Healthy Choices for Healthy Children Act Body Mass Index and Weight Status Category Screening Program 2010-2011

Introduction

Ohio Senate Bill 210, The Healthy Choices for Healthy Children (HCHC) Act, became law September 17, 2010. The law contains provisions to combat childhood obesity in the next several years by increasing students' physical activity, ensuring access to healthy meals and beverages at school and establishing a body mass index (BMI) and weight status category screening program for students in kindergarten (K) and grades 3, 5 and 9. Each school district, community school, Science, Technology, Engineering and Mathematics (STEM) school and chartered nonpublic school in Ohio is required to collect and submit aggregated, de-identified student BMI data to the Ohio Department of Health (ODH) by June 1 of each year unless the school district/nonpublic school has applied for and been granted a waiver. Parents/guardians may also decline to have their child undergo a BMI screening. The data are required to be aggregated to the district level, in the case of a school district, or to the school level, in the case of a community, STEM or chartered nonpublic school. Information about any health risks associated with the student's results must be provided to the students and their parents or guardians.

The Ohio Department of Education (ODE) is required to issue an annual report on the compliance of school districts and schools with the BMI screening requirements. A district or school may obtain a waiver of the BMI and weight status category screening requirements from the superintendent of public instruction. To obtain the waiver, the district or school must submit an affidavit stating that it is unable to comply with the requirements. The affidavit must be attested to by the president or presiding officer of the board of education or school governing authority. The superintendent must grant the waiver upon receipt of the affidavit.

According to the Act, ODH annually may publish the reported BMI data at the aggregate level. However, the quality of these data is dependent on participation by each student, school district and chartered nonpublic school. If any district or chartered nonpublic school is granted a waiver for the given school year, ODH shall note that the data for that particular county is incomplete. The following report presents an overview of BMI, methods of data collection and submission, a summary of BMI data collected during the 2010-2011 school year and recommendations for future participation.

BMI Overview

Body mass index (BMI) is a measurement used to assess if a person is obese, overweight, normal weight or underweight. BMI is a number that is calculated using the height and weight of an individual and is a better assessment of excess body fat than weight alone. In children and youth, BMI norms are based on the size and growth rates of the average child and are often referred to as BMI-for-age, according to the Centers for Disease Control and Prevention (CDC).

BMI does not measure body fat directly, but research has shown that BMI correlates to direct measures of body fat,

such as underwater weighing and dual energy x-ray absorptiometry (DXA). BMI can be considered an alternative for direct measures of body fat. Additionally, BMI is an inexpensive and easy-to-perform method of screening children for weight categories that may lead to health problems.

Boys and girls grow and develop at different rates. Based on CDC recommendations, a BMI percentile for children is calculated individually for each boy and girl based upon his or her gender, age, weight and height. BMI percentiles are then used to categorize children according to whether they are underweight (<5th percentile), healthy weight (5th to <85th percentile), overweight (85th to <95th percentile) or obese (≥95th percentile) (**Table 1**).

Table 1. BMI Percentile Ranges by Weight Status Category (Underweight, Normal Weight, Overweight, Obese)

Weight Status Category	BMI Percentile Range
Underweight	< 5th Percentile
Normal Weight	5th Percentile to <85th Percentile
Overweight	85th Percentile to <95th Percentile
Obese	≥ 95th Percentile

Methods

Each school in a participating school district was required to collect BMI data for each student in grades K, 3, 5 and 9. To assist with data collection, ODH created a tool in Microsoft Excel to be used by each school building — the School Building BMI Collection Tool. The School Building BMI Collection Tool is based on the Children's BMI Tool for Schools developed by the CDC. School buildings were allowed the option of using either tool, although there are pros and cons of each version. The ODH tool allows for the collection of grade level, accommodates more versions of Microsoft Excel and simplifies the submission of data to the school district. However, to accommodate earlier versions of Excel, BMI and BMI percentile must be calculated manually using an on-line tool. In contrast, the CDC tool automatically calculates BMI and BMI percentile but does not include a column for grade level or a data submission worksheet. The required variables to be collected were Grade Level (K, 3, 5, 9), Sex (M, F), Date of Birth (MM/DD/YYYY), Date of Measurement (MM/DD/YYYY), Height (feet and inches to nearest 1/8 inch), Weight (pounds to nearest ¼ pound), BMI (calculated variable) and BMI Percentile (calculated variable). In the ODH tool, the variables Grade Level, Sex and BMI Percentile automatically populate into a separate worksheet (the "District Summary") for submission to the respective district; thus, no identifying information for a given student is reported.

A second tool was created by ODH, the District BMI Submission Tool, for use by school districts. Each participating school district was charged with collecting BMI data from each school in their district, removing identifiers (if any), compiling all data into a single submission worksheet and submitting that data electronically to ODH at School.BMI@odh.ohio.gov, no later than June 1, 2011. ODH requested that BMI data be submitted electronically in an Excel or comparable format; submissions in alternate formats (e.g., .pdf, scanned copy) had to be hand-entered, which required additional resources and delayed analysis of the data. Submissions that included variables other than Grade Level, Sex and BMI Percentile could not be accepted to protect student confidentiality and thus were deleted.

Upon receipt of data from each school district, ODH reviewed the submission to assure that the appropriate variables

were submitted in the proper format. If any problems were indicated, the district was contacted to request a new submission that met the requirements. All submissions were compiled into an Excel database for further analysis. Prior to analysis, the data were reviewed to identify potential issues/errors that would affect the summary results. Any individual records or total submissions that were determined to contain values that could potentially alter the summary results were corrected or deleted. These include the following:

♦ 9 total submissions were deleted for providing ranges of BMI percentiles (e.g., <5%, 5%-84%) because averaging the ranges would skew the results.

♦ 12 total submissions were deleted for submitting multiple BMI percentiles outside of the normal range of 0 to 100 percent. For example, BMI percentiles ranging from 0 to 40 percent imply that the BMI, not BMI percentile, may have been submitted. Other submissions contained multiple values greater than 100 percent, suggesting that calculation errors may be contained in the submission.

♦ Individual records from 42 submissions were deleted due to data errors, i.e., missing data, calculation errors and incorrect/out of range values. A few examples include the submission of a formula rather than a BMI percentile (e.g., "#Value!"), ages out of range for children in grades K, 3, 5 or 9 and BMI percentiles not within the range of 0 to 100 percent.

♦ Individual records from 11 submissions were deleted where grade levels other than K, 3, 5 or 9 were submitted.

♦ In individual records from 24 submissions, BMI Percentiles of "<1%" were changed to "0.5%" and values of ">99%" were changed to "99.5%."

As a result of these changes and deletions, **the resulting analyses are only reflective of those data and submissions that met select quality criteria, not all data that were submitted**.

Results

A total of 244 BMI data submissions from school districts and nonpublic schools were received by ODH for the 2010-2011 school year. Of these, 10 submissions were later determined to be duplicates, and 21 submissions were invalid as described above. ODE received 686 waivers for the school year. Thus, the following results represent the findings from 213 data submissions and are not reflective of all school districts in Ohio. BMI data are not presented at the county level due to the large number of districts that submitted a waiver. In addition, the percent of eligible students within a district that completed BMI screening is unknown; thus, completeness by county cannot be determined.

The number of children screened for which valid data were submitted was 91,674. As shown in **Table 2**, valid data were received from 66 of 88 (75%) counties in Ohio. The number of children screened by county was highest for the three largest counties in Ohio—Franklin (17,701 screened, 19.3%), Hamilton (13,188 screened, 14.4%) and Cuyahoga (5,311 screened, 5.8%).

The number of children screened by grade and sex are shown in **Table 3** and **Table 4**, respectively. Kindergarteners represent the largest number of children screened (24,420 screened, 26.6%), and 9th graders represent the smallest number (20,924 screened, 22.8%). Approximately 52 percent of children screened were male (47,291 screened) and 48 percent were female (44,383 screened).

Table 5 presents the number of children screened in relation to the number enrolled for the 2010-2011 school year by grade and sex. For grades K, 3, 5 and 9 combined, 18.6 percent of all students enrolled participated in BMI screening, or nearly one in five. The largest percentage of enrolled students that participated in BMI screening was among kindergarteners (23.4%).

Table 2. Number and Percent of Ohio Children Screened, by County, School Year 2010-2011[1]

County	# Screened	Percent (%)	County	# Screened	Percent (%)
Adams	0	0.0	Licking	2,614	2.9
Allen	1,291	1.4	Logan	0	0.0
Ashland	0	0.0	Lorain	997	1.1
Ashtabula	707	0.8	Lucas	1,846	2.0
Athens	706	0.8	Madison	0	0.0
Auglaize	0	0.0	Mahoning	3,296	3.6
Belmont	729	0.8	Marion	1,767	1.9
Brown	345	0.4	Medina	50	0.1
Butler	2,997	3.3	Meigs	0	0.0
Carroll	0	0.0	Mercer	39	0.0
Champaign	315	0.3	Miami	0	0.0
Clark	34	0.0	Monroe	0	0.0
Clermont	173	0.2	Montgomery	1,519	1.7
Clinton	444	0.5	Morgan	0	0.0
Columbiana	621	0.7	Morrow	0	0.0
Coshocton	1,492	1.6	Muskingum	1,142	1.3
Crawford	0	0.0	Noble	0	0.0
Cuyahoga	5,311	5.8	Ottawa	631	0.7
Darke	327	0.4	Paulding	0	0.0
Defiance	306	0.3	Perry	202	0.2
Delaware	4,431	4.8	Pickaway	1,615	1.8
Erie	51	0.1	Pike	226	0.3
Fairfield	717	0.8	Portage	2,069	2.3
Fayette	0	0.0	Preble	0	0.0
Franklin	17,701	19.3	Putnam	385	0.4
Fulton	25	0.0	Richland	1,459	1.6
Gallia	1,267	1.4	Ross	568	0.6
Geauga	1,066	1.2	Sandusky	0	0.0
Greene	1,386	1.5	Scioto	371	0.4
Guernsey	42	0.1	Seneca	27	0.0
Hamilton	13,188	14.4	Shelby	44	0.1
Hancock	1,295	1.4	Stark	3,728	4.1
Hardin	269	0.3	Summit	1,406	1.5
Harrison	157	0.2	Trumbull	1,071	1.2
Henry	0	0.0	Tuscarawas	1,137	1.2
Highland	0	0.0	Union	0	0.0
Hocking	1,134	1.2	Van Wert	351	0.4
Holmes	0	0.0	Vinton	668	0.7
Huron	43	0.1	Warren	317	0.4
Jackson	254	0.3	Washington	866	0.9
Jefferson	550	0.6	Wayne	335	0.4
Knox	0	0.0	Williams	327	0.4
Lake	487	0.5	Wood	133	0.2
Lawrence	541	0.6	Wyandot	66	0.1
			Total	91,674	100.0

Table 3. Number and Percent of Ohio Children Screened, by Grade, School Year 2010-2011[1]

Grade	# Screened	Percent (%)
K	24,420	26.6
3	23,088	25.2
5	23,242	25.4
9	20,924	22.8
Total K, 3, 5, 9	91,674	100.0

[1]Chronic Disease and Behavioral Epidemiology Section, Center for Public Health Statistics and Informatics, Ohio Department of Health, 2012

Table 4. Number and Percent of Ohio Children Screened, by Sex, School Year 2010-2011[1]

Sex	# Screened	Percent (%)
Male	47,291	51.6
Female	44,383	48.4
Total	91,674	100.0

[1]Chronic Disease and Behavioral Epidemiology Section, Center for Public Health Statistics and Informatics, Ohio Department of Health, 2012

Table 5. Number of Ohio Children Enrolled and Number and Percent of Children Screened, by Grade and Sex, School Year 2010-2011[1]

Grade	Sex	# Enrolled	# Screened	Percent (%) Screened
K	Male	54,144	12,500	23.1%
	Female	50,405	11,920	23.6%
	Total	104,549	24,420	23.4%
3	Male	63,263	11,955	18.9%
	Female	60,152	11,133	18.5%
	Total	123,415	23,088	18.7%
5	Male	65,071	11,865	18.2%
	Female	61,936	11,377	18.4%
	Total	127,007	23,242	18.3%
9	Male	71,465	10,971	15.4%
	Female	66,555	9,953	15.0%
	Total	138,021	20,924	15.2%
K, 3, 5, 9	Male	253,943	47,291	18.6%
	Female	239,049	44,383	18.6%
	Total	492,992	91,674	18.6%

[1]Chronic Disease and Behavioral Epidemiology Section, Center for Public Health Statistics and Informatics, Ohio Department of Health, 2012

Figure 1 presents the percent of children screened by weight status category (underweight, healthy weight, overweight, obese). Of Ohio children screened in grades K, 3, 5 and 9, 16.4 percent were determined to be overweight, and an additional 18.5 percent were obese. In other words, more than one third (34.9%) of Ohio children screened had a BMI-for-age percentile of 85 or higher. In addition, 2.9 percent of children screened were underweight.

The number and percent of Ohio children screened by weight status category is further broken down in **Table 6** by grade. The percent of Ohio children screened who were overweight increased with increasing grade level. In addition, the percent of children who were obese was lowest among kindergarteners (13.7%) and highest among 5th (21.1%) and 9th (20.6%) graders. Kindergarteners also had the lowest percentage of overweight and obesity combined (28.9%) and 9th graders had the highest (38.0%). Alternatively, the percent of children screened who were underweight was highest among kindergarteners (3.7%) and lowest among 9th graders (1.9%).

Figure 1. Percent of Ohio Children Screened, by Weight Status, School Year 2010-2011[1]
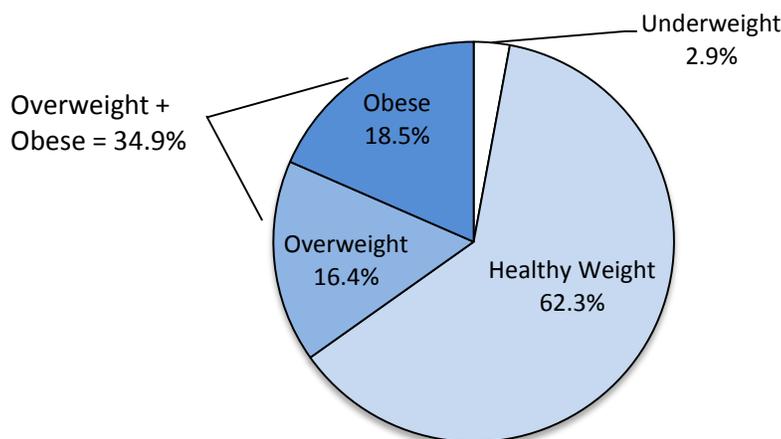
[1]Chronic Disease and Behavioral Epidemiology Section, Center for Public Health Statistics and Informatics, Ohio Department of Health, 2012

Table 6. Number and Percent of Ohio Children Screened, by Grade and Weight Status, School Year 2010-2011[1]

Grade	Underweight		Healthy Weight		Overweight		Obese	
	# Screened	Percent (%)	# Screened	Percent (%)	# Screened	Percent (%)	# Screened	Percent (%)
K	900	3.7	16,460	67.4	3,715	15.2	3,345	13.7
3	670	2.9	14,332	62.1	3,744	16.2	4,342	18.8
5	698	3.0	13,734	59.1	3,896	16.8	4,914	21.1
9	390	1.9	12,573	60.1	3,644	17.4	4,317	20.6
K, 3, 5, 9	2,658	2.9	57,099	62.3	14,999	16.4	16,918	18.5

[1]Chronic Disease and Behavioral Epidemiology Section, Center for Public Health Statistics and Informatics, Ohio Department of Health, 2012

The average BMI percentile among children screened increased with increasing grade level, with kindergarteners having an average BMI percentile of 62.1 percent and 9th graders averaging 68.4 percent (data not shown). However, the average BMI percentile was not found to differ among males (65.1%) and females (64.9%) in grades K, 3, 5 and 9 combined (data not shown). **Figure 2** shows the average BMI percentile of Ohio children screened by both grade and sex. The lowest average BMI percentile occurred among female kindergarteners (61.9%) and the highest occurred among female 9th graders (69.3%). The greatest disparity by sex was found among 9th graders, where the average BMI percentile among females was 1.6 percent higher compared with males.

Figure 2. Average BMI Percentile of Ohio Children Screened, by Grade and Sex, School Year 2010-2011[1]
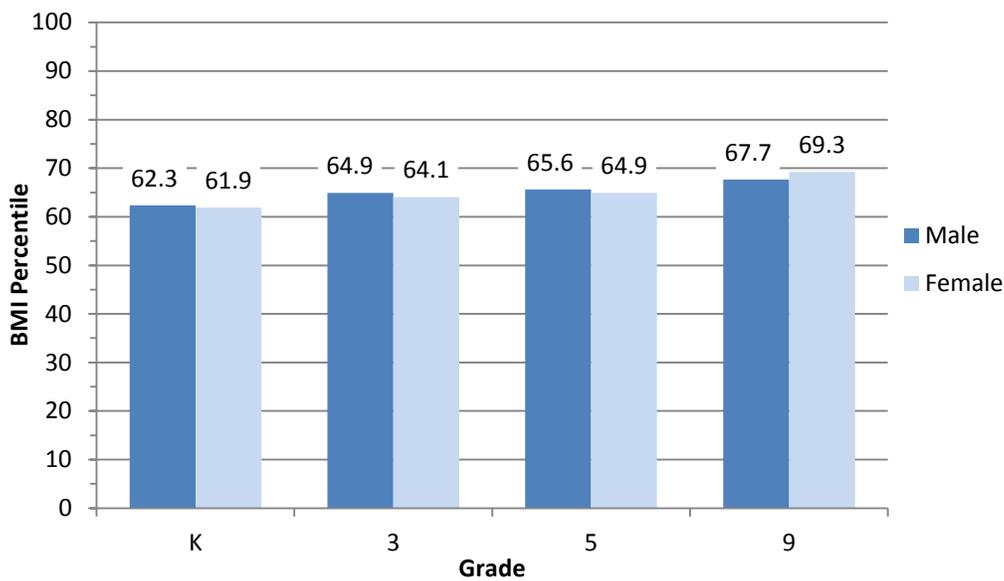
[1]Chronic Disease and Behavioral Epidemiology Section, Center for Public
Health Statistics and Informatics, Ohio Department of Health, 2012

Discussion

A childhood BMI surveillance report produced by ODH — A Report on the Body Mass Index of Ohio's Third Graders: 2004-2010 — revealed that more than one-third of Ohio's 3rd graders were overweight (16.3%) or obese (18.3%). These numbers are found to be similar to those obtained through the HCHC BMI screening program, where 16.2 percent of 3rd graders were overweight and 18.8 percent were obese.

However, there are limitations to using BMI screening data, rather than surveillance data, to calculate prevalence estimates of weight status. Population-based estimates of weight status among students in grades K, 3, 5 and 9 can only be calculated if each student participates in the screening program; thus, it is essential that each student, school district and chartered nonpublic school participate for the data to accurately reflect BMI levels for Ohio and each of the 88 counties. School districts and nonpublic schools submitted 686 waivers for meeting BMI screening requirements, and parents/guardians could deny their child's participation. Therefore, these findings only represent the students that participated and cannot be generalized to the entire population. A second limitation of this screening program is that a number of students and submissions were removed from the analysis due to data or submission errors. This may be due to using incompatible software for the data collection and submission tools and/or lack of training. Proper

training in screening techniques and data collection/submission procedures, as well as use of appropriate screening equipment, are essential to improving future BMI screening programs.

Conclusions

The major findings of the 2010-2011 Healthy Choices for Healthy Children Body Mass Index and Weight Status Category Screening Program are the following:

♦ The BMI screening results are representative of 213 data submissions and 91,674 students in grades K, 3, 5 and 9, or 18.6 percent of all eligible children enrolled in the 2010-2011 school year.

♦ 75 percent of Ohio counties participated in the screening program.

♦ Kindergarteners represent the largest percentage of students being screened.

♦ More than one in three (34.9%) participating students were overweight (16.4%) or obese (18.5%).

♦ The highest percentage of overweight/obesity was found among 9th graders (38.0%).

♦ Kindergarteners represented the highest percentage of underweight students (3.7%).

♦ The average BMI percentile increased with increasing grade level, with 9th graders having the highest average BMI percentile (68.4%).

♦ The average BMI percentile was similar among males and females of the same grade, although the greatest disparity by sex was found among male (67.7%) and female (69.3%) 9th graders.

♦ Valuable health information for individual students was obtained through the HCHC BMI Screening Program; future participation by school districts and non-public schools should be encouraged. However, this BMI screening program is not an equivalent substitute for BMI surveillance programs, which provide data that are essential to the planning, implementation and evaluation of public health initiatives.

Recommendations for Future Participation

♦ Encourage all students, school districts and chartered nonpublic schools to participate

♦ Report only Grade Level, Sex and BMI Percentile; do not include school building names (except for nonpublic schools), student identifiers, additional variables or data for students in grades other than K, 3, 5 and 9

♦ Submit BMI data in Excel or an alternate spreadsheet format; scanned, .pdf and similar formats require additional resources to process

♦ Provide the exact BMI percentile, versus a range of percentiles, so that accurate summary results can be calculated

♦ Check data for out of range or missing values and calculation errors prior to submission

♦ Ensure that school personnel are trained in proper techniques for conducting BMI screenings and submitting data

♦ Obtain appropriate screening equipment such as medical grade scales and free-standing stadiometers to assure accurate measurements