Trends in prevalence of childhood obesity in the US from 1963-2016

What’s changed from the 1960s-2020s
Obesogenic environment
Children ages 10-17

- 20.4% Obesity Rate
  - 4 of 51 Tennessee state rank

Adults

- 36.5% Obesity Rate
  - 5 of 51 Tennessee state rank

Adults with Diabetes

- 13.8% Obesity Rate
  - 4 of 51 Tennessee state rank

Adults with Hypertension

- 39.3% Obesity Rate
  - 4 of 51 Tennessee state rank
Obesity is associated with common chronic conditions

- Biological contributions
- Behavioral contributions
- Socio-cultural contributions
- Environmental contributions

Timing of Exposures and Duration of Exposure
Childhood Obesity as a Chronic Disease

• Obese children and adolescents are about 5 x more likely to be obese in adulthood than those who were not obese

  – 55% of obese children stay obese as adolescents
  – 80% of obese adolescents stay obese as adults
  – 70% will remain obese over age 30

Simmonds M et al Predicting adult obesity from childhood obesity. Obesity Reviews. 2016
Impact of Childhood Obesity: Healthcare Costs

• Health: **Childhood obesity** is estimated to cost $14 billion annually in direct health expenses. **In adults** the costs are between $147-210 billion/year. If the current prevalence continues, the cost will rise to between $861-957 billion by 2030.

• In 2014 in TN, additional health care costs for obesity was $2.49 billion dollars

• If adult obesity rates could decrease from 40% to 2009’s average of 27%, $500 million in healthcare costs/year could be saved.

Obesity Rates and Trend Data- The State of Childhood Obesity; Managing Overweight and Obesity in Adults NHLBI; Increasing Referrals of Hospitalized Obese Patients; The Cost of Obesity to US Cities.
Impact of Childhood Obesity: Economic Costs

• Obesity-related job absenteeism cost $4.3 billion annually

• Employees who are obese miss more work from short-term absences and long-term disability than employees who are non-obese

• Employers pay higher life insurance premiums and pay out more for worker’s compensation for employees who are obese than those who are not.
Overweight/Obesity among active duty service members has risen 73% between 2011-2015.

Unfit to serve: Obesity is Impacting National Security.
Why is this so hard?

Ultraprocessed foods are cheaper and taste good; High calories, low nutrients

1 in 6-8 children in TN don’t know where their next meal is coming from

Up to 80% of children don’t get the recommended amount of PA

Energy expenditure

Food Intake

Nutrition

Physical Activity

Energy Balance
Lifecourse Approach to Understanding and Intervening upon Pediatric Obesity

- Pregnancy
- Infancy and Toddlerhood
- Preschool
- Elementary
- Adolescence
Pregnancy (1)
Which baby is more at risk for obesity and later Type 2 Diabetes?

• Rapid infant growth in the first 24 months has an increased odds of obesity at
  – Age 5 (OR: 2.08, 95% CI: 1.84-2.34)
  – Age 10 (OR: 1.75, 95% CI: 1.53-2.00)

• These associations were the highest if 2 or more centiles were crossed by 6 months of life.

Nutrition
Common Diet in Early Childhood in the US

Percentage of infants consuming low nutrient/energy dense foods at least once per day.

Nutrition

Prices of *Foods* and *Beverages*, Inflation adjusted (taxes included)

1978 = 1
Source: BLS, via Haver
Children who have physically active parents are 6 times more likely to be physically active. Physical activity improves insulin sensitivity and reduces blood pressure.
Physical Environment associated with Physical Activity

• Less Physical Activity
  – Fewer free physical activity resources, such as parks and playgrounds

• More Physical Activity
  – Access to physical activity resources such as neighborhood trails
  – Proximity of exercise facilities to one’s home

Estabrooks PA, Lee RE, Gyurcsik NC. Resources for physical activity participation: does availability and accessibility differ by neighborhood socioeconomic status?
Sallis JF, Hovell MF, Hofstetter CR, et al. Distance between homes and exercise facilities related to frequency of exercise among San Diego residents. 
Public Health Rep.
Local Impact: Paradigm Shifts and Policies

Paradigm Shift: Family Programming in Metro Nashville Parks and Recreation

Preschool age children need 60-90 minutes of moderate-to-vigorous physical activity/day.

Parents need at least 30 minutes/day.
School Age
Early Overweight/Obesity Clinical Intervention

• Screening and intensive behavioral interventions for obesity in children >6 years can lead to improved weight status.

• Intensive behavioral interventions with a total of 26 hours delivered over 2-12 months results in weight loss.

• Multiple components required: counseling on diet, increasing physical activity, reducing sedentary behavior, and addressing behavior change.
Behavior is Shaped by Environment: Health in Context

- Built environment: Neighborhood and community made infrastructure and environmental context that affects our interaction with the environment.
  - Green Space
  - Sidewalks
  - Traffic Density and Speed
  - Crime
Adolescence
Overweight/Obesity in Late Adolescence Highly Correlated with Adult Heart Disease

• Overweight: 3 times as likely to develop heart disease in their 30s-40s

• Obese: 7 times as likely as likely to develop heart disease in their 30s-40s.

Tirosh, et al. Adolescent BMI Trajectory and Risk of Diabetes vs. Coronary Disease
New England Journal of Medicine
The Evidence: Bariatric Surgery for Adolescents with Severe Obesity

N= 242 at five US Centers, 13-19 years at the time of surgery

3 years later:
• mean weight decreased by 27%;
• remission of type 2 diabetes in 95%;
• remission of abnormal kidney function by 86%,
• remission of elevated blood pressure 74%,
• remission of dyslipidemia by 66%

Inge NEJM 2016
Bariatric Surgery for Severely Obese Adolescents

What is the optimal timing? Earlier is better to reduce associated chronic diseases and their effects. Disease remission higher.

Only successful long-term treatment option for adolescents with severe obesity

Risks exist: nutritional deficiencies (need to take multivitamins bid)
## Levers for Change to Address Childhood Obesity

<table>
<thead>
<tr>
<th>Developmental Age</th>
<th>Lever</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnancy</td>
<td>High quality, affordable, accessible food</td>
</tr>
<tr>
<td>Infancy and Toddlerhood</td>
<td>High quality, affordable accessible food</td>
</tr>
<tr>
<td>Preschool</td>
<td>Support parks and recreation programs and sites for accessible physical activity, built environment safety, High quality, affordable accessible food</td>
</tr>
<tr>
<td>School- age</td>
<td>Insurance coverage of clinical care for early obesity interventions; daily physical activity in school (at least 30 min/day); school meal food quality</td>
</tr>
<tr>
<td>Adolescence</td>
<td>Insurance coverage of bariatric surgery, starting earlier depending on associated chronic conditions; school meal food quality; daily physical activity in school (at least 30 min/day).</td>
</tr>
</tbody>
</table>