

***The New Hampshire  
2013-14 Healthy Smiles – Healthy Growth  
Third Grade Survey***

**An Oral Health and Body Mass Index Assessment of  
New Hampshire Third Grade Students**



Northeast Delta Dental

This survey was conducted by the New Hampshire Department of Health and Human Services, Division of Public Health Services with contributions from the Nashua Division of Public Health and Community Services. The survey was funded by the HNH Foundation and Northeast Delta Dental Foundation with technical assistance provided by the Association of State and Territorial Dental Directors.

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## **Executive Summary**

This survey was conducted during the 2013-14 school year by the New Hampshire Department of Health and Human Services, Division of Public Health Services with contributions from the Nashua Division of Public Health and Community Services. The purpose of the survey was to gather representative data on oral health and height/weight status for third grade students statewide. Data were gathered for all ten New Hampshire counties and the City of Nashua. Main findings of the survey include:

### *Overweight/Obesity*

- Altogether 3,971 third grade students in 126 schools were screened.
- Statewide, 12.6% of third grade students were obese, 15.4% were overweight and 2.5% were underweight.
- There was not a significant difference in prevalence of obesity by sex.
- There was a significantly higher percentage of obese third grade students in schools where  $\geq 50\%$  of students were participating in the Free and Reduced Lunch Program as compared with schools where  $< 25\%$  of students were participating.
- Among counties, Coos County had the highest prevalence of obesity (21.6%).
- The City of Nashua has 17.4% prevalence of obesity and 17.5% prevalence of overweight.

### *Oral Health*

- Statewide 35.4% of New Hampshire third grade students experienced tooth decay and 8.2% of students had untreated decay.
- Only 1.0% of third grade students required urgent treatment due to pain or swelling.
- There were no differences in the prevalence of oral health indicators by sex.
- Students attending schools with  $\geq 50.0\%$  Free and Reduced Lunch Program participation had a greater need for urgent care, more untreated decay, and treated decay than students in schools with  $< 25\%$  participation.
- Among Counties, Coos (14.0%) and Strafford (14.2%) counties had the highest prevalence of untreated decay.
- Coos County had the highest prevalence (56.0%) of decay experience.
- Strafford County third grade students had the greatest need (14.2%) for treatment.
- Third grade students in the Coos (53.5%) and Merrimack (52.3%) Counties had the fewest dental sealants.
- Sullivan County had the highest prevalence of dental sealants (91.3%).
- City of Nashua students experienced the highest prevalence of children needing treatment (17.6%), the highest prevalence of untreated decay (17.3%), and a high prevalence (69.5%) of dental sealants.

## **Introduction**

The New Hampshire 2013-14 Third Grade *Healthy Smiles – Healthy Growth Survey* was conducted between September 2013 and June 2014. The project goal was to gather uniform data on oral health and the height/weight status of third grade students, which would guide public health program planning, monitoring, evaluation, and future allocation of resources. The New Hampshire Department of Health and Human Services, Division of Public Health Services (DPHS), collected data at the state and county levels. The Nashua Division of Public Health and Community Services joined the project, adding city-level data for Nashua. The HNH Foundation and Northeast Delta Dental Foundation provided survey funding, while the Association of State and Territorial Dental Directors contributed technical assistance for the sampling and data analyses.

## **Background**

*Healthy People 2020* goals have identified oral health and nutrition, physical activity, and obesity as Leading Health Indicators (LHI). LHIs are considered high-priority areas, and there is specific emphasis on overcoming these public health challenges within the next decade.<sup>1</sup> Similarly, oral health and obesity are identified as priority focus areas in the New Hampshire State Health Improvement Plan.<sup>2</sup>

Oral health is an important part of general health that contributes to a person's ability to perform essential functions such as eating and speaking. Tooth decay is the most common chronic childhood disease and is largely preventable through a combination of community, professional and individual strategies. Enough is known about dental disease prevention that any child can grow into adulthood with good oral health.<sup>3</sup> The last statewide Third Grade Survey was conducted during the 2008-09 school year and revealed that approximately 43.6% of New Hampshire third grade students experienced tooth decay, 12.0% had untreated tooth decay, and 60.4% had protective dental sealants.<sup>4</sup>

Good nutrition, physical activity, and a healthy body weight are essential to a person's overall health and wellness. Childhood obesity increases the risk for several chronic diseases, including type 2 diabetes, high blood pressure, liver disease, and depression during childhood as well as adulthood.<sup>5</sup> Concerns about childhood obesity have increased significantly during recent years. In 2009, approximately 18.0% of New Hampshire third grade students were obese and 15.4% were overweight at the time of the survey.<sup>4</sup>

Although the oral health of New Hampshire third graders has been assessed periodically and height/weight assessments to calculate body mass index (BMI) were added in the 2008/2009 survey, this is the first time that the Third Grade *Healthy Smiles – Healthy Growth Survey* has gathered data on oral health and height/weight status for all New Hampshire counties and the City of Nashua.

## Methods

All elementary public schools with a third grade and at least 15 third grade students enrolled during the 2012-13 school year were eligible to participate in the cross-sectional survey of oral health and height/weight status. The list of schools with Free and Reduced Lunch (FRL) program participation was acquired from the New Hampshire Department of Education.<sup>6</sup>

A required sample size of 650 students per each county and the city of Nashua was determined based on the desired survey precision, expected student participation (70%), clustering by school, and the size of the surveyed population. Counties with approximately 650 (or fewer) enrolled third grade students, and the City of Nashua, were not sampled; instead a census approach was elected and each eligible and consenting student was screened. Probability-proportional-to-size samples of schools, with implicit stratification by the FRL participation at the school level, were drawn in Hillsborough, Merrimack, Rockingham, and Strafford Counties. All students in selected schools were eligible to participate. Schools determined whether consent would be active (consent required parental response) or passive. Consent forms were available in English and Spanish and were sent home prior to screenings. Parents could decline participation by their child in either or both the oral health and height/weight screenings. Similarly, students could decline participation on screening day. Satisfaction surveys related to the screening process were distributed to participating school staff and were used for continuous quality improvement throughout the survey period.

Registered dental hygienists were trained by Hope Saltmarsh, RDH, MEd, to collect data on oral health indicators. Height/weight training was provided by DPHS staff using standard protocols. Non-invasive oral health screenings followed the protocol of the Association of State and Territorial Dental Directors *Basic Screening Survey*.<sup>7</sup> Calibrated scales and stadiometers were provided to screeners to collect uniform height and weight data, and standardized forms were used for data recording. Participating students underwent a brief visual assessment to determine the presence of dental sealants, untreated and treated tooth decay, and the need for early or urgent dental care. Early care was defined as care needed prior to a regularly scheduled dental appointment; urgent care was defined as infection, pain, or swelling requiring dental care within the next several days. Students identified with early or urgent care needs were linked with dental care providers. Height was recorded to 1/8<sup>th</sup> of an inch and weight to 1/10<sup>th</sup> of a pound. Additional information, gathered to calculate the age- and sex-specific BMI percentiles, included sex, date of screening, and date of birth for each student. SAS 9.3 software and the Centers for Disease Control and Prevention growth charts<sup>8</sup> for BMI-for-age percentiles were used to conduct the analyses. Weight status was classified as: obese (BMI  $\geq 95^{\text{th}}$  percentile), overweight (BMI  $\geq 85^{\text{th}}$ – $< 95^{\text{th}}$  percentile), normal weight (BMI  $\geq 5^{\text{th}}$ – $< 85^{\text{th}}$  percentile), and underweight (BMI  $< 5^{\text{th}}$  percentile). Population proportions by weight status categories and proportions of students with active decay, decay history, and dental sealants were calculated with additional subgroup analyses by sex, FRL participation at the school level, and geography. In sampled counties, 95% confidence intervals were estimated with non-overlapping intervals considered statistically significant. All estimates from sampled counties were weighted (adjusted) according to the selection probability and for non-response (number

of students in the sampling interval/number of students screened). Estimates in census counties were adjusted for non-response at the school and student levels (number of schools eligible/number of schools participating; number of students selected/number of students screened). Because of the census approach and universally high participation at Nashua public schools, Nashua estimates were not adjusted (estimates are crude).

**Results**

The statewide sample consisted of 118 schools and 6,040 students. Participating schools were representative of the State in terms of eligibility for free and reduced lunch. Out of 6,040 eligible students, 3,328 (55.1%) participated in the screenings. From the selected statewide sample, 117 schools participated in the survey (Table 1). Altogether 91 schools used active parental consent and 26 used passive parental consent. The city-level analysis of Nashua includes data from an additional 9 schools which were not already included in the statewide sample.

Student participation rates within each county ranged from 45.5% in Rockingham County to 81.1% in Sullivan County (Table 1). The City of Nashua had the highest participation rate at 90.4%. Altogether 3,884 (64.3%) consent forms were returned to schools. Those not screened either declined participation, were absent on the day of the screenings, or were uncooperative. Participation rates among schools with active consent ranged from 13% to 89% (median 49%) and participation rates among schools with passive consent ranged from 35% to 97% (median 92%). Upon completion of the study, 3,201 consenting New Hampshire third grade students had data necessary to assess the height/weight status. Only 7-10 year olds (3,196) were included in the analyses; children 6 and 11 years old were considered outliers with regard to their age and were excluded from the height/weight status analyses. Altogether, 3,198 students were analyzed for oral health status.

**Table 1 – Participation in Screenings by County**

<b>County/City</b>	<b>Eligible School Participation</b>	<b>Eligible Student Participation</b>
Belknap	90.9%	49.1%
Carroll	100%	65.5%
Cheshire	100%	54.0%
Coos	100%	69.1%
Grafton	100%	55.0%
Sullivan	100%	81.1%
Strafford	100%	47.8%
Rockingham	100%	45.5%
Merrimack	100%	53.8%
Hillsborough	100%	60.1%
City of Nashua	100%	90.4%

## I. Oral Health Assessment of Third Grade Students in New Hampshire

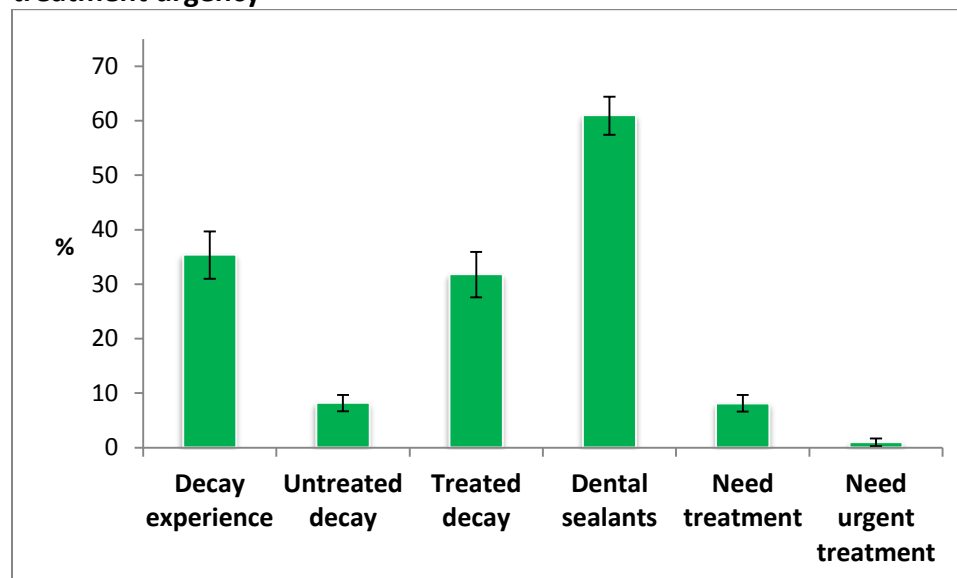
**Table 2 - Demographic description of children undergoing oral health screenings**

Variable (n = 3,199)	Number of Students	Percent
<b>Sex</b>		
Male	1,580	50.5
Female	1,548	49.5
<b>Age</b>		
6 years old	2	0.1
7 years old	28	0.9
8 years old	2,019	64.7
9 years old	1,043	33.4
10 years old	28	0.9
11 years old	3	0.1

**Table 3 - Statewide prevalence of tooth decay experience, dental sealants, and treatment urgency**

Variable	Number of Students	Percent	95% Confidence Interval
Decay experience	1,305	35.4	31.0-39.7
Untreated decay	298	8.2	6.7-9.7
Treated decay	1,161	31.8	27.6-35.9
Dental sealants	2,042	60.9	57.4-64.4
Need treatment	289	8.1	6.6-9.7
Need urgent treatment	26	1.0	0.3-1.7

**Figure 1 – Statewide prevalence and 95% CI of tooth decay experience, dental sealants, and treatment urgency**



**Table 4 - Statewide prevalence of tooth decay experience, dental sealants, and treatment urgency, stratified by sex**

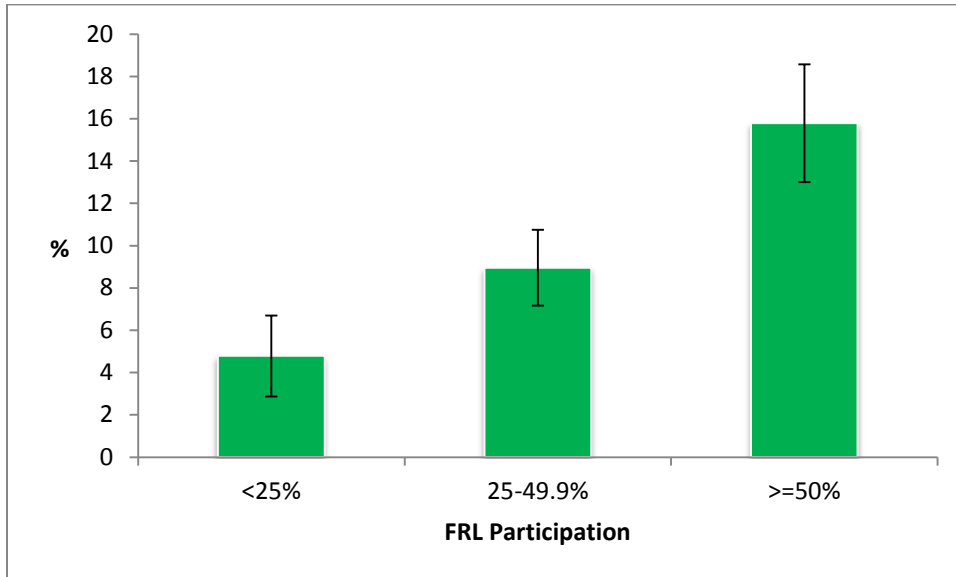
Variable	Male		Female	
	Number of Students	Percent (95% CI)	Number of Students	Percent (95% CI)
Decay experience	634	35.0 (30.2-39.7)	625	35.2 (30.5-39.9)
Untreated decay	151	9.1 (6.8-11.3)	139	7.1 (5.5-8.8)
Treated decay	562	31.4 (27.0-35.7)	557	31.6 (26.9-36.4)
Dental sealants	989	60.2 (56.8-63.7)	996	61.5 (56.8-66.2)
Need treatment	149	9.0 (6.8-11.2)	133	7.1 (5.4-8.8)
Need urgent treatment	15	1.4 (0.3-2.5)	10	0.6 (0.0-1.3)

**Table 5 - Statewide prevalence of tooth decay experience, dental sealants, and treatment urgency, stratified by Free and Reduced Lunch (FRL) participation at the school level**

Variable	< 25.0% FRL		25.0-49.9% FRL		≥ 50.0% FRL	
	Number of Students	Percent (95% CI)	Number of Students	Percent (95% CI)	Number of Students	Percent (95% CI)
Decay experience	259	22.6 (16.9-28.4)	626	42.5 (38.3-46.7)	420	53.4 (48.5-58.3)
Untreated decay	48	4.8 (2.9-6.7)	137	9.0 (7.2-10.7)	113	15.8 (13.0-18.6)
Treated decay	234	20.1 (15.3-24.8)	558	38.6 (34.7-42.6)	369	47.7 (42.2-53.1)
Dental sealants	616	59.0 (52.3-65.6)	886	62.2 (57.7-66.7)	540	63.2 (57.5-69.0)
Need treatment	48	4.8 (2.9-6.7)	131	8.8 (7.0-10.6)	110	15.8 (12.6-19.0)
Need urgent treatment	4	0.4 (0.0-0.8)	9	1.1 (0.0-2.5)	13	2.6 (1.0-4.2)

FRL participation during 2013-2014

**Figure 2 – Statewide prevalence estimates and 95% CI of untreated decay, stratified by Free and Reduced Lunch (FRL) participation at the school level**



Approximately 35.4% of New Hampshire third grade students experienced tooth decay and 8.2% of students had untreated decay at the time of the survey. Only 1.0% of third grade students required urgent treatment due to pain or swelling (Table 3). There were no differences in the prevalence of oral health indicators by sex at the elected significance level (Table 4). Based on the FRL program participation, students attending schools with  $\geq 50.0\%$  program participation had a greater need for urgent care, more untreated decay, and treated decay than students in schools with  $< 25\%$  participation. There was no statistically significant difference in the presence of dental sealants by FRL participation at the school level (Table 5).

According to the analysis by regions, Coos (14.0%) and Strafford (14.2%) Counties had the highest prevalence of untreated decay. Coos County also had the highest prevalence of decay experience. Strafford County third grade students had the greatest need for treatment as compared with the rest of the counties. Rockingham County had the lowest prevalence of untreated decay (4.1%) and decay experience (21.3%). Third grade students in the Coos (53.5%) and Merrimack (52.3%) Counties had fewer dental sealants than students in other regions. Sullivan County had the highest prevalence of dental sealants at 91.3%. When compared with the Counties, the city of Nashua students experienced the highest prevalence of children needing treatment (17.6%) and untreated decay (17.3%). However, City of Nashua students had a higher prevalence of dental sealants as compared with most counties (Table 6).

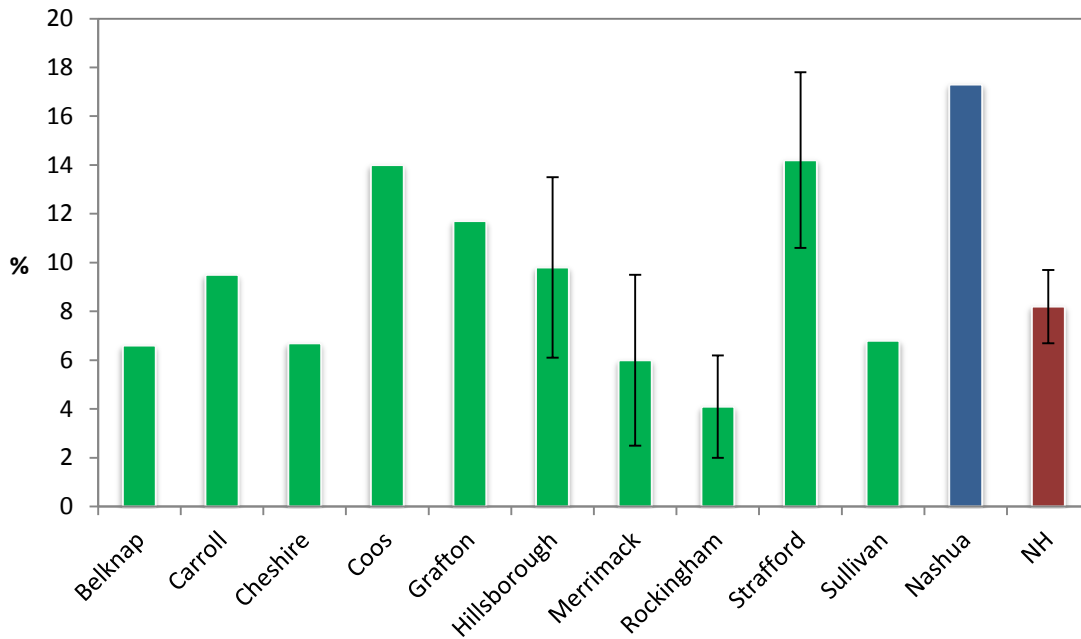


**Table 6 – Region specific prevalence estimates and 95% CI of tooth decay experience, dental sealants, and treatment urgency\***

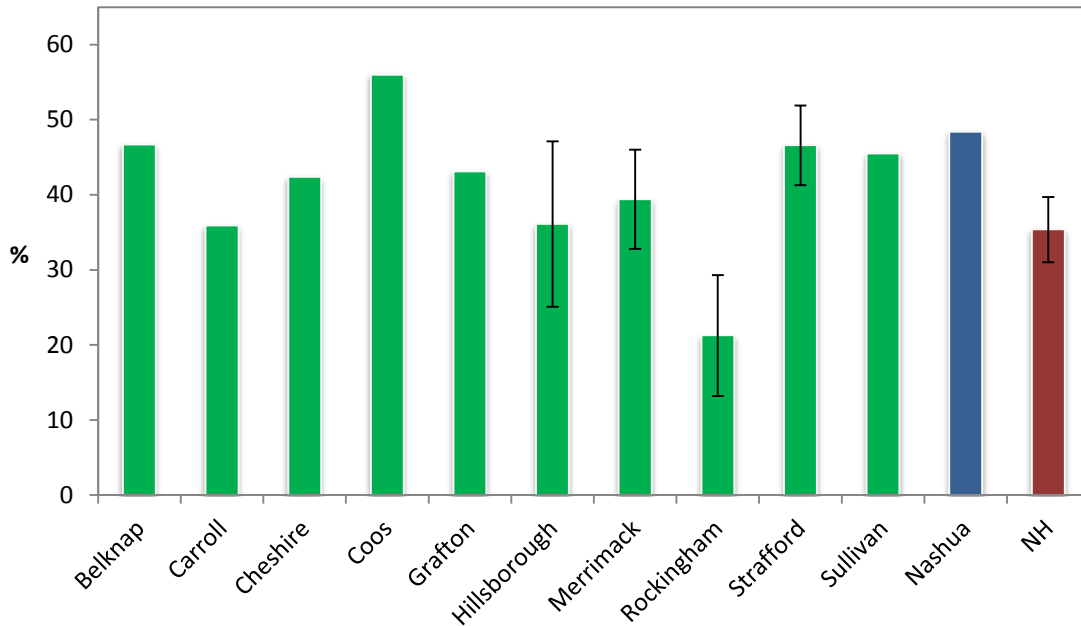
Variable	Belknap	Carroll	Cheshire	Coos	Grafton	Hillsborough	Merrimack	Rockingham	Strafford	Sullivan	Nashua	NH
Decay experience	46.7	35.9	42.4	56.0	43.1	36.1 (25.1-47.1)	39.4 (32.8-46.0)	21.3 (13.2-29.3)	46.6 (41.3-51.9)	45.5	48.4	35.4 (31.0-39.7)
Untreated decay	6.6	9.5	6.7	14.0	11.7	9.8 (6.1-13.5)	6.0 (2.5-9.5)	4.1 (2.0-6.2)	14.2 (10.6-17.8)	6.8	17.3	8.2 (6.7-9.7)
Treated Decay	44.0	30.3	38.4	50.6	37.9	32.4 (22.3-42.6)	36.1 (29.2-43.1)	19.7 (11.7-27.7)	39.1 (35.3-42.9)	41.6	40.0	31.8 (27.6-35.9)
Dental sealants	62.8	70.4	67.9	53.5	61.6	57.4 (49.8-65.0)	52.3 (43.0-61.7)	64.0 (56.5-71.6)	60.9 (54.0-67.7)	91.3	69.5	60.9 (57.4-64.4)
Need treatment	6.3	9.5	6.2	12.5	10.9	10.0 (6.1-13.9)	6.0 (2.5-9.5)	4.1 (2.0-6.2)	14.2 (10.6-17.8)	6.1	17.6	8.1 (6.6-9.7)
Need urgent treatment	0.0	0.7	0.6	0.5	0.8	1.7 (0.4-3.0)	0.2 (0.0-0.6)	1.2 (0.0-3.2)	0.0	1.8	2.7	1.0 (0.3-1.7)

\*The difference between census counties is the difference between the calculated point estimates. The difference between sampled counties is the difference between the confidence intervals. The difference between the point estimate from a census county and the confidence interval from the sampled county is the location of the point estimate from a census county relative to the confidence interval of the sampled county.

**Figure 3 - Region specific prevalence estimates and 95% CI of untreated decay\***

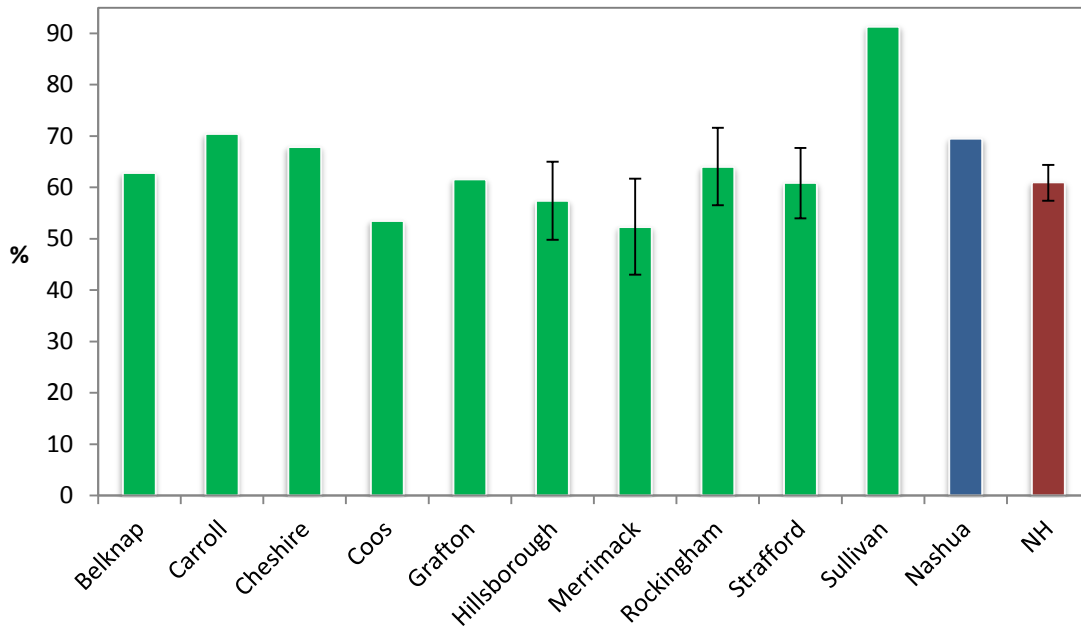


**Figure 4 - Region specific prevalence estimates and 95% CI of decay experience\***



\*Confidence intervals quantify the variability associated with the sampling and show the range of likely values. Confidence intervals are not reported for counties with a census approach where the estimates represent the true population parameters

**Figure 5 - Region specific prevalence estimates and 95% CI of dental sealants\***



\*Confidence intervals quantify the variability associated with the sampling and show the range of likely values. Confidence intervals are not reported for counties with a census approach where the estimates represent the true population parameters.

## II. BMI Assessment of Third Grade Students in New Hampshire

**Table 7 - Demographic description of children undergoing height and weight measurements**

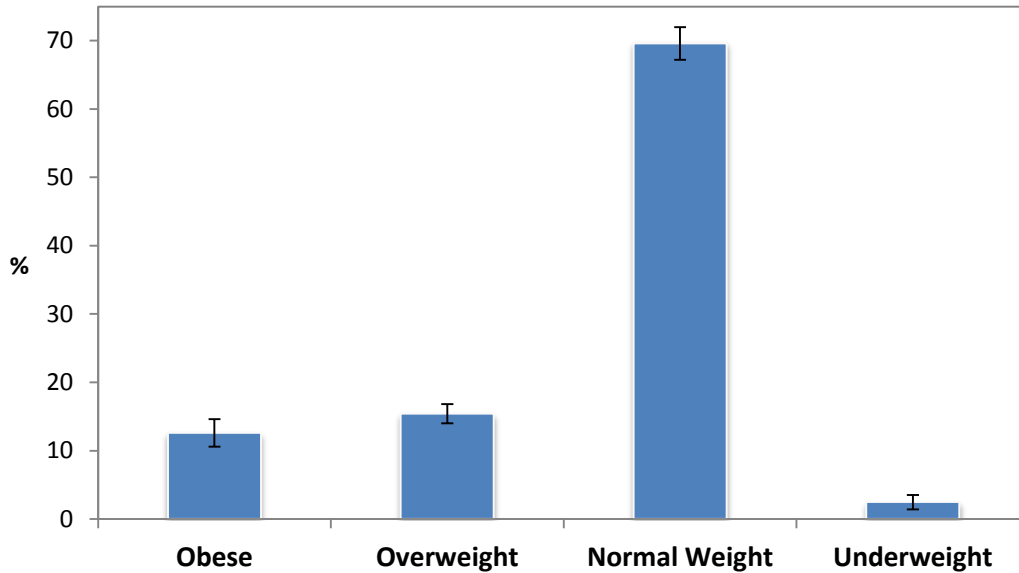
Variable (n = 201)	Number of Students	Percent
<b>Sex</b>		
Male	1,629	50.9
Female	1,572	49.1
<b>Age</b>		
6 years old	2	0.1
7 years old	28	0.9
8 years old	2,067	64.6
9 years old	1,071	33.5
10 years old	30	0.9
11 years old	3	0.1

**Table 8 - Statewide prevalence\* of overweight and obesity**

Variable	Number of Students	Percent	95% Confidence Interval
Obese	469	12.6	10.6-14.6
Overweight	496	15.4	14.0-16.8
Normal weight	2,166	69.6	67.2-72.0
Underweight	65	2.5	1.4-3.5

\*Only 7-10 year olds included in analyses

**Figure 6 - Statewide prevalence\* and 95% CI of overweight and obesity**



\*Only 7-10 year olds included in analyses

**Table 9 - Statewide prevalence\* of overweight and obesity, stratified by sex**

Variable	Male		Female	
	Number of Students	Percent (95% CI)	Number of Students	Percent (95% CI)
Obese	255	13.1 (11.1-15.2)	214	11.9 (9.2-14.7)
Overweight	253	14.4 (12.1-16.8)	243	16.4 (14.0-18.9)
Normal weight	1,087	70.4 (67.2-73.5)	1,079	68.8 (65.3-72.2)
Underweight	33	2.1 (1.1-3.1)	32	2.9 (1.5-4.2)

\*Only 7-10 year olds included in analyses

**Table 10 - Statewide prevalence\* of overweight and obesity, stratified by age**

Variable	7&8 Years Old		9&10 Years Old	
	Number of Students	Percent (95% CI)	Number of Students	Percent (95% CI)
Obese	333	13.1 (11.0-15.2)	136	11.6 (8.4-14.8)
Overweight	325	15.2 (13.0-17.4)	171	15.7 (13.5-18.0)
Normal weight	1,398	69.5 (66.4-72.6)	768	69.8 (65.9-73.8)
Underweight	39	2.2 (1.3-3.1)	26	2.9 (0.5-5.2)

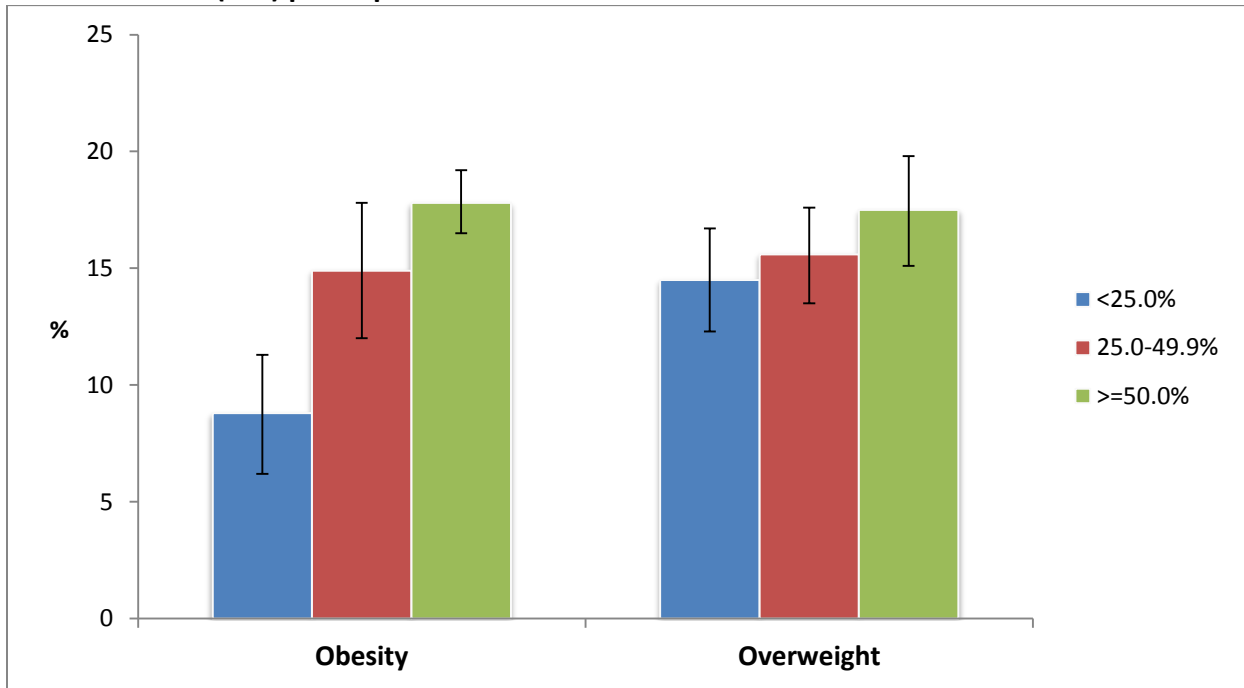
\*Only 7-10 year olds included in analyses

**Table 11 - Statewide prevalence\* of overweight and obesity, stratified by Free and Reduced Lunch (FRL) participation at the school level**

Variable	< 25.0% FRL		25.0-49.9% FRL		≥ 50.0% FRL	
	Number of Students	Percent (95% CI)	Number of Students	Percent (95% CI)	Number of Students	Percent (95% CI)
Obese	101	8.8 (6.2-11.3)	235	14.9 (12.0-17.8)	133	17.8 (16.5-19.2)
Overweight	141	14.5 (12.3-16.7)	233	15.6 (13.5-17.6)	122	17.5 (15.1-19.8)
Normal weight	766	74.8 (71.1-78.5)	930	66.1 (63.4-68.8)	470	63.3 (60.9-65.7)
Underweight	17	1.9 (0.5-3.4)	35	3.5 (1.8-5.2)	13	1.4 (0.5-2.3)

\* FRL participation during 2013-2014, only 7-10 year olds included in analyses

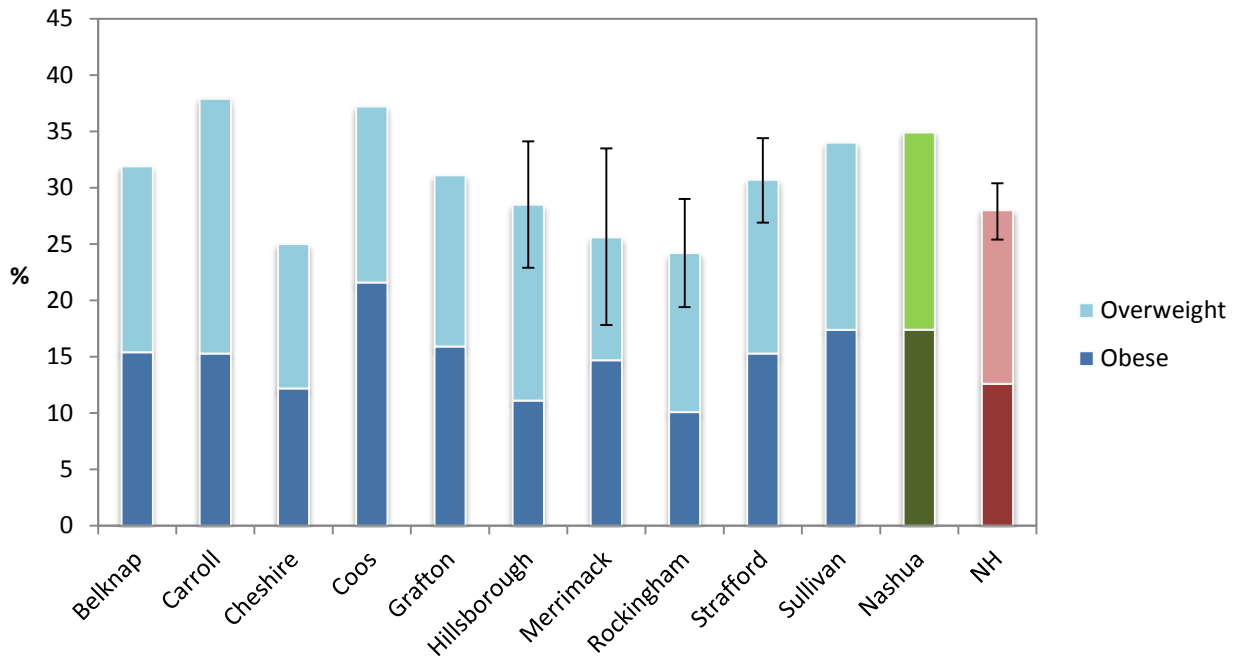
**Figure 7 - Statewide prevalence\* and 95% CI of overweight and obesity, stratified by Free and Reduced Lunch (FRL) participation at the school level**



\*Only 7-10 year olds included in analyses

Approximately 12.6% of New Hampshire third grade students were obese and 15.4% were overweight at the time of the survey. According to the Centers for Disease Control and Prevention growth charts, these percentages are expected to be 5% and 10%, respectively. Only 2.5% of third grade students were underweight (Table 8). There was not a significant difference in prevalence of overweight and obesity by sex at the elected significance level (Table 9). In addition, there was not a significant difference in overweight and obesity by age group at the elected significance level (Table 10). According to the analysis by participation in the FRL program, there was a significantly higher percentage of obese third grade students in schools where ≥50% of students were participating in the program as compared with schools where <25% of students were participating (Table 11). According to the analysis by county, Coos County had the highest prevalence of obesity (21.6%). When the categories of overweight and obese were combined, Carroll (37.9%) and Coos (37.2%) Counties shared the greatest burden of overweight and obesity. Third grade students in the City of Nashua also experience a high burden of overweight and obesity at a prevalence of 35% (Table 12).

**Figure 8 - Region specific prevalence\* estimates and 95% CI of overweight and obesity\*\***



\*Only 7-10 year olds included in analyses

\*\* Confidence intervals quantify the variability associated with the sampling and show the range of likely values. Confidence intervals are not reported for counties with a census approach where the estimates represent the true population parameters.

**Table 12 – Region specific prevalence\* estimates and 95% CI of overweight and obesity\*\***

Variable	Belknap	Carroll	Cheshire	Coos	Grafton	Hillsborough	Merrimack	Rockingham	Strafford	Sullivan	Nashua	NH
Obese	15.4	15.3	12.2	21.6	15.9	11.1 (6.3-16.0)	14.7 (8.7-20.8)	10.1 (7.0-13.2)	15.3 (11.2-19.4)	17.4	17.4	12.6 (10.6-14.6)
Overweight	16.5	22.6	12.8	15.6	15.2	17.4 (14.6-20.2)	10.9 (8.4-13.4)	14.1 (10.6-17.7)	15.4 (11.9-18.8)	16.6	17.5	15.4 (14.0-16.8)
Obese & Overweight	31.9	37.9	25.0	37.2	31.1	28.5 (22.9-34.1)	25.6 (17.8-33.5)	24.2 (19.4-29.0)	30.7 (26.9-34.4)	34.0	35.0	28.0 (25.4-30.4)

\*Only 7-10 year olds included in analyses

\*\*The difference between census counties is the difference between the calculated point estimates. The difference between sampled counties is the difference between the confidence intervals. The difference between the point estimate from a census county and the confidence interval from the sampled county is the location of the point estimate from a census county relative to the confidence interval of the sampled county



## **Discussion**

Statewide, children attending schools with a higher proportion ( $\geq 50.0\%$ ) of students participating in the FRL program were more likely to have experienced decay, have untreated decay, and to be in need of treatment compared with students in schools with  $< 25\%$  of students participating. There was no statistically significant difference in the prevalence of dental sealants by FRL participation, indicating that the New Hampshire school-based oral health programs have been successful in reducing oral health disparities by targeting at-risk children for the application of evidence-based protective dental sealants. Regional disparities in oral health were detected. Students in Coos County were more likely to have experienced decay, have untreated decay, and least likely to have dental sealants. Students in Strafford County also experienced a higher prevalence of untreated decay. As compared with the rest of the State, the City of Nashua bears a greater burden of oral disease with more of its third graders needing treatment and having untreated decay.

Statewide, no significant difference in prevalence of obesity was detected between males and females. Statewide, children attending schools with a higher proportion ( $\geq 50.0\%$ ) of students participating in the FRL program experienced an increased burden of obesity compared with students in schools with  $< 25\%$  of students participating. Those living in Coos and Sullivan Counties had the highest prevalence of obesity among New Hampshire's third grade students.

Limitations of the study include low participation rates in some counties. It is not known whether those not participating experience a smaller or larger burden of dental disease or obesity. Consequently, estimates from counties with higher participation rates in the survey are more reliable. Findings of this assessment are not generalizable beyond the studied population, and cannot be applied to students attending private schools and those students who are homeschooled. The FRL program participation at the school level indicates community level socioeconomic status<sup>9</sup>, and should not be interpreted to mean that individual students participating in the FRL program are more likely to be obese or to have unfavorable oral health status.

Detected disparities should be addressed by targeted prevention and intervention activities, with progress measured by similar surveys done at five year intervals. Preventive measures and intervention activities may differ depending on the type of disparity being addressed (e.g., regional vs. gender differences, low socioeconomic status).

## **Acknowledgments**

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