


# Obesity in Pediatric Specialty Clinics: An Underestimated Comorbidity

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## Abstract

**Objectives.** (a) To examine the prevalence of obesity across 31 subspecialties in a tertiary care children's hospital and (b) to examine the percentage of obesity-specified diagnosis codes used for obese patient visits. **Methods.** We analyzed 48 479 youth aged 2 to 18 years in 31 outpatient subspecialty clinics at Seattle Children's Hospital between 2005 and 2007. Body mass index (BMI) percentiles were determined by age- and gender-adjusted BMI calculated from height/weight obtained at clinic visits. For obese patients, the percentage of diagnoses coded as obesity-specific (278.11, 278.01, 272.02, 783.1) were determined by evaluation of standard diagnostic codes. **Results.** Twenty-two of the 31 clinics had patient obesity rates greater than 15%. Analysis of International Classification of Diseases, 9th Revision, codes for obese patient visits as defined by BMI revealed only 2 clinics used obesity-specific codes for >5% of all diagnoses. **Conclusions.** Given the prevalence of obesity across all subspecialties, more recognition and resources are needed to screen, diagnosis, and provide coordinated services for healthy weight management.

## Keywords

obesity, overweight, body mass index (BMI), subspecialty care, diagnostic codes

## Introduction

The rate of childhood obesity is rapidly rising worldwide.<sup>1</sup> In the United States, prevalence of overweight and obese children and adolescents has tripled in the past 3 decades, and 25% to 30% of youth are classified as such.<sup>2–4</sup> Consequences of obesity in youth include a number of associated resource-intensive morbidities, such as cardiovascular disease, diabetes, hypertension, sleep apnea, and asthma. These conditions associated with obesity place a heavy burden on health care.<sup>5,6</sup> Recent reports show that prevalence of overweight/obese patients is significant across primary care and preventive care, outpatients at pediatric tertiary care hospitals, and in pediatric emergency departments.<sup>7–11</sup>

Multisector involvement to address the childhood obesity epidemic is widely recommended,<sup>12</sup> particularly given recently revised recommendations for obesity screening based on improved treatment options.<sup>13</sup> Pediatric subspecialty providers often serve as a primary provider for patients with chronic diseases and therefore may be an important source for obesity screening and treatment

support. Furthermore, recognition and treatment of obesity when it exists as a comorbid condition may aid treatment of primary diagnosis. Beyond generalized evidence of obesity rates, efforts to engage pediatric subspecialty providers in coordinated obesity screening and treatment may be aided by more specific data regarding obesity rates in these subspecialties. Evaluation of obesity prevalence solely based on ICD-9 (International Classification of Diseases, 9th Revision) codes may vastly underestimate obesity in tertiary care settings,<sup>14,15</sup> potentially lessening the awareness and prioritization of the need to address obesity in subspecialty outpatient settings. Whether this is because of nonrecognition, lack of time to address obesity within the specialist setting, or

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insurance coverage is unclear. Measured height/weight and recorded body mass index (BMI) has been shown to be a more accurate assessment of obesity prevalence in a hospital setting;<sup>16</sup> however, little reported data exist on obesity prevalence in subspecialty clinics based on this method.

Thus, our study proposes 2 main aims: (a) to describe the prevalence of obesity across all outpatient subspecialty clinics ( $n = 31$ ) at a tertiary care children's hospital using measured height/weight data to calculate BMI and BMI percentile and (b) to examine the percentage of obesity-specific and obesity-related ICD-9 codes used for obese patient visits.

## Patients and Methods

We analyzed data extracted from electronic medical records from all outpatient subspecialty clinics ( $n = 31$ ) at Seattle Children's Hospital, Seattle, Washington, between January 1, 2005 and December 31, 2007. The research protocol was approved by the Seattle Children's Institutional Review Board.

Body mass index percentiles were determined for youth aged 2 to 18 years by age- and gender-adjusted BMI data, calculated from height and weight data obtained at the most recent clinic visit. Overweight was defined as BMI between 85th and 94th percentile and obesity was defined as BMI  $\geq$ 95th percentile.

We then used encounter records (1 per visit) to explore obesity-specific and obesity-related ICD-9 codes for patients with BMI  $\geq$ 95th percentile. The median number of visits per patient was 2 (interquartile range = 1-4). Obesity-specific ICD-9 codes included obesity unspecified (278.00), morbid obesity (278.01), overweight (278.02), and abnormal weight gain (783.1). Obesity-related ICD-9 codes were derived from the American Academy of Pediatrics Coding Fact Sheet for Primary Care Physicians,<sup>17</sup> which includes codes such as hypertension, hypothyroidism, and type 2 diabetes, and counted separately for each clinic.

## Statistical Analysis

Descriptive analyses with univariate and bivariate frequencies were performed for clinic subspecialty type, demographic characteristics, and obesity status, and tested for significance using one-way analysis of variance and Fisher's exact tests. All analyses were conducted using Stata 10 SE software (Stata Corp, College Station, TX).

## Results

### Patient Characteristics

Overall, 48 479 youth were seen for 170 745 visits in the 31 subspecialty clinics between 2005 and 2007. The

patient sample did not include an additional 10% of records that were excluded from this analysis. Reasons for exclusion were missing height and/or weight measurements (6.7%), duplicate height measurements in which the data did not match (3.0%), and outliers with the BMI  $<10$  or  $>60$  (0.3%).

Included participants were 47.8% female; 24.9% 2 to 5 years old, 36.2% 6 to 11 years old, and 38.9% 12 to 18 years old (Table 1). There were no significant differences in rates of overweight by age-group. There was a gender difference in rates of overweight among the 12- to 18-year age-group (females greater than males,  $P < .01$ ). Obesity rates differed by age-groups ( $P < .001$ ) with higher obesity rates in older age-groups: 18.7% for 12- to 18-year-olds, 17.6% for 6- to 11-year-olds, and 13.5% for 2- to 5-year-olds. Males were more obese than females across all age-groups: 18.1% versus 15.8%,  $P < .001$  (Table 1).

### Rates of Obesity by Subspecialty Clinic

Overall, 15.9% of all patients seen were overweight and 17.0% were obese. Clinics with the highest rates of obesity, assessed from BMI data, were nutrition (33.7%), orthotics (23.0%), adolescent medicine (22.6%), pulmonary (22.1%), nephrology (20.7%), and psychiatry (20.2%; Table 2). Twenty-two of the 31 clinics (71%) had obesity rates  $>15\%$ .

### Rates of Obesity-Specific and Obesity-Related ICD-9 Codes Used for Obese Patient Visits by Subspecialty Clinic

Table 3 shows the percentage of obesity-specific and obesity-related ICD-9 codes used across all patient visits with BMI  $\geq$ 95th percentile. Nutrition (58.3%) and adolescent medicine (15.6%) were the only clinics with obesity-specific ICD-9 codes used for more than 5% of all visits among those who were obese by calculated BMI.

Compared with obesity-specific codes, there was higher use of obesity-related codes for comorbidities: 19 of 31 clinics had obesity-related diagnoses codes for more than 5% of diagnoses. Only 6 clinics had obesity-related diagnoses codes for more than 20% of diagnoses among obese patients: nutrition (83.3%), pulmonary (52.3%), adolescent medicine (30.8%), endocrinology (30.2%), gastroenterology (21.9%), and psychiatry (20.9%).

## Discussion

These results highlighted 2 main points: For one, the obesity rate across all subspecialty clinics at a tertiary

**Table 1.** Overweight and Obese Percentages by Age and Gender Overall (Top), and by Gender Stratified by Age Group (Bottom)

	Total N	Total %	Overweight (85th-94th Percentile)	Obese (≥95th Percentile)
<i>Total</i>	48,479	100.0	15.9%	17.0%
<i>Age-group (years)</i>				
2-5	12 077	24.9	16.2	13.5 <sup>a</sup>
6-11	17 536	36.2	15.8	17.6
12-18	18 866	38.9	15.9	18.7
<i>Gender</i>				
Female	23,116	47.8	16.3	15.8 <sup>a</sup>
Male	25,363	52.2	15.6	18.1
<i>Gender differences stratified by age-group</i>				
<i>Age 2-5 years</i>				
Female	5265	43.6	16.7	11.6 <sup>a</sup>
Male	6812	56.4	15.8	15.0
<i>Age 6-11 years</i>				
Female	8161	46.5	15.6	16.9 <sup>b</sup>
Male	9375	53.5	16.0	18.2
<i>Age 12-18 years</i>				
Female	9690	51.4	16.6 <sup>a</sup>	17.2 <sup>a</sup>
Male	9176	48.6	15.2	20.4

<sup>a</sup>P < .001.<sup>b</sup>P < .05.

care center was significant, as 22 of the 31 clinics (71%) had obesity rates greater than 15%. Although this aligns with general prevalence data reported previously,<sup>2-4,11</sup> this is the first study to our knowledge that details rates of obesity across multiple pediatric subspecialties. At Seattle Children's Hospital, nutrition and adolescent medicine clinics are expected to have high rates of obesity among patients, as they specifically accept referrals for patients with obesity-related issues. We would also expect to find high obesity rates in a subspecialty clinic that sees patients with comorbidities of obesity, such as endocrinology. This study also revealed significant rates of obesity in other subspecialties that might be less expected, such as dermatology and infectious disease. Even the clinics with the fewest number of obesity-related visits had obesity rates of greater than 10%. This study thus demonstrates the importance of subspecialty providers in addressing obesity issues, regardless of the underlying condition at hand.

Research focused on primary care has shown that providers struggle with how to manage and intervene in families with weight-related issues.<sup>18</sup> While many subspecialists may consider their primary focus to be managing chronic diseases other than obesity, the complications of obesity may affect 1 in 5 patients they see. A coordinated care model would include subspecialists in providing the skills and resources required to support

families and patients in initial screening, diagnosis, and obesity counseling. We believe subspecialists could significantly contribute to treatment of obesity through four main areas. First, diagnosis and discussion are critical regardless of a provider's subspecialty. In fact, a recent report using data from the National Health and Nutrition and Examination Survey showed that fewer than a quarter of all parents with overweight children report being told by a health care provider that their child was overweight.<sup>19</sup> Thus, acknowledgement by the subspecialist may contribute to seeking more treatment or attention to their overweight status. Second, a subspecialist provider could facilitate a productive, short conversation assessing the parent's confidence and readiness to change, as these conversations have been linked to actual confidence in making weight-related changes.<sup>20</sup> This could lead to a third point of action: offering referrals to pediatric obesity clinics and/or behavioral treatment options that are commonly available in tertiary settings and as recommended by the US Preventive Task Force.<sup>13</sup> Finally, subspecialists could also refer these families to their own subspecialty clinic nutritionists, where available, who may have more expertise with weight management issues. At a minimum, subspecialty providers should be aware of resources available and support families in healthy lifestyle promotion.

**Table 2.** Percentage of Visits With Body Mass Index (BMI)  $\geq 95\%$  as Determined by Calculated BMI in Subspecialty Clinics, Sorted in Descending Order by Obesity Visit Rate

Subspecialty Clinics	Total No. of Visits	% Obesity Visits
Nutrition	622	33.7
Orthotics	397	23.0
Adolescent medicine	7581	22.6
Pulmonary	2410	22.1
Nephrology	5425	20.7
Psychiatry	10 753	20.2
Endocrinology	14 694	19.9
Neurology	9242	19.3
Neurosurgery	4398	19.0
Otolaryngology	11 748	18.5
Orthopedics	19 879	18.3
Audiology	2553	18.2
Urology	6815	18.1
Genetics	1246	17.8
Ophthalmology	2337	17.4
Rehabilitation	1385	17.1
Neurodevelopment	4928	17.1
Hematology/oncology	29 705	16.7
Dermatology	1416	15.9
Plastic surgery	691	15.7
Infectious disease/virology	663	15.6
Pain management	626	15.5
Gastroenterology	3975	14.8
Rheumatology	8047	14.7
Immunology	438	14.7
Surgery	2950	13.7
Occupational therapy	681	13.6
Transplant	938	13.4
Dental	206	12.4
Cardiology	8252	12.0
Craniofacial	5743	11.6

The second main finding of this study supports previous work showing ICD-9 codes do not capture the extent of obesity as well as BMI data.<sup>14,15</sup> Our data show that only 2 of the 31 clinics reported obesity-specific diagnostic codes more than 5% among obese patient visits. Thus, a payment coding system based on ICD-9 codes can be assumed to grossly underestimate the prevalence of obesity in a tertiary care pediatric setting. Lack of ICD-9 coding for obesity or obesity-related conditions may be a result of several factors. One may be a lack of recognition of the obesity diagnosis, which is likely if providers are solely relying on visual cues for weight instead of calculated BMI percentile. Another may be awareness of the obesity diagnosis, but lack of time to address it, perception of futility in addressing it, or a

perception that it is not the subspecialty provider's responsibility. Last, it is possible that obesity is not coded as insurance coverage has often not been extended to provide treatment of obesity primarily or as a comorbid condition. Regardless of the reason, our data suggest that pediatric subspecialists rarely code for obesity in their diagnoses, and thus may be either underrecognizing obesity, not addressing the extent of obesity, or do not expect to be reimbursed for treatment of obesity.

This study was subject to limitations. This was a retrospective, medical record review study confined to chart review. Ten percent of the height/weight data were classified as **inaccurate or missing data**. However, to our knowledge this is the most comprehensive assessment of obesity, using measured height and weight to determine BMI, across pediatric tertiary care center subspecialties available. We also cannot account for the reasons that obesity was not coded in the ICD-9 diagnoses, or if there were patients where obesity was recognized and addressed but not coded in the ICD-9. Our findings give further credence to the need for assessment and treatment of obesity in multiple settings and for a more global view that includes outpatient pediatric subspecialty clinics as important partners in obesity screening, diagnosis, and treatment (or referral for treatment), rather than limiting obesity care only to primary care providers.

Further research is needed to determine cost impact of obesity comorbid conditions on other chronic conditions and to support the institution of payment systems that will account for obesity-related comorbidities. Obese children incur larger costs than those without obesity in both inpatient and outpatient settings,<sup>21-23</sup> and mathematical modeling has shown pediatric obesity to have significant economic consequences.<sup>24</sup> Further work is also needed to identify those specific primary conditions that are most seriously impacted by obesity and are likely to result in high future health resource utilization and impaired function of daily activities.

In conclusion, youth seen in subspecialty clinics had high rates of overweight and obesity. Assessment of obesity rates through ICD-9 codes alone would vastly underestimate the high prevalence of obesity across most subspecialties in pediatric tertiary care institutions. Our results suggest that there needs to be improved recognition of obesity in children in ambulatory specialty centers and a payment system that will support recognition, education, and treatment. Given the pervasive nature of obesity in our society, coordinated, comprehensive obesity prevention and management is needed in all levels of care, including tertiary care. Furthermore, treatment of obesity is essential to have optimal outcomes for primary chronic conditions; for example, addressing healthy eating and activity can

**Table 3.** Percentage of All Diagnoses With Obesity-Specific or Obesity-Related ICD-9 Codes for Patients With BMI  $\geq 95\%$ , by Subspecialty Clinic, Sorted in Descending Order by Rate of Obesity-Specific Diagnoses

Subspecialty Clinics	N (Diagnoses)	% of ICD-9 Codes		Top 3 Obesity-Related Comorbidities
		Obesity Specific <sup>a</sup>	Obesity Related <sup>b</sup>	
Nutrition <sup>c</sup>	48	58.3	83.3	Abnormal weight gain (58.3%), acquired acanthosis nigricans (10.4%), sleep disturbance (6.3%)
Adolescent medicine	2007	15.6	30.8	Abnormal weight gain (15.2%), polycystic ovaries (7.0%), anxiety disorder (2.4%)
Genetics	380	4.5	11.8	Obesity unspecified (3.9%), congenital malformation syndrome (3.2%), other symptoms concerning nutrition metabolism and development (1.8%)
Neurodevelopment	1744	2.7	6.7	Constipation (1.8%), obesity unspecified (1.7%), inadequate development unspecified (1.4%)
Pulmonary	599	2.5	52.3	Hypersomnia with sleep apnea unspecified (43.2%), sleep disturbance unspecified (4.0%), sleep apnea unspecified (1.3%)
Infectious disease/ virology	129	1.6	2.3	Abnormal weight gain (1.6%), malaise and fatigue not elsewhere classified (0.8%)
Nephrology	1974	1.2	9.0	Hypertension (6.9%), obesity unspecified (1.2%), sexual precocity not elsewhere classified (0.9%)
Orthotics	96	1.0	3.1	Juvenile osteochondrosis of lower extremity (2.1%), abnormal weight gain (1.0%)
Immunology	91	1.0	2.2	Abnormal weight gain (1.1%), congenital malformation syndrome (1.1%)
Endocrinology	3506	0.7	30.2	Precocious puberty (10%), type 2 diabetes, all types (6.3%), hyperlipidemia (3.9%)
Craniofacial	1232	0.4	4.0	Obstructive sleep apnea (1.5%), insomnia with sleep apnea (1.0%), hypersomnia with sleep apnea (0.7%)
Gastroenterology	666	0.2	21.9	Esophageal reflux (12.5%), constipation unspecified (6.0%), feeding problem (1.4%)
Urology	1761	0.2	3.6	Constipation unspecified (3.5%), obesity unspecified (0.11%), morbid obesity (0.06%)
Audiology	559	0.2	1.0	Trisomy 21 (0.7%), obesity unspecified (0.2%)
Psychiatry	3270	0.0	20.9	Depression (7.9%), generalized anxiety disorder (4.9%), anxiety state (4.5%)
Occupational therapy	119	0.0	16.8	Feeding problem (11.8%), inadequate development unspecified (4.2%), hypersomnia with sleep apnea unspecified (0.8%)
Dental	39	0.0	15.4	Gastroesophageal reflux (5.1%), other specified acquired hypothyroid (2.6%), precocious sexual development (2.6%)
Surgery	565	0.0	5.1	Gastroesophageal reflux (2.8%), feeding problem (1.9%), hypertrophy of breast (0.4%)
Otolaryngology	3508	0.0	3.2	Obstructive sleep apnea (1.5%), unspecified sleep disturbance (0.7%), Down syndrome and hypersomnia with sleep apnea unspecified (0.5% each)
Transplant	386	0.0	3.1	Feeding problem (1.8%), type 2 diabetes, gastroesophageal reflux, other chronic nonalcoholic liver, inadequate development unspecified, nonspecific elevation of levels (0.26% each)

(continued)



**Table 3. (continued)**

Subspecialty Clinics	N (Diagnoses)	% of ICD-9 Codes		Top 3 Obesity-Related Comorbidities
		Obesity Specific <sup>a</sup>	Obesity Related <sup>b</sup>	
Plastic surgery	163	0.0	2.5	Hypertrophy of breast (1.8%), inadequate development unspecified (0.6%)
Cardiology	1412	0.0	2.3	Hypertension unspecified (2.1%), obstructive sleep apnea (0.3%)
Ophthalmology	723	0.0	2.1	Down syndrome (1.4%), benign intracranial hypertension (0.7%)
Orthopedics	5308	0.0	2.0	Blounts disease (1.3%), juvenile osteochondrosis of lower extremity (0.5%), short stature (0.2%)
Pain management	261	0.0	1.5	Anxiety disorder (1.2%), depression unspecified (0.4%)
Neurology	2422	0.0	1.3	Inadequate development unspecified (0.7%), benign intracranial hypertension (0.6%)
Dermatology	295	0.0	1.0	Acquired acanthosis nigricans (1%)
Rheumatology	1667	0.0	0.1	Hypothyroidism and obesity unspecified (0.06% each)
Neurosurgery	1169	0.0	0.0	None listed
Rehabilitation	317	0.0	0.0	None listed
Hematology/ oncology	7301	0.0	0.0	None listed

Abbreviations: ICD-9, International Classification of Diseases, 9th Revision; BMI, body mass index.

<sup>a</sup>ICD-9 codes = 278.00, 278.01, 278.02, 278.1

<sup>b</sup>ICD-9 codes as listed in the American Academy of Pediatrics Coding Fact Sheet for Primary Care Physicians.<sup>17</sup>

<sup>c</sup>Data only available from June 2006 to December 2007.

benefit all health conditions. The failure to address obesity in this setting is likely to have long-term negative impact on outcomes and cost beyond current costs of chronic care.

### Declaration of Conflicting Interests

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### References

1. World Health Organization. *Obesity: Preventing and Managing the Global Epidemic*. Report of a WHO Consultation, Geneva, June 3-5, 1997. Geneva, Switzerland: World Health Organization; 1998.
2. Hedley AA, Ogden CL, Johnson CL, Carroll MD, Curtin LR, Flegal KM. Prevalence of overweight and obesity among U.S. children, adolescents and adults, 1999-2002. *JAMA*. 2004;291:2847-2858.
3. Ogden CL, Carroll MD, Flegal KM. Epidemiologic trends in overweight and obesity. *Endocrinol Metab Clin North Am*. 2003;32:741-760.
4. Strauss RS, Pollack HA. Epidemic increase in childhood overweight, 1986-1998. *JAMA*. 2001;286:2845-2848.
5. Hauck K, Hollingsworth B. The impact of severe obesity on hospital length of stay. *Med Care*. 2010;48:335-340.
6. Trasande L, Chatterjee S. The impact of obesity on health service utilization and costs in childhood. *Obesity*. 2009;17:1749-1754.
7. Huang J, Marin E, Yu H, et al. Prevalence of overweight, obesity, and associated diseases among outpatients in a public hospital. *South Med J*. 2003;96:558-562.
8. O'Connor J, Youde LS, Allen JR, Baur LA. Obesity and under-nutrition in a tertiary paediatric hospital. *J Paediatr Child Health*. 2004;40:299-304.
9. Pomerantz WJ, Timm NL, Gittelman MA. Injury patterns in obese versus nonobese children presenting to a pediatric emergency department. *Pediatrics*. 2010;125:681-685.
10. Patel AI, Madsen KA, Maselli JH, Cabana MD, Stafford RS, Hersch AL. Underdiagnosis of pediatric obesity during outpatient preventive care visits. *Acad Pediatr*. 2010;10:405-409.

11. Riley MR, Bass NM, Rosenthal P, Merriman RB. Underdiagnosis of pediatric obesity and underscreening for fatty liver disease and metabolic syndrome by pediatricians and pediatric subspecialists. *J Pediatr*. 2005;147:839-842.
12. Barlow SE. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. *Pediatrics*. 2007;120(suppl 4):S164-S192.
13. US Preventive Services Task Force, Barton M. Screening for obesity in children and adolescents: US Preventive Services Task Force recommendation statement. *Pediatrics*. 2010;125:361-367.
14. O'Brien SH, Holubkov R, Reis EC. Identification, evaluation, and management of obesity in an academic primary care center. *Pediatrics*. 2004;114:e154-e159.
15. Woo JG, Zeller MH, Wilson K, Inge T. Obesity identified by discharge ICD-9 codes underestimates the true prevalence of obesity in hospitalized children. *J Pediatr*. 2009;154:327-331.
16. Barlow SE. Databases and diagnosis of obesity: pitfalls and potential of using ICD-9 codes. *J Pediatr*. 2009;154:315-317.
17. American Academy of Pediatrics. *Obesity and Related Comorbidities: Coding Fact Sheet for Primary Care Pediatricians*. Chicago, IL: American Medical Association; 2006.
18. Jelalian E, Boergers J, Alday CS, Frank R. Survey of physician attitudes and practices related to pediatric obesity. *Clin Pediatr (Phila)*. 2003;42:235-245.
19. Perrin EM, Skinner AC, Steiner MJ. Parental recall of doctor communication of weight status: national trends from 1999 through 2008. *Arch Pediatr Adolesc Med*. 2012;166:317-322.
20. Taveras EM, Mitchell K, Gortmaker SL. Parental confidence in making overweight-related behavior changes. *Pediatrics*. 2009;124:151-158.
21. Hampl SE, Carroll CA, Simon SD, Sharma V. Resource utilization and expenditures for overweight and obese children. *Arch Pediatr Adolesc Med*. 2007;161:11-14.
22. Woolford SJ, Gebremariam A, Clark SJ, Davis MM. Incremental hospital charges associated with obesity as a secondary diagnosis in children. *Obesity*. 2007;15:1895-1901.
23. Janicke DM, Harman JS, Jamoom EW, Simon SL, Zhang J, Dumont-Driscoll M. The relationship among child weight status, psychosocial functioning, and pediatric health care expenditures in a medicaid population. *J Pediatr Psychol*. 2010;35:883-891.
24. Trasande L. How much should we invest in preventing childhood obesity? *Health Affairs*. 2010;29:372-378.