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

In the past 12 months, I have had no relevant financial relationships with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial services discussed in this CME activity.
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Racial/ethnic disparities in childhood obesity exist, but do not mirror disparities in NAFLD

<table>
<thead>
<tr>
<th>Race</th>
<th>% Obesity</th>
<th>Class 2 Obesity</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>14%</td>
<td>4%</td>
</tr>
<tr>
<td>Black</td>
<td>20%</td>
<td>8%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>22%</td>
<td>7%</td>
</tr>
</tbody>
</table>

2012 obesity prevalence
(BMI ≥95th %ile): 14% white, 20% black, and 22% Hispanic

Increasing Socioeconomic Disparities in Obesity

Frederick CB, Swinburn K, Putnam RD. PNAS. 2014; 111(4):1338-42
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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%

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**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
  - Age 9 years
    - Mexican children: 2-3 fold higher odds obesity

- Early Childhood Longitudinal Study, Birth Cohort
  - Age 4 years:
    - Hispanic children: higher odds of obesity
  - At Kindergarten entry:
    - Latino children: higher odds of severe obesity

1. Whitaker 2006
2. Hamblin 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, biospecimens
- Annual questionnaires, Clinical data

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


Racial/ethnic differences in early childhood BMI characteristics

In adjusted models, black and Hispanic children had two-fold higher odds of obesity than white counterparts


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

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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

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

• Behavioral targets:
  • Diet/family meals, sleep, active play, reduce screen time\textsuperscript{1,2,3}
  • Eliminate sugar-sweetened beverage (SSB) intake\textsuperscript{4}

• Family, home, or community settings \textsuperscript{1-4}

• Provide food/beverages\textsuperscript{2,4}

• Motivational interviewing or health coaching\textsuperscript{1,4}

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**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
- Limited information regarding participants’ dietary habits

**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
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.

• 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

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

Calorie ranges for meal planning
Trans fats limits
Sodium limits

Stricter meal standards may narrow obesity disparities

- States with stricter meal standards
  - Smaller obesity disparities
  - Children receiving free/reduced lunch had lower obesity prevalence than those not receiving lunch

- Federal standards
  - More access to free school meals
  - More children eat fruit
  - Children eat more vegetables
  - Reduction in school-based disparities in meals

1. Taber. JAMA Pediatr 2013

http://www.schoolfoodnyc.org/schoolfood/MenusDailyDisplay.aspx
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


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

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

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


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

Life Course Approach

Modified from Glass and McAtee.
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In adjusted models, black and Hispanic children had two-fold higher odds of obesity than white counterparts
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 | | | |
Spanis-only | 53% | 27% | 18% |
Either English or Spanish activity | 47% | 73% | 76% |
Mean Gestational Age, months | 5.1 | n/a | n/a |
Mean Child Age, months | n/a | 2.8 | 14.3 |

"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)

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

"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)
Maternal Explanatory Factors for Childhood Obesity

“...and later when they start getting older they'll start knocking off some of the pounds.” (Infancy Group)

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

Childhood Obesity: Not Randomly Distributed in Our Communities
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
Clinical decision support (CDS) led to reductions in BMI – with and without coaching

Table 2: Changes in BMI and BMI Score From Initial Study Visit to 1-Year Follow-up by Study Arm

<table>
<thead>
<tr>
<th>Study Arm</th>
<th>Initial Study BMI</th>
<th>1-Year Follow-up</th>
<th>BMI Change</th>
<th>Unadjusted Differences</th>
<th>F Value</th>
<th>Adjusted Differences</th>
<th>F Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>25.8 (SD 3.1)</td>
<td>15.3 (SD 0.9)</td>
<td>-10.5</td>
<td>-1.64 (0.8 to -2.5)</td>
<td>.05</td>
<td>-1.64 (0.8 to -2.5)</td>
<td>.05</td>
</tr>
<tr>
<td>BMI + coaching</td>
<td>25.8 (SD 3.1)</td>
<td>14.9 (SD 0.9)</td>
<td>-10.9</td>
<td>-1.71 (0.8 to -2.5)</td>
<td>.05</td>
<td>-1.71 (0.8 to -2.5)</td>
<td>.05</td>
</tr>
<tr>
<td>CDS</td>
<td>26.5 (SD 3.1)</td>
<td>26.2 (SD 0.9)</td>
<td>-0.3</td>
<td>-0.05 (0.8 to -0.05)</td>
<td>.05</td>
<td>-0.05 (0.8 to -0.05)</td>
<td>.05</td>
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<tr>
<td>CDS + coaching</td>
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<td>.05</td>
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</tbody>
</table>

CDS + coaching with high fidelity to intervention protocol had greatest improvements in BMI (-0.53 kg/m² [95% CI: -1.01 to -0.04])


MiM Kids Materials

Community Health Worker

Comprehensive teen at B&G Club

Bring the whole family!
Results: Prevalence of Child Obesity Prevention Behaviors by Household WIC and SNAP enrollment

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<table>
<thead>
<tr>
<th>Action</th>
<th>Probability of Failure</th>
<th>Performance</th>
<th>Notional Value</th>
<th>Notional Value</th>
<th>Notional Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1</td>
<td>Low</td>
<td>High</td>
<td>$450,000,000</td>
<td>$300,000,000</td>
<td>$250,000,000</td>
</tr>
<tr>
<td>Option 2</td>
<td>Medium</td>
<td>Medium</td>
<td>$200,000,000</td>
<td>$150,000,000</td>
<td>$100,000,000</td>
</tr>
<tr>
<td>Option 3</td>
<td>High</td>
<td>Low</td>
<td>$50,000,000</td>
<td>$50,000,000</td>
<td>$50,000,000</td>
</tr>
</tbody>
</table>

*Note: The table above represents a simplified example of choices and performance metrics. Actual data may vary based on various factors.*