“What You Need to Know About Childhood Obesity”

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Objectives

- What are the causes of childhood obesity
- How are children and adolescents being affected by the obesity epidemic
- What we can do to fight childhood obesity
Chronic Diseases and Related Risk Factors in the United States

**Leading Causes of Death**

<table>
<thead>
<tr>
<th>Cause</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Disease</td>
<td>25%</td>
</tr>
<tr>
<td>Cancer</td>
<td>10%</td>
</tr>
<tr>
<td>Stroke</td>
<td>5%</td>
</tr>
<tr>
<td>Chronic lower respiratory disease</td>
<td>4%</td>
</tr>
<tr>
<td>Unintentional Injuries</td>
<td>3%</td>
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<tr>
<td>Diabetes</td>
<td>3%</td>
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<tr>
<td>Pneumonia/influenza</td>
<td>2%</td>
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<tr>
<td>Alzheimer’s disease</td>
<td>2%</td>
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<tr>
<td>Kidney Disease</td>
<td>2%</td>
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</tbody>
</table>

**Actual Causes of Death**

<table>
<thead>
<tr>
<th>Cause</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco</td>
<td>20%</td>
</tr>
<tr>
<td>Poor diet/lack of exercise</td>
<td>15%</td>
</tr>
<tr>
<td>Alcohol</td>
<td>10%</td>
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<tr>
<td>Infectious agents</td>
<td>10%</td>
</tr>
<tr>
<td>Pollutants/toxins</td>
<td>6%</td>
</tr>
<tr>
<td>Firearms</td>
<td>5%</td>
</tr>
<tr>
<td>Sexual behavior</td>
<td>5%</td>
</tr>
<tr>
<td>Motor vehicles</td>
<td>4%</td>
</tr>
<tr>
<td>Illicit drug use</td>
<td>3%</td>
</tr>
</tbody>
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† Adapted from McGinnis Foege, updated by Mokdad et. al.
Obesity

- **Obesity** – combined with poor diet and lack of physical activity – is the second leading preventable cause of death in Delaware and the U.S.

**Obesity Trends* Among U.S. Adults**

*BRFSS, 2009*

(*BMI ≥30, or ~ 30 lbs. overweight for 5’4” person)*
Childhood Overweight

Percentage of Children Who Are Overweight or Obese: 2005

2005

Percentage of Children Who Are Overweight or Obese: 2007

2007
Figure 1. Trends in obesity among children and adolescents: United States, 1963–2008

NOTE: Obesity is defined as body mass index (BMI) greater than or equal to sex- and age-specific 95th percentile from the 2000 CDC Growth Charts.

Prevalence of obesity in infancy

- **Birth to 1 yr**
  - 11.1% children 0-11 mo were >95% weight/length
- **1yr-2yr**
  - 17.0% children 12-23 mo were >95% weight/length
- **2yr-3yr**
  - 12.9% 24-35 mo had BMI>95%
- **3yr-4yr**
  - 36-47 mo 15.2% had BMI >95%

Delaware Adult Obesity by County

Obesity in Delaware

Majority Are Overweight or Obese

Overweight & Obesity Among DE Adults, 2000-2009

By Year

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009

% of Delaware Adults

Overweight

Obese

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Overweight = BMI 25-29.9; Obese = BMI ≥30
Overweight and Obesity Among Delaware H.S. Students

Overweight & Obesity Among Delaware Public High School Students, 2001-2009

Estimates for Delaware

Prevalence of Child Overweight and Obesity in Delaware, 2006 & 2008

Significant Racial Disparity Exits

White and African American Adults, 2009: Significant Disparity for Obesity

<table>
<thead>
<tr>
<th>Race</th>
<th>Obese (%)</th>
<th>Overweight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>26.1%</td>
<td>36.8%</td>
</tr>
<tr>
<td>African American</td>
<td>41.1%</td>
<td>33.4%</td>
</tr>
</tbody>
</table>

Source: DHSS, Division of Public Health, Behavioral Risk Factor Survey (BRFS), 2009.
Diabetes Prevalence Mirrors Disparity in Obesity

Delaware Adults With Diabetes: 2009

- White: 7.2%
- Black: 12.1%

Source: DHSS, Division of Public Health, Behavioral Risk Factor Survey (BRFS), 2009.
1 in 3 Children Could Develop Diabetes

- If current trends continue, 1 in 3 Americans will develop diabetes during in their lifetime, and those with diabetes will lose, on average, 10-15 years of life.

- In 2009, about 54,400 Delaware adults had been told by a doctor that they have diabetes.

- In 2009, an additional 36,000 Delaware adults had been told by a doctor that they have pre-diabetes.

- For people with pre-diabetes, lifestyle changes—including a 5 to 7% weight loss and at least 150 minutes of physical activity per week—can reduce the rate of onset of type 2 diabetes by 58%.

Sources: CDC Diabetes web page; Delaware Behavioral Risk Factor Survey (BRFS), 2009.
Impact on Youth

• “No longer considered to be a condition of primarily adult onset, type 2 diabetes has become increasingly common among children aged 6-11 years and adolescents aged 12-19 years.”

• “The increase in type 2 diabetes among children and adolescents has emerged in parallel with an alarming rise in the number of young people who have become overweight or obese.”

Health Costs of Obesity

- Heart Disease and Stroke
- Several Types of Cancer
- Type 2 Diabetes
- Liver Disease
- Orthopedic problems
- Sleep Apnea
- Arthritis
- Liver and Gallbladder Diseases
- Gynecological Problems
- Stress and Emotional Problems
Comorbidities of Obesity

- **Psychosocial**
  - Poor self-esteem
  - Depression
  - Eating disorders

- **Neurological**
  - Pseudotumor cerebri

- **Pulmonary**
  - Sleep apnoea
  - Asthma
  - Exercise intolerance

- **Gastrointestinal**
  - Gallstones
  - Steatohepatitis

- **Renal**
  - Glomerulosclerosis

- **Musculoskeletal**
  - Slipped capital femoral epiphysis
  - Blount’s disease
  - Forearm fracture
  - Flat feet

- **Cardiovascular**
  - Dyslipidaemia
  - Hypertension
  - Coagulopathy
  - Chronic inflammation
  - Endothelial dysfunction

- **Endocrine**
  - Type 2 diabetes
  - Precocious puberty
  - Polycystic ovary syndrome (girls)
  - Hypogonadism (boys)

http://www.cheo.on.ca/en/weightandhealth
Diabetes Is Costly:

- Total US costs (direct and indirect) of diabetes: $174 billion.
- Direct US medical costs: $116 billion.
- Indirect US costs (related to disability, work loss, premature death): $58 billion.
- People with diagnosed diabetes have medical expenditures that are about 2.3 times higher than medical expenditures for people without diabetes.

*US data from CDC*
Potential Medical Care Savings From Primary Disease Prevention

- National estimate: “reducing diabetes and hypertension prevalence by 5% would save approximately $9 billion annually in the near term.”

- Savings could rise to about $24.7 billion annually in the medium term.

- Returns were greatest in absolute terms for private payers, but greatest in percentage terms for public payers.

- Well-designed interventions that achieve improvements in lifestyle-related risk factors could result in sufficient savings to offset intervention costs.

*American Journal of Public Health, January 2011*
Potential Medical Care Savings From Primary Disease Prevention

• Short-term and medium-term modifiable diseases:
  • Diabetes
  • High blood pressure
    • Heart disease
    • Cerebrovascular disease
    • Renal disease

• Estimated Delaware medical expenditure savings following a 5% reduction in prevalence of the above conditions:
  - Short-run: $33 million a year
  - Medium-run: $92.4 million a year

Environment

- Where a child lives, goes to school and plays has a significant impact on his or her health.
- Today’s food and physical activity environment make it hard to be healthy. For example:
  - Lack of physical activity in schools (e.g., no PE or recess)
  - Car-focused world – active transport (e.g., walking or biking) is not easy
  - Lack of available and affordable fresh fruits and veggies
  - Massive marketing of unhealthy food and beverages
  - Overabundance of energy-dense, nutrient-poor foods
Genetics and Environment

• Genes influence susceptibility

• Environment influences outcome
Importance of the Intrauterine Environment

- Barker “thrifty phenotype”
  - Reduced birth weight associated with increased insulin resistance, increased cardiovascular disease, diabetes and central adiposity
    - Hales et al Br Med Bull 2001;60;:5-20
    - Veening MA et al J Clin Endocrinol Metab 2002;87(10) 4657-4661
    - Oken E et al Obes Res 2003;11;496-506.
- Infants with “restricted” intrauterine environment born into an energy rich environment increased risk
Importance of the Intrauterine Environment

- Infants of obese mothers and infants of diabetic mothers are at increased risk for later obesity and diabetes
  - Dabelea D et al J Pediatr Endocrinol Metab 2001;14(8) 1085-1091

- Insulin receptor expression and insulin sensitivity from intrauterine life may be a “mismatch” to needs of extrauterine life.
  - Frankel N Diabetes 1980;29;1023-1035
Risk for Obesity/Environmental Impact

- Vulnerable periods for increasing obesity
  - Infancy, ? Puberty, Pregnancy, Stress, Ageing
- Intrauterine risk for obesity
  - Maternal smoking, maternal diabetes, maternal obesity
- Genetic predisposition modified by environment
What does this mean for us?

- Longer lifespan may lead to greater gene-environment mismatch
- Environmental information can change inheritance
- Disease risk is maximized by “mismatch” between “predicted” and actual environment
- Profound connection between genome and environment
Environmental Shifts and Energy intake

- Modest increases in energy not compensated by activity can result in large weight gain over time.
- 150 kcal/d excess intake $= 15$ lbs/year
- Common causes of increased caloric intake
  - Snacking - Beverages
  - Increased portions - Limited variety
  - Fast food - Multiple caretakers
Nutritional Environment

- Children are increasingly consuming food away from home
  - Fast food, soft drinks, increased portion sizes, snacks
  - Higher fat, sugar, carbohydrate
450 12oz soda/person in one year

140kcal/soda = 63,000 kcal/year = 170kcal/day = 16lbs/year
Television

- Television
  - 2005 American children 2-11 yrs averaged 3 hours 19 minutes/day
  - African American children watched 30% more TV than white children
  - Positive association with obesity
Television

- Impact
  - Displaces physical activity
  - Snacking while viewing
  - Food advertisements
  - Use during mealtime-poor food consumption patterns
Physical Activity Patterns

The 2007 National Youth Risk Behavior Survey (high school students)

- 65% did not meet recommended levels of physical activity.
- 46% did not attend physical education classes.
- 70% did not attend physical education classes daily.
- 35% watched television 3 or more hours per day on an average school day.
- 25% played video or computer games or used a computer for something that was not school work for 3 or more hours per day on an average school day.
Walkability and The Built Environment

Traditional Grid Design (circa 1900)

Curvilinear Loop Designs & Beginning of Cul-De-Sacs (approx. 1930 – 1950)

Conventional Cul-De-Sac Design (since 1950)
Summer

- Obese children who responded to a fitness, lifestyle school program relapsed over the summer
  - Age 12 (55% females, 45% males) BMI 30.8
  - Mean body fat (DEXA) increased 1.3%
  - Mean VO$_{2\text{max}}$ decreased 3.2 ml/dl/min
  - Fasting insulin increased 6.1 uIU/ml

- Changes in 3 months of summer completely reversed effects of 1 year school intervention
  - Carrel AL et al School Based Fitness Changes Are Lost During the Summer Vacation Arch Pediatr Adolescent Med 2007;161;561-571.
Obesity Trajectory

• Phase I- steady increase in childhood obesity
• Phase II – emergence of serious obesity related comorbidities
• Phase III- medical complications lead to life threatening disease – death in middle age
• Phase IV – Acceleration of obesity epidemic by transgenerational transmission
  o Childhood obesity--the shape of things to come. Ludwig DS.
Obesity: Physician visit rates

Physician Visit Rates
(visits per year)

Privately Insured

Obese Children: 4.4
All Children: 2.4

Medicaid

Obese Children: 3.6
All Children: 1.7

Source: Thomson Medstat, 2006

Obesity: Hospitalization Rates

![Hospitalization Rates](http://www.medstat.com/pdfs/childhood_obesity.pdf)
Cost of Obesity

Annual Medical and Drug Expenditures (per Child)

Source: Thomson Medstat, 2006

Case Study of a 12-Year-Old Girl

- At the 12-year well check a mother reports her daughter’s increasing comments about her weight and being “fat.”

- BMI = 23, 90\textsuperscript{th} percentile for a 12 year-old girl

- Identified as overweight
12-Year-Old Girl: Dietary Patterns

Behavioral Perspective

- Skips breakfast (no time)
- Eats pretzel and juice for lunch (not hungry for a regular lunch)
- After school – soda and snack food (poor choices)
- Dinner – Family eats out 3x/week (too busy to cook)
- Bedtime – Cereal (eating while watching TV)
Community/Social/Demographic

Parenting Styles

Child Characteristics

Child’s Weight Status

• Yellow circles = behavioral perspective (dietary patterns)
12-Year-Old Girl: Dietary Patterns

Environmental Perspective

• Skips breakfast (school start time/availability of school breakfast)
• Eats pretzel and juice for lunch (school lunch)
• After school – soda and snack food (corner store)
• Dinner – Family eats out 3x/week (fast food availability)
• Bedtime – Cereal (TV in bedroom)
• Yellow circles = behavioral perspective (dietary patterns)
• Red = environmental
12-Year-Old Girl: Physical Activity Patterns

Behavioral Perspective

• No outdoor time (doesn’t want to go outside)
• Computer, IM etc.: 3 hours/day (nothing else to do)
• Homework: 2 hours/day (prefers not to do homework at study period)
• Weekends: “TV all the time” (doesn’t know what to do if not watching TV)
• Extracurricular activity: cheerleading 2x/week
Community/Social/Demographic

Parenting Styles

Child Characteristics

Child’s Weight Status

• Yellow circles = behavioral perspective (physical activity)
12-Year-Old-Girl: Physical Activity Patterns

Environmental Perspective

- No gym this session (school schedule)
- No recess (school schedule)
- No outdoor time (neighborhood safety)
- Computer, IM etc.: 3 hours/day (family entertainment environment)
- Homework 2 hours/day (family scheduling)
- Weekends “TV all the time” (family activity)
- Extracurricular activity Cheerleading 2x/week
• Yellow circles = behavioral perspective (physical activity)
• Red = environmental
Obesity in the Context of this 12-Year-Old’s Environment

• Interaction of environment and behavior is critical
• Making healthy decisions only works when there are safe and affordable healthy options readily available in the environment
• The next slide highlights all the factors that influence this 12-year-old’s food and physical activity environments
• Yellow circles = behavioral perspective (dietary) and
• behavioral perspective (physical activity)
• Red = environmental
Behavior is *influenced at all levels*.

Effective programs must be *comprehensive, addressing all levels*.
What is “Health Promotion”?

“Health promotion and disease prevention are the aggregate of all purposeful activities designed to improve personal and public health through a combination of strategies” – including the competent implementation of behavior change strategies, health education, health protection measures, risk factor detection, supportive policy and environmental change, health enhancement and health maintenance.

- From the Report of the 1990 Joint Committee on Health Education Terminology
What Is Primary Prevention?

- **Primary Prevention** – aimed at behavior change to increase prevalence of healthy behaviors, and decrease prevalence of unhealthy conditions related to those risk factors

- **Secondary Prevention** – aimed at reducing severity or duration of existing health problems

- **Tertiary Prevention** – aimed at reducing consequences or disability resulting from diseases
CDC MAPPS Strategies

- Developed by the U.S. Centers for Disease Control and Prevention (CDC)
- Developed from review of programs that worked
- Utilize the *Guide to Community Preventive Services*—“what works to promote community health”

www.thecommunityguide.org
# Recommended MAPPS Strategies

<table>
<thead>
<tr>
<th>Media / Social Mktg.</th>
<th>Access to Healthy Options</th>
<th>Point of Decision Prompts</th>
<th>Price Disincentives/Incentives</th>
<th>Social Support / Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Counter-marketing</td>
<td>• Tobacco-free campuses</td>
<td>• Restrict point of purchase</td>
<td>• Tax equity for cigars and</td>
<td>• Maintain DE Quitline and other</td>
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<td></td>
<td>• Enforce and expand Clean</td>
<td>tobacco advertising as allowed</td>
<td>smokeless tobacco products</td>
<td>cessation services</td>
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<td></td>
<td>Indoor Air Act</td>
<td>under federal law</td>
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<tr>
<td></td>
<td></td>
<td>• Enforce product placement</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>behind counters</td>
<td></td>
<td></td>
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<tr>
<td>• Promote healthy food and drink choices</td>
<td>• Attract markets to “food deserts”</td>
<td>• Encourage retailers to improve product placement of healthy food choices</td>
<td>• Provide incentives to retailers to offer healthier food choices</td>
<td>• Support breast feeding through policy change and maternity care practices</td>
</tr>
<tr>
<td></td>
<td>• Farmers’ Markets</td>
<td></td>
<td>• Establish excise tax of sugar-added drinks like soda and energy drinks</td>
<td>• Expand school nutrition programs</td>
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<td></td>
<td>• Provide healthier choices in child care, schools, and workplaces</td>
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<td>• Weight loss support groups</td>
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<td></td>
<td>• Menu labeling</td>
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<tr>
<td></td>
<td>• Community gardens</td>
<td></td>
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<tr>
<td></td>
<td>• Local farm to institution projects</td>
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<tr>
<td></td>
<td>• Changing procurement policies to obtain healthier choices.</td>
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<tr>
<td>• Promote increased physical activity as fun and healthy</td>
<td>• Develop safe, attractive and accessible places for activity</td>
<td>• Stairwell prompts near elevators in office buildings; with improved, safe and clean stairwells.</td>
<td>• Reduce prices for parks and recreational facilities to encourage more use.</td>
<td>• Safe Routes to Schools</td>
</tr>
<tr>
<td></td>
<td>• Promote walking and cycling</td>
<td></td>
<td>• Incentives for active transit</td>
<td>• Challenge programs and organized walking/bicycling groups</td>
</tr>
<tr>
<td></td>
<td>• Promote public transit</td>
<td></td>
<td>• Subsidize memberships in recreational facilities</td>
<td>• After school programs for community residents</td>
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<tr>
<td></td>
<td>• Design campaigns to encourage less television watching and other “screen time”</td>
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<td>• Neighborhood watch or community policing programs to ensure street and part safety.</td>
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<tr>
<td></td>
<td>• Share the Road and safe driving campaigns to encourage safe bicycling.</td>
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<td>• Develop safe, attractive and accessible places for activity</td>
<td>• Stairwell prompts near elevators in office buildings; with improved, safe and clean stairwells.</td>
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<tr>
<td></td>
<td>• Fully implement “Complete Streets”</td>
<td></td>
<td>• Incentives for active transit</td>
<td>• Challenge programs and organized walking/bicycling groups</td>
</tr>
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<td></td>
<td>• Develop or complete Rails to Trails and other trails</td>
<td>• Signage for neighborhood destinations in walkable, mixed-use neighborhoods.</td>
<td>• Subsidize memberships in recreational facilities</td>
<td>• After school programs for community residents</td>
</tr>
<tr>
<td></td>
<td>• Make state more “bikable,”</td>
<td>• Signage for walking trails and bike lanes.</td>
<td>• Reduce prices for parks and recreational facilities to encourage more use.</td>
<td>• Neighborhood watch or community policing programs to ensure street and part safety.</td>
</tr>
<tr>
<td></td>
<td>• Ensure crime-free parks with adequate crime prevention measures</td>
<td></td>
<td>• Incentives for active transit</td>
<td>• After school programs for community residents</td>
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<tr>
<td></td>
<td>• Provide bike lockers, bike racks and other facilities to encourage bicycling</td>
<td></td>
<td>• Subsidize memberships in recreational facilities</td>
<td>• Neighborhood watch or community policing programs to ensure street and part safety.</td>
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</tbody>
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**DELTA HEALTH AND SOCIAL SERVICES**
Division of Public Health
Health Promotion and Disease Prevention
Plans for Action Already Exist

Examples of Delaware Plans:

CDC Documents:
Governor’s Council on Health Promotion and Disease Prevention

The Council’s charge:

“A Council on Health Promotion and Disease Prevention is hereby established and its members are charged to advise the Governor and executive branch state agencies on the development and coordination of strategies, policies, programs and other actions state-wide to promote healthy lifestyles and prevent chronic and lifestyle-related disease.”
Revisiting the Emerging Structure: A “Regions” Perspective

1. Develop Policy and Funding
2. Evaluate Effective Outcomes
3. Increase Access to Coverage for Prevention and Care
4. Support Integrated Consistent Care
5. Take a Whole Person Health Approach
6. Build Individual Capacity to Achieve a Healthy Lifestyle
7. Educate for Health
8. Make Healthy Food Available
9. Focus on Schools
10. Create an Environment that Supports Healthy Choices
Making Healthy Choices Throughout Life

**Prenatal**
- Mother’s Diet
- Exercise, Smoking
- Choice of Breast Feeding
- Participating in PE, athletics

**Mid-Life**
- Making or supporting healthy policies
- Being positive role models to children
- Wise choices re: tobacco, alcohol/drugs

**Students**
- Limiting screen time: games and TV

**Parents**
- Staying Active
- Staying Active; healthy food choices

**Aging**
- Get recommended screenings