Childhood Obesity and Asthma in the Consolidated School District of New Britain, Connecticut

2016-17

NEW BRITAIN HEALTH DEPARTMENT

UCONN HEALTH

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Summary of Key Findings

The Consolidated School District of New Britain extracted 2016/2017 data from the PowerSchool database for 3,391 students in grades Pre-K 3 and 4, kindergarten, and 1st, 6th and 9th grade. New Britain Health Department also extracted health data from Health Assessment Records for 547 children attending 2 large preschools that are not part of the PowerSchool database. Demographic data and weight and asthma status were available for 3,650 children, while school performance and attendance information was available for the 3,109 students in the PowerSchool database. Analyses of these data found:

Demographics

- 61% of students are of Hispanic/Latino ethnicity
- English is the primary language for 66% of students
- Chronic absenteeism is most common in pre-kindergarten (38%) and 9th grade (32%)
- Chronic absenteeism for the 9th grade decreased in 2015/16 and 2016/17

Obesity

- 34% of students are overweight or obese
- 16% of 3-5 year olds are obese
- Percent of overweight/obesity is highest among Hispanic/Latino students
- Children in 6th and 9th grade have the highest obesity and extreme obesity prevalence
- Longitudinal data for 2011/12 to 2016/17 suggests a downward trend in overweight/obesity among children in preschool
- Weight is not related to school attendance

Asthma

- 20-25% of children in each grade from pre-kindergarten through 1st grade have asthma
- 1 out of 3 students in 6th grade have physician confirmed asthma
- Asthma prevalence is highest among Hispanic/Latino students (31%), non-Hispanic Black students (22.5%), and boys (28.2%)
- Children with asthma are more likely to be overweight or obese
- Children with asthma have higher rates of chronic absenteeism
- Students with asthma have lower reading and math test scores
- Asthma prevalence for 6th grade (33%) students in 2016/17 is similar to the 31% observed in 2011/12
- 9th grade asthma prevalence has an upward trend for the school years from 2011/12 to 2016/17, but has decreased since 2014/15

Obesity and asthma are among the most serious chronic conditions faced by children in the United States. New Britain surpasses national averages for both conditions. The proportion of obese children in New Britain is almost four times as many as expected according to CDC guidelines, and is highest among Hispanic/Latino children. Asthma prevalence is also very high among New Britain children, and is related to childhood obesity as well as school performance and attendance. Continuing to incorporate additional case management and air quality improvement initiatives within school, childcare and home settings may improve the health and attendance among children with asthma.

Introduction

Recognizing the importance of obesity and asthma as serious public health risks to its children, the New Britain Health Department asked the Programs in Public Health and Health Policy at UConn Health to analyze data on child weight status and asthma in city schools and preschools. The first report was issued for the 2013/14 school year. This report for the 2016/17 school year is the fourth annual report describing the extent of childhood obesity and asthma, and the relationship of obesity and asthma to demographics, standardized test scores, and chronic absenteeism in the school population. The reports provide a statistically sound base on which to design and evaluate the effectiveness of programs.

Methods

Data Sources

Data from two sources were used for this report: New Britain's PowerSchool database and the Health Department's MS Access databases. All data were de-identified. PowerSchool is a web-based information system created by Pearson Education, Inc. Extracted data from the PowerSchool database included age, gender, race/ethnicity, height, weight, age in months at time of height and weight measurement, total children at the same address, primary language, Individualized Education Program (IEP) participation, school attendance, standardized testing results (reading, language, math percentiles), and chronic diseases (asthma, allergy, diabetes, seizures). For the cross-sectional analyses in this report, data for the most recent school year, 2016/17, were extracted for all Pre-K 3 and 4, kindergarten, and 1st, 6th and 9th grade children in the Consolidated School District of New Britain.

The PowerSchool data was supplemented with the New Britain Health Department's MS Access database which included Health Assessment Records for two large preschools only: the Human Resource Agency's Head Start and the YWCA's preschool program, both of which are outside of the Consolidated School District of New Britain. The data extracted for this report from the Health Department's databases included: date of birth, sex, grade, race, ethnicity, health insurance status, dental insurance status, asthma status, diabetes status, height, and weight.

For the time trend analyses, previously extracted data was combined with the 2016/17 data. This included PowerSchool data for the 2013/14, 2014/15, and 2015/16 school years, as well as data from the MS Access databases for school years 2011/12, 2012/13, 2014/15, and 2015/16.

Analyses

Cross-sectional analyses of the 2016/17 data

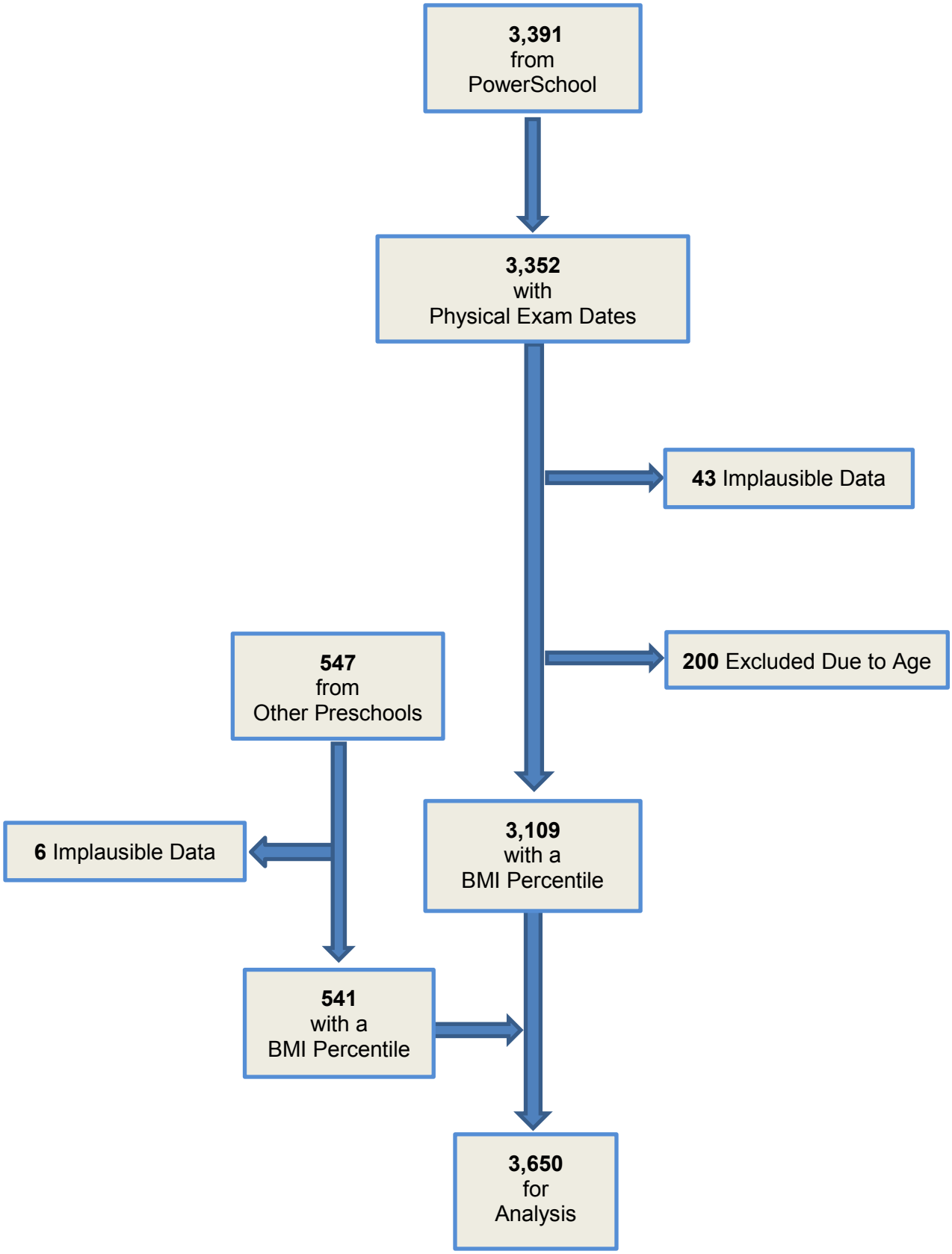
Using data from the combined sources, the 2016/17 school year demographics, weight status, and asthma were examined. Data is summarized by grade and by weight category. Body mass index (BMI) and BMI percentiles were calculated for each student using SAS programs downloaded from the Centers for Disease Control and Prevention (CDC) website. BMI percentiles are obtained by plotting BMI on the CDC BMI-for-age growth charts. The BMI percentile indicates the relative position of the child's BMI number among children of the same sex and age. Students were classified extremely obese, obese, overweight, healthy weight, or underweight as indicated by the CDC [1].

The analyses that incorporate 2016/17 school year data from the PowerSchool database and the Health Department's MS Access database included a combined sample size of 3,650 children with BMI percentiles. This includes the final analytic sample from PowerSchool consisting of 3,109 children and another 541 preschool children from the 2016/17 data provided by the Health Department as shown in Figure 1. PowerSchool data for 3,391 children was provided, but 282 were excluded from the analyses (n=3,109). Reasons for exclusion were: missing necessary information for calculation of the BMI percentile (age in months at physical exam, sex, height, weight), 'Biologically Implausible Values' as determined by the CDC software, date of the physical exam was prior to 7/1/2015, and for several reasons related to age. In addition, values were excluded for children whose age was more than a year different from typical age for children in that grade. For example, the typical age for a child in kindergarten is 5 years old, so ages older than 6 or less than 4 were excluded. Analyses of BMI and asthma data used the combined datasets (3,650 children), while all other analyses are based on the 3,109 children from the PowerSchool database. The PowerSchool data represent between 77% and 91% of all students in the Consolidated School District of New Britain in the grades studied (Table 1).

Table 1. 2016-17 Consolidated School District of New Britain Child Data Sample

	Overall	Pre-K 3	Pre-K 4	Kindergarten	1st Grade	6th Grade	9th Grade
Official Enrollment	3,632	230	315	828	895	715	649
Sample Size	3,109	177	267	742	763	653	507
Percent of enrollment	85.6	77.0	84.8	89.6	85.3	91.3	78.1

Figure 1. 2016-17 School Year Data and Analytic Sample



Longitudinal Analyses

In addition to the 2016/17 data used above, school year data was available from five previous school years: 2011/12, 2012/13, 2013/14, 2014/15, and 2015/16. Table 2 shows the data available by grade and school year. There are six years of weight status and asthma data for kindergarten, 6th and 9th grade (2011/12 – 2016/17), five years of data for Pre-K 3 and 4 (no preschool data was available for 2011/12), two years of data for 3rd grade (2014/15 and 2015/16), and one year of data for 1st grade (2016/17) and 2nd grade (2014/15). Longitudinal data was analyzed two ways to identify possible changes in overweight/obesity and asthma among New Britain children over time.

Table 2. Historical Data: Number of Children in Data Files by Grade and Year

Year	Total # of children	Pre-K 3	Pre-K 4	Kindergarten	1st Grade	2nd Grade	3rd Grade	6th Grade	9th Grade
2011/12	2,036	n/a	n/a	827	n/a	n/a	n/a	669	540
2012/13	3,204	523	599	908	n/a	n/a	n/a	589	585
2013/14	3,389	584	818	902	n/a	n/a	n/a	620	465
2014/15	4,509	479	538	800	n/a	776	700	573	643
2015/16	3,848	460	587	817	n/a	n/a	794	623	567
2016/17	3,650	439	546	742	763	n/a	n/a	653	507
Total	**20,636**	**2,485**	**3,088**	**4,996**	**763**	**776**	**1,494**	**3,727**	**3,307**

Historical Analysis

This approach looked at whether the rate of overweight/obesity, obesity, extreme obesity, and asthma for a given grade-level changed significantly across school years. The data used did not follow individual students over time. The percent of overweight/obese children and children with asthma in Pre-K 3, Pre-K 4, kindergarten, and 6th and 9th grade were calculated for each school year using available data from 2011/2012 through 2016/17. Statistical analyses included the Cochran-Armitage Trend Test to detect whether the prevalence changed significantly over time. Table 2 shows the number of children with available data by grade for grade-level historical comparisons of overweight/obesity prevalence. A total of 20,636 records were available from the New Britain databases.

Cohort Analysis

Change in weight status over time was also explored using 'cohorts' of children and following them over time. The de-identified data used makes it impossible to know how many of the same children appear in each year of data; however, it is expected that many of the children are in all three years of the data. This report focuses on three cohorts with data beginning in Pre-K 3. Beginning with different years, Cohorts 1 and 3 have data from Pre-K 3, Pre-K 4, and kindergarten; cohort 2 also has a 4th year of data from 1st grade. Rates of overweight and obesity were examined for change in consecutive years for each cohort. Table 3 shows the school year and number of children in the data files for the three cohorts of children. For example, the weight status of Cohort 1 is assessed using available data for children in Pre-K 3 during the 2012/13 school year, Pre-K 4 during the 2013/14 school year and kindergarten during the 2014/15 school year. Statistical analyses included chi-square tests to detect significant differences in overweight/obesity prevalence between the two cohorts at each grade level and Cochran-Armitage test to detect differences in the distribution of weight classifications over time.

Table 3. Pre-Kindergarten Cohort Analyses: Number of Children in Data Files by Cohort and School Year

Grade	Cohort 1	Cohort 2	Cohort 3
Pre-K 3	2012/13 (**523**)	2013/14 (**584**)	2014/15 (**479**)
Pre-K 4	2013/14 (**818**)	2014/15 (**538**)	2015/16 (**587**)
Kindergarten	2014/15 (**800**)	2015/16 (**817**)	2016/17 (**742**)
1st grade	n/a --	2016/17 (**763**)	n/a --

Demographics 2016-2017

Age, sex, race, ethnicity and primary language of the full sample of 3,650 children overall and by grade are shown in Table 4. Average ages for each grade are as expected given the inclusion criteria stated above. Gender of children in the sample overall and pre-kindergarten, kindergarten, and 1st grade is fairly evenly split; however, more than half of the children in 6th and 9th grade are males (54% and 56%, respectively). More than half of the children are Hispanic/Latino (61%); 18% are White and 16% are non-Hispanic Black.

Table 4. Demographics Data for New Britain Students in the Combined Databases 2016/17

	Overall	Pre-K 3	Pre-K 4	Kindergarten	1st Grade	6th Grade	9th Grade
Sample Size, n (%)	3,650	439 (12.0)	546 (15.0)	742 (20.3)	763 (20.9)	653 (17.9)	507 (13.9)
Age Years, mean (SD)	7.4 (3.7)	3.4 (0.5)	4.5 (0.4)	4.8 (0.5)	6.6 (0.4)	11.1 (0.6)	14.3 (0.6)
Sex, n (%)							
Female	1,773 (48.6)	210 (47.8)	274 (50.2)	377 (50.8)	385 (50.5)	303 (46.4)	224 (44.2)
Male	1,877 (51.4)	229 (52.2)	272 (49.8)	365 (49.2)	378 (49.5)	350 (53.6)	283 (55.8)
Ethnicity/Race, n (%)							
Asian/Pacific Islander	122 (3.3)	22 (5.0)	29 (5.3)	19 (2.6)	21 (2.8)	13 (2.0)	18 (3.6)
Black, non-Hispanic	587 (16.1)	91 (20.7)	103 (18.9)	114 (15.4)	100 (13.1)	100 (15.3)	79 (15.6)
Hispanic/Latino	2,223 (60.9)	254 (57.9)	310 (56.8)	428 (57.7)	505 (66.2)	410 (62.8)	316 (62.3)
Other	18 (0.5)	3 (0.7)	4 (0.7)	8 (1.1)	1 (0.1)	2 (0.3)	0 (0.0)
White, non-Hispanic	661 (18.1)	67 (15.3)	100 (18.3)	149 (20.1)	134 (17.6)	126 (19.3)	85 (16.8)

Additional demographics shown in Table 5 show the primary language of the 3,109 children in the PowerSchool database varied with 66% of children speaking English as a primary language, 20% speaking Spanish, and 23% speaking a language other than English or Spanish. Primary language varies significantly by grade level ($p<.001$). Approximately one-third of the children in 6th and 9th grade spoke Spanish as their primary language compared to 19% children in the other grades.

Table 5. Additional Demographics for Children in the PowerSchool Databases 2016/17

	Overall	Pre-K 3	Pre-K 4	Kindergarten	1st Grade	6th Grade	9th Grade
Primary Language, n (%)							
English	2,060 (66.3)	107 (60.5)	175 (65.5)	525 (70.8)	565 (74.1)	389 (59.6)	299 (59.0)
Spanish	746 (24.0)	39 (22.0)	58 (21.7)	144 (19.4)	129 (16.9)	208 (31.9)	168 (33.1)
Other	303 (9.7)	31 (17.5)	34 (12.7)	73 (9.8)	69 (9.0)	56 (8.6)	40 (7.9)

Educational Services, Testing, and Attendance

Table 6 describes the educational services received, test scores, and school attendance data from the PowerSchool database overall and by grade. Nineteen percent of children in the grades examined received special education (n=583) and 19% received English Language Learner (ELL) services (n=518). Children in 6th grade (27%) and 9th grade (25%) participated in ELL at significantly higher rates than children in kindergarten (13%) and 1st grade (16%).

Standardized reading and math test score percentiles were available for children in kindergarten, 1st, and 6th grade. Language scores were available only for children in 6th grade. Scores shown in Table 6 were classified as above or below the 50th percentile. One would expect half of the students to be above and half below the 50th percentile. However, 23%, 20%, and 26% of children were above the 50th percentile in the reading, math, and language scores, respectively.

School attendance of 90% or lower is considered chronic absenteeism. The chronic absenteeism rate among New Britain students was 22%, with the lowest rate of absenteeism among children in 1st grade (12%) and the highest rates among children in preschool (38%) and 9th grade (32%). The chronic absenteeism rate among 9th grade students was more than twice the statewide rate for high school students [4]. Although the rate of chronic absenteeism is high for 9th grade students, the rate appears to have improved significantly over the last two school years ($p<.001$). The much higher rate of 46% in 2014/15 significantly decreased to 38% in 2015/16 and decreased again to 32% in 2016/17.

Table 6. School-related Data for Students in PowerSchool Database 2016/17, n (%)

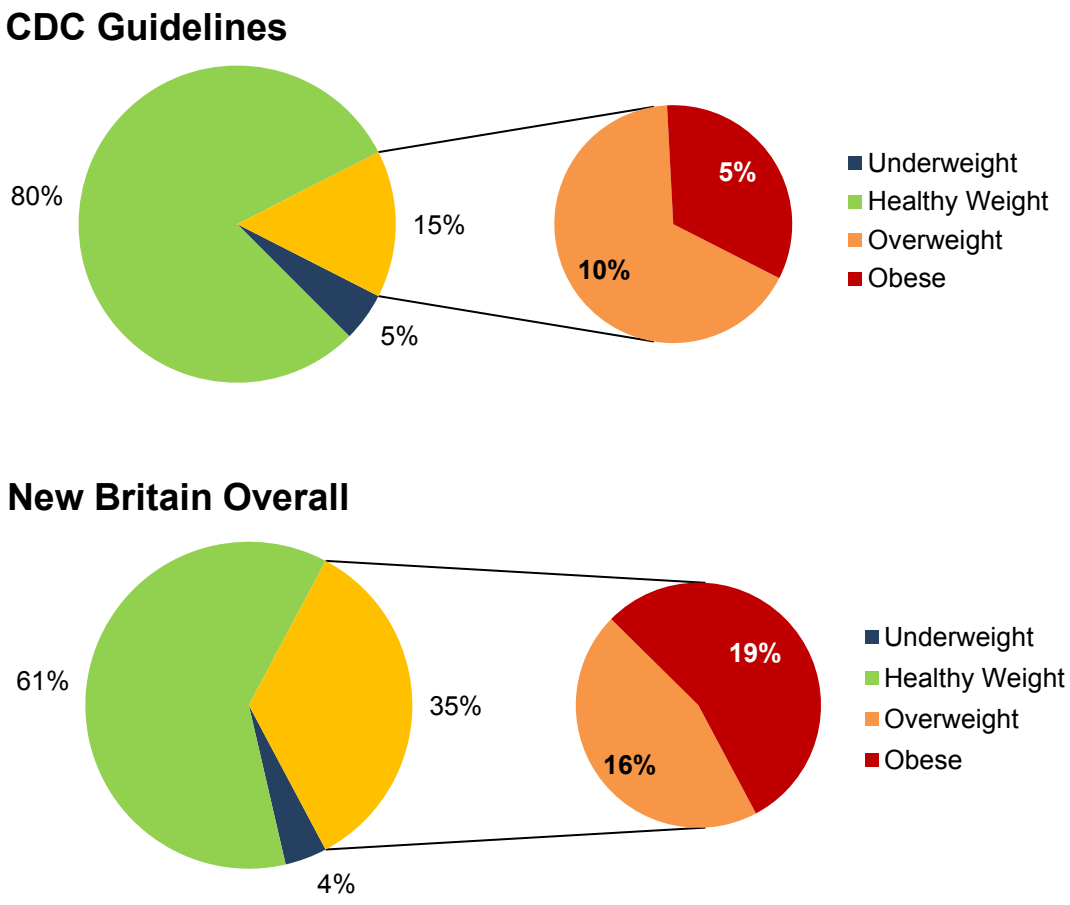
	Overall	Pre-K 3	Pre-K 4	Kindergarten	1st Grade	6th Grade	9th Grade
Sample Size	3,109	177	267	742	763	653	507
ELL Services*							
Yes	518 (19.4)	n/a	n/a	93 (12.5)	120 (15.7)	178 (27.3)	127 (25.0)
No	2147 (80.6)	n/a	n/a	649 (87.5)	643 (84.3)	475 (72.7)	380 (75.0)
Special Education *							
Yes	583 (18.8)	79 (44.6)	86 (32.2)	97 (13.1)	91 (11.9)	122 (18.7)	108 (21.3)
No	2,526 (81.3)	98 (55.4)	181 (67.8)	645 (86.9)	672 (88.1)	531 (81.3)	399 (78.7)
Reading RIT, *50th percentile*							
Above	493 (23.4)	n/a	n/a	148 (20.3)	182 (24.1)	163 (26.2)	n/a
Below	1611 (76.6)	n/a	n/a	580 (79.7)	572 (75.9)	459 (73.8)	n/a
Math RIT, *50th percentile*							
Above	416 (19.7)	n/a	n/a	160 (22.1)	170 (22.5)	86 (13.7)	n/a
Below	1691 (80.3)	n/a	n/a	564 (77.9)	585 (77.5)	542 (86.3)	n/a
Language RIT, *50th percentile*							
Above	163 (26.2)	n/a	n/a	n/a	n/a	163 (26.2)	n/a
Below	459 (73.8)	n/a	n/a	n/a	n/a	459 (73.8)	n/a
Chronic Absenteeism, ≤ *90% attendance*							
Yes	674 (21.7)	68 (38.4)	100 (37.5)	131 (17.7)	88 (11.5)	123 (18.8)	164 (32.4)
No	2,434 (78.3)	109 (61.6)	167 (62.6)	611 (82.4)	675 (88.5)	530 (81.2)	342 (67.6)

*Sum does not add to zero due to rounding

Body Mass Index and Weight Classifications

For children and teens, BMI percentile indicates the relative position of the child's BMI adjusted for sex and age. The percentile is the child's BMI relative to US children who participated in national surveys from 1963-65 to 1988-94. The CDC has defined weight categories for children based on age- and sex-adjusted percentiles: Underweight (< 5th percentile), Healthy Weight (5th to < 85th percentile), Overweight (85th to < 95th percentile), and Obese (95th percentile and above). By definition of these categories, one would expect that 5% of children to be Underweight, 80% Healthy Weight, 10% Overweight, and 5% Obese.

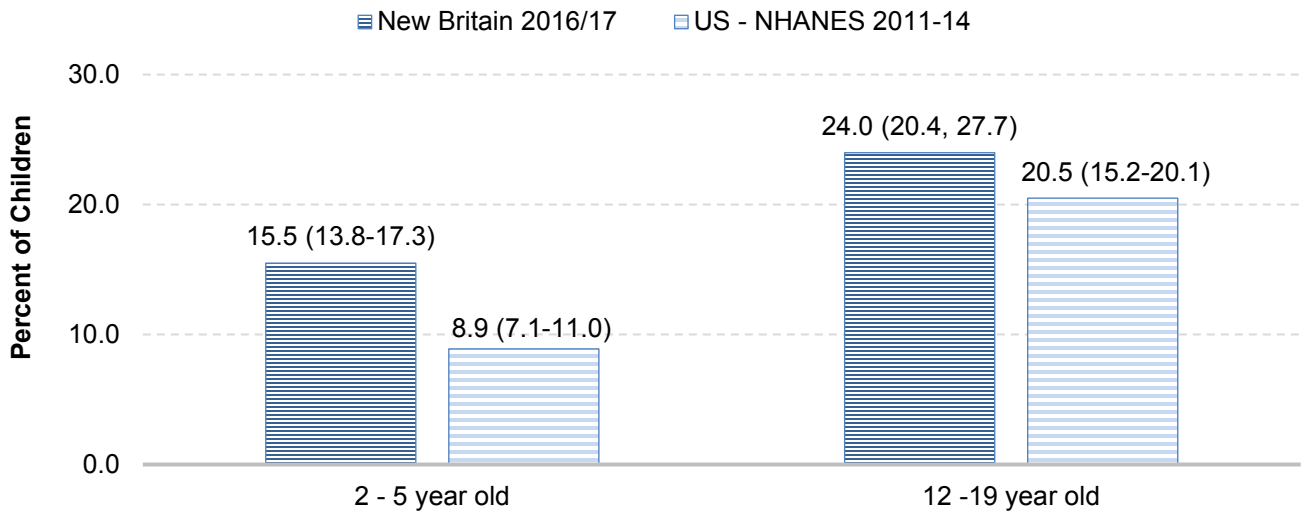
Figure 2. Overall Weight Classification of New Britain Children Compared to CDC Guidelines



The prevalence of overweight and obesity among New Britain school children, 35%, exceeds the CDC guideline of 15% (Figure 2). There are 1.5 times (16% versus 10%) as many overweight children and almost four times (19% versus 5%) as many obese children as CDC guidelines suggest.

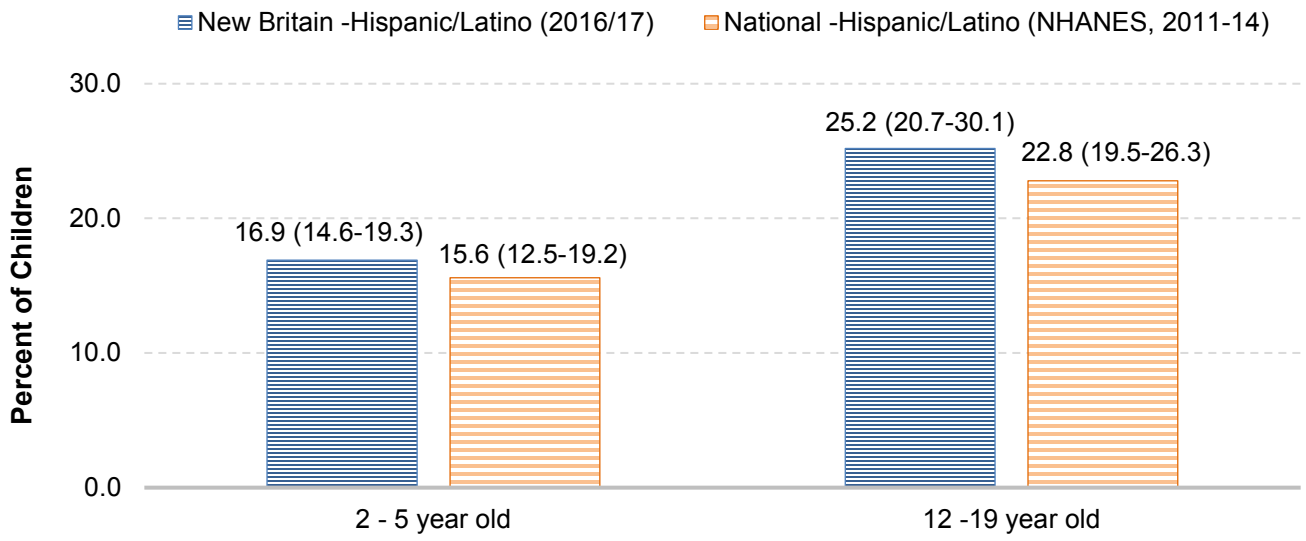
Figure 3 compares the obesity rates of New Britain children to rates for US children during the period from 2011-2014 [2]. New Britain children had higher rates at both preschool age (16% versus 9%) and adolescent age (24% versus 21%).

Figure 3. Prevalence of Obesity in New Britain, CT and the U.S. Child Population



Nationally, rates of obesity are highest among children and adolescents who are Hispanic or Latino (22%), non-Hispanic Black (20%), or live in households headed by individuals with less than a high school degree (21%) [2]. Many of the children in New Britain share these demographics. Figure 4 shows that the rate of obesity among New Britain's Hispanic and Latino children is comparable to national rates at both preschool age (17% vs 16%) and adolescence (25% vs 23%). The city-wide obesity rate is also similar to the national rate for Hispanic and Latino children at both preschool age (16% vs 17%) and adolescence (24% vs. 25%).

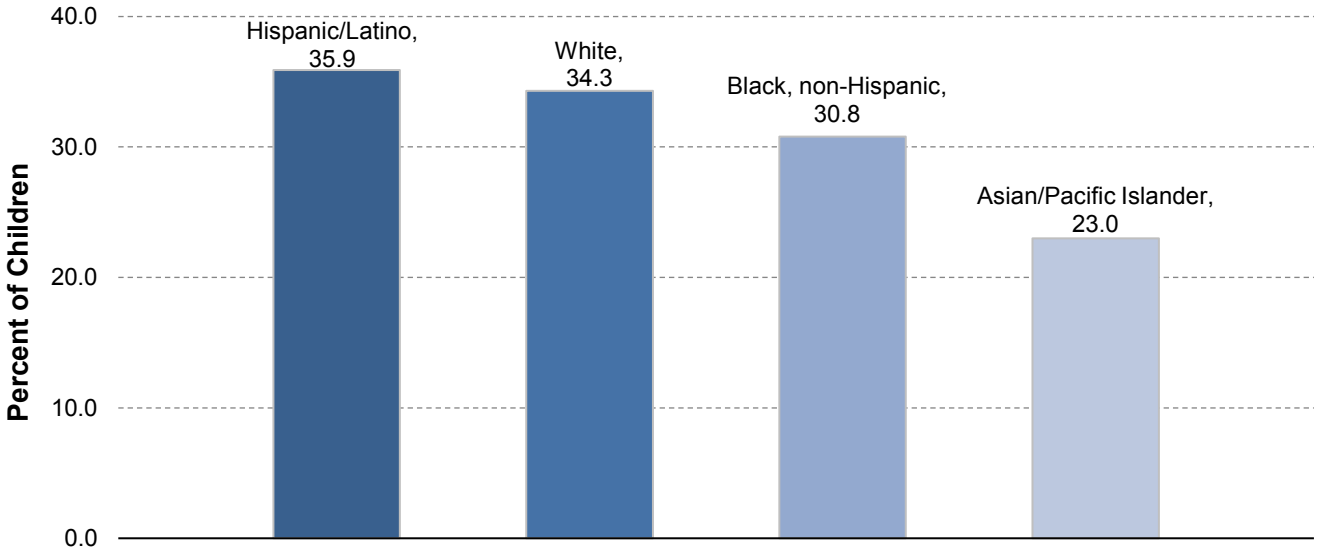
Figure 4. Prevalence of Obesity among Hispanic/Latino Children: New Britain, CT and the U.S. Child Population



Weight Classification by Gender and Race/Ethnicity

Table A1 in the Appendix shows the distribution of weight classifications by different demographic groups. New Britain's rates of overweight/obesity by demographic groups are consistent with findings from national data [3]. Overall rates of overweight/obesity were similar for male (34%) and female (35%) children in the school district. Significant differences between racial/ethnic groups existed, however. The rate of overweight/obesity was highest among Hispanic/Latino (36%) and White children (34%), and lowest among children who were Black (31%) or Asian/Pacific Islander (23%). (Differences between Hispanic/Latino and White children, White and Black children, and Black and Asian/Pacific Islander were not statistically significant).

Figure 5. Percentage of New Britain Children who are Overweight or Obese by Race/Ethnicity



Weight Classification by Grade

Figure 6 shows the percent of students in each weight category by grade. In all grade levels studied, there were fewer children at a healthy weight than the 80% recommended by CDC guidelines. Healthy weights were most common for children in pre-kindergarten and 1st grade; approximately two-thirds of the children in these grades had a healthy weight. At the same time, almost half of the children in 6th grade (49%) and 9th grade (45%) were overweight or obese, with more than 25% of the children in both of these grades classified as obese.

Figure 6. Weight Classification by Grade (New Britain, 2016/17)

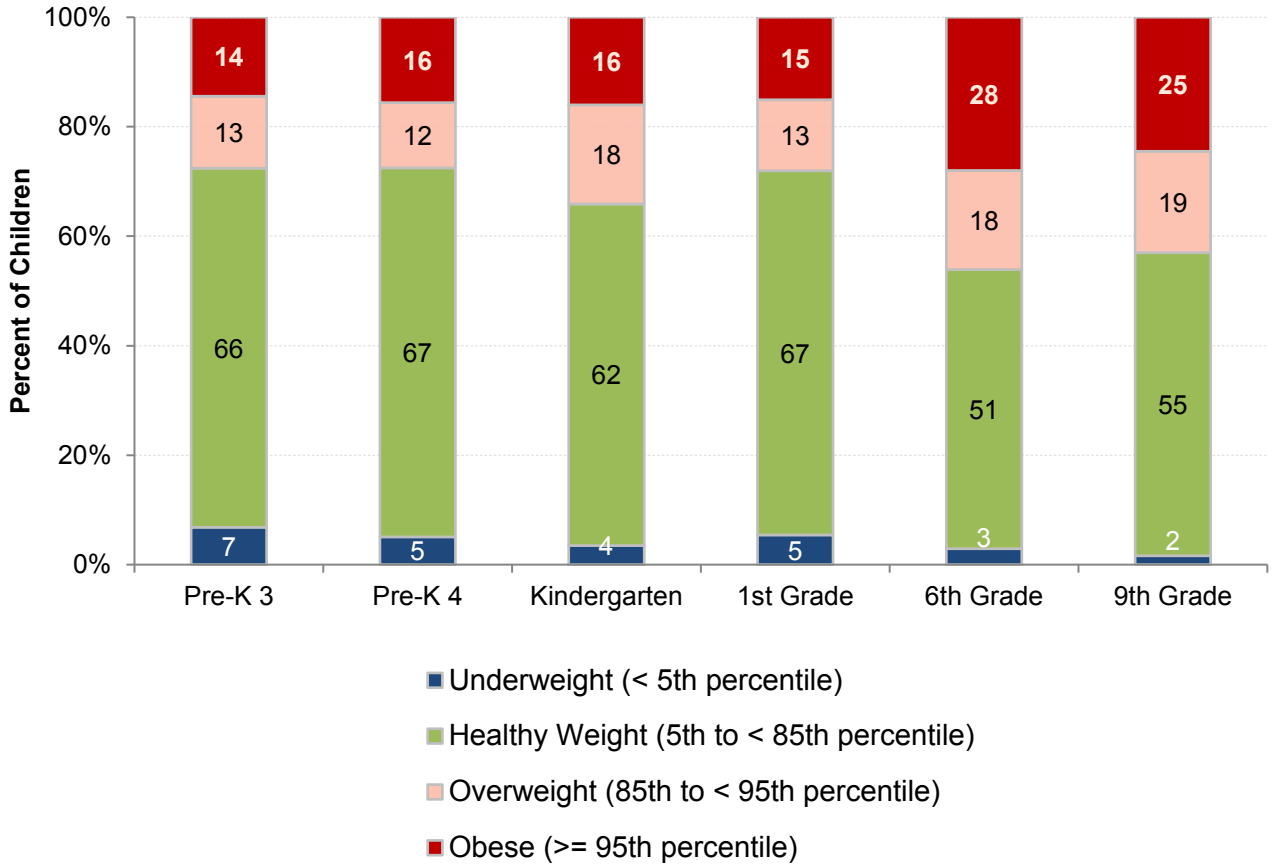
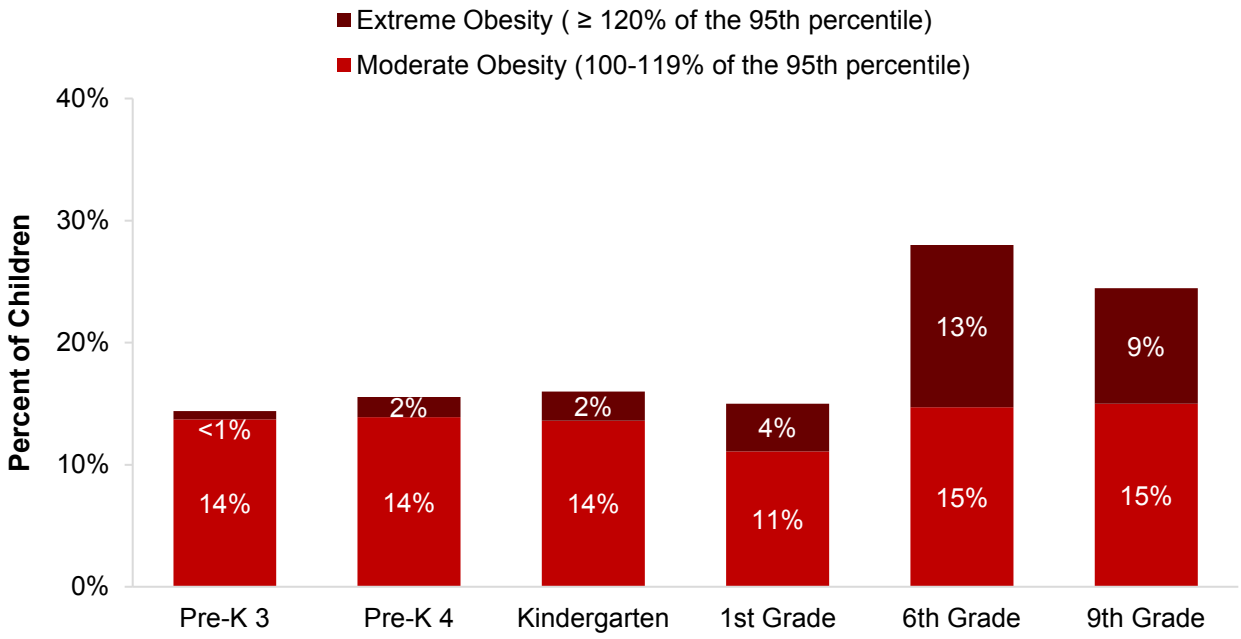


Figure 7 shows the prevalence of obesity for each grade, indicating the percent of children who met the criteria for extreme obesity and those who met the criteria for moderate obesity. The CDC defines extreme or "severe" obesity as children who have a BMI value that is 120% of the sex-specific 95th percentile on the CDC BMI-for-age growth charts. Extreme obesity in childhood has been associated with higher risk for extreme obesity in subsequent years and health issues such as the odds of hypertension [5], worse cardiovascular risk factor profiles, and elevated levels of inflammation when compared to less obese children [6].

Figure 7. Percent of New Britain Children with Obesity by Obesity Type and Grade (New Britain, 2016/17)



The prevalence of obesity (BMI ≥ 95th percentile) and of extreme obesity were much higher in 6th and 9th grade than among the younger children in Pre-K 3 through 1st grade. The percent of children with extreme obesity varied from less than 1% to 13%, with the lowest rate in Pre-K 3 and the highest rate in 6th grade. In the 6th grade, almost half of the children classified as obese met the criteria for extreme obesity. It also appears that the chances an obese child will have extreme obesity increases significantly when comparing older grades to younger grades (with the exception of 9th grade). For example, 5% of children classified as obese in Pre-K 3 met the extreme obesity definition compared to 15% in kindergarten and 26% in 1st grade.

A data summary with the complete weight distribution for each school is provided in the Appendix (Table A2).

Weight Classification and School Performance

Table 7 shows test results by weight category. Both average standardized test scores and the percent of children with scores above the 50th percentile vary slightly by weight classification. For some standardized tests, the average scores and likelihood of scoring above the 50th percentile appeared to be higher among children who were overweight and lowest among children who were obese when compared to other weight classifications. However, differences in school performance tests were not statistically significant.

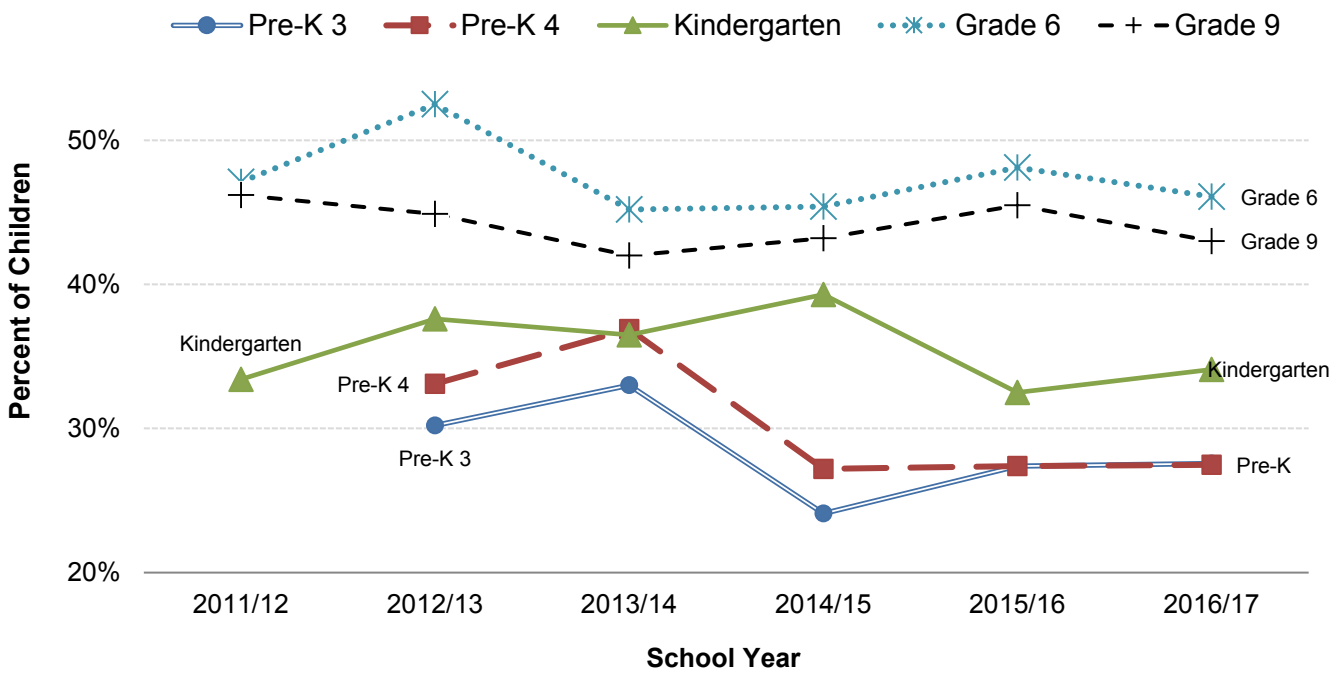
Table 7. School Performance by Weight Classification 2016/17

	Sample Size	Underweight (< 5th percentile)	Healthy Weight (5th to < 85th percentile)	Overweight (85th to < 95th percentile)	Obese (>= 95th percentile)	*p*
Reading RIT Percentile, mean (SD)	2,104	33.0 (28.8)	31.5 (25.3)	34.6 (26.5)	30.6 (25.5)	0.16
Percent above 50th percentile	2,104	28.2	22.7	26.5	22.2	0.18
Math RIT Percentile, mean (SD)	2,107	26.7 (24.2)	28.9 (24.8)	28.4 (25.6)	26.3 (23.6)	0.29
Percent above 50th percentile	2,107	18.8	20.2	22.3	16.4	0.30
Language RIT Percentile, mean (SD)	622	32.4 (30.4)	32.1 (26.8)	35.4 (29.5)	28.1 (27.1)	0.16
Percent above 50th percentile	622	21.1	26.7	30.9	22.9	0.13

Historical Data

The historical data represents different groups of children for each year. As expected, the percent of children who are overweight/obese fluctuates from year to year. Figure 8 shows that for kindergarten, 6th grade and 9th grade, the prevalence of overweight/obesity is fairly consistent and the changes over time are not statistically significant. In contrast, the trend among Pre-K 4 children shows a significant decrease over time (p<.001) from 33% to 28%. The trend among Pre-K 3 children nears significance (p=0.07).

Figure 8. Historical Analyses of Overweight/Obesity Prevalence among Children in Select Grades



*Pre-K 4 showed significant change over time (p<.001). Pre-K 3 showed significant decreases through 2015/16 and then leveled off (p=.07 overall). The statistical test used was the Cochran-Armitage Trend Test.

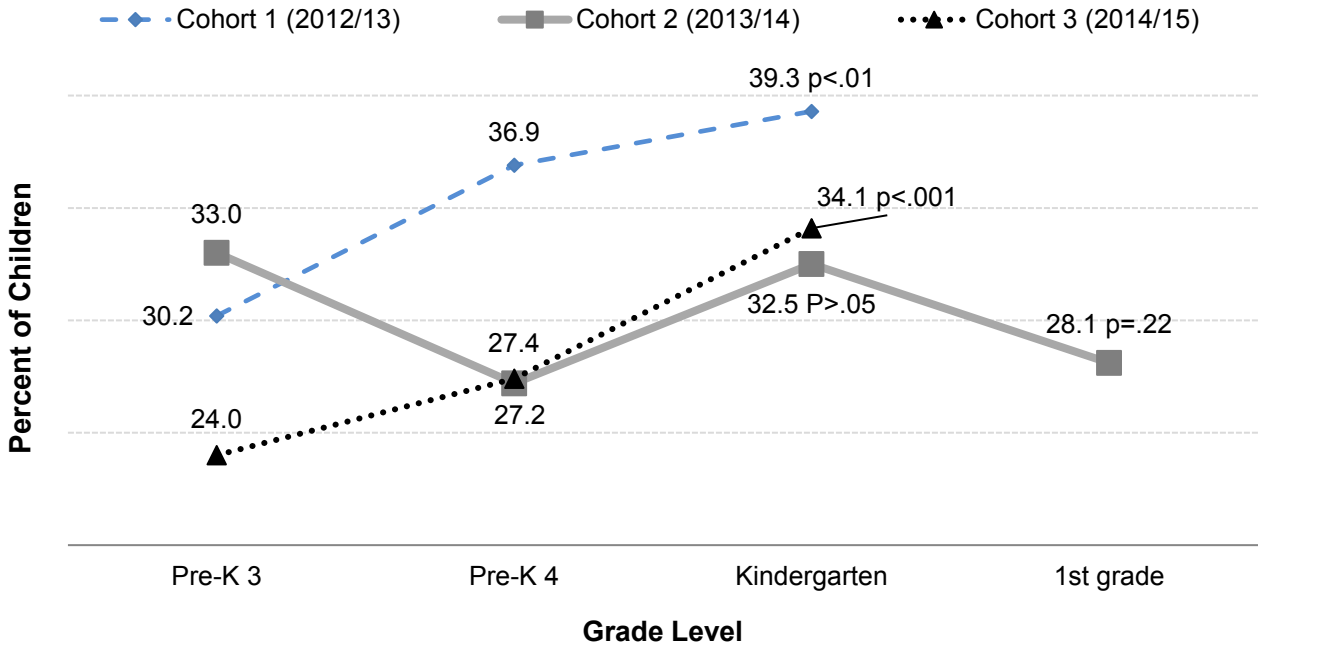
In the Appendix, detailed information on weight classifications by grade level for each available school year can be found in Table A3.

Cohort Data

The cohort analyses for this report focus on changes in weight status for three cohorts of children with data beginning in Pre-K 3. For discussion purposes, Cohort 1 consists of all children (for whom there was BMI data) who were in Pre-K 3 in 2012/13, Cohort 2 includes children who were in Pre-K 3 in 2013/14, and Cohort 3 includes children who were in Pre-K 3 in 2014/15. Each cohort was examined for the next two consecutive years using Pre-K 4 and then kindergarten data. Data for 1st grade is also shown for Cohort 3.

Figure 9 shows the prevalence of overweight/obesity over time for each cohort. The prevalence of children who were overweight/obese increased significantly during the period from preschool to kindergarten for children in Cohort 1 (30% to 39%, p<.01) and Cohort 3 (24% to 34%, p<.001). In contrast, Cohort 2 followed a very different pattern.

Figure 9. Cohort Analyses of Overweight/Obesity Prevalence in Early Childhood



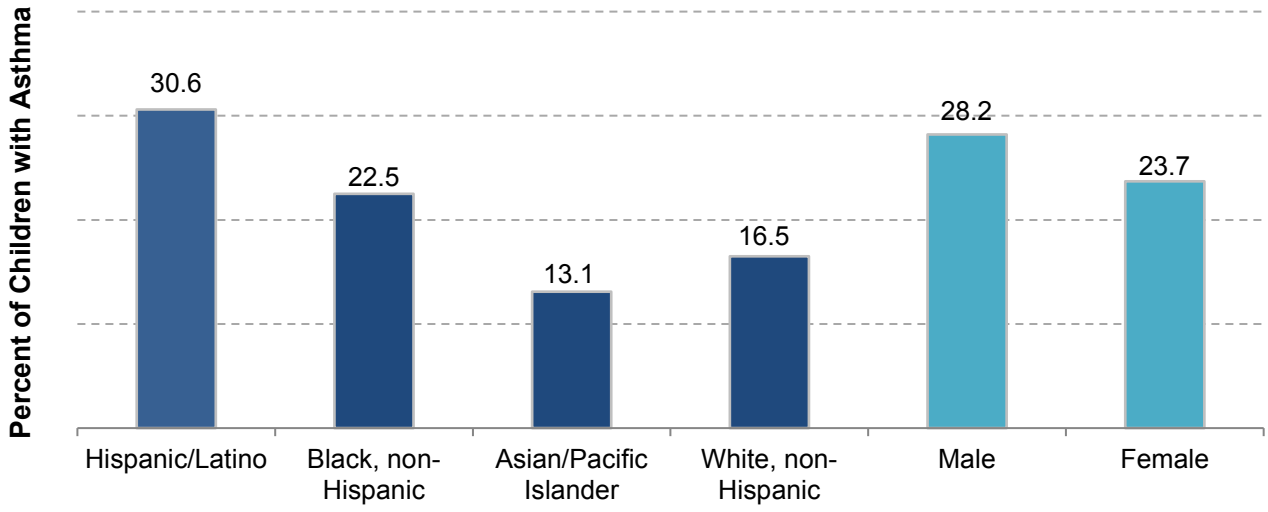
For Cohort 2, the prevalence of overweight/obesity showed large fluctuations during the period from Pre-K 3 to 1st grade. The percent of overweight and obese children decreased from 33% in Pre-K 3 to 27% in Pre-K 4 but then returned to 33% in kindergarten and decreased again to 28% in 1st grade. It is possible that these fluctuations are due to having different children in the samples from year to year.

Asthma

The physician-confirmed asthma prevalence rates were identified for New Britain children in preschool, kindergarten, 1st grade, 6th grade and 9th grade. Table A4, located in the Appendix, summarizes asthma rates by demographics, grade, and school services received.

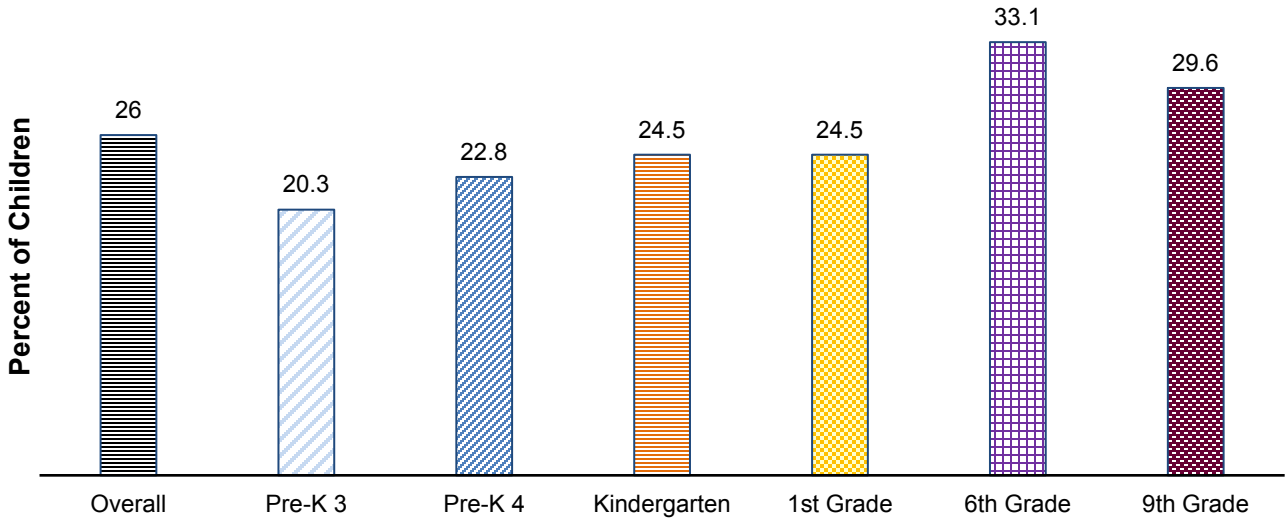
Overall, 26% of New Britain students had physician-confirmed asthma during the 2016/17 school year. Figure 10 shows asthma prevalence by select demographics. Prevalence of asthma was significantly higher among boys than girls (28% versus 24%, p<.01). Asthma prevalence was highest among Hispanic/Latino (31%) and non-Hispanic Black students (23%) whereas significantly fewer non-Hispanic white (17%) and Asian students (13%) had physician confirmed asthma. These demographic differences in asthma prevalence found for children in New Britain are similar to differences reported for students in Connecticut public schools by the Department of Public Health. The Connecticut School-based Asthma Surveillance Report (2014) found significantly higher rates of asthma among boys and a higher prevalence of asthma among Hispanic students and non-Hispanic black students when compared to non-Hispanic white or Asian students [7].

Figure 10. Prevalence of Asthma in New Britain by Gender and Race/Ethnicity



Physician-confirmed asthma prevalence also varied by grade (Figure 11). Students in Pre-K 3 had the lowest asthma rate (20%). Rates were significantly higher among older children in 6th grade (33%) and 9th grade (30%) when compared to students in Pre-K 3 (20%) through 1st grade (25%). Among the grades studied, asthma rates appear the highest among the 6th grade students. Although 3% lower, the asthma prevalence among 9th grade students is not statistically different from the asthma prevalence among 6th grade students. The reason for this leveling off or decrease in asthma rates is unknown, but it is generally consistent with other observations of asthma rates in adolescence [8]. A lower rate among 9th grade students was also seen in the three previous New Britain surveillance reports (2013/14 – 2015/16).

Figure 11. Percent of Children in New Britain with Asthma Overall and by Grade Level

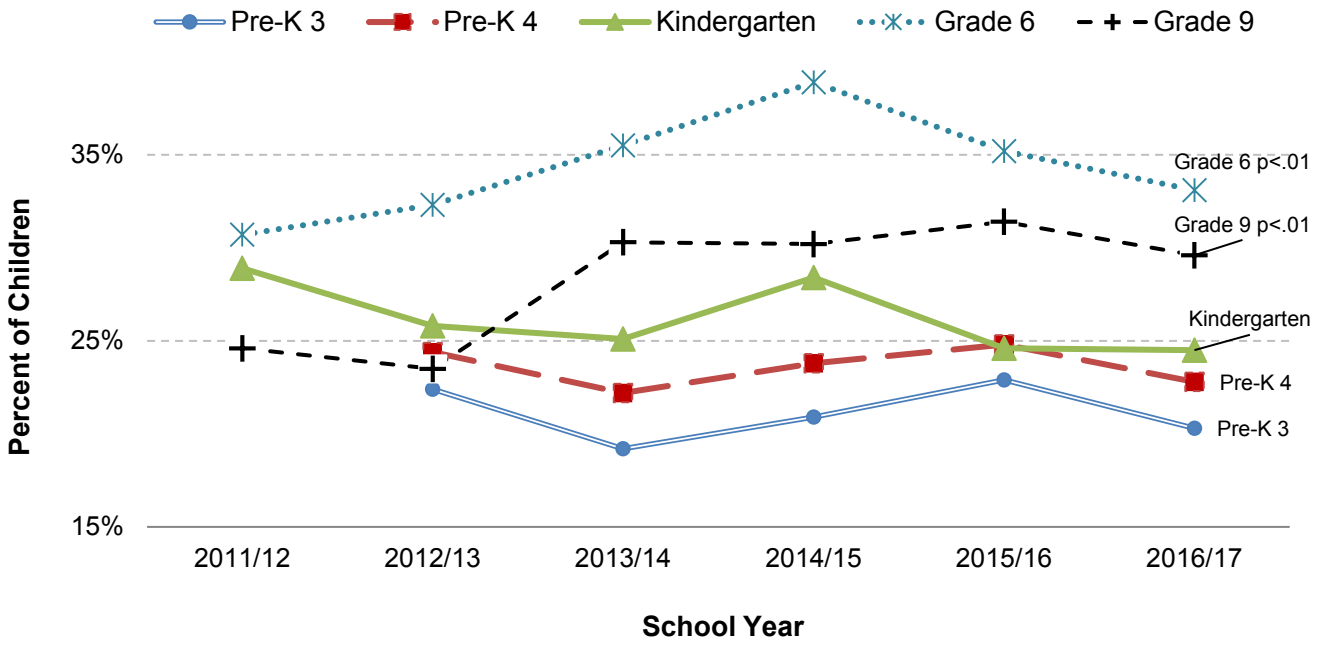


Asthma rates for New Britain's public schools are shown in Table A5 located in the Appendix.

Longitudinal Analysis

Figure 12 shows the annual asthma prevalence for Pre-K 3, Pre-K 4, kindergarten, 6th grade and 9th grade for the six school years from 2011/12 through 2016/17. During these six years, the asthma prevalence for 6th and 9th grade students changed significantly (p<.01) whereas asthma prevalence for preschool and kindergarten did not change significantly overall. For the 9th grade, physician diagnosed asthma prevalence increased from 25% in 2011/12 to 30% in 2013/14; since 2013/14, however, rates have maintained around 30%. During the same period, asthma prevalence for the 6th grade increased in the three years from 2011/12 to 2014/15 (from 31% to a high of 39%) then decreased to 33% over the next two years. More years of data will be needed to determine if these are true trends or simply random variation in the groups of children.

Figure 12. Historical Trends: Percent of Children with Asthma by Grade Level

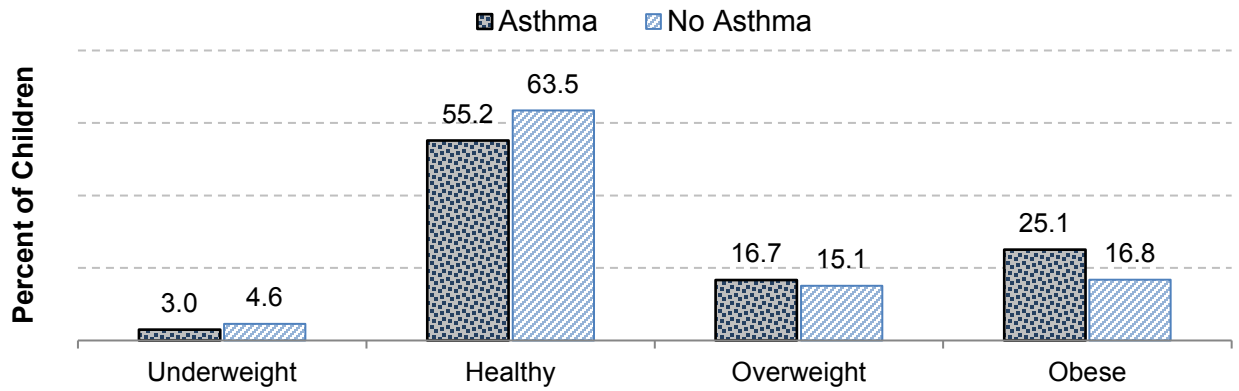


*Grade 6 (p=.01) and Grade 9 (p<.01) showed significant increases over time. The statistical test used was the Cochran-Armitage trend test.

Asthma by Weight Classification

Figure 13 compares the weight classification of children with asthma to children without asthma. The rate of being overweight or obese was 42% for children with asthma compared to 32% among children without asthma (p< 0.001). More of the children diagnosed with asthma were overweight (17% versus 15%, p=.24) and obese (25% versus 17%, p<.001) than children without asthma.

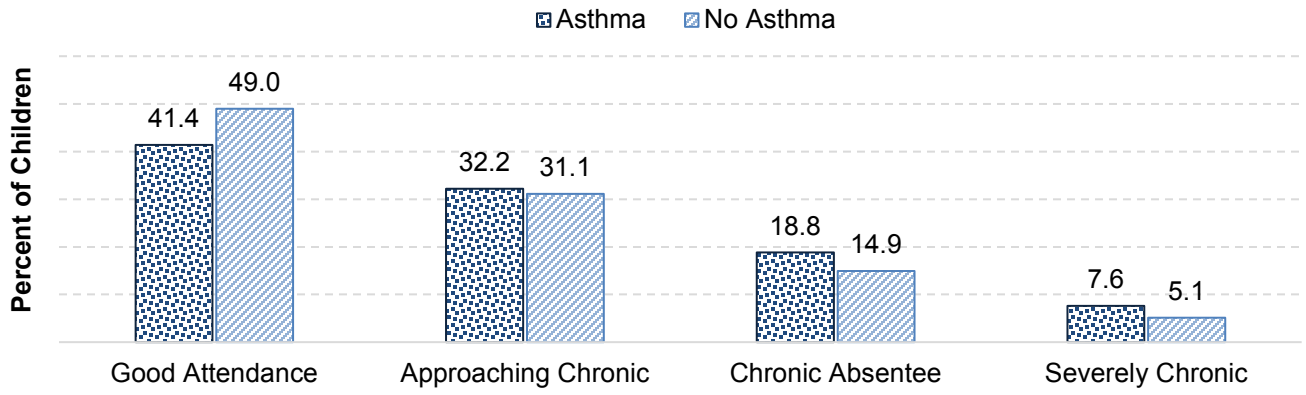
Figure 13. Weight Classification of New Britain Children with and without Asthma



Asthma, Attendance and School Performance

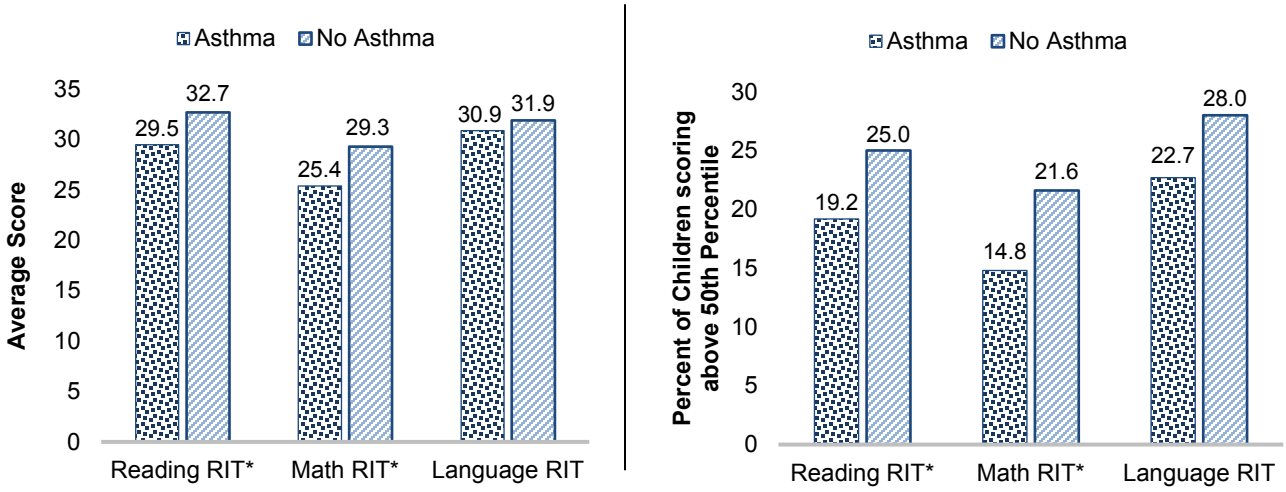
Children with asthma may be at risk for missing more school days. Figure 14 compares attendance status for children with and without asthma. Good attendance was more common among children without asthma (49% vs 41%, p =<.001) while significantly higher rates of chronic to severely chronic absenteeism were found among children with asthma when compared to children without asthma (26% versus 20%, p<.001).

Figure 14. School Attendance in New Britain by Asthma Status (New Britain, 2016/17)



In addition to asthma being associated with higher rates of chronic and severely chronic absenteeism, Figure 15 illustrates lower standardized test scores and fewer children with asthma scoring above the 50th percentile on two of the three standardized tests.

Figure 15. Performance on Standardized Tests by Asthma Status (New Britain, 2016/17)



*Statistically significant difference.

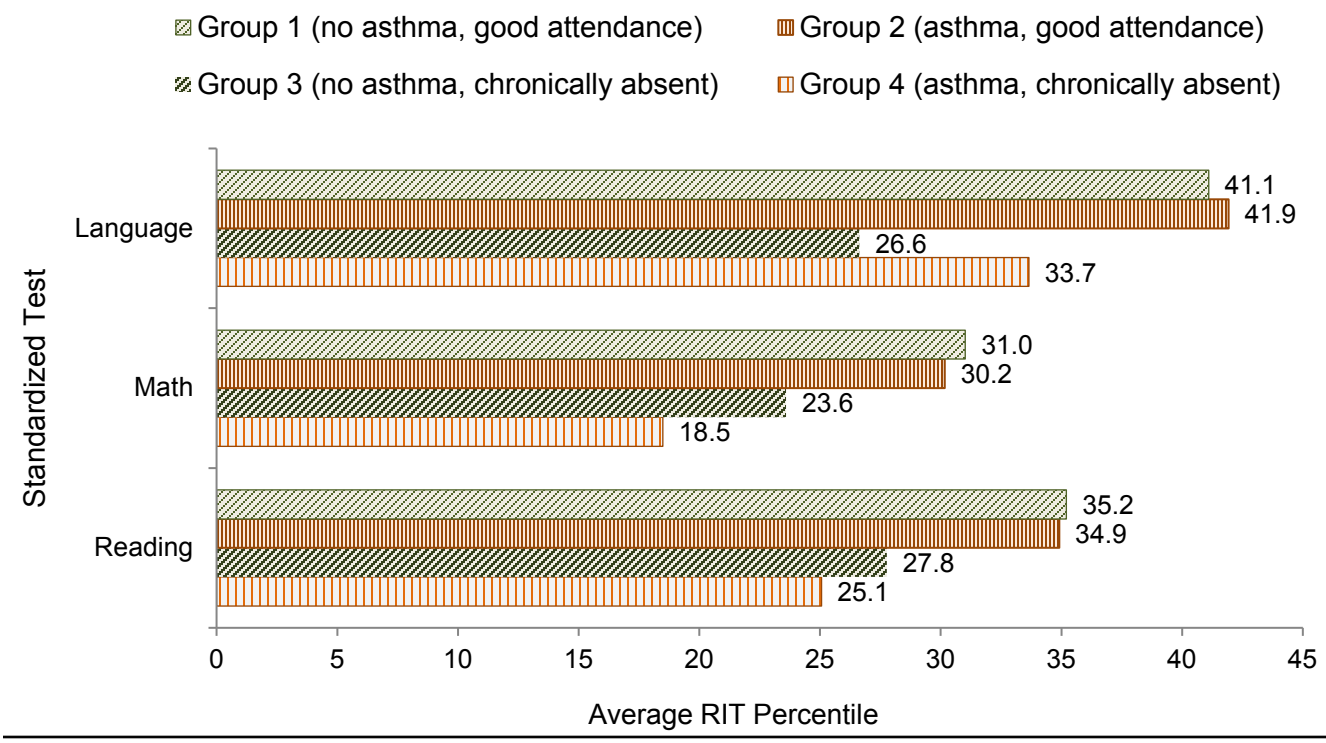
The association between standardized test scores, chronic absenteeism and asthma status was further examined using multivariate models. To separate the effects of asthma and absenteeism, four groups were created:

1. No asthma, good attendance
2. Asthma, good attendance
3. No asthma, chronically absent
4. Asthma, chronically absent

The average Math, Reading, and Language RIT percentiles were compared among the 4 groups using multivariate models controlling for gender, primary language, and race/ethnicity. Differences in test scores were explained by attendance but not by asthma status. Among children with good attendance, there was no statistical difference between test scores of children with and without asthma (Figure 16). This was also true among children who were chronically absent; however, the difference among chronically absent children with and without asthma neared significance on the Language RIT (p=.06).

These findings differ from those reported for 2015/16. Those models showed that children with asthma did more poorly on the tests than children without asthma, regardless of attendance status. It is important to note that the 2015/16 data includes 9th grade students whereas the 2016/17 did not. Since the asthma rate and the absenteeism rate is high among 9th grade students, the analyses that examined the association between asthma and absenteeism were not expected to be the same as the results found in 2015/16.

Figure 16. Student Test Scores by Asthma and Chronic Absenteeism* (New Britain, 2016/17)



*Holding race/ethnicity, primary language and gender constant. Note: Language scores include only 6th grade.

Conclusions

The surveillance data for the 2016/17 school year shows disproportionately high rates of obesity and asthma among children in New Britain when compared to national statistics. The proportion of obese children was almost four times as many as expected according to CDC guidelines and the asthma prevalence was triple the national average [9]. In addition to health concerns related to obesity and asthma, the high prevalence of asthma may also have implications for school performance and attendance. Among New Britain children, asthma was related to childhood obesity as well as chronic absenteeism.

In most cases, the grade-specific prevalence rates for obesity and asthma were similar to those found in previous years. These findings indicate a continued need for comprehensive, multi-sector interventions to attain the city-wide goal of decreasing obesity rates and improving asthma management for children in New Britain by 2019. At the same time, incorporating additional case management and air quality improvement initiatives within school, childcare and home settings may improve the health and attendance among children with asthma.

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Appendix

Table A1. Demographics by Weight Classification 2016/17*

	Sample Size	Underweight (<5th percentile)	Healthy Weight (5th to <85th percentile)	Overweight (85th to <95th percentile)	Obese (> = 95th percentile)	*p*
Grade, % (n)						
Pre-K 3	439	6.8 (30)	65.6 (286)	13.2 (58)	14.4 (63)	
Pre-K 4	546	5.1 (28)	67.4 (368)	11.9 (65)	15.6 (85)	
Kindergarten	742	3.5 (26)	62.4 (463)	18.1 (134)	16.0 (119)	<.001
1st Grade	763	5.4 (41)	66.6 (508)	13.0 (99)	15.1 (115)	
6th Grade	653	2.9 (19)	51.0 (333)	18.1 (118)	28.0 (183)	
9th Grade	507	1.6 (8)	55.4 (281)	18.5 (94)	24.5 (124)	
Gender, % (n)						
Male	1,877	4.9 (92)	61.3 (1150)	14.5 (272)	19.3 (363)	0.04
Female	1,773	3.4 (60)	61.5 (1091)	16.7 (296)	18.4 (326)	
Ethnicity, %, (n)*						
Asian/Pacific Islander	122	12.3 (15)	64.8 (79)	13.1 (16)	9.8 (12)	
Hispanic/Latino	2,223	3.6 (79)	60.6 (1346)	15.8 (351)	20.1 (447)	
White, non-Hispanic	661	4.5 (30)	61.1 (404)	15.4 (102)	18.9 (125)	<.001
Black, non-Hispanic	587	4.6 (27)	64.6 (379)	14.8 (87)	16.0 (94)	
Multi-racial	39	2.6 (1)	56.4 (22)	25.6 (10)	15.4 (6)	
Other	18	0.0 (0)	61.1 (11)	11.1 (2)	27.8 (5)	
Overall, % (n)	**3,650**	**4.2 (152)**	**61.4 (2241)**	**15.6 (568)**	**18.9 (689)**	

* Values may not equal 100% due to rounding

Table A2. Weight Classification by School, 2016/17*, n (%)

School	# of Students	Underweight	Healthy	Overweight	Obese
Chamberlain Elementary School	153	3 (2.0)	106 (69.3)	18 (11.8)	26 (17.0)
Frank J. DiLoreto School	274	7 (2.6)	174 (63.5)	30 (11.0)	63 (23.0)
Gaffney Elementary School	268	13 (4.9)	176 (65.7)	34 (12.7)	45 (16.8)
HALS Academy	46	2 (4.4)	16 (34.8)	16 (34.8)	12 (26.1)
Human Resources Agency Head Start	353	21 (6.0)	244 (69.1)	35 (9.9)	53 (15.0)
Holmes Elementary School	154	15 (9.7)	94 (61.0)	21 (13.6)	24 (15.6)
Jefferson Elementary School	142	5 (3.5)	101 (71.1)	23 (16.2)	13 (9.2)
Lincoln Elementary School	248	15 (6.1)	155 (62.5)	45 (18.2)	33 (13.3)
New Britain High School	494	8 (1.6)	272 (55.1)	94 (19.0)	120 (24.3)
Northend Elementary School	88	2 (2.3)	56 (63.6)	17 (19.3)	13 (14.8)
Preschool at Roosevelt	167	14 (8.4)	97 (58.1)	28 (16.8)	28 (16.8)
Pulaski Middle School	268	9 (3.4)	147 (54.9)	47 (17.5)	65 (24.3)
Slade Middle School	267	7 (2.6)	137 (51.3)	48 (18.0)	75 (28.1)
Smalley Academy	214	13 (6.1)	134 (62.6)	38 (17.8)	29 (13.6)
Smith Elementary School	167	7 (4.2)	101 (60.5)	28 (16.8)	31 (18.6)
Vance Village School	143	3 (2.1)	94 (65.7)	20 (14.0)	26 (18.2)
YWCA	188	8 (4.3)	127 (67.6)	26 (13.8)	27 (14.4)

*Alternative Center School, Brook Side Elementary School, and New Britain Transitional Center not shown due to small population size. *Where applicable, percentage includes children in Pre-K 3, Pre-K 4, Kindergarten, 1st grade, 6th grade and 9th grade. Percentages may not equal 100% due to rounding.

Table A3. Weight Classifications by Grade: Historical Data

Grade	Year	# of Children	Underweight	Healthy	Overweight	Obese	*p**
Pre-K 3	2012/13	523	4.2%	65.6%	15.5%	14.7%	.008
	2013/14	584	4.1%	62.8%	15.9%	17.1%	
	2014/15	479	6.1%	69.9%	13.4%	10.7%	
	2015/16	460	5.0%	67.6%	12.0%	15.4%	
	2016/17	439	6.8%	65.6%	13.2%	14.4%	
Pre-K 4	2012/13	599	4.7%	62.3%	16.4%	16.7%	<.001
	2013/14	818	4.0%	59.0%	15.6%	21.3%	
	2014/15	538	5.2%	67.7%	12.1%	15.1%	
	2015/16	587	4.3%	68.3%	17.0%	10.4%	
	2016/17	546	5.1%	67.4%	11.9%	15.6%	
Kindergarten	2011/12	827	3.8%	62.9%	16.0%	17.4%	.001
	2012/13	908	3.2%	59.1%	17.7%	19.9%	
	2013/14	902	2.9%	60.5%	16.7%	19.8%	
	2014/15	800	3.1%	57.6%	15.5%	23.8%	
	2015/16	817	5.3%	62.3%	15.2%	17.3%	
	2016/17	742	3.5%	62.4%	18.1%	16.0%	
6th Grade	2011/12	669	1.5%	51.4%	18.7%	28.4%	.093
	2012/13	589	2.4%	45.2%	20.4%	32.1%	
	2013/14	620	2.9%	51.9%	17.9%	27.3%	
	2014/15	573	3.5%	51.1%	19.2%	26.2%	
	2015/16	623	2.6%	49.3%	18.1%	30.0%	
	2016/17	653	2.9%	51.0%	18.1%	28.0%	
9th Grade	2011/12	540	1.9%	52.0%	20.6%	25.6%	.877
	2012/13	585	2.1%	53.0%	20.3%	24.6%	
	2013/14	465	1.5%	56.6%	16.6%	25.4%	
	2014/15	643	1.9%	54.9%	19.6%	23.6%	
	2015/16	567	2.5%	52.0%	18.3%	27.2%	
	2016/17	507	1.6%	55.4%	18.5%	24.5%	

*Cochran-Mantel-Haenszel test was used to detect differences in the distribution of weight classification over time.

Table A4. Select Population Characteristics and Asthma Diagnosis, 2016/17

Demographic and School Performance	Asthma Diagnosis	No Diagnosis
Ethnicity, % (n)*		
Asian/Pacific Islander	13 (16)	87 (106)
Black, non-Hispanic	23 (130)	77 (447)
Hispanic/Latino	31 (678)	69 (1,536)
Other	17 (3)	83 (15)
White, non-Hispanic	17 (109)	83 (550)
Gender, % (n)		
Female	24 (417)	76 (1,342)
Male	28 (527)	72 (1,343)
Grade		
PreK-3	20 (87)	80 (341)
PreK-4	23 (122)	77 (414)
Kindergarten	25 (182)	75 (560)
3rd Grade	25 (187)	75 (576)
6th Grade	33 (216)	67 (437)
9th Grade	30 (150)	70 (357)
Primary Language, % (n)		
English	28 (572)	72 (1488)
Spanish	32 (236)	68 (510)
Other	17 (136)	83 (687)
Special Education, % (n)		
Yes	33 (195)	67 (388)
No	25 (644)	75 (1,882)
ELL Services, n (%)		
Yes	25 (131)	75 (387)
No	27 (708)	73 (1,883)
Overall, n (%)	27 (839)	73 (2,270)

*Percentage includes children in Pre-K 3, Pre-K 4, Kindergarten, 1st grade, 6th grade and 9th grade, when applicable.

Table A5. Asthma Rates by School 2016/17

School	Total Students	Asthma % (n)
Chamberlain Elementary School	153	26 (40)
Frank J. DiLoreto School	274	29 (80)
Gaffney Elementary School	268	22 (58)
HALS Academy	46	30 (14)
HRA	353	20 (72)
Holmes Elementary School	154	16 (24)
Jefferson Elementary School	142	23 (32)
Lincoln Elementary School	248	24 (59)
New Britain High School	494	29 (144)
Northend Elementary School	88	26 (23)
Pulaski Middle School	268	35 (93)
Roosevelt Early Learning Center	167	31 (51)
Slade Middle School	267	30 (81)
Smalley Academy	214	25 (53)
Smith Elementary School	167	23 (39)
Vance Village School	143	29 (41)
YWCA	167	20 (33)

Brook Side Elementary School, and New Britain Transitional Center not shown due to small population size.