls [16]. Teeth do not need to be dried prior to examination, and visual assessment can be performed directly on moist tooth surfaces.

Results

The results obtained from the indices used to assess caries intensity in preschool children are presented in the corresponding table(1) and diagrams(2,3).

Clinical epidemiological examination revealed that both the prevalence and intensity of caries among preschool children were high.

Across all age groups, the intensity of caries increased with age, showing the highest values among 5- and 6-year-old children.

According to the dmft/dmfs index, the average caries intensity among the 315 children aged 3–6 years was:

4.16 ± 0.23 for primary teeth

10.64 ± 0.35 for tooth surfaces

Using the ICDAS-II index, the average caries intensity was:

5.47 ± 0.24 for teeth

13.49 ± 0.34 for tooth surfaces

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 3, March 2026



This article/work is licensed under CC by 4.0 Attribution

<https://eurekaoa.com/index.php/5>

Using the CAST index, the average values were:

4.85 ± 0.24 for teeth

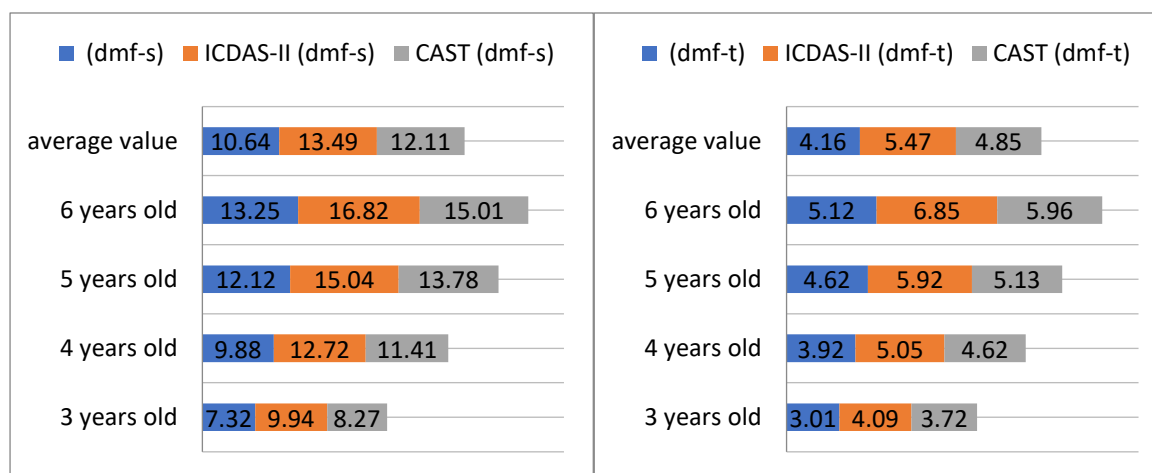
12.11 ± 0.34 for tooth surfaces

For all age groups, the results were statistically significant ($p < 0.05$).

Table 1. (results obtained by indices)

Age groups	dmft/dmfs index	ICDAS-II index (d1-6mf-t/ d1-6mf-s)	CAST index (d3-7mf-t/d3-7mf-s)
3 years old	3,01±0,11	4,09±0,18	3,72±0,17
	7,32±0,36	9,94±0,26	8,27±0,29
4 years old	3,92±0,19**	5,05±0,21**	4,62±0,17**
	9,88±0,42**	12,72±0,37*	11,41±0,37**
5 years old	4,62±0,16**	5,92±0,26***	5,13±0,23
	12,12±0,47**	15,04±0,36*	13,78±0,40*
6 years old	5,12±0,25	6,85±0,31***	5,96±0,27***
	13,25±0,5	16,82±0,49***	15,01±0,52
Average value	4,49±0,12	5,88±0,16	5,17±0,14
	11,57±0,28	14,67±0,26	13,17±0,27

* (***) - $P < 0,05$; ** - $P < 0,01$; * - $P < 0,001$



Diagrams 2, 3.

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 3, March 2026



This article/work is licensed under CC by 4.0 Attribution

<https://eurekaoa.com/index.php/5>

Conclusion

This study investigated the epidemiological characteristics of dental caries in primary teeth among preschool children, as well as performed a comparative analysis of caries assessment systems (dmft, ICDAS-II, and CAST). The findings indicate a high prevalence and intensity of dental caries among preschool children, highlighting the importance of implementing early preventive measures. Among the assessment systems studied, ICDAS-II demonstrated the highest detection rate, mainly due to its ability to register early-stage carious lesions. In contrast, the dmft index records only decayed, filled, and missing teeth, while early caries lesions are often classified as healthy teeth. ICDAS-II not only identifies early lesions but also allows classification of caries according to specific stages such as enamel and dentin caries.

The results obtained using the CAST index were close to those obtained with ICDAS-II, although slightly lower. Nevertheless, CAST values were higher than those recorded using the dmft index. While CAST also allows the detection of early caries lesions, it relies on visual assessment of naturally moist tooth surfaces, which may limit the detection of subtle lesions that become visible only after drying the tooth surface. Despite requiring additional time and equipment, ICDAS-II appears to be the most informative system, as it allows the detection of early caries stages and may therefore contribute to more effective caries prevention strategies.

References

1. Peterson P. E. World Oral Health Report - 2017 // Community Dental Oral Epidemiology. 2017. N 31. Supplement 1. P. 3-24.
2. World Health Organization. Oral Health Surveys: Basic Methods, 4th ed. Geneva: WHO, 1997. Available from: https://www.paho.org/hq/dmdocuments/2009/OH_st_Esurv.pdf.

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 3, March 2026



This article/work is licensed under CC by 4.0 Attribution

<https://eurekaoa.com/index.php/5>

3. Namal N, Vehid S, Sheiham A. Ranking countries by dental status using the DMFT and FS-T indices. *Int Dent J.* 2005;55:373-376.
4. Pitts NB. Modern perspectives on caries activity and control. *J Am Dent Assoc.* 2011;142:790–792.
5. Kassawara AB, Assaf AV, Meneghim Mde C, Pereira AC, Topping G, Levin K, et al. Comparison of epidemiological evaluations under different caries diagnostic thresholds. *Oral Health Prev Dent* 2007;5:137-44.
6. Nyvad B, Machiulskiene V, Baelum V. Construct and predictive validity of clinical caries diagnostic criteria assessing lesion activity. *J Dent Res* 2003;82:117-22.
7. Pitts N. “ICDAS” – An international system for caries detection and assessment being developed to facilitate caries epidemiology, research and appropriate clinical management. *Community Dent Health* 2004;21:193-8.
8. Ismail AI, Sohn W, Tellez M, Amaya A, Sen A, Hasson H, et al. The international caries detection and assessment system (ICDAS): An integrated system for measuring dental caries. *Community Dent Oral Epidemiol* 2007;35:170-8.
9. Frencken JE, de Amorim RG, Faber J, Leal SC. The caries assessment spectrum and treatment (CAST) index: Rationale and development. *Int Dent J* 2011;61:117-23.
10. Ли В., Кисельникова Л. П., Шевченко М. А. Применение современных индексов оценки кариозных поражений зубов у детей раннего возраста // *Стоматология детского возраста и профилактика.* – 2019. – Т. 19. – №. 2. – С. 19-24.
11. Пастбин М. Ю. и др. Современные системы оценки и регистрации кариеса зубов. Обзор литературы // *Экология человека.* – 2013. – №. 9. – С. 49-55.

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 3, March 2026



This article/work is licensed under CC by 4.0 Attribution

<https://eurekaoa.com/index.php/5>

12. Klein H., Palmer C. Studies on dental caries vs. familial resemblance in the caries experience of siblings // Public Health Report. 1938. N 53. P. 1353-1364.
13. International Caries Detection and Assessment System Coordinating Committee: Criteria Manual. International Caries Detection and Assessment System (ICDAS II). Baltimore -Maryland USA, 2005. P. 43
14. Jablonski-Momeni A, Stachniss V, Ricketts DN,Heinzel-Gutenbrunner M, Pieper K. Reproducibility and accuracy of the ICDAS-II for detection of occlusal caries in vitro. Caries Res 2008;42:79-87.
15. Voruganti S, Haricharan PB, Mudrakola DP, Turagam N. Reliability of Caries Assessment Spectrum and Treatment Tool in the Indian Subcontinent. J Int Soc Prevent Communit Dent. 2020;10:410-414.
16. de Souza AL, Bronkhorst EM, Creugers NH, Leal SC, Frencken JE. The caries assessment spectrum and treatment (CAST) instrument: its reproducibility in clinical studies. Int Dent J. 2014;64:187-194.