Impacts of the Built Environment on Public Health

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Factors that Affect Health

Changing the Context to make individuals’ default decisions healthy: BUILT ENVIRONMENT

Largest Impact

Smallest Impact

Education

Clinical Interventions

Long-lasting Protective Interventions

Socio-Economic Factors

Frieden, AJPH, 100:590, 2010
Community Design and Health

Related to land use
- Obesity, physical activity, CVD
- Water quantity and quality
- Access to healthy food

Related to automobile dependency
- Air pollution and asthma
- Climate change contribution
- Car crashes
- Pedestrian injuries

Related to social processes
- Mental health impact
- Social capital
- Environmental justice
Determinants of Physical Activity

More likely to exercise if:
- Walking trails, parks and gyms accessible
- Sidewalks present and scenery enjoyable
- Many people exercising
- Friends available with whom to exercise

Less likely to exercise if:
- Too little time
- Too tired
- Unmotivated
- Perceived traffic, crime or danger
- Long distance to exercise location

- HealthStyles Survey, 1999
Walkable Community Designs: Connectivity and Physical Activity

Suburban Development

Traditional Neighborhood

Drawing by Duany Plater Zyberk, in ITE Journal 1989;59:17-18
Transportation Design to Discourage Physical Activity
Transportation Design to Encourage Physical Activity

Cooper River Bridge, Charleston, SC
Access to Parks
Transportation Planning and Land Use Choices

Will 23 lanes be enough?

Proposal would put I-75 among country’s biggest

By ARIEL HART
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It’s wider than an aircraft carrier. Far wider than the carving on Stone Mountain. Wider than the White House stretched end to end, twice.

It’s the planned I-75, all 23 lanes, coming soon to Cobb County. As currently conceived it’s 388 feet across, wider than a football field is long.

23 LANES: The state Department of Transportation is planning to expand I-75 (below) and I-575 in Cobb and Cherokee counties. The 23-lane stretch would be between Delk and Windy Hill roads on I-75.

Traffic heads north on I-75, just north of I-285, on Thursday. A proposal for the interstate is enough to make a road builder weep with joy, and make others wonder whether it’s overkill.

Source: Atlanta Journal-Constitution, March 10, 2006
Walking and Bicycling: International Comparisons

Percent of trips by walking and biking, 1995:
- USA: 7%
- Germany: 34%
- Netherlands: 46%

Pedestrian fatalities per 100 million trips, 2000:
- USA: 17
- Germany: 5.2
- Netherlands: 1.1

Pucher, AJPH 93:1509, 2003
Increasing Bicycle Use, Portland, OR

1991:
- 78 miles of bikeways
- 2,850 daily trips

2006:
- 263 miles of bikeways
- 11,956 daily trips
Children Walking to School

- Parental reported barriers to walking/biking to school: 55% distance, 40% traffic danger

Source: MMWR 2002;51(32):701-704
Asthma and Air Pollution

- Natural experiment during 1996 Summer Olympic games in Atlanta
- Peak morning traffic decreased 23% and peak ozone levels decreased 28%
- Asthma-related emergency room visits by children decreased 42%
- Children’s emergency visits for non-asthma causes did not change during same period

Friedman et al. *JAMA* 2001;285:897
Water Quality

• Water run-off from roads and parking lots can pollute water supplies with possible impact on human health

• Increased erosion and stream siltation causes environmental damage and may affect water treatment plants
Deaths and Injuries to Motor Vehicle Occupants and Pedestrians

- Leading cause of deaths among persons 1-34 years old
- Annual toll from motor vehicle crashes in United States:
  - 34,000 deaths
  - 2.4 million nonfatal injuries
  - $100 billion in costs

Sources: NHTSA 2010; USDOT 2008; Naumann 2010
Mental Health Issues that may Relate to Community Design

- Depression
  - Relieved by physical activity and social interaction
- Stress
  - Aggravated by long commutes
- Attention Deficit-Hyperactivity Disorder
  - Greenspace may improve function in ADHD
- Violent Behavior – Impulse Control
  - Example: road rage
Social Capital

• Defined as social networking, civic engagement, trust and reciprocity
• Decreased by long commutes
Design Principles to Address Climate Change

- Transportation alternatives
- Density
- Mixed land use
- Parks and green spaces
- Energy efficient buildings
Smart Growth is Likely to Feature:

- Higher density, more contiguous development
- Preserved green spaces
- Mixed land uses with walkable neighborhoods
- Limited road construction, balanced by transportation alternatives
- Architectural heterogeneity
- Economic and racial heterogeneity
- Development and capital investment balanced between central city and periphery
- Effective, coordinated regional planning
### What Smart Growth “Is” And “Is Not”

<table>
<thead>
<tr>
<th>Is</th>
<th>Not</th>
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<tbody>
<tr>
<td>More transportation choices and less traffic</td>
<td>Not against cars and roads</td>
</tr>
<tr>
<td>Vibrant cities, suburbs, and towns</td>
<td>Not anti-suburban</td>
</tr>
<tr>
<td>Wider variety of housing choices</td>
<td>Not about telling people where or how to live</td>
</tr>
<tr>
<td>Well-planned growth that improves quality-of-life</td>
<td>Not against growth</td>
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Slide credit: Smart Growth America
LEED for Neighborhood Development Rating System integrates the principles of smart growth, urbanism, public health, and green building into the first national standard for neighborhood design.

- Supported in part by NCEH and EPA

Complete Streets

**Definition:** a safe, comfortable and convenient route designed for travel via automobile, foot, bicycle, and transit.

Oregon state law: “Footpaths and bicycle trails… shall be provided wherever a highway, road or street is being constructed, reconstructed, or relocated.”
Walkscore can be Added to Real Estate Listings to Assist Homebuyer Decisions

Walkscore 0-10
Few destinations

Walkscore 80-90
Many destinations
Health Impact Assessment

• A tool to increase partnerships and communication between public health professionals and planners and other decision-makers
Health Impact Assessment
Definition

- HIA is a systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population. HIA provides recommendations on monitoring and managing those effects.

National Academies Committee on HIA, 2011
A Vision of Health Impact Assessment

- Planners and others will request information on potential health consequences of projects and policies as part of their decision-making process.
- Health officials will have a tool to facilitate their involvement in planning and land use decisions.
- HIAs will lead to better informed decisions.
Steps in Conducting an HIA

• **Screening**
  – Identify projects/policies for which HIA useful

• **Scoping**
  – Identify which health impacts to include

• **Risk assessment**
  – Identify how many and which people may be affected
  – Assess how they may be affected

• **Recommendations**
  – Identify changes to promote health or mitigate harm

• **Reporting** of results to decision-makers

• **Evaluation** of impact of HIA on decision process
Voluntary vs. Regulatory Approach to Using an HIA

• Voluntary (a tool used by a health officer to inform a planning agency)
  – Simpler, less expensive, less litigious
  – Less likely to be used if not required
  – More politically acceptable

• Regulatory (modeled on a required environmental impact statement)
  – More complex, more expensive, more litigious
  – More likely to be used if required
  – May be less politically acceptable
Relationship of HIA to Environmental Impact Assessment (EIA)

- HIA components could logically and legally fit within an EIA process
- HIA incorporated into EIA is necessarily regulatory
- Incorporating health issues into current EIA process has been successful in some settings
**HIA Level of Complexity**

- **Qualitative** – describe direction but not magnitude of predicted results
  - Easy to predict; hard to use in cost/benefit models
  - Example: Build a sidewalk and people will walk more

- **Quantitative** – describe direction and magnitude of predicted results
  - Difficult to obtain data; useful for cost/benefit models
  - Hypothetical example: Build a sidewalk and 300 people who live within 200 yards of location will walk an average of 15 extra minutes per day
Public Transit and Physical Activity

- Transit users walk a median of 19 minutes daily to and from transit
- 29% of transit users exceed 30 minutes of walking daily to and from transit

Besser LM, Dannenberg AL

USDOT 2001 National Household Travel Survey; 3312 transit users
HIAs of Projects and Policies

- Housing redevelopment
- Highway corridor redevelopment
- Pedestrian/bicycle trail development
- Highway bridge replacement
- Transit line
- Community transportation plan
- Local area and comprehensive plans
- After-school programs
- Living wage ordinance
- Paid sick leave policy
- Coal-fired power plant
- Low income home energy subsidies
- Oil and gas leasing policies
HIA of Walk to School Program

• Policy of encouraging children to walk to school and project of street improvement
• Low-income diverse population in Sacramento
• Found students achieving 30 minutes/day of physical activity would increase from 13% to 21%
• Overweight students would reduce BMI 0.09 kg/m2/yr
• Reduced air pollution exposure; small decrease in pedestrian injuries; enhanced social capital; reduced neighborhood crime
• Recommendation: walk to school programs should be encouraged to help children be active
HIA of Proposed Redirection of Mass Transit Funding in California
UCLA School of Public Health

- Examined health impacts of loss of mass transit funds through legislative reallocation
- Findings
  - Identified multiple links between transit funding and obesity, CVD, respiratory conditions, and injuries
  - Many uncertainties in quantitative estimates
  - Reallocation could improve health if used for health care for uninsured children
- Impact: Legislature approved reallocation of funds prior to completion of HIA
Making Healthy Places: Designing and Building for Health, Well-Being, and Sustainability

Andrew Dannenberg, MD, MPH
Howard Frumkin, MD, DrPH
Richard Jackson, MD, MPH

www.makinghealthyplaces.com

Island Press, 2011
Community design and transportation choices can promote or harm human health

www.cdc.gov/healthyplaces
www.healthimpactproject.org