Objectives

- To introduce obesity as a complex problem that requires complex solutions.
- To introduce the term “built environment” and its components, including environmental hazards.
- To provide an overview of the impact of the built environment upon obesity.
- To promote advocacy for a healthier built environment.
- To discuss solutions with a significant potential impact.
How bad is the problem?
Key Definitions

- Body Mass Index = weight in kg/(height in meters)$^2$
- In adults
  - Healthy BMI = 18 - 25
  - Overweight 25 - 30
  - Obese > 30
Key Definitions

- In Children:
  - BMI Percentiles adjusted for Age and Sex
  - BMI percentiles based on data collected from five national surveys from 1963 – 1994.
  - **CDC Definitions:**
    - Healthy BMI $\geq 5$ and $\leq 85^{th}$ percentile
    - “At risk for overweight” $85 – 95^{th}$ percentile
    - “Overweight” $>95^{th}$ percentile
Revised Terminology

- AMA Expert Committee on the Assessment, Treatment, and Prevention of Child and Adolescent Obesity:
  - BMI percentile between 85th and 95th = overweight
  - BMI percentile > 95th = obese
  - Consistent with adult terminology
Figure 1. Prevalence of overweight among children and adolescents ages 6-19 years

Percent

Age in years

<table>
<thead>
<tr>
<th></th>
<th>6-11</th>
<th>12-19</th>
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<tbody>
<tr>
<td>1963-70</td>
<td>4</td>
<td>5</td>
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<td>1971-74</td>
<td>4</td>
<td>6</td>
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<td>1976-80</td>
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<td>5</td>
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<td>1988-94</td>
<td>11</td>
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<tr>
<td>1999-02</td>
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SOURCE: CDC/NCHS, NHES and NHANES
Some populations are especially prone

- **African American Women >=20**
  - 49.0% prevalence of obesity
  - 77.2% combined prevalence of overweight and obesity

- **Mexican American Women >= 20**
  - 38.4% prevalence of obesity
  - 71.7% combined prevalence of overweight and obesity

- **Men, prevalence, age >= 20**
  - White (28.2%), African-American (27.9%), Mexican-American (27.3%)
Minority Children Disproportionately Affected

Between 1971 – 1974 and 1999-2002, prevalence of obesity (BMI > 95th percentile) increased from 4 to 13% among white children, but from 4 to 20% among black children and 6% to 22% among Mexican American children.
Common Obesity-Related Diseases

- Hypertension
- Dyslipidemia
- Type 2 Diabetes
- GERD
- Sleep disordered breathing
- Asthma
- Osteoarthritis
- Cancer (colon, breast in premenopausal women, endometrium, kidney)
How I got Interested

- Prevention of cardiovascular disease
- Role of obesity and obesity-related co-morbidities
So what should we do?
So what should we do???

- Drugs
- Michael Lemonick (Time Magazine): “We’ll keep getting fatter and fatter, with no real prospect of reversing the trend. Unless medical science provides a quick fix that is.”
Treatment: Drugs

Two major concerns:
- Effectiveness
- Side effects

1940s: Thyroid hormone
  - heart rhythm disturbances
  - sudden death

1960s: Amphetamines
  - addiction, high blood pressure, death
Treatment: Drugs (Cont’d)

- 1992: Fenfluramine-phentermine
  - Primary pulmonary hypertension
  - Pulled off market in 1997

- Phenylpropanolamine (Accutrim, Dexatrim)
  - Widely used for many years.
  - Association with increased risk of stroke.
  - Pulled off market in 2000.

- Sibutramine (Meridia)
  - Recently pulled off market due to cardiovascular side effects.
Treatment: Drugs (Cont’d)

- Rimonabant
  - CB1 antagonist
  - Associated with 5.3kg of weight loss in one year in obese adult diabetics
  - Not approved by FDA due to psychiatric side effects.

- Qnexa (combination of topiramate & phentermine)

- Lorcaserin (5HT2C-receptor agonist)

- Contrave (combination of bupropion and naltrexone)
Treatment: Surgery

- 16,000 bariatric surgeries performed in 1992.
- 103,000 performed in 2003
- 140,000 performed in 2004
- Gastric bypass ($25,000)
- Gastric banding ($10,000-$25,000) (recently approved for adults with a BMI as low as 35 or even 30 with obesity-related medical problems)
Hypothetical Situation

Consider:

- 33.8% of American adults have a BMI $\geq 30$
- 70% of obese adults have co-morbidities
- 222.8 million adults
- 52.7 million candidates for the Lap-Band
- $1,317,500,000,000$
The Built Environment

- Environment: “All that is external to the individual.”
- Built environment: “Encompasses aspects of a person’s surroundings which are man made.”
- Broad definition:
  - Schools, cities, workplaces
  - Community-based practices
  - Restaurants/grocery stores
Levels of Measurement

Indirect methods
- Census data
- GIS (Geographic Information Systems) data
- Street network data
- Indexes of deprivation

Intermediate methods
- Perceived Environment Measures completed by residents
- Regional land use data from tax assessors
- Aerial photography
- Databases (e.g., phone books, Internet, US Department of Agriculture, etc.)

Direct methods
- In-person audits of the environmental characteristics completed by trained observers
Is a healthier built environment associated with lower levels of obesity?
Bison Don't Roam, And It's a Problem For the Polish Herd Plan Is to Get Lazy Beasts To Travel Abroad and Breed; The EU Looks for Solution
The Built Environment

- Difficult to study.
- Conflicting results.
- For example, two studies report higher obesity rates in communities with higher fast food density; two others do not.
Access to Physical Activity

- Proximity to play space/recreational facilities
  - No relationship in young children
  - Positive association of overweight with distance among adults
- Net residential density
  - Greater the density, less the risk of being overweight
- Land use mix
  - Greater land use mix, less the risk of being overweight
- Neighborhood walkability
  - Greater walkability, less the risk of being overweight
- Number of recreational facilities
  - Higher the number of facilities, the less the risk of being overweight
- Sprawl/Commuting time
  - Mixed results. Generally associated with increased risk of overweight
Access to Food Sources

- Supermarkets
  - Lower risk of overweight

- Convenience stores
  - Increased risk of overweight

- Fruit and vegetable prices
  - Predicted lower gains in BMI among children over 3 year period beginning at age 4 or 5
The Built Environment

- Uses a different language:
  - Density: “amount of activity in an area”
  - Diversity: “diversity in the spatial arrangement of land use”
  - Connectivity: “ease of travel between places.”
  - Design: “features of individual streets or structures.”
  - Spatial access: “intensity of the possibility for interaction”
The Built Environment

- Challenges
  - “Place”
  - “Context”
  - “Endogeneity”: Bias through neighborhood selection by residents)
Environmental Obesogens

- Bisphenol A (BPA)
- Organotins (TBT) & TPT
- Perfluorooctanoic acid (PFOA)
- Phthlate
- Phytoestrogens
Bottom Line

- Conclusive evidence for the role of obesogens in promoting obesity is lacking.
- Regulating environmental obesogens may be a wise thing to do, but as an obesity-control measure, it should be a very low priority.
What should we do?

- 2005 Institute of Medicine Report on Childhood Obesity:

  “Knowing that it is impossible to produce an optimal solution a priori, we more appropriately adopt surveillance, trial, measurement, error, success, alteration, and dissemination as our course, to be embarked on immediately. Given that the health of today’s children and future generations is at stake, we must proceed with all due urgency and vigor.”
One idea: Safe Routes to School

- Safe perimeter
  - 1 km around each school would encompass safety zone
  - School buses stop at perimeter (except for ill or disabled children)
  - Children expected to walk from boundary to school daily
What Next?

- Experimentation
- Advocacy
- Teach

Thank you!