

INTRODUCTION

Caries is a multifactorial disease affecting 1 in 5 children aged 6-8 years old¹, with diet as a major etiologic factor. School breakfast and lunch meals provide up to 58% of daily caloric intake² for those kids participating in free or reduced-price meal programs. Students in public or charter school programs can come from low socioeconomic backgrounds making them more at risk for dependence on school meals for their main nutrition.

School meals often contain refined carbohydrates and added sugars, which are associated with increased caries risk in children^{3,4}. Limited data evaluating the cariogenic potential of school lunch menus exists, particularly in underserved populations^{4,5}. Assessing the cariogenicity of school meals is essential to inform preventive strategies, dietary counseling, and policy improvements aimed at reducing childhood dental caries^{3,6}.

PURPOSE

This study aims to compare the cariogenicity of school provided lunch menus in public and charter schools and assess their relationship to dental caries in school-aged children.

METHODS

A retrospective cohort study was conducted using data from Nicklaus Children's Hospital MDU (Jan 2023 – May 2025) for children aged 5-12 years. School lunch menus from six schools in South Florida were assessed.

Variables collected: Gender, age, school zip code, visit month, procedures completed, school type, medical history, type of insurance, poverty level, cariogenicity score, Basic Screening Survey (BSS) and Total Caries Experience (TOCE)

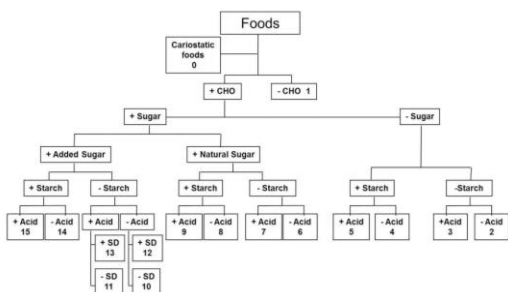
Poverty Scoring: School zip codes were analyzed to determine percentage of population below poverty level according to the U.S. Census.

Dental Morbidity Scoring

- BSS is a standardized Yes/No system assessing oral health in children (Untreated Decay, Treated Decay, Sealants, and Treatment Urgency).
- TOCE is a measure of cumulative caries history which sums all untreated and treated decay at each observation on a continuous scale.

School Meal Cariogenicity Scoring

Lunch menus preceding 3-20 months to a MDU visit were collected and analyzed for cariogenic potential using the Evans method, with ingredients from the USDA database, acidity from public sources, and slow-dissolving foods based on Evans. Mean scores were calculated for each school.



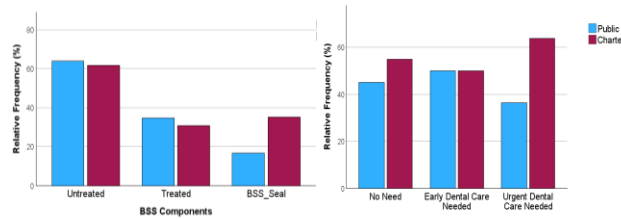
RESULTS

Demographic Characteristics

Characteristic	All Sample (N=268)	School Type		P-value
		Public (N=120)	Charter (N=148)	
Gender - n (%)				
Female	135 (50.4)	63 (52.9)	72 (48.6)	0.486
Male	132 (49.7)	56 (47.1)	76 (51.4)	
Medical History - n (%)				
Yes	71 (26.5)	41 (34.2)	30 (20.3)	0.010
No	197 (73.5)	79 (65.8)	118 (79.7)	
Dentition - n (%)				
Primary	22 (8.2)	14 (11.8)	8 (5.5)	0.150
Mixed	209 (78.0)	92 (77.3)	117 (80.1)	
Permanent	34 (12.7)	13 (10.9)	21 (14.4)	
Insurance Type - n (%)				
Public	74 (27.6)	32(26.7)	42(28.4)	0.600
Private	71 (26.5)	29(24.2)	42(28.4)	
Unknown	123 (45.9)	59(49.2)	64(43.2)	
Age - mean (SD)	8.2 (2.1)	8.4 (2.2)	8.1 (2.0)	0.135
Poverty Score – mean (SD)	24.4 (7.2)	18.6 (6.2)	29.1 (3.6)	<0.001
Cariogenicity Score - mean (Min-Max)				
2022*	8.1 (7.8 - 8.9)	8.0 (6.38-10.56)	8.4 (6.25-11.4)	0.004
2025	7.8 (7.5 - 8.0)	8.0 (6.29-10.0)	7.7 (3.71-10.67)	<0.001

Two-hundred sixty-eight children with a mean age of 8.2 years and mean poverty level of 24.4% were seen between 2023-2025. Both genders were evenly represented, and most children were in mixed dentition. Public and private insurance were evenly distributed, though many families did not report insurance information. Charter school students had fewer reported medical conditions, with asthma and allergies being the most prevalent, and they lived in areas with higher poverty levels. Meal cariogenicity remained stable in public schools but improved slightly in charter schools (P < 0.001) from 2022 to 2025.

Dental Morbidity seen in Public vs Charter Schools



BSS untreated and treated caries were similar across schools but existing sealants were more common in charter schools (22.3% vs. 10%). Urgency levels were comparable, though charter schools had slightly more urgent cases (BSS 2). Public and charter school students showed similar average TOCE scores [2.4 (3.3) vs. 2.1 (3.0)]. Low TOCE scores were comparable, while charter school students appeared more often at score 3 and had the highest scores observed.

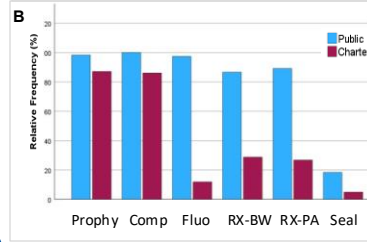
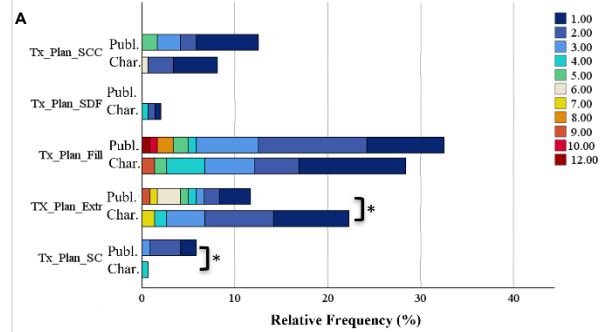
Correlation between Cariogenicity Score, Patient demographics and BSS values

BSS	Cariogenicity Score				Age (years)			
	OR	95% C. I.		P-Value	OR	95% C. I.		P-Value
Untreated	10	4.1	24.6	<0.001	0.85	0.742	0.975	0.02
Treated	1.3	0.6	2.7	0.472	0.998	0.862	1.156	0.981
Sealants	0.6	0.2	1.4	0.234	1.381	1.15	1.657	0.001
Urgency	0.8	0.2	2.5	0.705	1.014	0.845	1.217	0.881

BSS	Poverty Score			Time to Screening (months)				
	OR	95% C. I.		P-Value	OR	95% C. I.		P-Value
Untreated	1.035	0.742	0.975	0.211	1.059	1.016	1.104	0.007
Treated	1.056	0.994	1.121	0.077	1.013	0.964	1.065	0.607
Sealants	1.1	1.022	1.185	0.011	0.921	0.862	0.984	0.015
Urgency	1.018	0.959	1.082	0.556	1.048	1.006	1.092	0.026

Higher Cariogenicity Scores greatly increased the odds of untreated caries (10x). Older age was linked to fewer untreated caries and more sealants, evidencing dental interventions. Higher poverty scores increased the likelihood of existing sealants, suggesting access to Medicaid benefits. Longer time to screening had only minimal effects on caries, sealants, and treatment urgency.

Services Rendered and Planned at Public and Charter Schools



A. Need for strip crowns were more common in public school students (P = 0.15) whereas need for extractions was more common for charter school students (P = 0.037).

B. Notably less students from chartered schools received fluoride applications, sealants or radiographic assessment.

DISCUSSION

The findings of this study highlight the effect that school-provided meals can have on children's oral health. The strong association between higher menu cariogenicity and untreated caries underscores the importance of diet as a key modifiable risk factor in school-aged populations.

Age and poverty level significantly influenced BSS outcomes. Older age was associated with fewer untreated caries and greater sealant prevalence, reflecting increased permanent dentition and preventive care. Higher poverty levels were also linked to greater sealant use, stressing the role of public insurance and the need for continued public funding for preventive dental services.

Differences in demographic characteristics and care utilization between public and charter school students also help contextualize the observed outcomes. Charter school students had higher poverty scores and more frequent sealant placement, which may be linked to greater eligibility for public insurance programs. Furthermore, they also received fewer preventive services during screenings, possibly because these patients had received certain treatments elsewhere.

Treatment planning patterns showed clear contrasts between school systems, with public school students more often requiring strip crowns and charter school students more likely to requiring extractions. These differences may reflect underlying disparities in access to routine dental care, differing rates of disease progression, or variations in nutrition and home care practices within each community.

Overall, this study reinforces that oral health outcomes among schoolchildren are influenced by a combination of dietary exposure, socioeconomic status, and access to preventive services.

Although charter schools initially demonstrated higher cariogenicity scores, and an improvement observed in 2025, future longitudinal studies are needed. These studies should assess how targeted changes in school nutrition practices can lead to measurable reductions in dietary risk.

CONCLUSION

- Higher school meal cariogenicity** is strongly associated with increased dental morbidity, emphasizing the need for improved nutritional standards in school meal programs.
- Public vs Charter Schools:** Significant disparities exist between public and charter school populations, influenced by differences in poverty levels, preventive service utilization, and treatment needs.
- Healthier school lunch menus and access to care:** Adopting healthy menus and expanded preventive care opportunities have potential to decrease dental disease and positively impact overall health among school children.

REFERENCES

