

INTERVENTIONS AND POLICIES TO PREVENT CHILDHOOD OBESITY AMONG VULNERABLE CHILDREN

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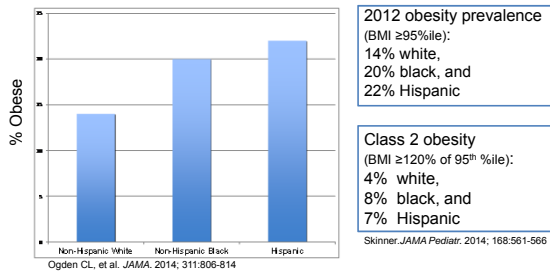
Key Points

- Racial/ethnic and socioeconomic disparities in obesity exist and may be widening
- Childhood obesity and its disparate impact on racial/ethnic minorities originate early in life
- Effective interventions starting early in life are needed to reduce obesity disparities
- Federal supplemental nutrition programs could serve as platforms to reduce obesity in racial/ethnic minority and low-income populations

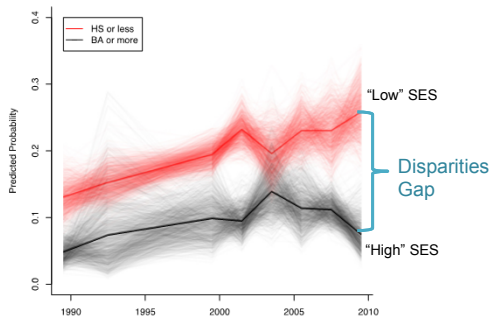
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Racial/ethnic disparities in childhood obesity exist, but do not mirror disparities in NAFLD



Increasing Socioeconomic Disparities in Obesity

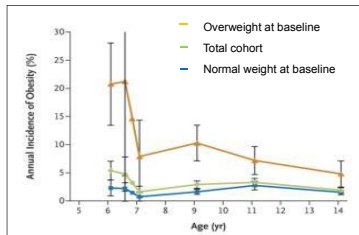


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Early life is a critical period in the development and prevention of childhood obesity

Annual incidence of obesity: Girls in ECLS-K



- 12% obese at Kindergarten entry
- Early age of obesity onset
- Kindergarten BMI%ile predicts 8th grade obesity
 - 50th → 6%
 - 85th → 25%
 - 95th → 47%
 - 99th → 72%

Cunningham SA et al. N Engl J Med 2014;370:403-411.

Latino children: longer duration and higher degree of excess weight compared to white counterparts?

- Fragile Families Well-Being Cohort
 - Age 3 years:
 - Hispanic children: higher odds of obesity.¹
 - Age 9 years
 - Mexican children: 2-3 fold higher odds obesity.²
- Early Childhood Longitudinal Study, Birth Cohort
 - Age 4 years:
 - Hispanic children: higher odds of obesity.³
 - At Kindergarten entry:
 - Latino children: higher odds of severe obesity.⁴

1. Whitaker 2006
2. Hamilton 2011

3. Kitsantas 2010
4. Flores 2013

Project Viva Pre-birth Cohort

Project Viva: Cohort of mother-offspring pairs in Eastern Massachusetts

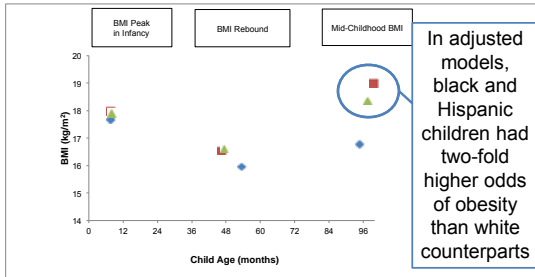


- In-person visits: Interviews, anthropometrics, bio-specimens
- Annual questionnaires, Clinical data

2128 mother-child dyads enrolled
1116 mid-childhood visit completed

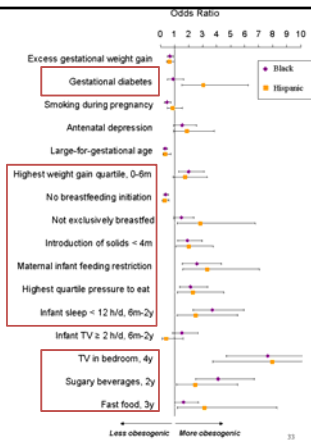
Woo Baidal JA, et al. Racial/ethnic differences in BMI trajectories and obesity among children of US-born and immigrant mothers.(2013)

Racial/ethnic differences in early childhood BMI characteristics



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Racial/ethnic differences exist in many early life risk factors for childhood obesity



Taveras, et al. *Pediatrics*; 2010

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Few Obesity Interventions Target Early Life

- Only 6 randomized-controlled interventions in children with overweight or obesity under age 6 years
- Multidisciplinary, intensive approaches that target multiple behaviors show most evidence for efficacy
- Few interventions include substantial proportions of racial/ethnic minority children

Foster. Acad Pediatr. 2014;15 (4):353-61

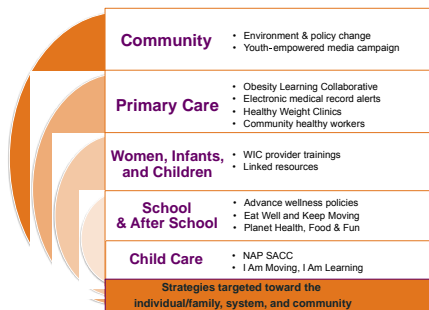
Multi-component strategies showing promise to reduce obesity in racial/ethnic minority children

- Behavioral targets:
 - Diet/family meals, sleep, active play, reduce screen time^{1,2,3}
 - Eliminate sugar-sweetened beverage (SSB) intake⁴
- Family, home, or community settings¹⁻⁴
- Provide food/beverages^{2,4}
- Motivational interviewing or health coaching¹⁻⁴

1. Haines, JAMA Pediatr. 2013; 1072
 2. Barkin, Pediatrics. 2012; 445
 3. Stark, Obesity. 2011; 134

4. Ebbeling, N Eng J Med. 2012;1407

MA-CORD: Community-clinical partnerships to reduce childhood obesity in low-income communities



Taveras EM, et al. Childhood Obes. 2015

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Special Supplemental Program for Women, Infants, and Children

WIC

- 4.7 million children under age 5 years
- 185% Federal Poverty Level
- Mandatory nutrition education
- 2009 Food Package
 - Low-fat dairy, whole grains
 - Fruit/vegetable vouchers
 - Limited 100% fruit juice

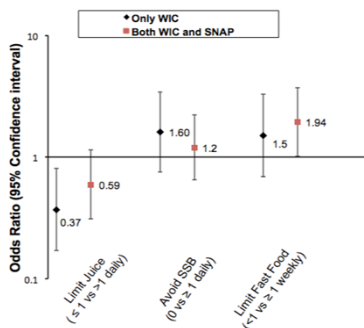
Supplemental Nutrition Assistance Program

SNAP

- 23 million households
- No age limit
- 130% Federal Poverty Level
- Education not mandatory
- Food Benefits
 - Most food items
 - No tobacco, alcohol
 - No hot/prepared foods

Limited information regarding participants' dietary habits

WIC, SNAP, and Childhood Obesity Prevention



- WIC-only: less likely to limit juice intake
- Both WIC and SNAP: more likely to limit fast food
- No differences in fruit, vegetable, or SSB intake

*Reference: Neither WIC nor SNAP (OR 1.00)
Adjusted for child age, sex, and race/ethnicity; parent education; household income; site.

Implications

- WIC and SNAP are platforms for childhood obesity prevention
- Opportunities exist in WIC and SNAP to improve childhood obesity prevention in low-income households

Healthy Hunger-Free Kids Act 2010

Previous Daily Requirements

Fruits and Vegetables Combined 1/2 to 1 cup <i>No specific types required</i>	Milk 1 cup <i>No fat or flavor restrictions</i>
Grains 1 oz (8–15 oz minimum per wk) <i>Whole grains "encouraged"</i>	Meat or Meat Alternative 1.5 to 2 oz (7.5–15 oz minimum per wk)

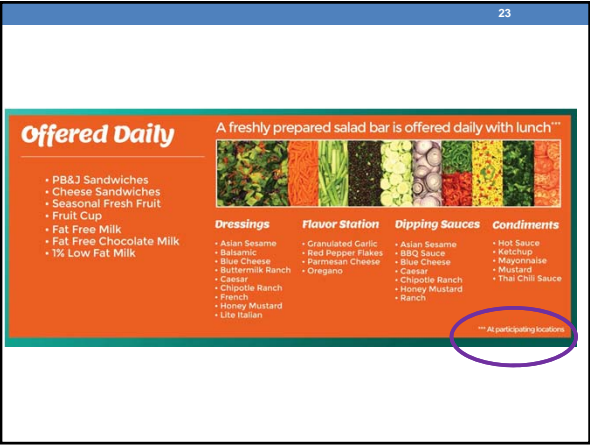
Current Daily Requirements

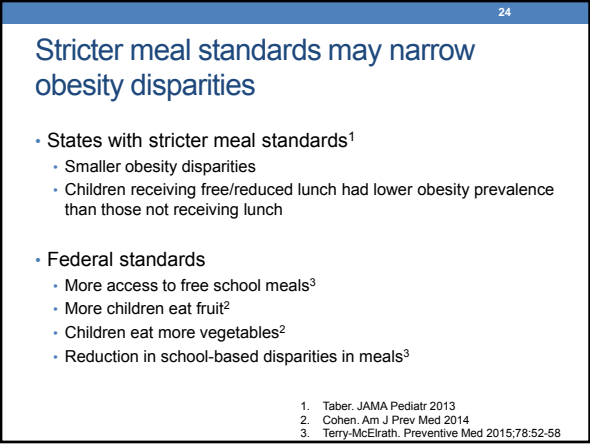
Fruits 1/2 to 1 cup	Vegetables 3/4 to 1 cup <i>Specific types required each wk</i>	Milk 1 cup <i>Must be fat-free (lowfat) or 2% fat (unflavored)</i>
Grains 1 to 2 oz (8–12 oz maximum per wk) <i>Whole grain-rich by July 2014</i>	Meat or Meat Alternative 1 to 2 oz (10–12 oz maximum per wk)	

- Calorie ranges for meal planning
- Trans fats limits
- Sodium limits


Woo Baidal. N Engl J Med. 2014;371:1862-5







Policy interventions: potential to increase health equity

- Broad population reach, sustainable
 - Potential cost-savings
- 
- Example: SSB excise tax of \$0.01 per ounce (all ages)
 - Per person BMI reduction: 0.08 over 1 year
 - Cost-effectiveness: \$3.16 per BMI reduction over 1 year
 - Health care-cost savings over 10 years: \$23.6 billion
 - Additional revenue: \$12.5 billion per year
 - Compared to bariatric surgery
 - Per person BMI reduction: 13.5 over 1 year
 - Cost-effectiveness: \$2,100 per BMI reduction over 1 year

Gortmaker et al. Am J Prev med 2015; 49:102-111

Take-home Messages

- Assess and address child weight status at every age
- Resources exist outside the clinical environment to support behavior change and weight loss
- Sign up for and respond to NASPGHAN Public Affairs and Advocacy Committee (PAAC) advisories



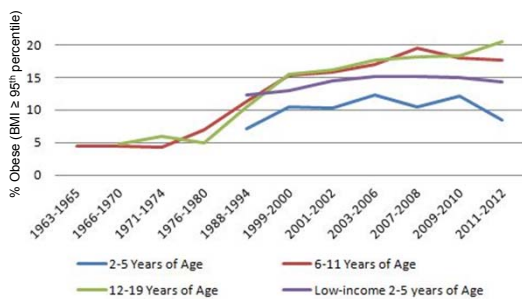
JAMA Pediatr. 2015;169(5):484-490. doi:10.1001/jamapediatrics.2014.3554
Published online March 16, 2015.

- Intrauterine determinants of obesity
- Definitions of excess infant weight and weight gain
- Valid measurements of infant behaviors
- Emerging risk factors: microbiome, epigenetics

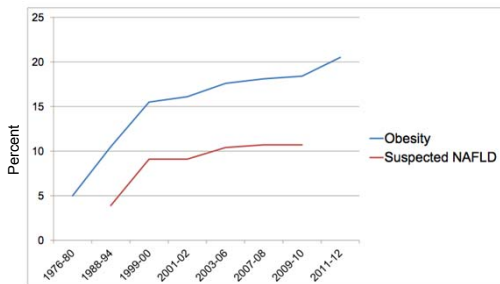
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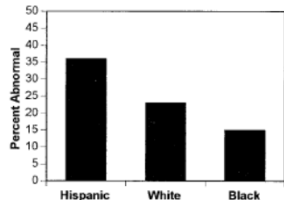
Obesity remains highly prevalent among all ages



Adolescent Obesity and NAFLD



Racial/ethnic differences in pediatric NAFLD



Hispanic/Latino and Asian children are disproportionately burdened by NAFLD

Schwimmer JB et al. Pediatrics 2006;118:1388-93

Louthan MV et al. J Pediatr Gastroenterol Nutr 2005;41:426-9

Neighborhood Disparities in Childhood Obesity



- NYC: Modest declines
 - 38% overweight or obese
- Washington Heights: Highest childhood obesity prevalence in NYC
 - 47% overweight or obese

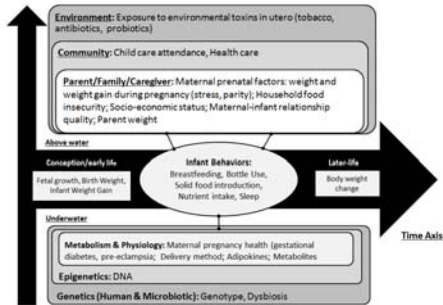
Sekhobo et al. Prev Chronic Dis 2014;11:140152
<http://nypost.com/2014/08/31/washington-heights-has-citys-fattest-schoolkids-see-data/>, accessed Sept 21, 2015

Life Course Approach



Modified from Glass and McAtee.

Multi-level Framework: Childhood Obesity Risk Factors



Modified from Glass and McAtee.

Project Viva Pre-birth Cohort

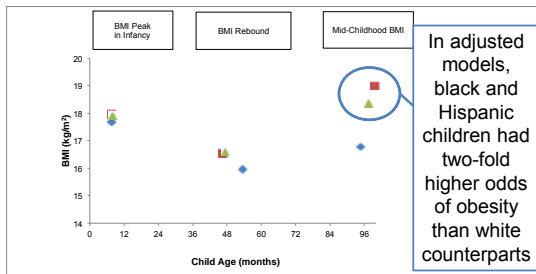
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Racial/ethnic differences in early childhood BMI characteristics



Woo Baidal JA, et al. Racial/ethnic differences in BMI trajectories and obesity among children of US-born and immigrant mothers (2013)

Parent/Family Characteristic	Pregnancy (n=17)	Infancy (n= 15)	Early Childhood (n= 17)
Mean Maternal Age, years	25.6	25.6	27.9
High School Graduate	76%	60%	71%
Language			
Spanish-only	53%	27%	18%
Either English or Spanish	47%	73%	76%
Mean Gestational Age, months	5.1	n/a	n/a
Mean Child Age, months	n/a	2.8	14.3

Woo Baidal et al. J Obes; Mar 2015

Pregnancy Health Perceptions

Coping with pregnancy may trump healthy eating and physical activity.

Weight extremes should be avoided during pregnancy

"I am not doing any physical activity because of laziness. Because before I was studying, I went back and forth on foot. And now that I'm done studying—and I say I'm not going to get out of bed."
(Pregnancy Group)

Woo Baidal et al. J Obes; Mar 2015

Influences on Infant and Child Risk Factors

Fear of infant hunger drives addition of bottles and solid foods

Beliefs on infant taste promote early solid foods and sugary beverage intake

Screen time is important for child development

"I give her juice, and she's also tried soda. They have to try everything... so she (learns) the taste of everything."
(Early Childhood Group)

"Those learning videos, so it's good because she watches them and then she learns more."
(Infancy Group)

Woo Baidal et al. J Obes; Mar 2015

Maternal Explanatory Factors for Childhood Obesity

Early life weight gain impacts health, but is unrelated to later life obesity

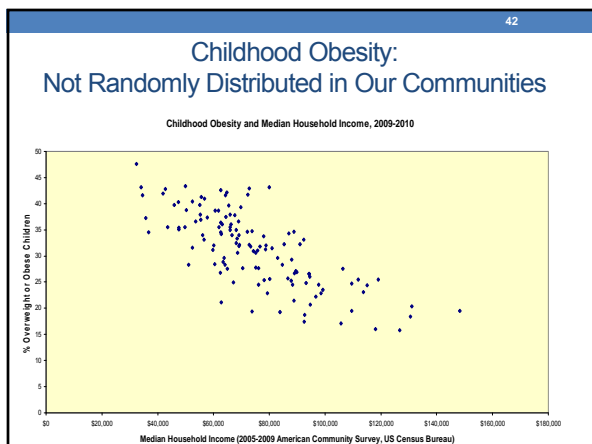
Overfeeding and early introduction of "adult" foods lead to childhood obesity

Woo Baidal et al. J Obes, Mar 2015

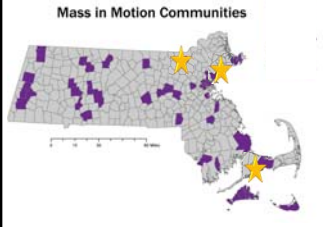
Suggested Intervention Strategies

- Group classes with other parents
- Faster access to health care provider for routine advice
- Multi-modal delivery of health information: Texting, Internet, Paper, Telephone
- Health coaching
- More frequent visits with Program for Women, Infants, and Children (WIC)
- Home visits
- Include fathers and extended family members

Woo Baidal et al. J Obes, Mar 2015
Criss et al. Matern Child Health J, Jun 2015



Setting: Massachusetts Childhood Obesity Research Demonstration Study (MA-CORD)



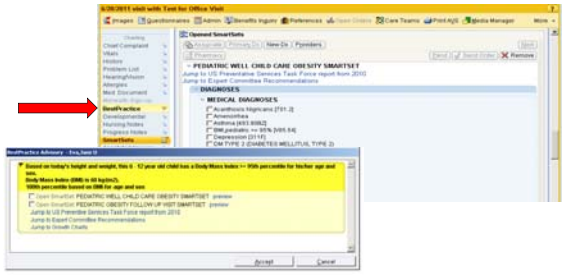
- 3 federally-qualified community health centers (2012-13)
- Age 2-12 years, any BMI
- In-person or telephone interviews
- Linked data from electronic medical record

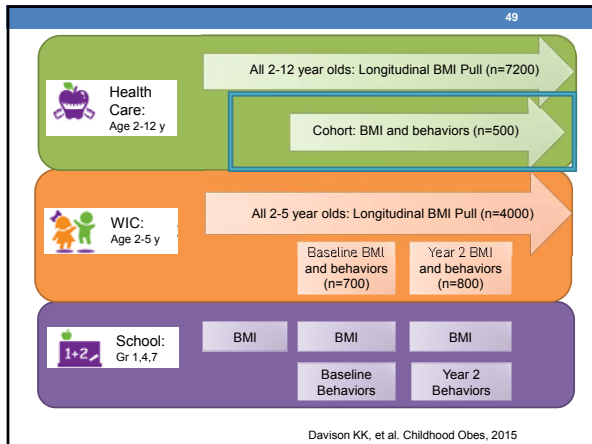
MA-CORD: 5 Target Behaviors

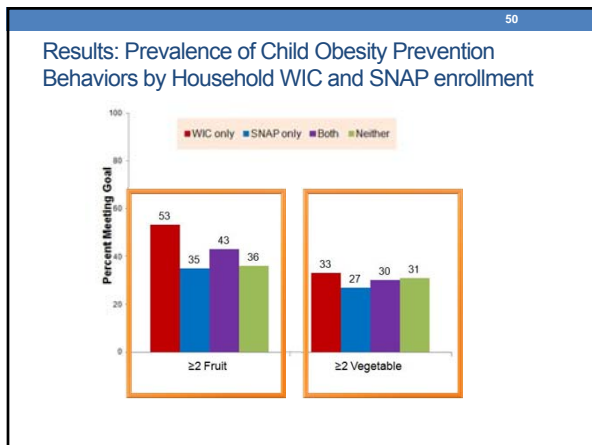
-  Decrease children's consumption of sugar-sweetened beverages
-  Increase children's moderate and vigorous physical activity
-  Decrease screen time and TVs in children's bedrooms
-  Substitution of empty-calories/nutrient poor foods with fruits and vegetables
-  Improve children's sleep quality and duration

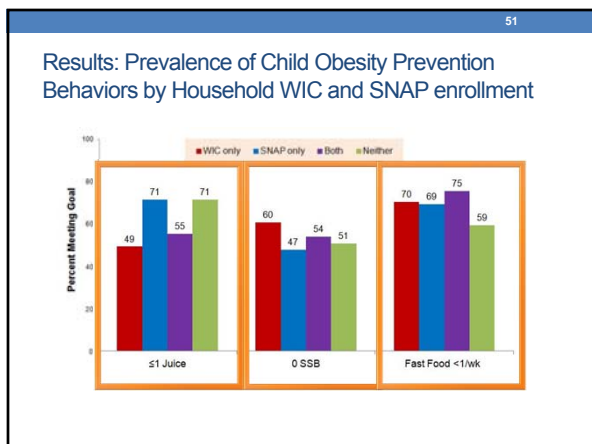
Point-of-Care Decision Alert Examples

If the patient's BMI ≥ 95th percentile, an alert was created









CHOICES

Intervention	Health care costs UK, \$ millions (UK)	Probability of net cost saving	Net costs UK, \$ millions (UK)	DALYs averted* (UK)	DALYs gained* (UK)	Net cost saved per \$ spent (UK)
Supplemented beverage intake (SB), all ages	-623,000 (-654,900, -591,300)	1.00	-623,000 (-654,900, -591,300)	301,000 (35,000, 587,000)	871,000 (342,000, 2,000,000)	\$55 (\$21, \$145)
Reduce tax subsidy of TV advertising (TV Ad)	-352 (\$81, -138)	1.00	-352 (-372, -332)	-	4,540 (1,750, 7,500)	\$38 (\$14, \$74)
Early care and education policy changes (ECE)	-852 (-134, -114)	0.95	-852 (-135, -114)	-	-	\$6 (-\$52, \$68)
Share policy for active physical advisors (Active PE)	-261 (-153, -89)	0.003	-261 (-170, 663, 827)	-	-	-

*DALYs were not reported for the SB intervention because significant benefits do not begin until ages > 35 years, so DALYs are averted for these childhood interventions within the 15-year time horizon of the study. For reasons of mortality and morbidity at ages < 15 years, DALYs were not reported for the TV Ad and ECE interventions. DALYs were not reported for the Active PE intervention because for subjects over the 20-year period will fall into the age range of < 15 years where DALYs are not defined.
 DALYs of cost per person per year: QALYs and DALYs per person per year: 18, 95% uncertainty interval
