



**Halifax County, North Carolina
Youth Activity and Nutrition Survey (YANS) Report**

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Acknowledgements

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NC STATE UNIVERSITY

**Department of Parks, Recreation, and Tourism
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In Alliance with GP RED

www.GPRED.org

East Carolina University

and

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working with

**Chaloner Middle School and Weldon Middle School
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I. Executive Summary

Through a collaboration of many researchers and community members, a **Youth and Activities Nutrition Survey (YANS)** was conducted with two middle schools in Halifax County, North Carolina. A total number of **567** individual students took the survey.

Students aged 10 to 14 in 6th through 8th grades were asked 23 questions related to demographic factors and their habits and preferences related to physical activity, nutrition, and height/weight. Body mass index (BMI) was calculated and used as the primary dependent variable.

The results from the research in Halifax County are presented in this written report of findings from the survey with statistical analysis and identification of key issues for potential action and/or additional research. There are additional variables from questions that were not fully analyzed, but could be addressed in the future. It is important to note that just two of the four Middle Schools in the County were able to participate in this initial study; so findings, while informative, may not be fully representative of all students in the County.

A. Key Findings from this Research

There is a large amount of raw data generated from this survey. To bring the report to a manageable summary, the analysis focused on five key potential determinants of physical activity and obesity in youth. These include **nutrition, specific social and physical activities, transportation, perceptions of safety, and parental engagement.**

While considerable outreach and approvals were obtained for inclusion of all four middle schools within Halifax County, only Chaloner had full school participation. As Chaloner has a higher percentage of white students, there is a noted difference between race/ethnicity from this study and the population of Halifax County. Future surveys should include all middle schools to ensure better representation across the County. Of the students taking the survey, over five percent did not fully follow protocol to enter an accurate self-reporting of height and weight, leading to unusable analysis data for the dependent variable of BMI. The protocols should be more closely monitored to increase accuracy.

From the analysis of this sample, approximately **29.7 percent** of girls were overweight or obese, while **34.3 percent** of boys were overweight/obese, for an average of **32 percent**. While these rates are slightly lower than reported national averages, comparisons should be made with caution. It should be noted that national figures include data for youth up to age 19. The inclusion of higher age ranges in national surveillance data may potentially skew results upward, as it is well documented that BMI increases with age.

Literature shows that there are often cultural differences in activity preference by ethnicity, and this could be further explored in Halifax County. Particularly, previous research suggests that African Americans tend to participate less in outdoor activities. This study showed a high participation in outdoor activities (66%), which may be correlated to race. This may warrant additional study as the other schools are added and national research continues for comparative analysis.

While this study found no significant correlation between either eating breakfast or drinking sugar-sweetened beverages and BMI, other studies have indicated such correlations. This study did indicate high numbers of youth who did not eat breakfast at least once a week (24% of girls and 32% of boys), or who reported having drunk a sugared soda on the previous days (70% of all respondents). These habits may have a cumulative effect as the students age, and may warrant additional research over time.

While both boys and girls spent most of their non-active out of school time on social media, there were significant differences between genders related to time spent on video games, with boys reporting spending an average of almost seven hours total on this activity per week (slightly more than television). Just 15 percent of youth reported walking to the activities in which they participated outside of school, and only three percent walked to school. Boys tended to ride their bikes more often than girls. Very few rode the bus outside of school time. There appears to be opportunity for developing practices in these areas as potential mechanisms for increasing physical activity.

Ninety-five percent (95%) of students reported feeling very (59%) or somewhat (36%) safe getting to their activities, indicating that in Halifax County, at least from the students' viewpoints, perception of safety may not be a key barrier to participation in activities. Perception may vary from parental viewpoints, but that information is not available within this study.

Related to parental engagement and modeling, scores were higher for those statements related to rule-setting and encouragement of healthy activities for youth, but lower for those statements related to whether parents actually model healthy behaviors. This result indicated that there may be opportunities for both youth and adult education, as research indicates that youth often do more of what their parents "do" than what they "say" unless they learn otherwise.

The researchers hope to repeat the survey in the future, along with possibly conducting additional qualitative studies that will further enlighten County decision makers, community members, and parents in Halifax County. This work may also be used in comparative studies with other communities.

II. Introduction

Through a collaboration of the North Carolina State University, College of Natural Resources, Parks, Recreation, and Tourism Department and GP RED's Healthy Communities Research Group (www.gpred.org), the Roanoke Valley Community Health Initiative, and participating schools, a **Youth and Activities Nutrition Survey (YANS)** was conducted with two middle schools in Halifax County, NC. The total number of individual students who took the survey was **567**. The two middle schools participating were Weldon Middle School (n=74) and Chaloner Middle School (n=465), with 24 respondents not indicating their school. Four respondents indicated they attended William R. Davie Middle School, which intended to participate, and thus was listed in the school options within the survey. However, that school did not conduct the survey.

The online survey consisted of 23 questions related to demographic factors and habits of middle school youth related to physical activity, nutrition, and body mass index (BMI). The survey was conducted during school time (average completion time was about 18 minutes) using computers accessible to students in schools. This summary research paper analyzes this resultant data set. This report provides descriptive statistics from the finding explores various research questions to evaluate the relationships of potential explanatory variables to see if there were significant effects on student BMI.

This YANS allowed for the rare opportunity to further explore some of the determinants of health for middle school students in Halifax County and to find out more specific information about what the youth in the community think about determinants of health. Primary Elements of the research include:

- What are the actual BMI levels of middle school youth in Halifax County?
- What are the key community-specific issues around nutritional habits and physical activity of middle school youth in Halifax County?
- Are there areas of concern or potential opportunities for health and/or programming improvements in the County?
- What can community leaders do to address these opportunities?

This information will be valuable to help continue to expand health improvement efforts through the County partners, including the recently approved Halifax County Recreation Master Plan, Roanoke Valley Community Health Initiative efforts, and the School Health Network. The Roanoke Valley Community Health Initiative and the Halifax County School Health Network believe that the information gathered will be valuable to help improve health outcomes for students in Halifax County. These groups have been working collaboratively over the past three years to increase access to activities and healthy foods for students in the County. The County partners chose to participate in part because of recent Health Outcomes Rankings in the state, in which it ranked 99th out of 100 counties, and because of the efforts various partners are putting into improving these rankings to make them better.

The deliverable to the communities and school systems from the research in Halifax County is this written report of findings from the survey with statistical analysis and identification of keys issues for potential action and/or additional research. The information gathered is jointly owned by GP RED and NCSU, primarily for publication and comparative analysis with other communities beyond the Halifax project. Halifax County has access to the resultant data (with no individual identifiers) providing GP RED and NCSU with credits when it is used and notifications if published so effects can be tracked. We are hopeful to establish a long-term relationship with these organizations as we collectively seek to improve health outcomes within the County.

III. Background

Obesity is one of the greatest health threats currently facing the United States. It contributes significantly to a variety of serious diseases including heart disease, diabetes, stroke, and certain cancers, as well as poor general health and premature death (CDC, 2014, Finkelstein et al., 2008, Wetmore & Mokdad, 2012). In addition, research shows that the current generation of youth are the first that will most likely have a shorter lifespan than their parents (Compton, 2013). Various literature, trends, and local demographics were collected to help supplement the findings and potential recommendations.

A. Halifax County Demographic Trends

Understanding community demographics and needs is an important component of planning for the Halifax County Youth Activity and Nutrition Survey. The population data used in this demographic profile comes from Esri Business Information Solutions, based on the 2000 and 2010 U.S. Census data. As **Table 1** shows, median age is higher and household incomes are lower than the State overall.

Table 1: Summary Demographics for Halifax County, North Carolina – 2015

Summary Demographics	Halifax County	State of North Carolina
Population	54,120	10,014,449
Number of Households	22,027	3,945,351
Avg. Household Size	2.39	2.47
Median Age	42.8	38.2
Median Household Income	\$30,816	\$46,306

Population Projections

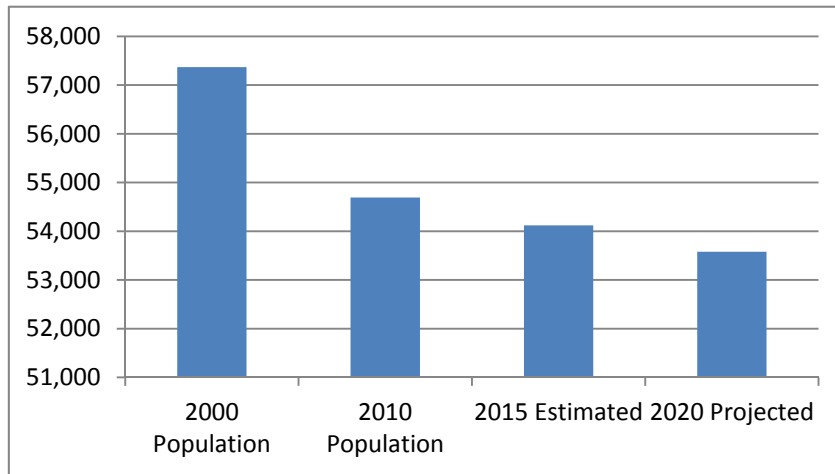
Although future population growth cannot be predicted with certainty, it is helpful to make growth projections for planning purposes. **Table 2** contains actual population figures based on the 2000 and 2010 U.S. Census for Halifax County, as well as a population estimate for 2015 and projection for 2020. The county’s annual growth rate from 2000 through 2010 was -0.48%. Esri’s projected annual growth rate for 2015 through 2020 is -0.20% for the County, compared to the projected 2015 – 2020 annual growth rate for the State of North Carolina (1.10%) and the United States as a whole (0.75%). The growth trend is graphically represented in **Figure 1**.

Table 2: Halifax County, North Carolina, Population projections, 2000--2020

U.S. Census (2000 and 2010) and Esri Projections	
2000 Population	57,370
2010 Population	54,691
2015 Estimated	54,120
2020 Projected	53,578

Source: 2010 U.S. Census; 2015 estimates and 2020 forecasts provided by Esri Business Information Solutions.

Figure 1: Halifax County, North Carolina, Population Growth Trend

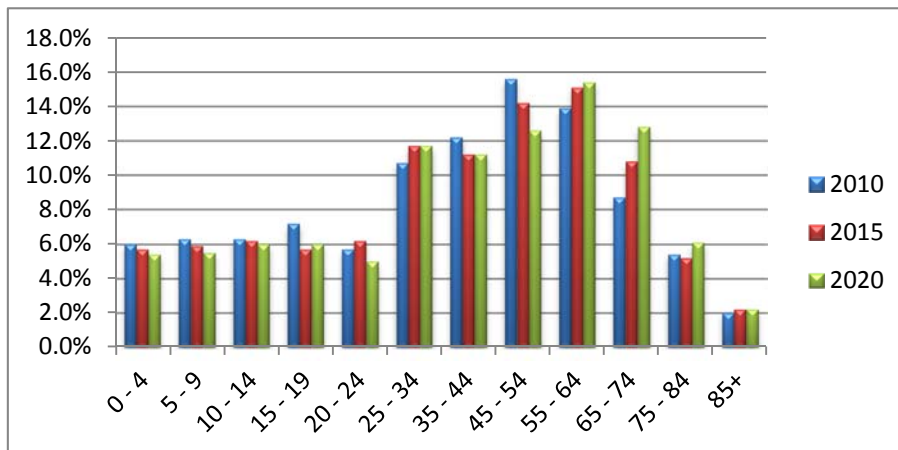


Source: Esri Business Information Solutions.

Population Age Distribution

A comparison of the estimated population break down by age for Halifax County from 2010 to 2020 is shown in **Figure 2**. The gender distribution in 2015 is 48 percent male to 52 percent female. The median age projected for the county by Esri in 2015 is 42.8. When broken down by race/ethnicity by the U.S. Census in 2010, the median age for the Caucasian population was 46.9, African American population—38.5, Asian population—37.6, and Hispanic population (irrespective of race)—24.9.

Figure 2: Halifax County, North Carolina, Age Distribution for the Years 2010, 2015, and 2020



Source: 2010 U.S. Census; 2015 estimates and 2020 forecasts provided by Esri Business Information Solutions.

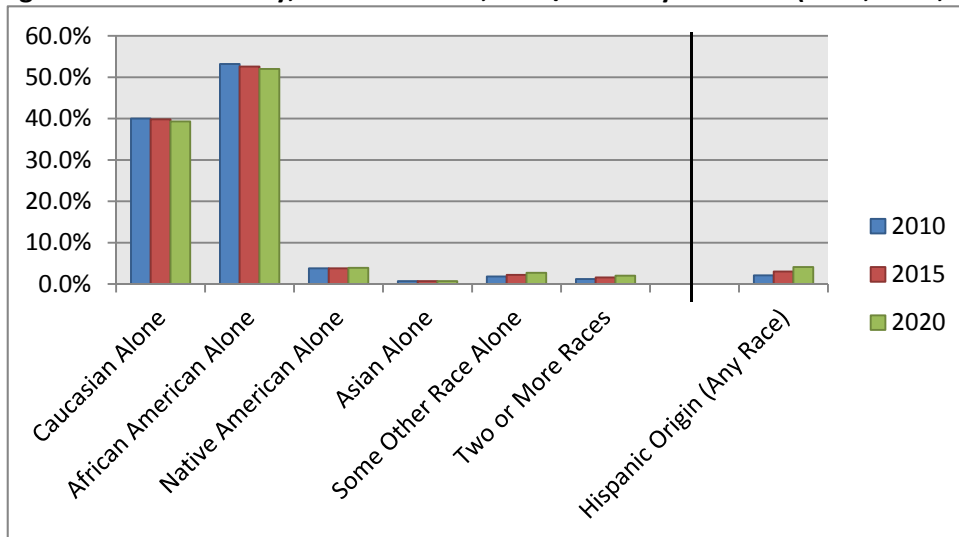
The age demographics have undergone a number of changes in the county from 2010 to 2015 with these trends predicted to continue through 2020. The percentage of Halifax County residents in the 55–85+ age range is expected to grow 6.5 percent from 2010 (30%) to 2020 (36.5%). Conversely, the percentage of residents in the 35–54 age range is predicted to drop 4% from 2010 (27.8%) to 2020 (23.8%). The percentage of youth in the 10–14 age range drops from 6.3% in 2010 to 6.0% in 2020.

Race/Ethnicity

Figure 3 reflects the racial/ethnic population distribution for Halifax County. Esri estimates that 52.6 percent of the population in 2015 is African American, with a Caucasian population at 39.8 percent, a Native American population at 3.8 percent, and an Asian population at 0.7 percent. The population of Hispanic origin* provides separate look at the population, irrespective of race and this population is estimated at 3.0 percent of the population in 2015. There is little movement in racial distribution from 2010 to 2020.

- The Caucasian population is trending slightly downward from 40 percent in 2010 to a predicted 39.3 percent in 2020.
- The African American population percentage is also trending slightly downward from 53.2 percent in 2010 to 52 percent in 2020.
- The population of Hispanic origin (regardless of race), at 2.1 percent in 2010, is expected to represent 4.1 percent of the population by 2020.

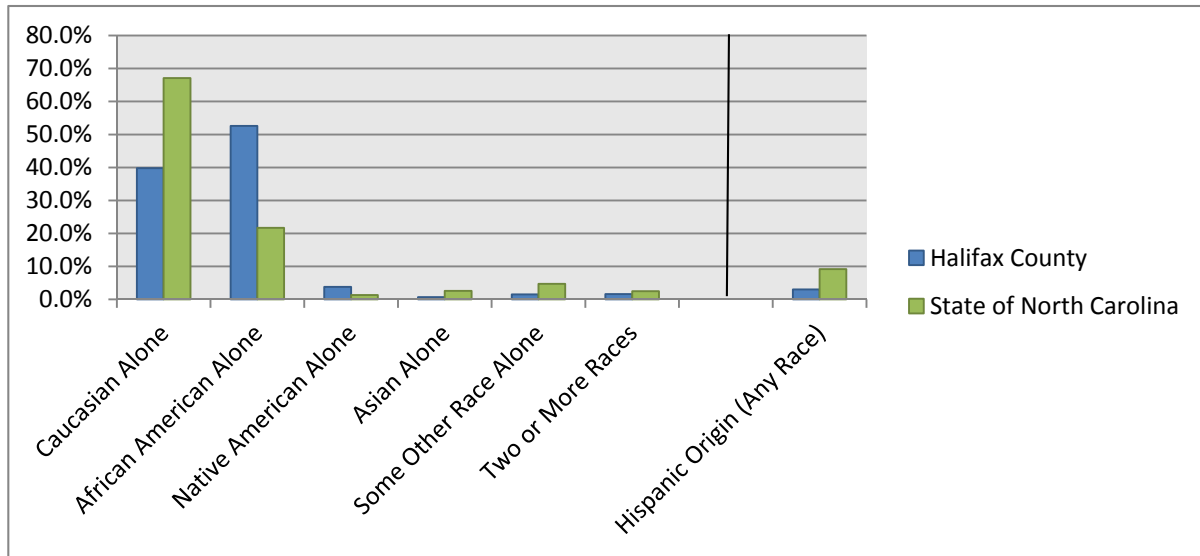
Figure 3: Halifax County, North Carolina, Race/Ethnicity Statistics (2010, 2015, 2020)



Source: 2010 U.S. Census; 2015 estimates and 2020 forecasts provided by Esri Business Information Solutions.

* Hispanic origin can be viewed as the heritage, nationality, lineage, or country of birth of the person or the person's parents or ancestors before arriving in the United States. In the U.S. census, people who identify as Hispanic, Latino, or Spanish may be any race and are included in all of the race categories. **Figure 3** represents Hispanic Origin as recorded in the U.S. Census.

Figure 3: Race/Ethnicity Statistics for Halifax County and for the State of North Carolina (2015)



Source: Esri Business Information Solutions 2015 estimate based on the 2010 U.S. Census.

Halifax County has a lower white population and a higher African American population than the state overall.

Educational Attainment

As shown in **Table 3**, the highest ranking educational cohorts in Halifax County are high school graduates (28.5%) and those with some college, no degree (21.1%), followed by those with those who attended 9th to 12th grade, no diploma (14%). According to a census study, education levels had more effect on earnings over a 40-year span in the workforce than any other demographic factor, such as gender, race, and ethnic origin (Julian & Kominski, 2011).

Table 3: Halifax County and the State of North Carolina, Educational Attainment, 2015

Education Attainment	Halifax County	State of North Carolina
Less than 9 th grade	8.7%	5.3%
9th to 12th grade, no diploma	14.0%	8.6%
High school graduate	28.5%	21.7%
GED/alternative credential	6.5%	4.6%
Some college, no degree	21.1%	22.0%
Associate's degree	8.4%	8.9%
Bachelor's degree	8.3%	18.7%
Graduate or professional degree	4.5%	10.3%

Source: Esri Business Information Solutions 2015 estimate based on the 2010 U.S. Census.

Household Information

As reflected in **Table 4**, in 2015, Halifax County has 26,110 housing units with a 52 percent owner-occupied housing rate, compared to 32.4 percent renter occupied rate. The owner-occupied housing rate has dropped somewhat since 2000 when 58.6 percent of the housing in the county was owner-occupied. The average household size in 2015 is 2.39.

Table 4: Halifax County, North Carolina, Housing Statistics

	2000	2010	2015	2020
Total housing units	25,309	25,781	26,110	26,136
Percent owner occupied	58.6%	54.6%	52.0%	51.6%
Percent renter occupied	28.8%	30.7%	32.4%	32.2%
Percent vacant	12.6%	14.8%	15.6%	16.2%

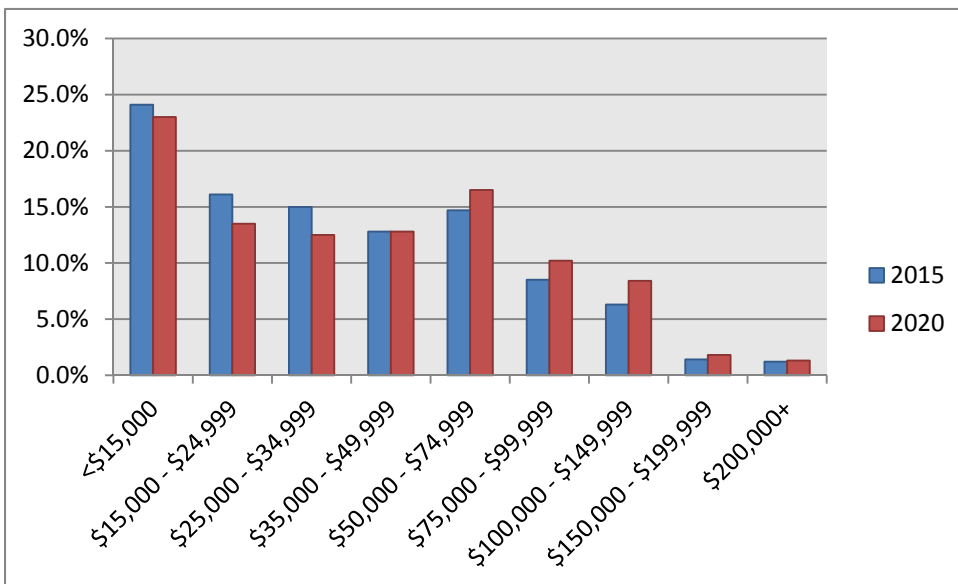
Source: 2010 U.S. Census; 2015 estimates and 2020 forecasts provided by Esri Business Information Solutions.

Household Income

The estimated 2015 median household income for residents of Halifax County is \$30,816 and is expected to grow to \$35,802 by 2020. **Figure 4** illustrates the full income distribution estimated for the county in 2015 and projected for 2020.

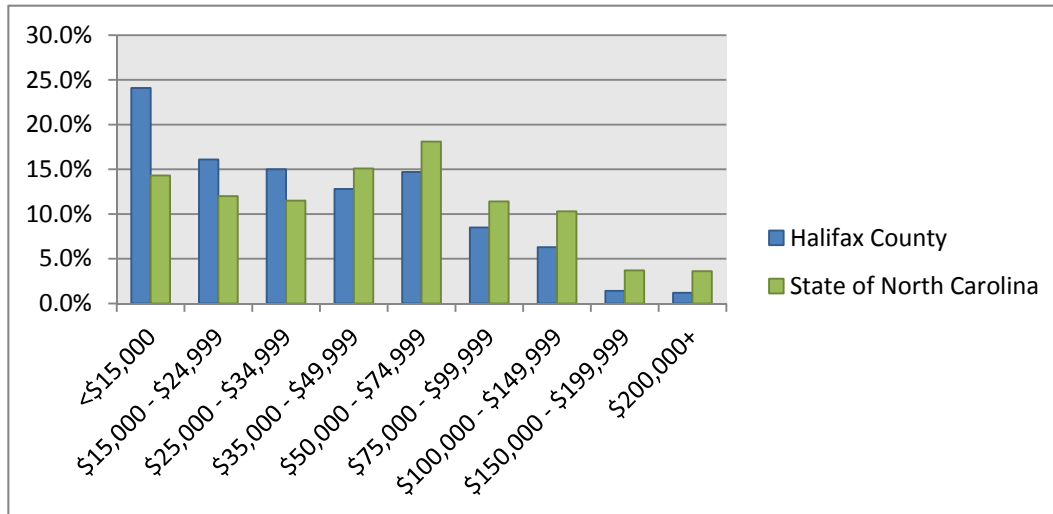
- In 2015, the largest percentage of residents have an income in the <\$15,000 income range (24.1%), followed by the \$15,000 – \$24,999 income range (16.1%), the \$25,000 – \$34,999 income range (15%), and the \$50,000 – \$74,999 income range (14.7%).
- Income distribution in the \$50,000 through \$149,000 income range is expected to grow by a total of 5.6 percent, from 2015 to 2020.

Figure 4: Halifax County, North Carolina, Annual Household Income Distribution Comparison (2015--2020)



Source: Esri Business Information Solutions, 2015.

Figure 5: Annual Household Income Distribution Comparison for Halifax County and the State of North Carolina (2015)



Source: Esri Business Information Solutions, 2015.

Halifax County has higher numbers of lower income households than the State overall (**Figure 5**), with 24 percent having household incomes less than \$15,000 per year.

Statewide Health Rankings

The United Health Foundation has ranked North Carolina 37th out of all US states and the District of Columbia in its *State Health Rankings* in 2014, down from 35th in 2013. The State’s biggest strengths include:

- Low prevalence of binge drinking
- Low incidence of pertussis (whooping cough)
- High immunization coverage among children

Some of the challenges the State faces include:

- High prevalence of children in poverty
- Limited availability of dentists
- High prevalence of diabetes

Obesity levels in North Carolina vary by age. According to the United Health Foundation, 26.2 percent of those in the 18-44 age range are obese, with this percentage rising to 35.5 percent for the 45-64 age range, and dropping again to 25.7 percent for the 65+ age range. A report entitled “The State of Obesity in North Carolina,” found that in 2011 the obesity rate for 2-4 year olds from low-income families was 15.4 percent, while the rate was 16.1 percent for 10-17 year olds and 12.5 percent for high school students (RWJF & TFAH, 2015).

In the 2014 North Carolina County Health Rankings (RWJF, 2014), Halifax County ranked 99th out of 100 North Carolina counties for health outcomes and 96th for health factors with an adult obesity rate of 39 percent, one of the highest in the country. As explained in the health ranking report, “Health outcomes represent how healthy a county is while health factors represent what influences the health of the county.” (RWJF, 2014) According to the 2015 Halifax County Community Health Assessment (HCCHA, 2015), a 2009 Eat Smart Move More study found that 14.6 percent of children 2-18 years of age in Halifax County were overweight and 21.7 percent, obese.

B. Body Mass Index (BMI)

Body Mass Index (BMI) is a measurement of height relative to weight that is often used to evaluate health as related to body size.

There are limitations related to using BMI as a self-reported measurement tool (an explanation of which is beyond the scope of this paper), but it remains a common and accepted measure of body weight status (CDCP, 2014) and continues to be the best available mechanism available for assessing overall body mass in large study populations. The national categories for weight classifications typically include categories (underweight; healthy weight; overweight; and obese) as established by the Centers for Disease Control and Prevention (CDC, 2014). According to the CDC, a healthy BMI for girls in this age range is 16.5 – 22.8, and for boys it is 15.5 – 22.5.

Body Mass Index was the primary response variable measured, through student self-report of weight (they weighed themselves privately just prior to taking the survey) and height (an attendant measured their height for them just prior to survey) using the standard BMI percentage calculation of: $\text{weight (lb)} / [\text{height (in)}]^2 \times 703 = \text{BMI}$ (CDCP, 2014)

*Note: While BMI is calculated the same way for youth and adults, standard youth classification charts indicate slightly different ranges for normal, overweight, and obesity to accommodate the variability of younger bodies. Sample BMI Charts for boys and girls ages 2 – 20 from the Centers for Disease Control and Prevention (CDC, 2014) are provided in **Appendix A**.*

C. Identified Factors and Indicators for Physical Activity and Obesity

This survey included answers to questions carefully selected to evaluate youth responses regarding BMI, nutrition, activity types, perception of safety, transportation, and social/caregiver factors. These factors were focused based on prior work by GP RED which identified these primary factors and indicators through extensive literature review and Multi-Attribute Utilities Technique (MAUT) nominal group process analysis in multiple communities (see www.gpred.org and **Appendix B** for more information).

IV. Summary Findings from Halifax County YANS

A. Surveyed Youth Demographics

The total number of individual students who took the survey was 567. The two middle schools participating were Weldon Middle School (n=74) and Chaloner Middle School (n=465), with (n=24) not indicating which school they attended. Four respondents (n=4) indicated that they attended William R. Davie Middle School, which intended to participate, and as such was listed in the survey options but did not fully conduct the survey. As shown in **Table 5**, there was representative distribution across 6th through 8th grades and gender.

Table 5: Grade and Gender Distribution of Survey Respondents

Grade	Percentage
6th	32%
7th	45%
8th	22%
Total	100%
Gender	Percentage
Girls	58%
Boys	42%

Racial/Ethnic Distribution

As shown in **Table 6**, For Halifax County overall, Esri estimates that 52.6 percent of the population in 2015 is African American, with a Caucasian population at 39.8 percent, a Native American population at 3.8 percent, Hispanic at three percent, and an Asian population at 0.7 percent. The student YANS respondents were 31 percent African American and 52 percent White. This makes sense, as 86 percent of total survey respondents are from Chaloner Middle School, which reports serving primarily white students, but participation by all middle schools would likely provide a more representative sample of the County overall.

Table 6: Racial/Ethnic Background – Survey Respondents vs. Halifax County Residents

Racial/Ethnic Breakdown from Student Respondents	YANS Percentage	Halifax County Percentage
African American/Black	31%	53%
Asian	3%	1%
Latino/Hispanic	2%	3%
Native American	3%	4%
White/Caucasian	52%	40%
Mixed race/Ethnicity	9%	N/A

B. BMI Results from Youth in Halifax County

While BMI remains challenging to accurately obtain from individuals, a controlled project protocol helped increase reliability of this self-report format. Students weighed themselves privately and had an attendant measure their height just prior to taking their own survey on a computer terminal. One of the first set of questions had each respondent enter his or her height and weight. BMI was later calculated from these data. Data were examined and responses were excluded if BMI percentages were calculated as under 10 percent and over 50 percent (due to these outliers assumed to be due to reporting or measurement errors) or if they had missing data (25 students did not include weight; 29 didn't answer 3 or more variables of interest), resulting in a useable dataset of **N = 502**. The overall descriptive statistics for total BMI for Halifax County are shown in **Table 7**.

Table 7: Descriptive Output – BMI

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
BMI Calc.	502	10.17	45.26	21.3807	5.7785

The overall mean of **21.38** for all students is just under the national category upper limit of healthy weight of 22.5 for boys, and 22.8 for girls, so on average, the student are of healthy weight. **However, this indicates those above the mean in Halifax County are overweight or obese.**

Table 8 illustrates the mean of students, regardless of age or gender, are of a healthy weight level. However, it is evident that BMI increases with each grade level and by gender.

Table 8: Mean BMI and Standard Deviation by Gender and Grade

Gender	Grade	Mean	SD	N
Girl	6 th	20.06	5.74	84
	7 th	21.90	5.18	120
	8 th	21.52	4.80	65
	All	21.23	5.32	269
Boy	6 th	20.18	5.19	84
	7 th	21.76	5.62	94
	8 th	23.26	6.00	55
	All	21.55	5.66	233

BMI Category Ranges

Table 9 shows proportion of underweight (Female: BMI <16.5; Male: BMI < 15.5), healthy weight (Female: 16.5 ≤ BMI ≤ 22.8; Male 15.5 ≤ BMI ≤ 22.5), and overweight/obese (Female BMI > 22.8; Male BMI > 22.5) by gender.

Table 9: Halifax County BMI Category Percentages by Gender

Sex		Frequency	Valid Percent
Girl	Underweight	43	16.0
	Healthy Weight	146	54.3
	Overweight/Obese	80	29.7
	Total	269	100.0
Boy	Underweight	23	9.9
	Healthy Weight	130	55.8
	Overweight/Obese	80	34.3
	Total	233	100.0
Total OW/Obese			32.0

This analysis shows that from valid reported survey respondents, approximately **29.7 percent** of girls are overweight or obese, while **34.3 percent** of boys are overweight/obese, for an average of **32 percent**.

Comparison of Halifax County Age 10-14 BMI with other Available Reports

While exact comparisons of BMI for this age group are difficult to obtain, the overall **32 percent** rate for overweight and obese for both genders is similar or slightly lower than that found in other county and state reports, and similar for national data for this age group. **Table 10** depicts similar values that can be found from other sources. Note: this YANS report provides the only current data source focused specifically on ages 10 to 14.

Table 10: Comparisons of YANS vs. Other County, State, and National BMI Level Reporting

Jurisdiction	OW&OB %	Ages	Source	Source Date
Nationwide - adults	68.5%	20+	JAMA/ NHANES	2014
Nationwide - youth	34.4%	12 to 19	JAMA/ NHANES	2014
YRBSS - nationwide	30.3%	9th to 12th grade	CDC YRBSS	2013
Statewide - NC	34.2%	2 to 18	HCCHA	2015
Halifax County	36.3%	2 to 18	HCCHA	2015
HC YANS Self-Report	32.0%	10 to 14	YANS	2015

Note: BMI increases with age for all studies.
In children and adolescents age 2 to 19 years, obesity was defined as a body mass index (BMI) at or above the 95th percentile of the sex-specific CDC BMI-for-age growth charts, and overweight is defined as 85th to 95th percentile.

C. Reported Nutrition Regimen

Breakfast Frequency

Research findings support the importance of promoting regular breakfast consumption among adolescents, as this has been inversely associated with body weight in cross-sectional studies. Typically, the frequency of eating breakfast declines through adolescence (Bruening, Larson, Story, Neumark-Sztainer, & Hannan, 2011).

Table 11: Frequency of Having Eaten Breakfast - Results by Gender

Students skipped at least one breakfast (Missing =16)			
Sex		Frequency	Percent
Girl	Ate	232	86.2
	Skipped	27	10.4
	Total	259	96.3
	System	10	3.7
	Total	269	100.0
Boy	Ate	207	88.8
	Skipped	14	6.3
	Total	221	94.8
	System	12	5.2
	Total	233	100.0

Twenty-three-point-six percent (23.6%) of girls and 32.1 percent boys didn't eat breakfast at least once.

Among those students who skipped at least one meal for breakfast, 13 percent of girls did not eat breakfast at all, while 10.7 percent boys didn't eat breakfast at all.

Table 12: Correlational Analysis of BMI with Skipping Breakfast

Correlational Analysis between BMI and # Breakfasts skipped			
Sex		BMI Calc.	Number skipped
Female: BMI Calc.	Pearson Correlation	1	.035
	Sig. (2-tailed)		.664
	N	269	161
Male: BMI Calc.	Pearson Correlation	1	-0.016
	Sig. (2-tailed)		.869
	N	233	112

** Correlation is significant at the 0.01 level (2-tailed).

In examining the correlational relationship between BMI score and the number of meals (breakfast) skipped. There was no significant positive relationship between two variables for either male ($r=-0.016$, $p>.05$) or female students ($r=.035$, $p>.05$).

Sugar Sweetened Soft Drink Consumption

Research has indicated a potential correlation between sugar-sweetened beverages and obesity (Cordain, Eaton, Sebastian, Mann, Lindeberg, Watkins & Brand-Miller, 2005; Ferder, Ferder, & Inserra, 2010).

Question 20.1 - This question was asked only about type of beverage YESTERDAY and did not specify day of week (could have been weekday or weekend). It is understood that respondents may have drunk other sugar-sweetened beverages (energy drinks, lemonade, sweet tea, etc.) not accounted for in this answer analysis, but the analysis for this question right now is: **Did they drink specifically drink one or more sugared soft drinks yesterday?**

Table 13: Percent who Drank Sugared Soft Drinks

Whether drank Sugar Soda Yesterday or Not			
		Frequency	Valid Percent
Valid	No	147	30.4
	Yes	337	69.6
	Total	484	100.0
Missing		18	
Total		502	

Sixty-nine-point-six percent (69.6%) of students reported drinking a sugar-sweetened soda on the previous day.

Table 14: Percent who Drank Sugared Soda by Gender

Girls and Boys - Whether drank sugar soda or not				
Sex		Frequency		Valid Percent
Girl	Valid	No	77	29.4
		Yes	185	70.6
		Total	262	100.0
	Total		269	
Boy	Valid	No	70	31.5
		Yes	152	68.5
		Total	222	100.0
	Total		233	100.0

Seventy-point-six percent (70.6%) of girls and **68.5 percent** of boys drank a sugar soda on the previous day.

Analysis was conducted to compare mean BMI scores between those who drank soft drink and those who did not.

Group Statistics						
Sex		Whether drank or not	N	Mean	Std. Deviation	Std. Error Mean
Girl	BMI	No	77	21.6727	5.63063	.64167
	Calc.	Yes	185	21.0998	5.24779	.38583
Boy	BMI	No	70	21.6428	5.91445	.70691
	Calc.	Yes	152	21.3551	5.42570	.44008

a. t-test cannot be computed because at least one of the groups is empty.

Correlational analysis was conducted to see if there was a significant relationship.

Independent T-Test Sample – Boys vs. Girls

Sex	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
Girl	BMI	.130	.719	.788	260	.432	.57295
	Calc.						
Boy	BMI	.262	.609	.357	220	.722	.28770
	Calc.						

Those students who drank soft drinks appear to have slightly lower BMI scores than those who didn't drink soft drinks, but the difference between two groups was not statistically significant (Female: Mean difference (\bar{X}) =.57, p=.432; Male: mean difference (\bar{X})=.29, p=.722).

D. Out of School Time Activities

Research indicates that the types of activities youth engage in may be correlated with BMI. Questions 22.1 – 22.7 asked students to indicate any out of school time activities in which they participate.

Table 15: Number of Study Participants Engaged in Physical Activity per Week

	Organized Physical activity	Outdoor activity	Youth Group activity	Park & Rec Center	Other activities	Doing more than one activity
Total	239 (47.6%)	300 (65.7%)	80 (15.9%)	184 (36.7%)	78 (15.5%)	282 (56.2%)
Female	135 (50.2%)	178 (66.2%)	54 (20.1%)	105 (39.0%)	41 (15.2%)	159 (59.1%)
Male	104 (44.6%)	152 (65.2%)	26 (11.2%)	79 (33.9%)	37 (15.9%)	123 (52.8%)

Slightly more than half of all students indicate that they participate in more than one activity, with outdoor activities being highest participation for both girls and boys at **65.7 percent**. Thirty-six-point-seven percent (**36.7%**) of all students report participating in recreation center activities, while **48 percent** participate in organized physical activities (primarily sports). One limitation of this response method is that some respondents may have miscategorized other activities that could fit under a provided category, and some did not check any activities. However, instances of misclassification are expected to be low and would not skew overall results.

Percentage Time Spent on Various Non-Active Activities

Research indicates that individual entertainment, passive screen time, and social media is increasing, and increased screen time is typically related to increased BMI (Gronsted & Hu, 2011; Stamatakis, Rogers, Ding, Berrigan, Chau, Hamer, & Bauman, 2015). It is recognized that social media is usually on a computer or phone – but focus is on type of activity, not tool.

Q. 28 – 1.1 – 2.4. Analyzed the number of hours spent on academic, watching TV, playing video games, or engaged in Social media/phone both during the week and on the weekend.

Table 16: WeekDAY Activities – Hours per Weekday

	WeekDAY Hours-Academic activities	WeekDAY Hours-Watch TV	WeekDAY Hours-Play video games	WeekDAY Hours-Social media, texting, on phone	Total Hours Non-Active during week
N	Valid	430	429	423	425
	Missing	72	73	79	77
Mean	3.34	3.23	2.66	3.97	=13.2
Mode	2	2	1	6	
Std. Deviation	1.700	1.561	1.763	1.771	

Table 17: WeekEND Activities – Hours per Weekend

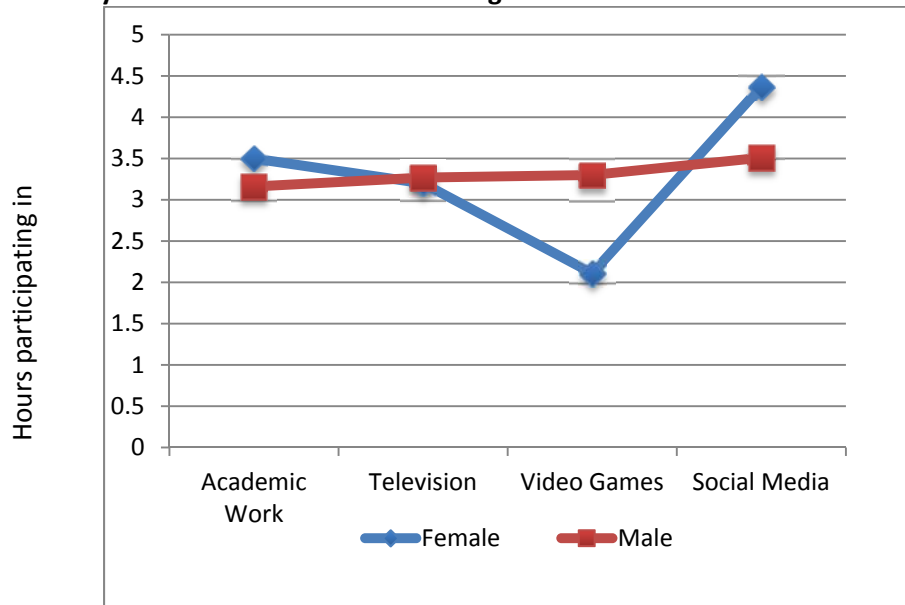
		WeekEND Hours- Academic activities	WeekEND Hours- Watch TV	WeekEND Hours-Play video games	WeekEND Hours- Social media, texting, on phone	Total Hours spent on Non-Active
N	Valid	409	410	405	407	
	Missing	93	92	97	95	
Mean		2.52	3.67	3.07	4.27	=13.53
Mode		1	6	1	6	
Std. Deviation		1.718	1.717	1.946	1.776	

Both during the week and on weekends, time was mostly spent on social media. During the week, the second highest percentage of time was spent on academic activities, followed by TV. On weekends, TV came in second, followed by video games and academic activities.

Table 18: Gender Comparison – Hours Spent per Weekday on Non-Active Activities

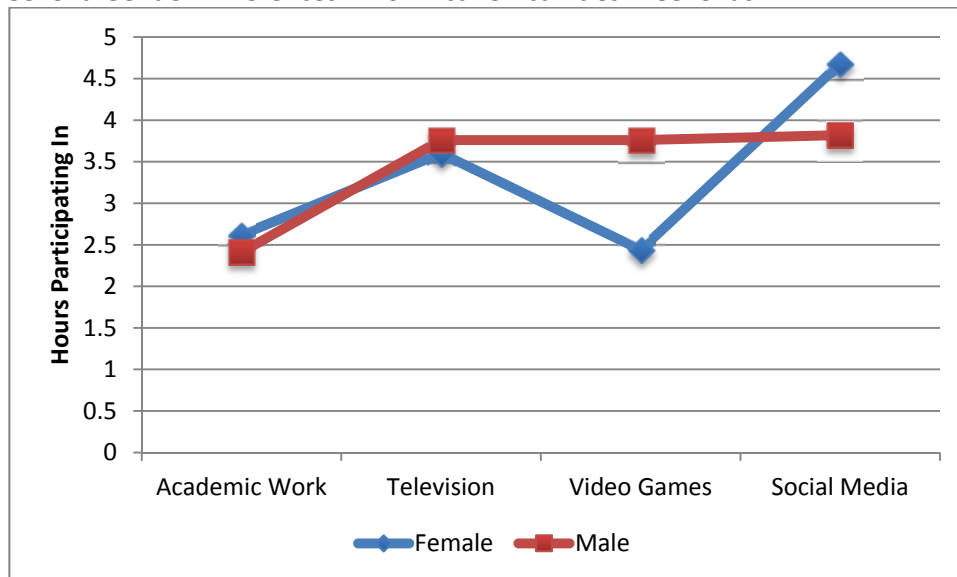
Sex			WeekDAY Hours- Academic activities	WeekDAY Hours- Watch TV	WeekDAY Hours-Play video games	WeekDAY Hours-Social media, texting, on phone
Girl	N	Valid	226	231	228	229
		Missing	43	38	41	40
	Mean		3.50	3.20	2.11	4.37
	Mode		2	2	1	6
	Std. Deviation		1.687	1.570	1.537	1.656
Boy	N	Valid	204	198	195	196
		Missing	29	35	38	37
	Mean		3.16	3.27	3.30	3.51
	Mode		2	3	1	2
	Std. Deviation		1.701	1.553	1.797	1.793

Figure 6: Weekdays – Gender Differences – Average Time on Various Activities



During the week, females spend slightly more time on academics and social media, and less time on TV and video games; however, the amount is only significant for video games.

Figure 7: Weekend Gender Differences – Non-Active Activities Weekends



There was a difference in hours playing video game between male and female students. Results indicated that male students played video games over **3.76 hours** on average while female students spent **2.4 hours** on weekends. On the other hand, female students spent more hours connecting social media than male students.

E. Transportation

Transportation to Activities - Out of School Time

A variety of studies indicate potential correlations between self-transport or vehicular transport and youth BMI (Friedan, 2010; Glanz & Sallis, 2006; Grow & Saelens, 2008). For this study, Survey **Question #23** asked students **how they USUALLY get to their out of school time activities (Table 19)**.

Table 19: Modes to Get to Location for After School Activities (Percent)

	Walk	Bike	Bus	Adult drives	Other	Total (missing)
Total	72 (15.3%)	61 (13.0%)	8 (1.7%)	297 (63.0%)	33 (7.0%)	470 (32)
Girls	40 (15.7%)	16 (6.3%)	2 (0.8%)	186 (73.2%)	10 (3.9%)	254 (15)
Boys	32 (14.8%)	45 (20.8%)	6 (2.8%)	110 (50.9%)	23 (10.6%)	216 (17)

The majority students for both genders (63%) rely on adults who drive for them when they go to a place for extracurricular activities, and just 15 percent walk. Interestingly, a large number of male students (21%) ride a bike. Bus usage is minimal for boys and is nearly non-existent for girls. In using an independent samples t-test to examine the mean difference in BMI scores between students using self-transport and vehicular transport, it was determined that there is no significant difference.

Table 20: Modes to Get to School

	Walk	Bike	Bus	Adult drives	Total (missing)
Total	16 (3.2%)	5 (1.0%)	228 (45.4%)	253 (50.4%)	502 (0)
Female	6 (2.2%)	2 (0.7%)	115 (42.8%)	146 (54.3%)	269 (0)
Male	10 (4.3%)	3 (1.3%)	113 (48.5%)	107 (45.9%)	233 (0)

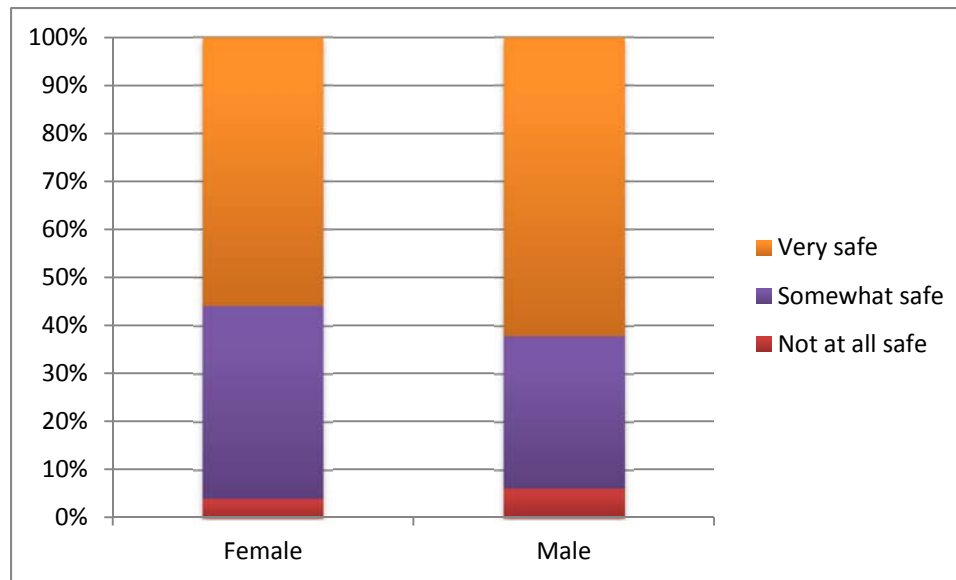
Ninety-five-point-eight percent (95.8%) of students either take the bus or get a ride to get to school, while a mere **4.2%** of students get to school by walking or riding a bike. There was no noticeable gender difference in modes of transportation to get to school. F statistics were calculated to examine if there was a significant mean difference in BMI scores between students using different transportation modes using an omnibus test. Descriptive statistics indicate that students who ride a bike or walk show slightly lower BMI scores than those students taking bus or vehicle, but the result was not statistically significant ($F=.291, df=500, p>.05$).

F. Perceptions of Safety

One barrier to activity participation may be the safety or perception of safety around how youth get to the activity location (Carver & Timperio, 2008; Friedan & Dietz, 2010). **Q. 23** asks about how they get to activities, **Q. 24** asks how safe they feel on their way.

Table 21: Perceptions of Safety

	Not at all safe	Somewhat safe	Very safe	Total (missing)
Total	23 (5.0%)	168 (36.4%)	271 (58.7%)	462 (40)
Female	10 (4.0%)	101 (40.2%)	140 (55.8%)	251 (18)
Male	13 (6.2%)	67 (31.8%)	131 (62.1%)	211 (22)

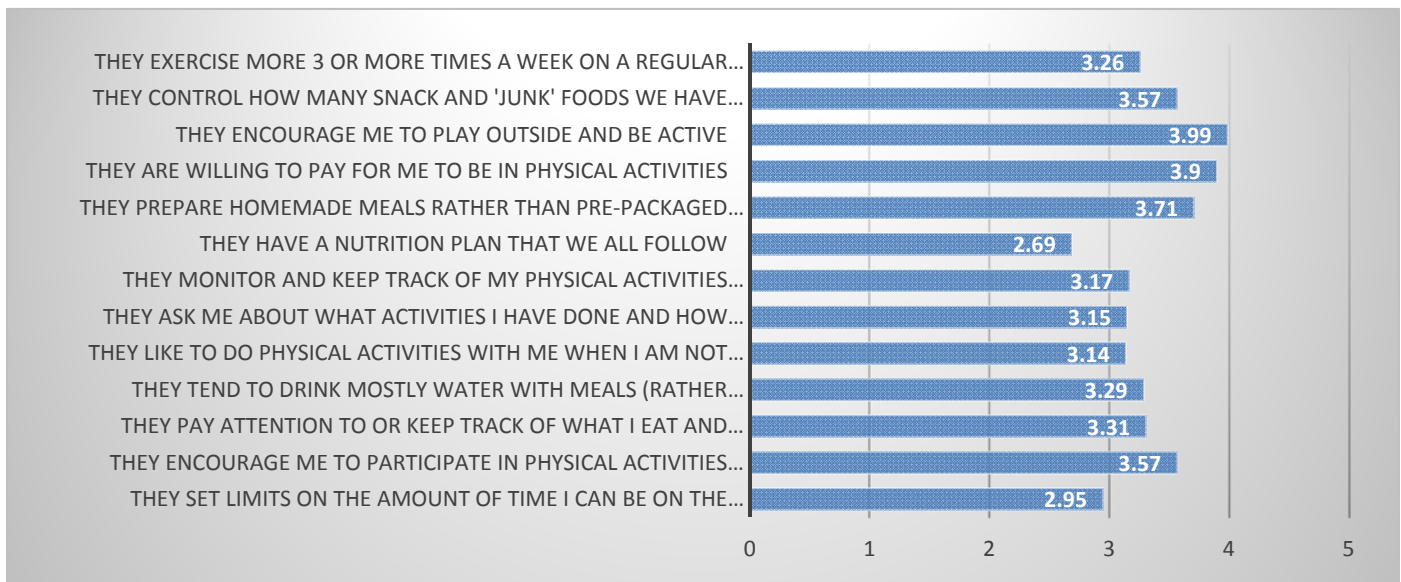


It appears that overall, students in Halifax feel very (**59%**) or at least somewhat (**36%**) safe getting to activities.

G. Parental/Guardians Modeling and Support

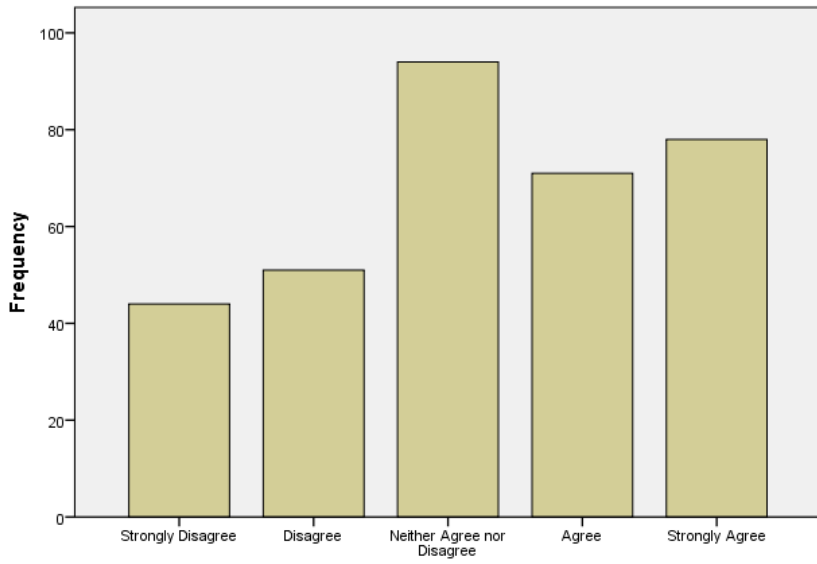
While peer behavior often becomes more important with age, the role of modeling and support by parents and guardians are still key determinants for behaviors by youth. (Haines, 2007; Puhl, 2010)

Q. 34 – Students were asked to rate how much they agree or disagree (1 = Strong Disagree, 5 = Strongly Agree) with various parental involvement statements. The following bar graph that shows the text of the statement question on left side, with a bar chart showing mean Likert scale answer (higher is disagree more) for that question for the group overall. Note that none of the answers were highly agreed upon (averaging a score of 4 or higher). The scores are higher for those items indicating student encouragement rather than parental action or modeling.

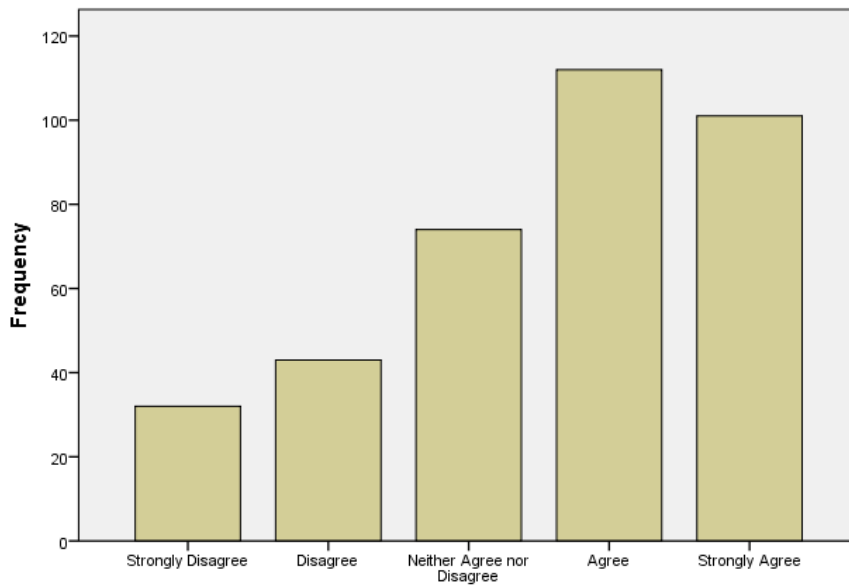


The following pages include additional charts related to answers about parental engagement and modeling.

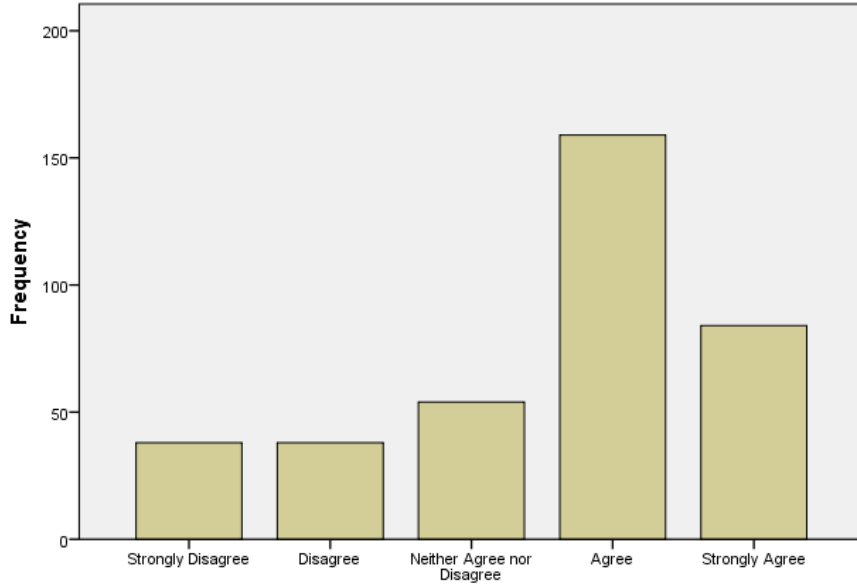
Parents or guardians exercise more 3 or more times a week on a regular basis



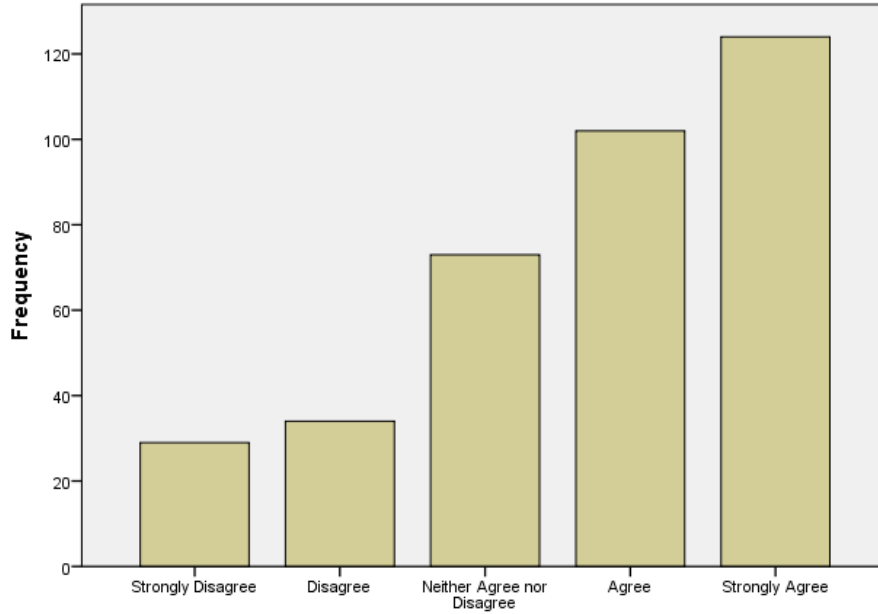
Parents or guardian control how many snack and 'junk' foods have in the house

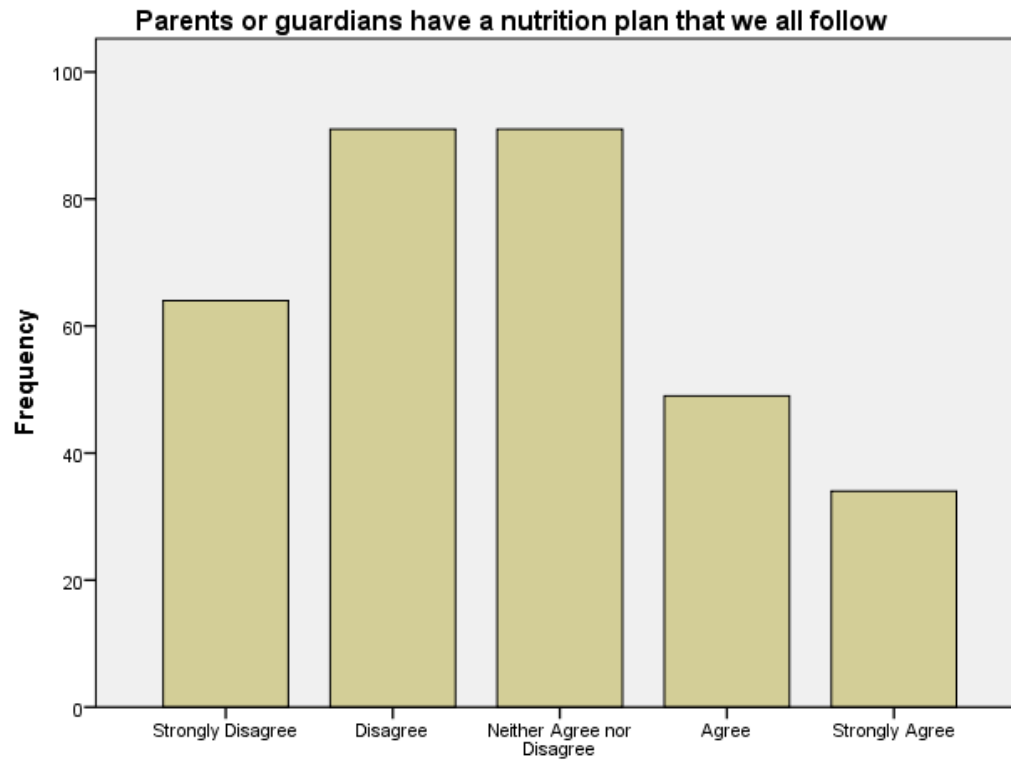
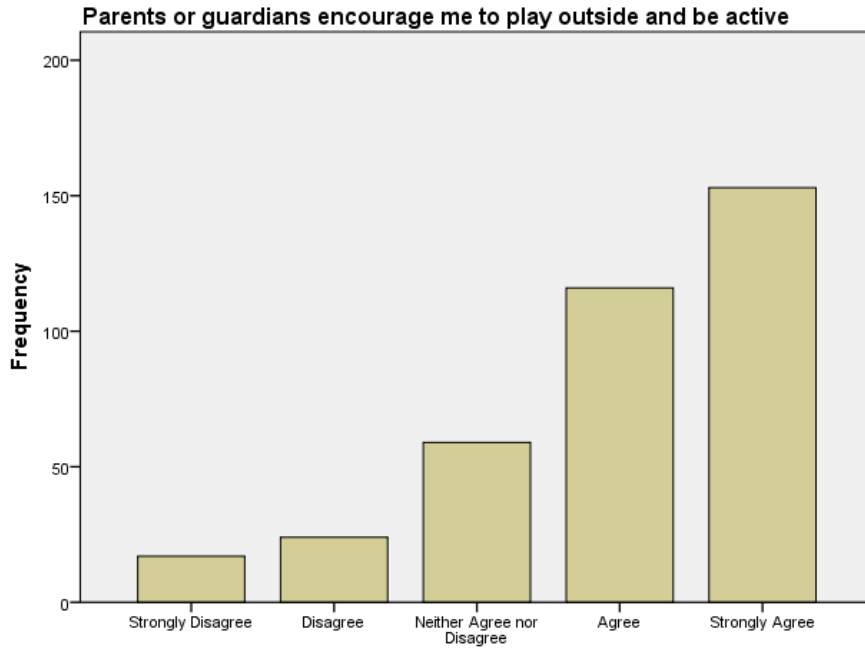


Parents or guardians encourage me to participate in physical activities when I am not in school



Parents or guardians prepare homemade meals rather than pre-packaged or frozen meals





V. Conclusions

A summary of key findings and conclusions are as follows:

- This analysis shows that based on the survey responses, approximately **29.7%** of girls were overweight or obese, while **34.3%** of boys were overweight/obese, for an average of **32%**. While this number appears to be lower than other reported national averages, those averages include ages up to 18 or 19. It is known that BMI increases with age, and this is one of the first studies identified to evaluate only ages 10 to 14.
- Literature shows that there are often cultural differences in activity preference by ethnicity, and this could be further explored in Halifax County. Particularly, research suggests that African Americans tend to participate less frequently in outdoor activities. This study showed a high participation in outdoor activities (66%), which may be correlated to race. This may warrant additional study as the other schools are added and national research continues for comparative analysis.
- This study did indicate high numbers of youth who did not eat breakfast at least once a week (24% of girls and 32% of boys), or who reported having drank a sugared soda on the previous days (70% of all respondents). These habits may have a cumulative effect as the students age, and may warrant additional research over time.
- While both boys and girls spend most of their non-active time on social media, there were significant differences between genders related to time spent on video games, with boys reporting spending an average of almost seven hours total on this activity per week (slightly more than television).
- Just 15 percent of youth reported walking to activities in which they participate out of school time, and three percent walk to school. Boys tend to ride their bikes more than girls. Very few ride the bus outside of school time. There appears to be opportunity for increase in these areas as potential for increasing physical activity.
- Ninety-five percent (95%) of students report feeling very (59%) or somewhat (36%) safe getting to their activities, indicating that in Halifax County, at least from the students' viewpoint, perception of safety may not be a key issue. It is recognized that this perception may vary from parental viewpoints, but that information is not available within this study.
- As related to parental engagement and modeling, scores were higher for those statements related to rule-setting and encouragement of healthy activities for youth, but lower for those statements related to whether the parents actually model the healthy behavior. This indicates that there may be opportunity for both youth and adult education, as research indicates that youth often do more of what their parents "do" than what they "say" unless they learn otherwise.

A. Limitations

There are identified limitations to using self-reported data from middle schools students in terms of recall and honesty, and the use of self-measured height and weight to calculate BMI. However, by removing some obviously wrong answers (i.e.; BMI reported as > 50, strong outliers for nutritional answers, etc.) and with the power of over 500 responses, it appears this may be as close as we can get for community-specific recalled data with relatively low cost and time investment.

Other limitations are that the results of this survey present a snapshot in time for just one community. It will be good to collect additional data from other communities, and again from Halifax County as time goes on, for comparative purposes and to confirm the reliability and validity of the testing and analysis methods. As with all research, multiple regression helps control for some variable bias effects, but does not solve the problem of identifying effects of unmeasured variables that have not been considered (Remler & Van Ryzin, 2015). It is hoped that over time these limitations will be further explored and can be minimized for this type of research.

- While considerable outreach and approvals by the Superintendent and principals were obtained for inclusion of all four middle schools, only Chaloner had full school participation. This indicates a need to stress importance for teachers and administrators for gathering this information.
- Due to the primary participation by Chaloner Middle School and its higher percentage of white students, there is a noted difference between race/ethnicity from this study and the population of Halifax County. It is recommended that future surveys include all Middle Schools to ensure better representation across the County.

B. Recommendations for Future Action

The YANS survey should be administered again to determine if there are changes and/or consistency in data findings. It would be desirable to add additional middle schools and the Tribal School. A comparative analysis with the 2015 data will provide the beginnings of a longitudinal study of factors influencing the obesity issue in Halifax County, North Carolina among middle school youth. This may also be compared with findings from other YANS reports to be conducted by GP RED and/or NCSU in other communities in 2015.

It could be beneficial to compare the answers for other types of activity groups that were collected to see if those types of activities also have a similar effect on community youth BMI. It would also be beneficial to compare this to other variables, such as distance to activity locations, fast food consumption, and adult involvement. There is no limit to the amount of detail that can be explored with this type of data analysis. It will be beneficial to have a validated survey instrument to help identify and address key variables for this age group. Perhaps with each look, we may get closer to unlocking the puzzle of how we can manage community offerings and education to help our youth become healthier in the future.

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Appendix A – Sample BMI Charts for Boys and Girls

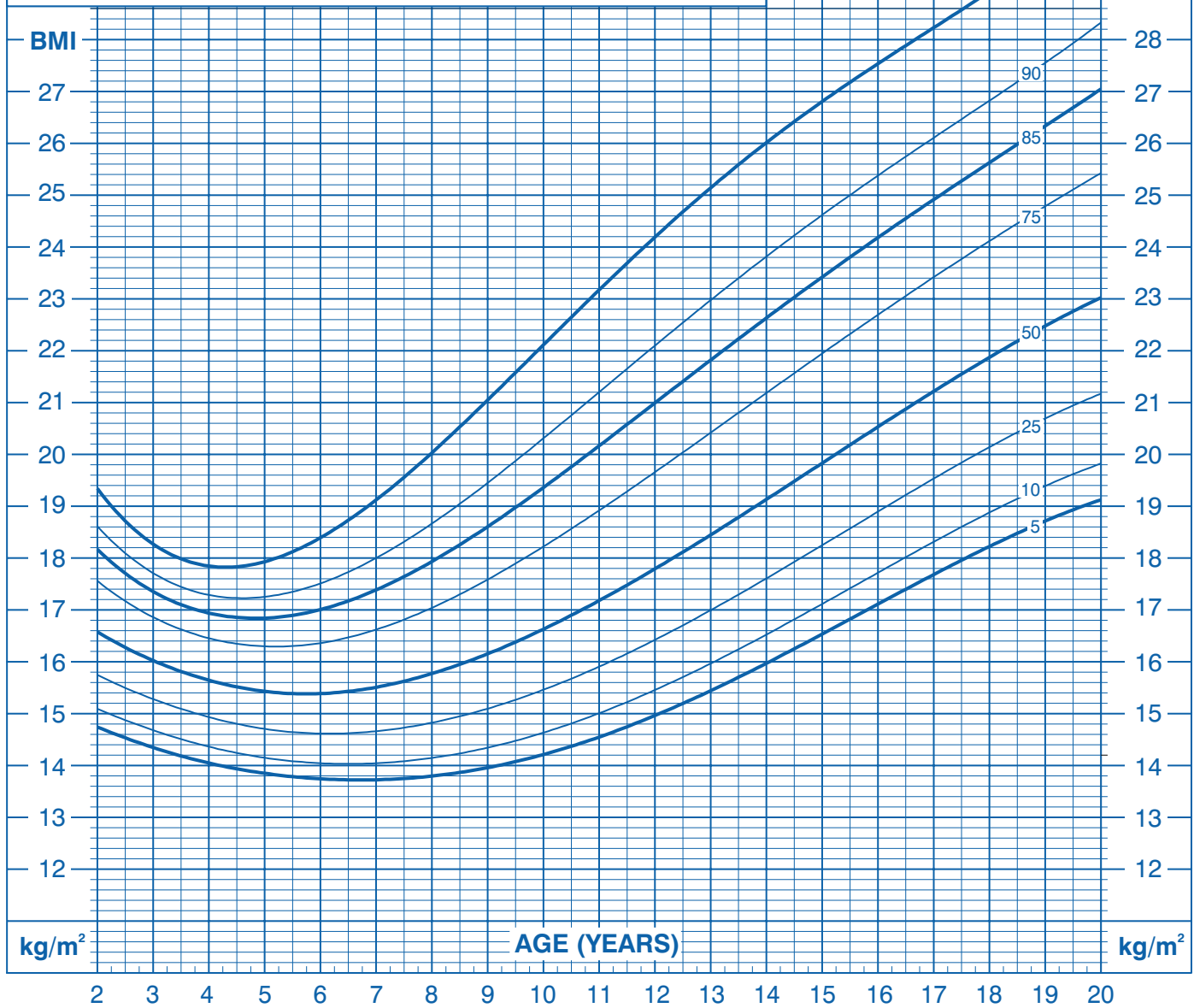
2 to 20 years: Boys Body mass index-for-age percentiles

NAME _____

RECORD # _____

Date	Age	Weight	Stature	BMI*	Comments

***To Calculate BMI:** Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703



Published May 30, 2000 (modified 10/16/00).

SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000). <http://www.cdc.gov/growthcharts>

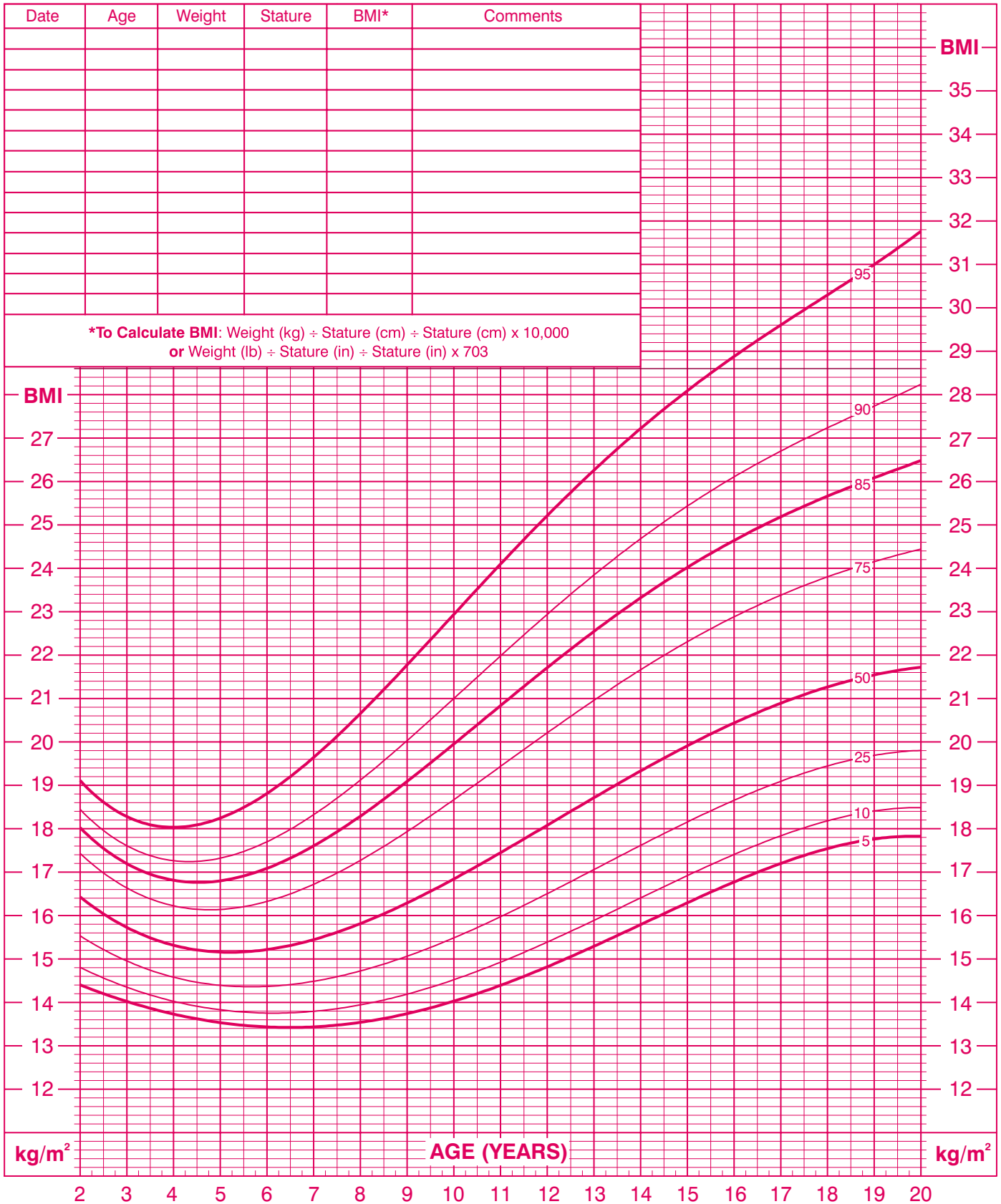


2 to 20 years: Girls

Body mass index-for-age percentiles

NAME _____

RECORD # _____



Published May 30, 2000 (modified 10/16/00).
 SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
<http://www.cdc.gov/growthcharts>



Appendix B – Primary Factors and Indicators for Analysis

An intensive ongoing literature review has been performed by the GP RED Healthy Communities Research Group Staff, including a focused effort by Dianna Damask, MPH, as an intern at GPRED in 2012. There was much initial work to identify primary critical factors and indicators relevant to policies contributing to the potential increase in physical activity and reduction of the prevalence of overweight and obesity issue among youth age 10-14 years. As a result of this process, five factors and corresponding indicators were deduced from the literature reviews and input of HCRG Peer Review experts. These factors include: 1) Nutrition regimen; 2) Social interaction; 3) Transportation services; 4) Physical activity; and 5) Safety. In addition, five indicators corresponding to each factor were identified as shown in the following table.

Factors and indicators contributing to reducing obesogenic reduction

Nutrition regimen: A balanced intake of food that is comprised of various solids, liquids, fresh and prepared foods that provide the necessary daily nutrients for an active lifestyle and is culturally relevant.	
Availability of healthy food	Support and provide incentives for farmers' markets and grocery stores serving fresh food and healthy food.
Information, education and training	Increase programming and communication campaigns for healthy cooking, gardening and recipe testing, along with messaging about healthy eating consequences.
Healthy food/drink options	Limited to healthy food/drink at public P&R venues or related agencies that are relevant.
Collaboration with local restaurants	Affinity programs that adds points on a score card when one chooses a healthy menu, which may be redeemed at the P&R.
Community gardens	Increasing number of community gardens at several places in the service area and land them at a lower cost.
Social interaction: Positive social relations and role modeling with peers and adults in various settings. Engaging in social discourse. Developing and maintaining friendships with others.	
Efforts to prevent bullying and hazing	Establish programs, campaigns, etc. for those who are ostracized or socially isolated, and those who engage in bullying behaviors.
Non-competitive organized activity options	Encourage more youth to participate in non-competitive activities to increase retention in programs/activities.
Establish practices of social inclusiveness	Emphasize the virtue of friendships, teamwork, and a sense of belonging in the every program.
Positive social environment	Create positive atmosphere where all youth are welcomed, valorized and respected; Establish a strong policy strictly prohibiting bullying or hazing behaviors.
Relevancy of programs/services	Offering programs, services and activities based on customer identified needs, and appropriateness (e.g.) age, gender, religious preference, cultural norms, etc.

Transportation services: Various modes of transportation of individuals or groups including vehicles offered by public, private, or family members. Primarily used for getting youth to and from a program, event or activity.	
Accessibility, availability, and Interconnectivity of public transportation	Transportation in communities is multi-modal and requires close access, available when most needed, synchronized with programs, services and operating hours, and account for interconnectivity across the community at large.
Cost of services	Collaboration with schools, local businesses, and other agencies when utilizing public modes of transportation to & from P&R facilities & programs.
Convenience	Synchronization with P & R programs, events, services, activities of P&R
Consumer knowledge of public transportation services	Information and training strategies to increase the level of awareness of public transportation to and from P & R facilities, programs, events, services, activities.
Utilization rates	Monitor utilization rates by type of customer, location, mode of transportation, frequency, time/day, etc.
Physical activity: The array of opportunities in a community that require physical skills and capacities (e.g.) balance, strength, flexibility, etc.) and often specific venues in which to engage during free or discretionary time.	
Quality of natural and built assets	Increase the number of amenities, invest more financial resources for maintenance.
Varied physical demands of programs/services	Utilize analysis to examine the level of required physical skills in programs, events, activities, sport types by age, gender, etc. to sustained engagement across the lifespan.
Availability of assets/programs	Using GIS to document the location and operating hours/days of all natural and built assets; likewise do the same with all programs, services, activities, events by age, program type, etc.
Application of evidence based standards, practices by staff	Using national, state and other physical fitness standards seek to increase the physical capacity of each individual in community. Review and implement evidence based practices to increase physical capacity (aerobic, strength, flexibility, balance, etc.).
Marketing and promotion of increased physical capacity	Utilize varying modes of increasing physical activity through collaboration, partnerships, sponsorships, campaigns to increase awareness of the vital role in personal and public health.
Safety: Both actual and perceived, including provision of programs, activities, events, places, spaces (indoors or outdoors) that are not likely to cause avoidable harm, personal injury, or perceived threat of same.	
Crime rate at or near assets/programs	Collaborate with law enforcement to reduce crimes in areas managed by P & R. Install surveillance cameras, Hire police or security officers, CPTED principles, and/or positive activation.
Parent/children perception of safety level	Make streetlights brighter, more people on trails, speed bumps near P&R buildings and pedestrian walkways.

Prevention practices of direct and affiliated service providers	Staff training for accident/injury free environment and safety education for participants.
Safety inspection & risk management	Conduct frequent and regular inspections to assure safe operations at facilities (built or natural) and in programs/events/services.
Staff supervision & surveillance efforts	Establish standards for supervision & surveillance at all sponsored programs, events, activities as well as managed assets.

Complete References for Appendix B are included in:

Compton, D. M., Kiboum K., and Damask, D. (2012). *MAUT Analysis of Factors and Indicators*, Appendix B, South Bend, Indiana Parks and Recreation Department, Healthy Communities Research Group Surveillance and Management Toolkit, Year Two Report, GP RED, 2013, Available at <http://gpred.org/wp-content/uploads/2014/02/South-Bend-HCRG-Year-Two-Report.pdf>. Accessed March 23, 2014.