


HEALTHY CHICAGO

TRANSFORMING THE HEALTH OF OUR CITY

City of Chicago



Overweight and Obesity among Chicago Public Schools Students, 2010-11

February 2013



Rahm Emanuel
Mayor



Bechara Choucair, M.D.
Commissioner

CHICAGO
PUBLIC
SCHOOLS

CPS

Barbara Byrd-Bennett
Chief Executive Officer



February 28, 2013

Dear Fellow Chicagoans:

The health of our children is paramount to their individual futures and the future of our city. That is why the Chicago Department of Public Health and the Chicago Public Schools (CPS) have joined together to develop and launch initiatives to ensure the health of all students in the CPS system. As former U.S. Surgeon General Joycelyn Elders once said, “You can’t educate a child who isn’t healthy, and you can’t keep a child healthy who isn’t educated.” Together, we will help ensure all children in Chicago have an opportunity to be both healthy and well educated.

Part of our work is to gather data and insight into the health of CPS students. This report accomplishes this by providing estimates of the prevalence of overweight and obesity among the CPS student population. It represents the most comprehensive description ever available of how the obesity epidemic affects children in our city. Our findings are mixed. While more CPS kindergarteners are at a healthy weight than in recent years, the overall proportion of students who are overweight or obese remains unacceptably high.

But more than simply providing data, this report serves as a guide for both public health and education advocates to develop community- and school-based interventions to make options for physical activity and healthy eating more accessible for our students. Together, we can halt the course of the epidemic for the health and well-being of our children and our future. Together we can help make Chicago the healthiest city in our nation.

To find out how you can participate in our efforts to improve student health or to share your own efforts, please contact us at HealthyChicago@cityofchicago.org.

Sincerely,

A handwritten signature in black ink, appearing to read "Bechara Choucair".

Bechara Choucair, M.D.
Commissioner
Chicago Department of Public Health

A handwritten signature in black ink, appearing to read "Barbara Byrd-Bennett".

Barbara Byrd-Bennett
Chief Executive Officer
Chicago Public Schools

EXECUTIVE SUMMARY

Childhood obesity has more than tripled over the past three decades in the United States. Compared to children at a healthy weight, children who are overweight or obese have a higher risk of developing cardiovascular disease, type 2 diabetes, and other physical and psychological ailments. These factors can decrease life span and impact quality of life. The causes of the problem are complex. Obesity is related to an individual's biology and behaviors, but is also impacted by family and household factors, the surrounding community and institutions, and society in general.

This report provides estimates of the prevalence of overweight and obesity in the Chicago Public Schools (CPS) student population. Not only does this help us understand where we stand when it comes to obesity, but also serves in developing community- and school-based interventions to combat the epidemic. Studies conducted over the past decade have shown that Chicago youths are deeply affected by the obesity epidemic, and the results of this analysis validate those findings.

CPS estimates that its student population is made up of 87% low-income households, with a race-ethnicity composition of approximately 45% Hispanic and 42% non-Hispanic black students. We assessed over 88,000 de-identified student physical exam records of students enrolled in kindergarten, sixth grade, and ninth grade in the 2010-11 school year. The overall prevalence of obesity for the three grades was 25%. Obesity prevalence was higher in sixth graders (29%) and ninth graders (25%) than in kindergartners (20%).

These estimates are higher than national averages for similarly-aged youths. However, there is substantial variation across the school district. Consistent with national trends, at all three grade-levels the prevalence of obesity in Hispanic and non-Hispanic black students was higher than in non-Hispanic whites and non-Hispanic Asian or Pacific Islanders. By community area, rates were as low as 13% in students residing in Lincoln Park (home to a predominantly white, higher-income population) and as high as 33% in those living in South Lawndale (a predominantly Hispanic, lower-income population).

Our assessment found that one in five CPS kindergartners is obese. This highlights the importance of obesity prevention efforts being initiated at very young ages, but also supports the conclusion that more young Chicago children are at a healthy weight than in recent years. In studies conducted by the Consortium to Lower Obesity in Chicago Children (CLOCC), the prevalence of obesity in kindergarten-aged students in Chicago was estimated to be 24% in 2003 and 22% in 2008. This reduction was among the first evidence of declining childhood obesity rates in large cities. The obesity prevalence estimate of 20% in the 2010-11 CPS kindergarten cohort suggests that the downward trend continues in Chicago.

Our approach to combating obesity in Chicago mirrors the priorities outlined in a consensus report released by the Institute of Medicine in 2012 that identifies five critical areas or environments for change: 1) environments for physical activity; 2) food and beverage environments; 3) message environments; 4) health care and work environments; and 5) school environments. These priorities are reflected in the activities of the Chicago Department of Public Health (CDPH) and the CPS Office of Student Health and Wellness.

Healthy Chicago is the City's first-ever comprehensive plan for public health. Obesity prevention is one of the 12 priority areas for action. A major component is *Healthy Places*, a partnership between CDPH and CLOCC to implement sustainable policies and environmental changes to combat obesity. Initiatives underway include the expansion of programs that make healthy foods more readily available to residents of all Chicago neighborhoods, the establishment of nutrition, physical activity and screen time standards for children in child care settings, and neighborhood assessments to assist in defining policies that will make Chicago's parks easier and safer to access by foot or bike.

As part of *Healthy Places*, CPS has adopted school meals that meet or exceed the gold standard established by the United States Department of Agriculture. Individual schools are also engaged in meeting the certification requirements of the HealthierUS School Challenge (HUSSC), a key component of First Lady Michelle Obama's Let's Move initiative. HUSSC certification reflects a school-wide commitment to student wellness through student access to healthy food at school, (including school meals, celebrations and fund raising), nutrition education and physical activity.

BACKGROUND

Childhood obesity has more than tripled over the past three decades in the United States. Compared to those at a healthy weight, children with excess body fat have a higher risk of developing cardiovascular disease, type 2 diabetes, and other physical and psychological ailments that decrease quality of life and shorten life span. Nationally 30% of all children and adolescents are overweight or obese. The prevalence of obesity among youth is 17%, accounting for 12.5 million individuals, with rates varying across age groups, gender, income levels, and race-ethnicities.¹ For example, among adolescent boys, the prevalence of obesity is significantly higher in Mexican-Americans (27%) than in non-Hispanic whites (17%). Among adolescent girls, non-Hispanic blacks have an obesity prevalence nearly double that of non-Hispanic whites (29% vs. 15%, respectively).² Both white and black youths living in poverty are at higher risk of obesity than children of the same age, gender and race from higher-income households.³

Studies conducted over the past decade suggest that Chicago children are deeply affected by the obesity epidemic. A review of the school physical exam records of students aged 3-5 years in 2002-03 revealed an estimated obesity prevalence of 24%, more than double the national estimate at the time for similarly-aged children.⁴ Around the same period, a door-to-door health survey undertaken in six Chicago community areas found that 56% of the 2-12 year olds in Roseland were obese, with prevalence estimates of 48%, 46%, 42%, and 34% in Humboldt Park, North Lawndale, West Town, and South Lawndale, respectively. “To our knowledge,” the investigators concluded, “such elevated proportions of pediatric obesity have never before been documented.”⁵ More recently, a 2008 study found obesity prevalence in Chicago sixth graders to be at 28%, about nine percentage points higher than the national estimate for similarly-aged children.⁶

While public health monitoring systems have long been in place to understand and inform interventions in response to acute disease emergencies, childhood body mass index (BMI) surveillance is not as well-established. Data on the percentage of students who are overweight or obese in a school district can be useful for program and policy planning, advocacy efforts, and evaluation.⁷ In 2003, Arkansas became the first state to mandate BMI screening of public school students. Several states select a sample from particular grades, schools or districts for screening, or measure students as part of physical education classes. For example, California collects data

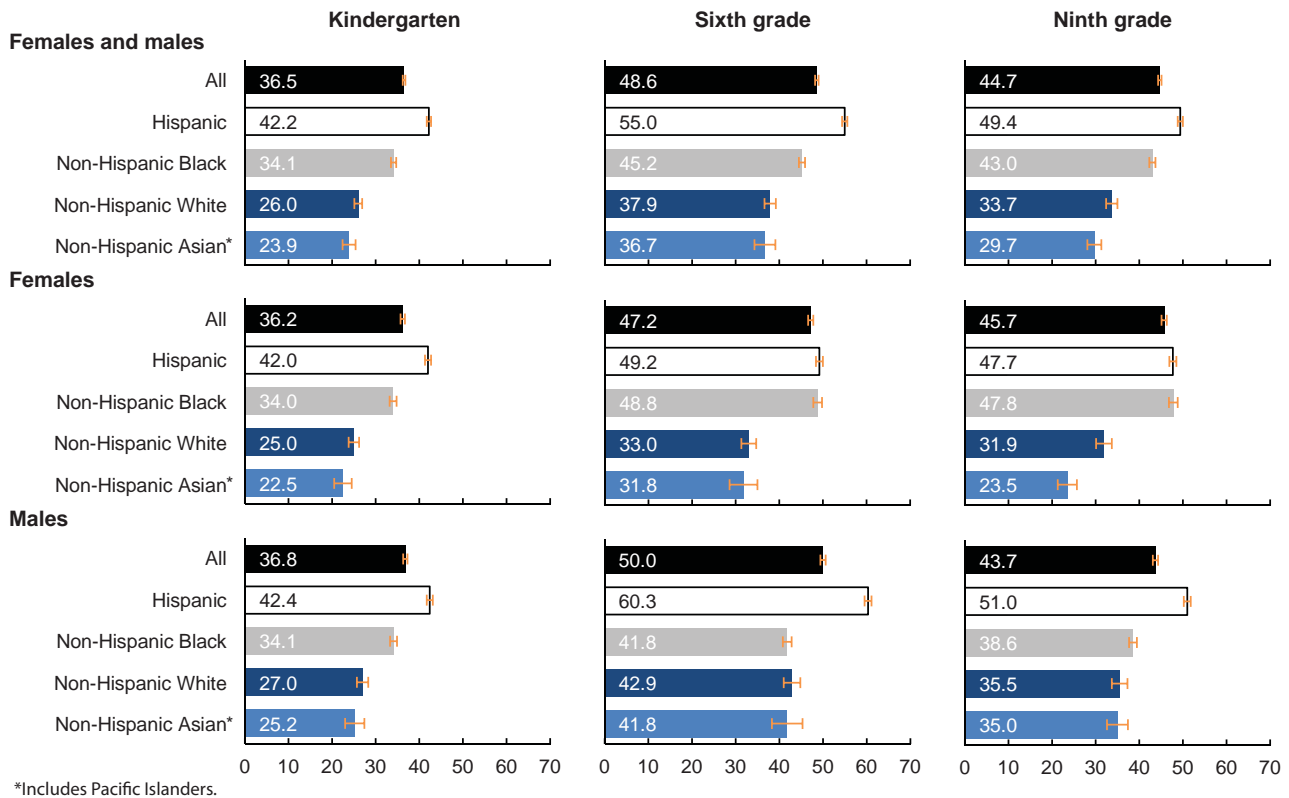
on all students in the fifth, seventh, and ninth grades using a series of fitness tests that measure aerobic capacity, body composition, and muscular strength. As of 2010, approximately 30 states had proposed or enacted BMI surveillance regulations or laws, and about two-thirds were implementing them.⁸ New York City’s Department of Education initiated the annual BMI measurement of public school students in kindergarten through twelfth grade as part of its physical education programming, and has collaborated with the local department of public health in analyses and interventions for the past several years.⁹ Effective in 2005, Illinois Public Act 093-0966 authorizes the Illinois Department of Public Health to collect and analyze BMI data from schools, but at present, a surveillance system has not been established.¹⁰

In recognition of the need for aggressive intervention to combat obesity in Chicago, Chicago Public Schools (CPS) and the Chicago Department of Public Health (CDPH) have entered into a five-year intergovernmental agreement beginning in 2011 to develop community- and school-based interventions that are informed by ongoing analyses of student health data. Under this agreement CPS and CDPH have shared data, conducted analyses, and convened to interpret findings and develop complementary interventions. This brief report establishes baseline prevalence estimates for overweight and obesity by demographic group and community area, and highlights the interventions that CPS, CDPH, and community partners have launched in response.

APPROACH

A detailed description of materials and methods is provided in Appendix 1. To establish the estimates, we used de-identified student physical exam information. This information is recorded by healthcare providers on paper forms that students then submit to their schools. Subsequently, the data are entered by staff at each school into IMPACT SIM, a web-based student information management system operated and maintained by CPS. BMI calculation in children and adolescents requires all of the following data: date of birth, sex, height, weight, and date of measurement. Using the definitions of the United States Centers for Disease Control and Prevention (CDC), obesity is defined in youths as BMI equal to or greater than the 95th percentile on the sex-specific CDC BMI-for-age growth charts; between the 85th and 95th percentiles, an individual is classified as overweight. In this report, “overweight or obese” refers to BMI equal to or greater than the 85th percentile.

Figure 1. Adjusted estimates of overweight or obesity prevalence among Chicago Public Schools students in grades kindergarten, 6, and 9, by sex and race-ethnicity, 2010-11 school year. Orange bars denote 95% confidence limits (i.e., the margin of error associated with each estimate).



The analysis was based on records of CPS students enrolled in kindergarten, sixth grade, or ninth grade in the 2010-11 school year for whom recent, valid, and complete height and weight measurements were available. To account for the potential unequal representation of demographic subgroups in the set of analyzed records, statistical adjustments were made. The percentages in this report reflect adjusted, or “weighted,” estimates.

FINDINGS

The records of 88,527 students in kindergarten, sixth grade, and ninth grade from 672 traditional and charter schools were included in the assessment. Roughly 44% were identified as Hispanic, 42% as non-Hispanic black, 9% as non-Hispanic white, and 3% as non-Hispanic Asian or Pacific Islander. Recent, valid, and complete height and weight measurements were available for 59,794 (67.5%) records.

Overweight or Obesity

The overall prevalence of overweight or obesity for these three grade levels was 43.3%. Consistent with childhood growth patterns and trends seen in national data, overweight or obesity prevalence was higher among sixth graders (48.6%) and ninth graders (44.7%) than in kindergartners (36.5%). Among demographic subgroups, overweight or obesity prevalence estimates varied substantially across each grade, sex, and race-ethnicity category (Figure 1 and Appendix 2). For example, 60.3% of Hispanic male sixth graders were overweight or obese while 22.5% of non-Hispanic Asian or Pacific Islander female kindergartners were overweight or obese. An analysis of overweight or obesity prevalence by community area of residence also revealed disparities, with estimates ranging from 21.4% in Edison Park to 52.3% in South Lawndale (Figure 2 and Appendix 3).

Figure 2. Estimates of overweight or obesity prevalence among Chicago Public Schools students in grades kindergarten, 6, and 9, adjusted for non-response and standardized to District-wide grade-level enrollment proportions, by community area of residence, 2010-11 school year.

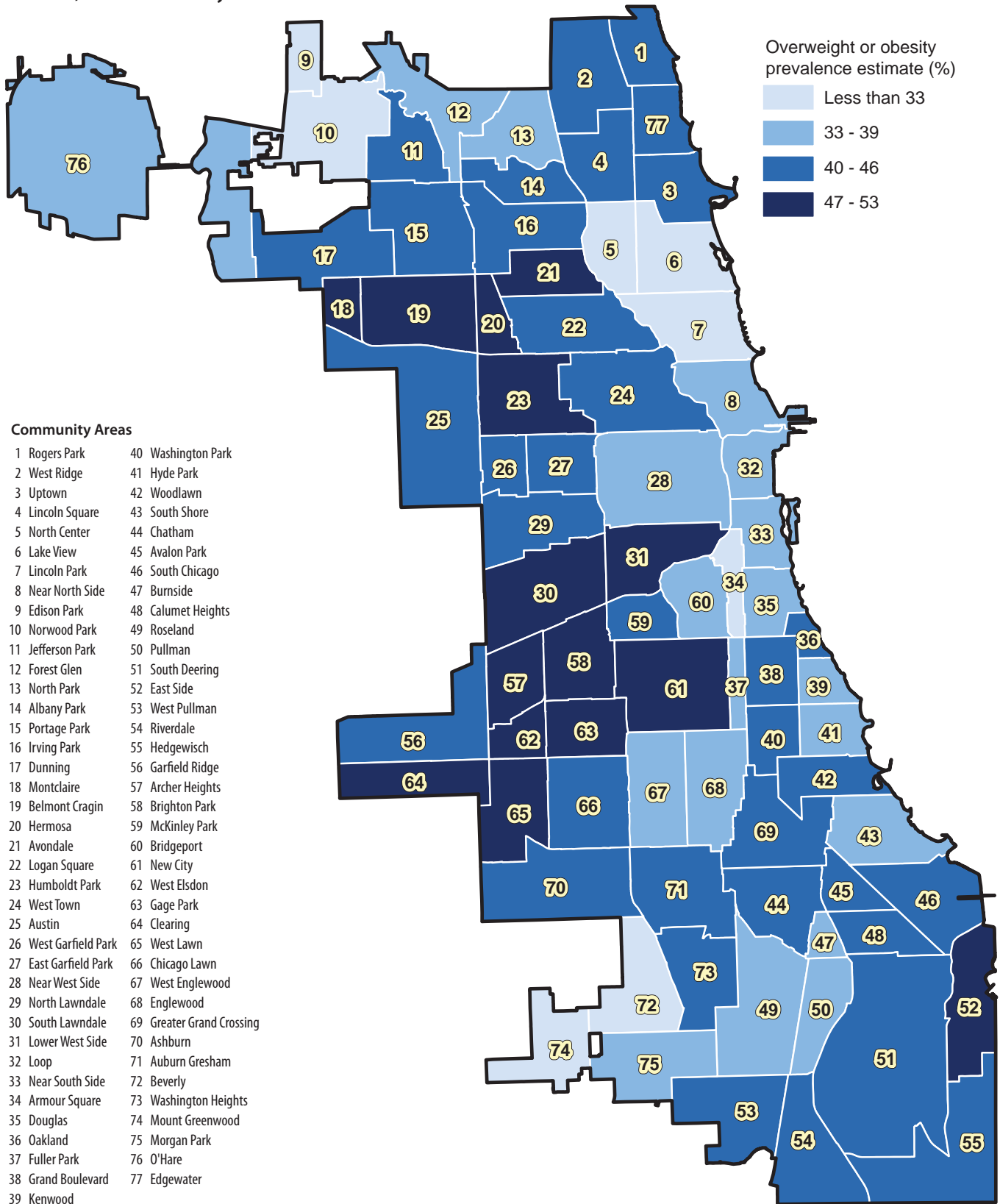
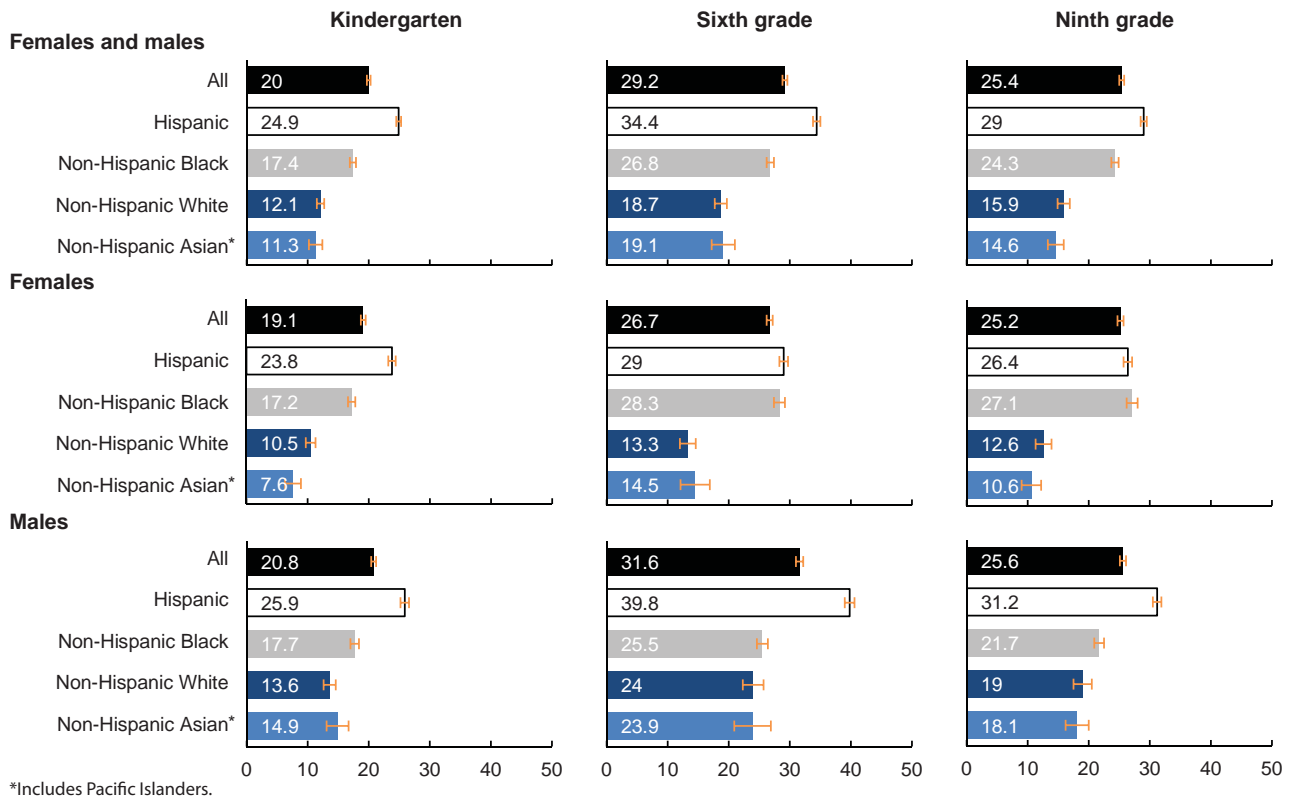


Figure 3. Adjusted estimates of obesity prevalence among Chicago Public Schools students in grades kindergarten, 6, and 9, by sex and race-ethnicity, 2010-11 school year. Orange bars denote 95% confidence limits (i.e., the margin of error associated with each estimate).



Obesity

The overall prevalence of obesity for the three grades was 24.9%. Obesity prevalence was higher in sixth graders (29.2%) and ninth graders (25.4%) than in kindergartners (20.0%). By demographic subgroup, estimates ranged from 7.6% of non-Hispanic Asian or Pacific Islander female kindergartners to 39.8% of Hispanic male sixth graders (Figure 3 and Appendix 2). By community area, obesity estimates were as low as 12.7% in Lincoln Park and as high as 32.9% in South Lawndale (Figure 4 and Appendix 3).

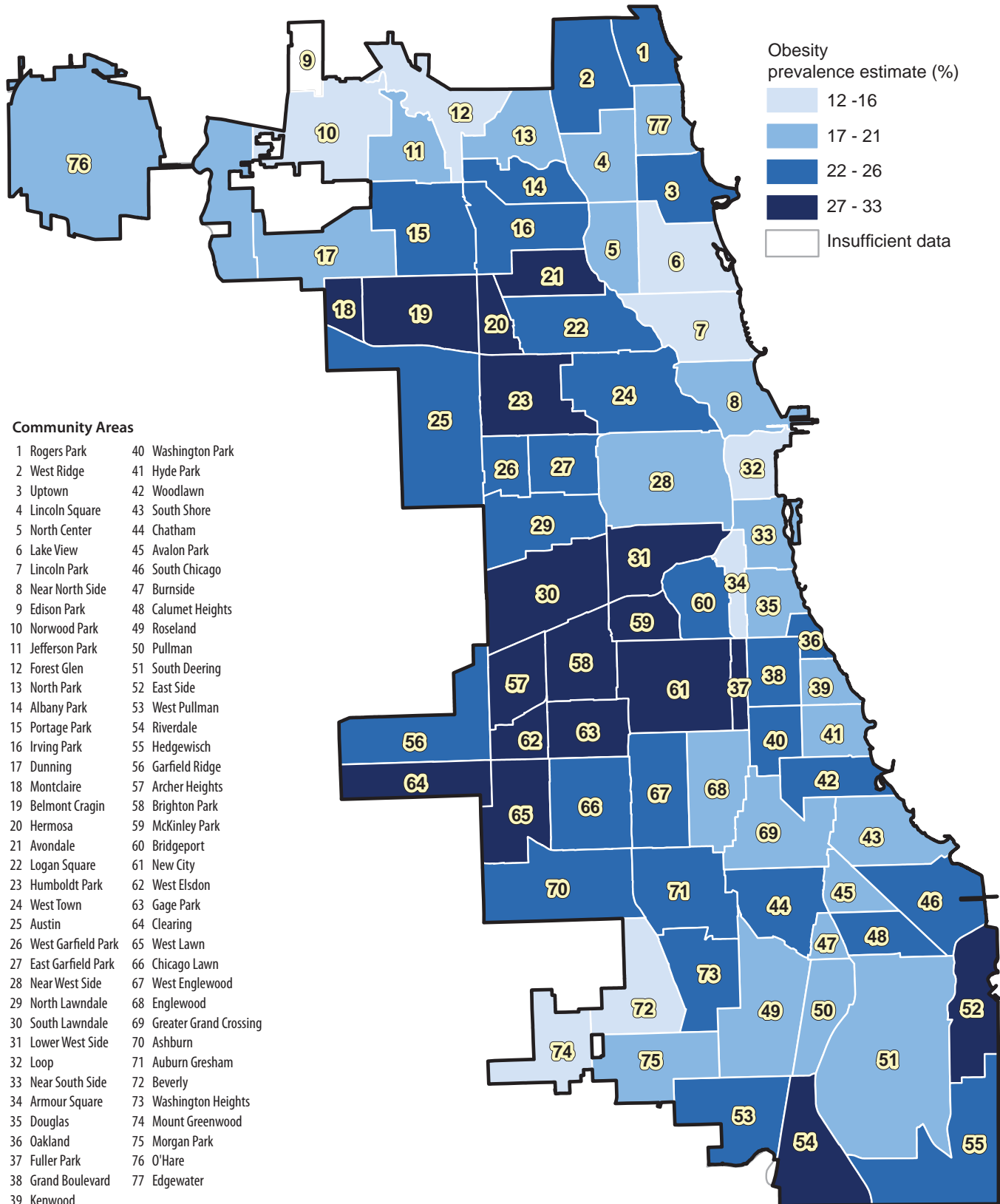
CONCLUSIONS

One in four CPS kindergartners, sixth graders, and ninth graders is obese. Although there are no published national obesity estimates that directly correspond to the age groups that compose these grade levels, our findings verify that CPS students are deeply affected by the obesity epidemic. According to the 2009-10 National Health and Nutrition Examination Survey (NHANES), 12.1% of 2-5 year olds are obese (compared to 20.0% of CPS kindergartners), 18.0% of 6-11

year olds are obese (compared to 29.2% of CPS sixth graders), and 18.4% of 12-19 year olds are obese (compared to 25.4% of CPS ninth graders).¹⁰ These discrepancies are explained in part by the fact that the attributes that place a child or adolescent at high risk for obesity, such as coming from a low-income household or being Hispanic or African-American, are prevalent in the CPS student population. Stratified by age and race-ethnicity, the NHANES data mirror the patterns identified in CPS.

The importance of obesity prevention at very young ages is underscored by the fact that one in five kindergartners begins his or her CPS career obese. Despite the finding that CPS kindergartners' obesity rate continues to exceed national estimates, the 20% estimate obtained for the 2010-11 cohort is lower than what was found in 2003 (24%) and 2008 (22%).⁶ This is consistent with a national trend showing that the prevalence of obesity appears to have stabilized nationally among preschool and school-aged children.⁹ However, the 29.2% estimate obtained for 2010-11 sixth graders is slightly higher than the 2008 estimate of 28% for Chicago sixth graders.⁶

Figure 4. Estimates of obesity prevalence among Chicago Public Schools students in grades kindergarten, 6, and 9, adjusted for non-response and standardized to District-wide grade-level enrollment proportions, by community area of residence, 2010-11 school year.



INTERVENTIONS

The results from this assessment establish baselines for obesity prevention and control initiatives that CPS, CDPH and their partners have launched in response to the obesity epidemic. The findings and supplemental analyses will inform decisions about needs, assets, and resource allocation in relation to both school networks and Chicago neighborhoods. In a consensus report released by the Institute of Medicine (IOM) in 2012, an expert committee reviewed almost 800 previously published recommendations and strategies related to obesity prevention and identified five critical areas or environments for change: 1) environments for physical activity; 2) food and beverage environments; 3) message environments; 4) health care and work environments; and 5) school environments.¹² The IOM's emphasis on policies and environments is reflected in the establishment of CDPH's *Healthy Chicago* public health agenda, the *Healthy CPS* agenda and Office of Student Health and Wellness activities, and CDPH's *Healthy Places* partnership with the Consortium to Lower Obesity in Chicago Children (CLOCC).

Healthy Chicago

Released in August 2011, *Healthy Chicago* is the first-ever comprehensive plan for public health put forth by the City.¹³ Mayor Emanuel originally called for the formation of an agenda in his transition report and *Healthy Chicago* now serves as a blueprint for a focused approach by CDPH to implement policies and system changes to transform the health of the city over the next five years. Obesity prevention is one of the 12 prioritized activities of the Department, and a major component is *Healthy Places*, a partnership between CDPH and CLOCC to implement sustainable policies and environmental changes to combat obesity.¹⁴ Over the past year,

- The Chicago Park District unveiled a new vending policy, requiring Park District vending machines to be stocked with healthy snacks. The new nutritional standards include limitations on calories, sodium, fat and sugar per serving. In addition, the City recently implemented a contract that will provide healthier vending options in all machines in City-owned or operated buildings.
- The Chicago City Council passed an ordinance in September 2011 amending the Chicago Zoning Code to more clearly define and regulate urban agriculture uses.
- Child care standards were issued by the Chicago Board of Health providing guidance for nutrition, physical activity and screen time for children in child care settings. The standards have been imposed by the Chicago Department of Family and Support Services on all of its Head Start, Early Head Start and child care centers, which impact more than 20,000 Chicago children.
- In collaboration with the Chicago Department of Housing and Economic Development, CDPH is supporting the launch of an entrepreneurial venture to fund Healthy Produce Carts as a means to increase the availability of fruits and vegetables to Chicago communities, including those with limited access to fresh produce.
- The City received commitments from grocers to make available fresh fruit and vegetables in 18 new stores and 18 retrofitted stores located in low-access areas by 2014. Also, five new farmers markets opened in June, 2012 in West side neighborhoods that have limited grocery options. The farmers markets are a result of partnerships between the City of Chicago and several organizations, including Kraft Foods and Safeway Foundation, each donating \$75,000 to cover the costs of opening and maintaining the markets for the next five years. The markets will accept LINK cards and provide access to fresh and healthy foods.
- With Blue Cross and Blue Shield support, CDPH began implementing PlayStreets in neighborhoods across the City in August, 2012. The goal of PlayStreets is to promote health and wellness by increasing access to safe play spaces for children and adults in Chicago, and replace sedentary activity with play and physical activity.

Healthy CPS

The *Healthy CPS* agenda parallels CDPH's *Healthy Chicago*, and is spearheaded by the CPS Office of Student Health and Wellness (OSHW). The newly-created Chief Health Officer position directs OSHW, reports to both the CPS and CDPH administrations, and is tasked with developing and implementing *Healthy CPS* and removing health-related barriers for learning by advancing health promotion, health education, health policy and direct services in CPS.

OSHW has initiated a variety of high-impact policy, systems and environmental change strategies that build school capacity to positively influence their wellness environments.

CPS has demonstrated its commitment to promoting student health through promotion of the United States Department of Agriculture's (USDA) HealthierUS School Challenge (HUSSC), rigorous policy creation and implementation, student engagement programming, support for physical activity and physical education (PE), and resource allocation among schools.

CPS has a history of supporting student health and wellness, as evidenced by a healthy vending policy passed in 2004, a Local School Wellness Policy regarding nutrition and physical activity in 2006, and more recently, the adoption of school meals that meet or exceed the gold standard established by the USDA. In an effort to support the district's ongoing commitment to student health, CPS has undertaken efforts to assist schools in becoming certified for the HUSSC, a key component of First Lady Michelle Obama's Let's Move initiative.¹⁵ HUSSC certification reflects a school-wide commitment to student wellness through student access to healthy food at school (including school meals, celebrations and fundraising), nutrition education and physical activity. By December 2012, 70 schools were certified for the HUSSC, with an additional 75 pending approval by the USDA (Figure 5).

The HUSSC serves as an implementation strategy to help schools meet the new policies targeting obesity prevention and health and wellness promotion. In October 2012, the Chicago Board of Education (CBOE) passed an updated Local School Wellness Policy that requires the establishment of School Wellness Teams at all schools, ensures health-optimizing PE programming, prohibits the use of food or physical activity (e.g., participation in recess) as a reward or punishment, and requires recess in all elementary schools.

In November 2012, the CBOE approved the Healthy Snack and Beverage Policy intended to ensure that any snack or drink available to students throughout the school day is of high nutritional value (not including the school meals program, which is addressed by the Local School Wellness Policy). This policy requires all foods and beverages sold outside federally reimbursable meals meet rigorous nutrition standards. The policy strengthens the district's previous vending machine standards, encourages schools to adopt healthy school fundraisers and promote healthy celebrations, and prohibits distributing food as a reward or withholding it as a punishment. The policy also prohibits the sale of unhealthy food items by independent vendors on school property.

Collaboration for effective policy implementation with community partners is crucial due to limited capacity, expertise, and funding at the school level. Therefore, OSHW has developed a process for vetting community partners that provide health-related programming to schools. This process is necessary to ensure that health programming is aligned to new policy guidelines, research-based, equitably distributed, and targeted to student needs. The partner vetting process is being undertaken in conjunction with the HUSSC application process to ensure schools have access to high quality resources promoting healthful environments where students can excel academically. The new vetting process will include curriculum review and allow CPS to facilitate partnerships between schools with the greatest need for wellness programming and partners who are qualified and eager to provide it.

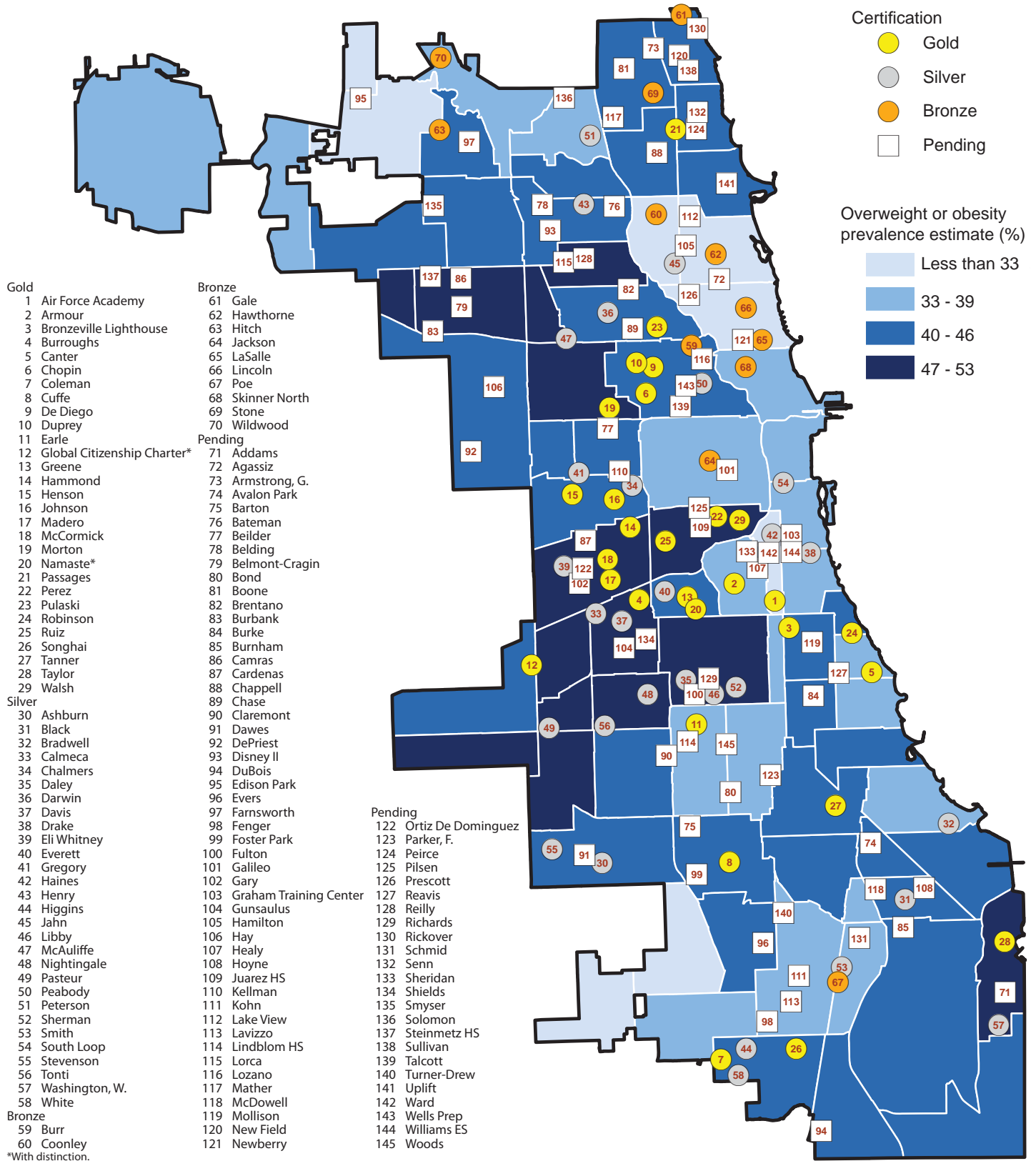
In addition, OSHW is working to increase the quality and quantity of PE students receive to ensure that all students have access to health-optimizing PE. Specifically, OSHW is working with a group of highly qualified PE teachers (called the PE Leadership Team) to develop a scope and sequence, curriculum, assessments, and ongoing professional development for PE teachers. The collaboration between OSHW and the PE Leadership Team will help guide initiatives to improve and build upon the PE program in CPS.

Finally, in 2013, under a new federal grant, CPS and its partners will implement several additional policy, systems and environmental strategies designed to further improve the health of all CPS students.

NEXT STEPS

This report is an initial overview of the CPS-CDPH collaborative approach to reverse the trajectory of the obesity epidemic in Chicago youth. The prevalence estimates presented are expected to provide evidence for the design and implementation of interventions that positively alter policies and environments in schools, neighborhoods, and the City as a whole. Over the next five years, CPS and CDPH plan to repeat the assessment annually, and to use the findings to evaluate initiatives, as well as better understand patterns and trends. Topics under consideration for future analyses include the relationship between obesity and environments (e.g., park or grocery store accessibility, neighborhood safety) and the impact of school- and community-based wellness interventions and policies.

Figure 5. U.S. Department of Agriculture HealthierUS School Challenge Certification as of December 2012 with prevalence of overweight or obesity among Chicago Public Schools Students in grades kindergarten, 6, and 9, adjusted for non-response and standardized to District-wide grade-level enrollment proportions, by community area of residence.



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APPENDIX 1: MATERIALS AND METHODS

DATA SOURCE

The source of the data elements is the Illinois Child Health Examination form.¹ CPS requires that this form be completed and turned in by October 15 of the school year for students:

- Entering preschool and kindergarten up to age 6 (physical exam and lead screen)
- Entering the State of Illinois for the first time at any grade level
- Entering kindergarten, sixth grade, or ninth grade (ages 5, 11, and 15 for ungraded programs).²

Information from paper forms are entered by staff (e.g., nurses, clerical staff) at each school into IMPACT SIM, a web-based student information management system operated and maintained by CPS.³ Although heights and weight are expected to be measured by a healthcare professional, equipment and methods (e.g., removal of shoes or clothing, use of self-reported information) are not standardized across the student population. The physical exam form is signed by a healthcare provider, but students or their family members participate in the completion of it, and are in possession of it prior to submitting it to the school.

DATA REVIEW AND PREPARATION FOR ANALYSIS

Use of IMPACT SIM across CPS was standard practice at the time these data were compiled. However, IMPACT SIM did not have a mechanism to prevent the entry of erroneous or inconsistent data, and audits and corrections of data from the physical exam unrelated to vaccination are not systematic. For example, although there are two distinct data elements for height in feet and height in inches, entry errors include the reversing of feet and inches (e.g., 10'4") and centimeter measurements. (e.g., "181 cm"). These errors were corrected in the analysis dataset, and recommendations were provided about enhancing the standardization of collection of these data elements in IMPACT SIM. Record completeness varied by school. Certain schools were under-represented in the analyses.

The age of the student at the time of measurement was calculated in months and used in calculations as a number with four decimal places. An alternative method is to count only the months of life completed at the time of measurement (i.e., a whole number that would almost always be less than the number with four decimal places). Use of the alternative methodology would in most cases result in slightly higher BMI values and BMI-for-age percentiles.

BMI AND PERCENTILE CALCULATION

To calculate BMI and percentiles for each student as well as to flag height and weight values that were biologically implausible, CDC methodology and SAS programs were used.⁴ BMI calculation in children and adolescents requires the following data: date of birth, sex, height, weight, and the date these measurements were taken. If any of these elements are missing or implausible, an individual's BMI cannot be calculated.⁵

The analyses described in this document refer to "response" and "non-response." "Response" refers to a record pertaining to a student enrolled in kindergarten, sixth grade, or ninth grade in the 2010-11 school year that was included in the analyses because it had valid and complete data sufficient for BMI calculation, and reflected height and weight measurements obtained in 2009, 2010, or 2011. The records of students enrolled in kindergarten, sixth grade, or ninth grade in the 2010-11 school year for which data were invalid or insufficient to calculate BMI, or which contained measurements obtained prior to 2009, are classified as "non-response."

Obesity was defined as equal to or greater than the 95th percentile on the CDC BMI-for-age growth charts (for either girls or boys). Between the 85th and 95th percentiles, an individual is classified as overweight. In this report, "overweight or obese" refers to BMI equal to or greater than the 85th percentile.⁶

OVERWEIGHT OR OBESITY AND OBESITY PREVALENCE ESTIMATION

Demographic Estimates

Crude estimates and estimates adjusted for non-response were calculated for the three grade levels and for sex and race-ethnicity subgroups within each grade level. The method used to adjust for non-response was logistic regression.⁷ The independent variables included in the logistic regression model were sex, grade level, free-or-reduced meal enrollment (yes or no), and race-ethnicity (categorized as Hispanic, non-Hispanic black, and non-Hispanic, non-black). For each domain, respondent weights were ratio-adjusted so they summed to the total number of students (respondents and non-respondents) within the domain. For each estimate, 95% confidence limits were calculated and a finite population correction was applied.

By demographic subgroup, respondent counts ranged from 290 to 20,958 (median, 4,014), response rates ranged from 57.8% to 77.4% (median, 70.6%). Differences between crude and adjusted estimates ranged from 0 to 0.3 percentage points (median, 0) for obesity, and from 0 to 0.4 percentage points (median, 0.1) for overweight or obesity.

Community Area Estimates

To generate estimates based on community area of residence, the dataset with weight adjustments determined through logistic regression modeling was used, with the records of kindergarten, sixth, and ninth graders pooled. One additional step was introduced to standardize the estimates by calibrating the three grade levels to reflect the proportions of students in these grades across the entire school district. The approach and SAS code of Zheng was applied, using standardization weights of 0.32293 for kindergarten, 0.32870 for sixth grade, and 0.34836 for ninth grade.⁸

By community area, respondent counts ranged from 69 to 2,845 (median, 596), and response rates ranged from 32.9% to 89.3% (median, 67.8%). Differences between crude and standardized estimates ranged from 0 to 1.9 percentage points (median, 0.3) for obesity, and from 0 to 2.9 percentage points (median, 0.4) for overweight or obesity.

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Appendix 2. Adjusted estimates of overweight and obesity prevalence among Chicago Public Schools students in grades kindergarten, 6, and 9, by sex and race-ethnicity, 2010-11 school year.

Demographic Group	Overweight or obesity					
	Kindergarten		Sixth grade		Ninth grade	
	Adjusted estimate (%)	Margin of error (+/-)	Adjusted estimate (%)	Margin of error (+/-)	Adjusted estimate (%)	Margin of error (+/-)
Females and males						
All	36.5	0.3	48.6	0.4	44.7	0.4
Hispanic	42.2	0.5	55.0	0.6	49.4	0.6
Non-Hispanic black	34.1	0.6	45.2	0.7	43.0	0.7
Non-Hispanic white	26.0	0.9	37.9	1.3	33.7	1.3
Non-Hispanic Asian/PI	23.9	1.5	36.7	2.4	29.7	1.6
Females						
All	36.2	0.5	47.2	0.6	45.7	0.6
Hispanic	42.0	0.7	49.7	0.8	47.7	0.8
Non-Hispanic black	34.0	0.8	48.8	1.0	47.8	1.0
Non-Hispanic white	25.0	1.2	33.0	1.7	31.9	1.8
Non-Hispanic Asian/PI	22.5	2.0	31.8	3.2	23.5	2.2
Males						
All	36.8	0.5	50.0	0.6	43.7	0.6
Hispanic	42.4	0.7	60.3	0.8	51.0	0.8
Non-Hispanic black	34.1	0.8	41.8	1.0	38.5	0.9
Non-Hispanic white	27.0	1.3	42.9	1.9	35.5	1.8
Non-Hispanic Asian/PI	25.2	2.2	41.8	3.5	35.0	2.4
Demographic Group	Obesity					
	Kindergarten		Sixth grade		Ninth grade	
	Adjusted estimate (%)	Margin of error (+/-)	Adjusted estimate (%)	Margin of error (+/-)	Adjusted estimate (%)	Margin of error (+/-)
Females and males						
All	20.0	0.3	29.2	0.4	25.4	0.4
Hispanic	24.9	0.4	34.4	0.6	29.0	0.5
Non-Hispanic Black	17.4	0.5	26.8	0.6	24.3	0.6
Non-Hispanic White	12.1	0.6	18.7	1.0	15.9	1.0
Non-Hispanic Asian/PI	11.3	1.1	19.1	1.9	14.6	1.3
Females						
All	19.1	0.4	26.7	0.5	25.2	0.5
Hispanic	23.8	0.6	29.0	0.7	26.4	0.7
Non-Hispanic Black	17.2	0.6	28.3	0.9	27.1	0.9
Non-Hispanic White	10.5	0.8	13.3	1.3	12.6	1.3
Non-Hispanic Asian/PI	7.6	1.3	14.5	2.4	10.6	1.6
Males						
All	20.8	0.4	31.6	0.6	25.6	0.5
Hispanic	25.9	0.7	39.8	0.8	31.2	0.7
Non-Hispanic Black	17.7	0.7	25.5	0.9	21.7	0.8
Non-Hispanic White	13.6	1.0	24.0	1.7	19.0	1.5
Non-Hispanic Asian/PI	14.9	1.8	23.9	3.0	18.1	1.9

Appendix 3. Adjusted, standardized estimates of overweight and obesity prevalence for Chicago Public Schools students in grades kindergarten, 6, and 9, by community area of residence, 2010-11 school year.

Community Area		Obesity		Overweight or obesity		Community Area		Obesity		Overweight or obesity	
		Adjusted, standardized estimate (%)	Margin of error (+/-)	Adjusted, standardized estimate (%)	Margin of error (+/-)			Adjusted, standardized estimate (%)	Margin of error (+/-)	Adjusted, standardized estimate (%)	Margin of error (+/-)
1	Rogers Park	25.1	1.3	44.2	1.5	40	Washington Park	24.4	2.9	41.9	3.3
2	West Ridge	22.9	1.0	40.5	1.2	41	Hyde Park	16.7	3.0	34.5	3.8
3	Uptown	23.6	1.9	40.5	2.2	42	Woodlawn	22.9	2.4	40.8	2.8
4	Lincoln Square	21.5	1.4	41.4	1.6	43	South Shore	21.9	1.9	38.5	2.3
5	North Center	16.5	1.6	32.3	2.1	44	Chatham	26.8	2.6	44.2	2.9
6	Lake View	14.2	1.6	30.3	2.2	45	Avalon Park	21.3	3.4	42.2	4.1
7	Lincoln Park	12.7	1.6	26.1	2.0	46	South Chicago	23.6	1.8	43.4	2.1
8	Near North Side	21.4	2.3	39.7	2.8	47	Burnside	21.9	5.3	33.2	6.0
9	Edison Park*	.	.	21.4	5.6	48	Calumet Heights	23.9	2.8	40.6	3.1
10	Norwood Park	14.7	1.5	31.9	2.0	49	Roseland	21.4	1.5	38.1	1.7
11	Jefferson Park	21.8	1.8	42.5	2.1	50	Pullman	19.4	4.0	38.7	4.8
12	Forest Glen	15.5	2.0	35.8	2.6	51	South Deering	20.5	3.0	41.7	3.6
13	North Park	19.8	2.5	35.3	3.0	52	East Side	30.9	1.7	49.2	1.8
14	Albany Park	22.8	1.4	43.7	1.6	53	West Pullman	24.5	1.6	41.1	1.8
15	Portage Park	22.8	1.0	41.0	1.2	54	Riverdale	28.9	4.2	42.2	4.6
16	Irving Park	22.6	1.3	42.3	1.6	55	Hegewisch	22.6	3.7	45.1	4.5
17	Dunning	21.0	1.6	42.4	1.9	56	Garfield Ridge	23.0	2.9	42.7	3.3
18	Montclair	28.0	2.4	49.0	2.6	57	Archer Heights	29.8	2.3	48.9	2.5
19	Belmont Cragin	29.3	0.9	48.7	1.0	58	Brighton Park	27.7	1.1	48.0	1.2
20	Hermosa	31.3	1.6	50.4	1.8	59	McKinley Park	29.4	1.7	44.7	1.9
21	Avondale	28.5	1.3	48.4	1.5	60	Bridgeport	23.2	2.0	36.7	2.2
22	Logan Square	26.7	1.3	43.1	1.4	61	New City	27.7	1.3	48.2	1.5
23	Humboldt park	27.7	1.1	47.3	1.2	62	West Elsdon	28.5	1.8	48.9	2.0
24	West Town	25.2	1.4	43.8	1.6	63	Gage Park	29.8	1.1	48.6	1.2
25	Austin	25.4	0.9	44.1	1.0	64	Clearing	27.7	2.2	47.4	2.5
26	West Garfield Park	24.6	2.0	43.4	2.3	65	West Lawn	30.2	1.4	49.2	1.5
27	East Garfield Park	25.1	2.0	41.4	2.2	66	Chicago Lawn	26.8	1.5	45.8	1.7
28	Near West Side	20.3	1.8	37.5	2.1	67	West Englewood	22.6	1.4	39.4	1.6
29	North Lawndale	22.4	1.4	42.0	1.7	68	Englewood	20.9	1.5	36.7	1.8
30	South Lawndale	32.9	1.0	52.3	1.0	69	Gtr. Grand Crossing	21.0	1.8	40.0	2.2
31	Lower West Side	30.5	1.6	48.9	1.7	70	Ashburn	25.1	1.2	44.5	1.4
32	Loop	13.5	3.5	34.3	5.0	71	Auburn Gresham	25.2	1.5	42.5	1.7
33	Near South Side	20.2	3.3	37.2	3.9	72	Beverly	15.6	2.3	32.1	2.9
34	Armour Square	14.1	2.4	29.9	3.1	73	Washington Heights	23.3	1.8	41.7	2.1
35	Douglas	21.8	2.7	38.3	3.1	74	Mount Greenwood	12.9	1.9	29.5	2.5
36	Oakland	25.9	4.1	44.5	4.6	75	Morgan Park	19.3	2.4	39.6	3.0
37	Fuller Park	29.0	6.2	37.4	6.6	76	O'Hare	20.9	7.8	36.0	9.2
38	Grand Boulevard	23.6	2.3	40.8	2.7	77	Edgewater	21.2	2.0	40.3	2.3
39	Kenwood	20.1	3.1	35.5	3.7						

*Due to small numbers, the data for Edison Park did not meet CDPH's threshold for statistical reliability (defined as a relative standard error of less than 0.25).