

This article illustrates one way that local health departments can obtain data on obesity quickly. Some may object that this approach will not draw a picture accurate enough to target public health efforts. But with obesity in children requiring an urgent response, many local health departments may find this an interesting model for estimating the scope of the problem.

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METHODOLOGY TO MEASURE LOCAL PREVALENCE OF OVERWEIGHT CHILDREN AND ADOLESCENTS IN ANNE ARUNDEL COUNTY, MARYLAND, 2006

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Childhood obesity represents a major public health concern in the United States. In the 2000 *Healthy People 2010* report, the goal was to reduce the proportion of children and adolescents who are overweight or obese to 5%.¹ At that time, the prevalence of overweight or obese children and adolescents in the U.S. was only 11%. However, more recent estimates from 2003–2004 show that the numbers have increased: 17.1% of U.S. children and adolescents are now considered overweight and 33.6% are either overweight or at risk of overweight.² In the 2003 National Survey of Children's Health, only 13.3% of 10- to 17-year-old-children in Maryland were overweight, although this estimate was based on parental reports rather than measurement data.³ Overweight is known to be associated with a number of health problems including an increased risk of developing type II diabetes and insulin resistance, hypertension, and hypercholesterolemia.⁴

Interventions to address this public health issue are urgently needed. Local data to drive local efforts are essential and, in many locations, still lacking. This problem prompted the Anne Arundel County (Maryland) Department of Health to look for an innovative way to better define the problem. The purpose of this article is to describe the methodology and results of a prospective provider-based county survey of children and adolescents to estimate the extent of the childhood overweight problem in Anne Arundel County.

INITIATIVE SUMMARY

Providers were asked to collect data on all children aged 2 to 19 years who came for an office visit during the study period. Primary-care providers serving children and adolescents were selected as a convenience sample of county practices based on prior participation in joint activities with the Department of Health, geographic diversity, and through intraprovider referral. Primary inclusion criteria for children and adolescents were age and residence in Anne Arundel County. Exclusion criteria included acute illness (e.g., too sick to stand on a scale or an acute condition such as vomiting/diarrhea that may affect weight), presence of a nonremovable orthopedic device (such as a cast), or pregnancy. To allow meaningful comparisons among regions or between genders, a sample size requirement of 350 per group was calculated, taking both α and β errors into account, for a total minimum sample size of 1,400 children. Using providers' estimates of their weekly patient loads, the study took place during four weeks to attain the calculated sample size.

Data collection took place during the summer to maximize visits for routine care in school-aged children and to decrease the potential error due to heavier cold-weather clothing. Site visits to provide study instructions, including proper height and weight measurement techniques, were attempted at all practices. Data collection began once instructions were understood and continued through August 18, 2006. Providers were instructed to record the following data: gender; age in years and months; weight to the nearest quarter-pound (with outer clothing and shoes removed); standing height to the nearest eighth-inch; zip code of primary residence; and visit type (well or sick visit). Decisions about sick- and well-visit designation were left to the individual providers to make.

Logbooks for data collection were provided to all participating office locations. No individual identifying information was collected. The Institutional Review Board (IRB) of the Maryland Department of Health

and Mental Hygiene reviewed the protocol and granted a waiver for informed consent. After the study period was completed, a brief questionnaire was sent to all participating providers to assess their experience with the study. One full-time staff equivalent conducted the study during a five-month period with minimal clerical support from drafting the proposal for the IRB to the final data analyses.

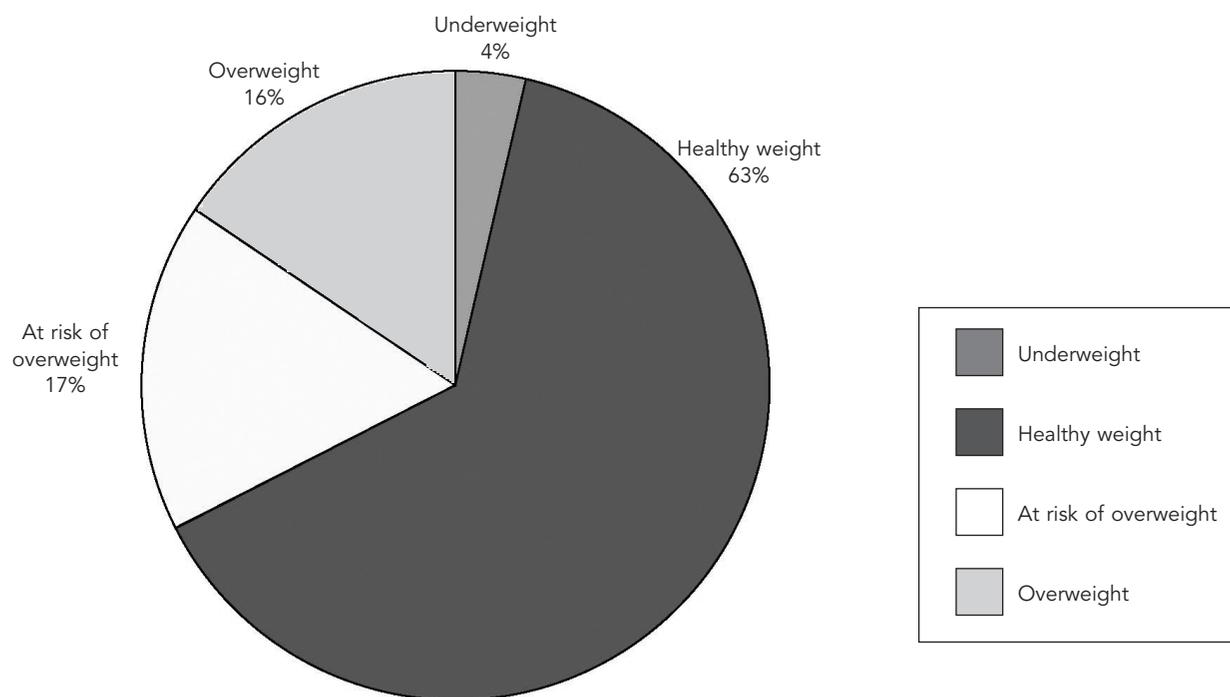
Using age, gender, weight, and height measurements, body mass index (BMI) was calculated in the NutChildren program of Epi Info™ Version 3.3.2.⁵ Weight categories were defined based on the gender-specific BMI-for-age growth charts from the Centers for Disease Control and Prevention (CDC).⁶ The “overweight” category was defined as the age- and gender-specific BMI at or above the 95th percentile. The “at risk of overweight” category was defined as the age- and gender-specific BMI at or above the 85th percentile but less than the 95th percentile. “Healthy” was defined as a BMI-for-age at or above the gender-specific fifth percentile but less than the 85th percentile, and “underweight” was defined as a BMI-for-age less than the gender-specific fifth percentile. Statistical analyses were performed using Epi Info Version 3.3.2.

OUTCOME AND EVALUATION

The survey took place between July 17 and August 18, 2006. Nineteen practices (20.9%) out of an estimated 91 family medicine and pediatric practices (identified through local hospital provider directories) were contacted. Fifteen agreed to participate in the study for a total of 21 data collection sites. All were private practices except for the Anne Arundel County Department of Health and one community health center. Seven of the sites were located in the central region of the county with five, six, and three sites in the northern, western, and southern regions, respectively. A total of 55 health-care providers were represented in the 21 provider sites. Data were collected on a total of 2,234 children. Information about total number of patient visits was not collected, so participation rates were not calculated. Cases were excluded if the child lived in a zip code outside of the county or if the child’s information was incomplete (no age, gender, height, or weight information). These exclusions left a total of 1,848 children eligible for analysis.

Among all the children and adolescents surveyed, 15.6% were considered to be overweight (95% CI 14.0, 17.4) (Figure). Overall, 32.6% of children and

Figure. Weight category of children aged 2–19 in Anne Arundel County, Maryland, 2006



adolescents (602/1,848) were either overweight or at risk of overweight (95% CI 30.5, 34.8). Of the 952 males, 34.9% were overweight or at risk of overweight, which was significantly different from 30.1% of females (Table). There was no significant difference among age groups in the prevalence of overweight or at risk of overweight. Children who were seen for a sick visit were more likely to be overweight or at risk of overweight (37.1%) when compared to those who were seen for a well visit (31.6%).

Based on the 2000 census data, approximately 1% (range, 1.2%–1.6%) of the child and adolescent population in each region was sampled, demonstrating that the study subjects were well distributed geographically.⁷ Analysis by county region showed that the northern region had a 20.0% prevalence of overweight—a significant difference when compared to the western (15.0%), central (11.5%), and southern (15.7%) regions ($p=0.04$). The northern region also had the highest prevalence of children who were either overweight or at risk of overweight (38.5%) compared to the rest of the county (30.3%).

Feedback questionnaires were sent to all 15 participating practice offices, and six were returned (response rate, 40%). All the providers indicated that the methodology was easy to incorporate into their practice, and five out of the six responders said they would be willing to participate in a similar study again.

DISCUSSION

The issue of obesity has become an important public health problem nationwide. Surveys such as the National Health and Nutrition Examination Survey (NHANES) have clearly demonstrated the rising prevalence of overweight and obesity among both children and adults in the United States.² In this local survey, 15.6% of children aged 2–19 years are overweight, which is lower than the 2003–2004 NHANES data that showed a 17.1% overweight prevalence. However, the combined prevalence of overweight and at risk of overweight appears to be similar between the local and national studies. Children between 2 and 5 years of age in the survey sample have a slightly higher overweight prevalence (16.5%) compared to the national sample (13.9%), which has implications for future interventions to target the toddler age group.

Regional differences in prevalence of overweight interestingly reflect the distribution of other health and socioeconomic indicators in the county (unpublished data). The northern region had the highest proportion of overweight children. It is a suburban area bordering on Maryland's Baltimore City and Baltimore County

Table. Prevalence of overweight or at risk of overweight in children aged 2–19 in Anne Arundel County, Maryland, by gender, age group, visit type, and region

	Number of overweight (percent)	Number of overweight or at risk of overweight (percent)
Gender		
Male (n=952)	168 (17.6)	332 (34.9)
Female (n=896)	121 (13.5)	270 (30.1)
	$p=0.08$	$p=0.03$
Age group		
2–5 years (n=496)	82 (16.5)	163 (32.9)
6–11 years (n=502)	81 (16.1)	172 (34.3)
12–19 years (n=850)	126 (14.8)	267 (31.4)
	$p=0.13$	$p=0.55$
Visit type		
Well (n=1,470)	222 (15.1)	464 (31.6)
Sick (n=364)	64 (17.6)	135 (37.1)
	$p=0.17$	$p=0.04$
County region		
Northern (n=519)	104 (20.0)	200 (38.5)
Western (n=579)	87 (15.0)	181 (31.3)
Central (n=513)	59 (11.5)	148 (28.8)
Southern (n=210)	33 (15.7)	66 (31.4)
	$p=0.04$	$p<0.01$

and has a lower average income compared to the rest of the county. Some studies have shown an inconsistent association between lower socioeconomic status and overweight in children.⁷ Other factors such as race and ethnicity, which were not captured in this survey, appear to demonstrate a stronger association.^{2,3,7} The geographic variation within the county is important because it will help prioritize and target future obesity prevention efforts in the community and schools.

By partnering with area providers, this straightforward approach can estimate the population prevalence of overweight among children and adolescents. Many practices commented on the relative ease with which they were able to incorporate the study into their busy clinic schedules because most of the requested information was routinely measured, although not usually collected in an easily retrievable format. The study provided an additional benefit of strengthening the Department of Health's relationship with private providers by engaging them in a discussion of the problem of childhood obesity and possible interventions.

Compared with BMI surveillance in the school setting, this approach is less labor-intensive and intrusive. It is also less stigmatizing because it is linked to health issues rather than to academic performance. It was

done in a confidential manner in a medical setting, without the need for individual consent, and also did not require school staff or class instruction time.

Limitations

The primary limitations of this study related to the amount and type of information that was collected. Data on racial/ethnic background, dietary history, and physical activity would have contributed another important dimension to the analyses. However, obtaining this information would have required parental involvement (to provide race designations and other history) and informed consent, adding a layer of difficulty for the providers.

This methodology had other limitations. Because the study took place in provider offices, study subjects showed that they had access to medical care. Therefore, they could have been healthier than the general population or sicker because they were seeking medical care. In addition, providers were selected based on a convenience sample of practices known to the Department of Health and intraprovider referral, so there may have been a bias due to an unrepresentative patient population. Nevertheless, practices drew from geographically and demographically diverse patient catchment areas, and the study subjects were well distributed among the four regions.

The time of year during which the study took place was chosen to take advantage of the greater number of well-child and sports physical visits that typically happen prior to the start of the school year. However, this timing could have led to an underestimation of the overall prevalence of overweight due to healthier or more athletic children going for visits.

In future surveys, instituting a more random practice selection based on the list of known practices and collecting more information about practice characteristics and patient population could improve the representativeness of the study population. In addition, expanding the amount of patient data collected would enhance our understanding of the determinants of overweight in the population.

CONCLUSION

As overweight and obesity issues reach the forefront of the community's consciousness, the Department of Health continues to push initiatives that address this problem at the local level. This survey will help guide future program development to target specific geographic areas in the county. This study will be repeated periodically to assess trends in the prevalence of childhood overweight and help monitor the outcomes of interventions.

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