

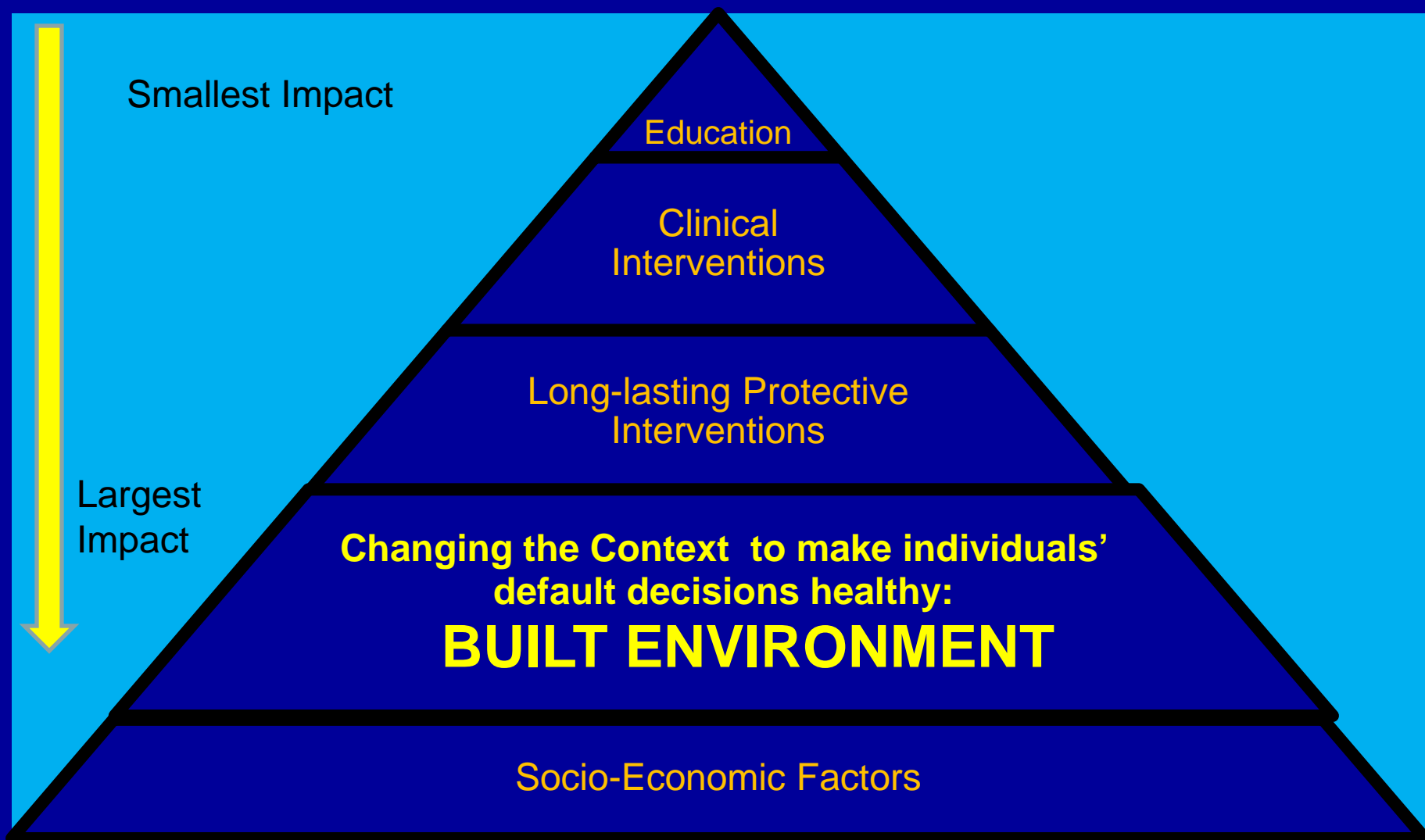
Healthy Community Design: Current Research and Opportunities

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Factors that Affect Health



Community Design and Health

Related to land use

- Obesity, physical activity, CVD
- Water quantity and quality
- Access to healthy foods

Related to automobile dependency

- Air pollution and asthma
- Climate change contribution
- Car crashes
- Pedestrian injuries

Related to social processes

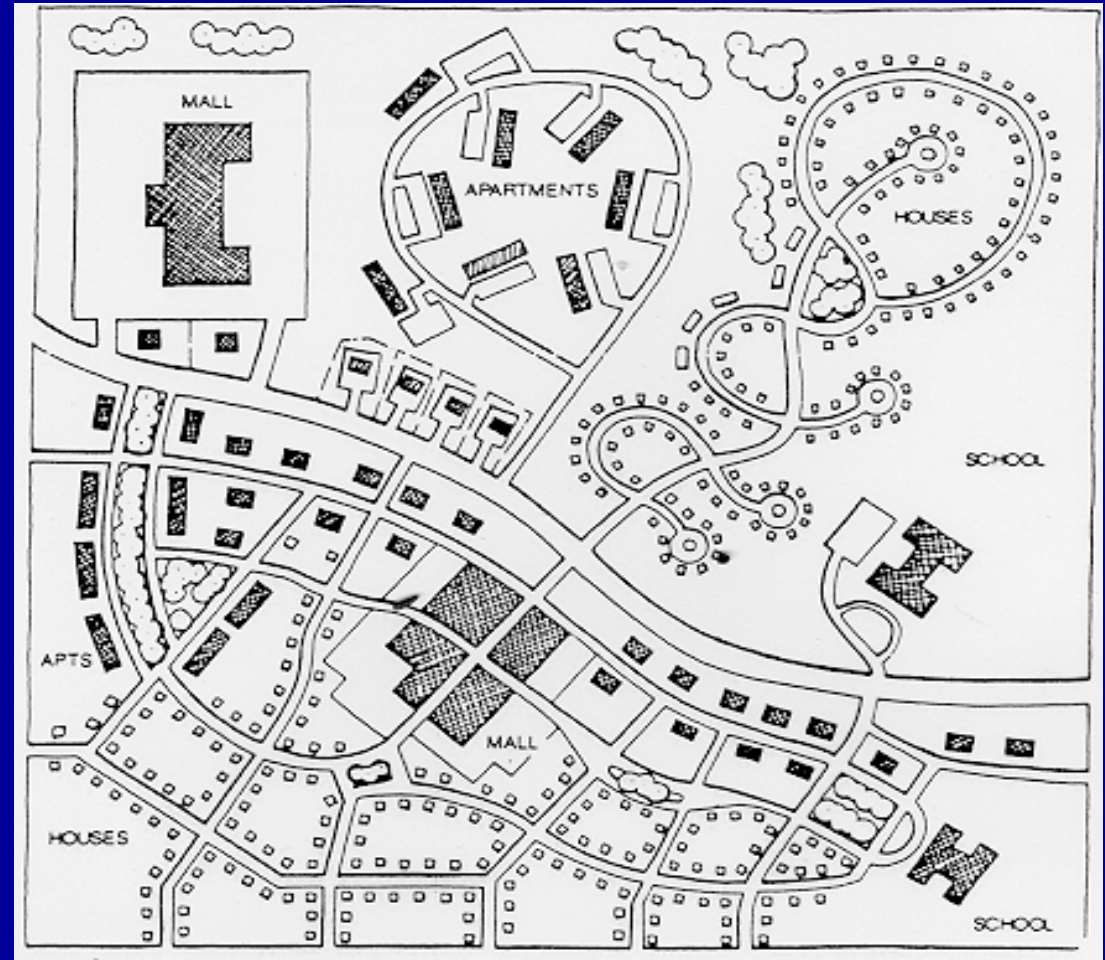
- Mental health impact
- Social capital
- Environmental justice

Walkable Community Designs: Connectivity and Physical Activity

Suburban
Development

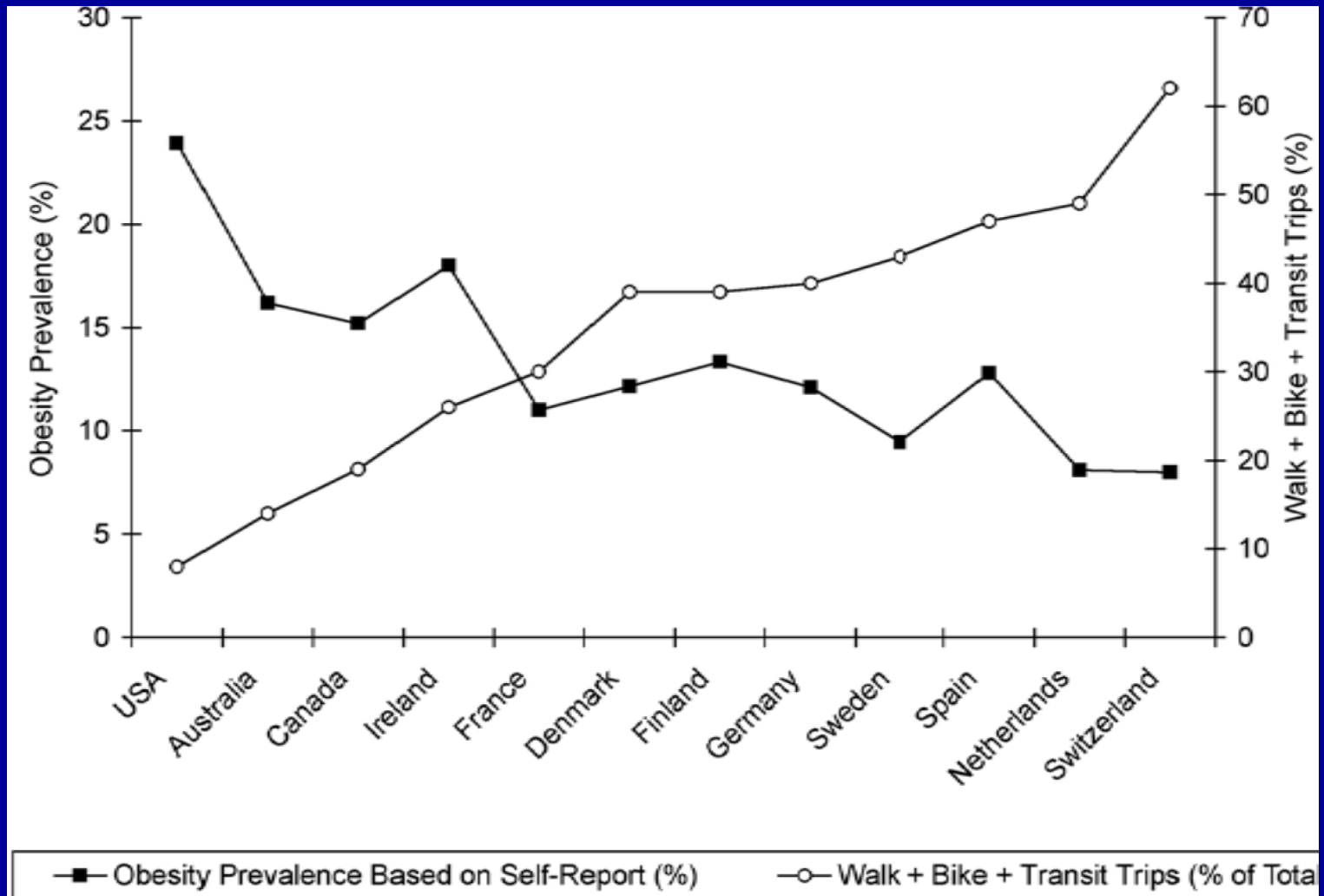


Traditional
Neighborhood

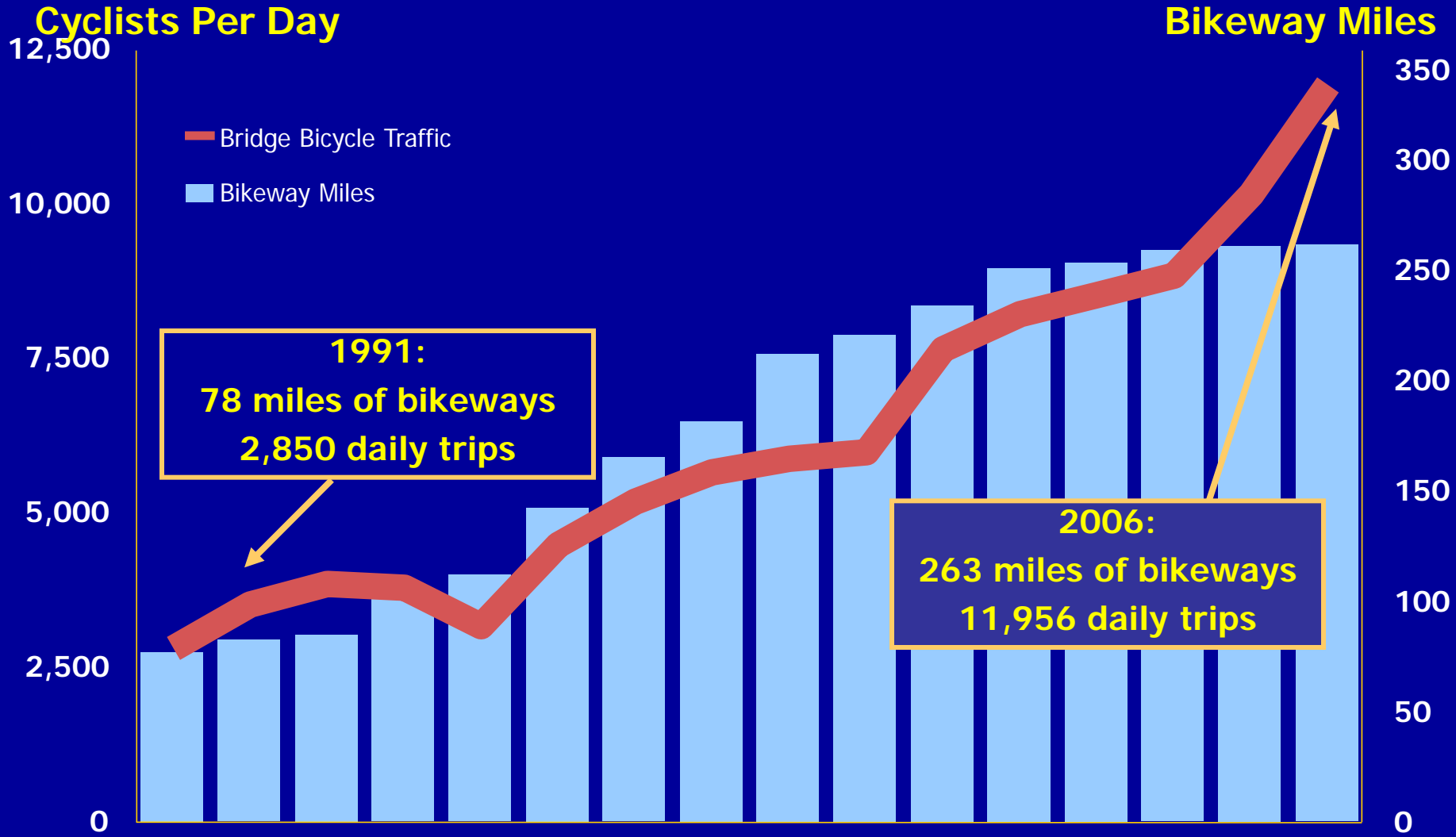


Drawing by Duany Plater Zyberk,
in ITE Journal 1989;59:17-18

Obesity and Active Transportation



Increasing Bicycle Use, Portland, OR

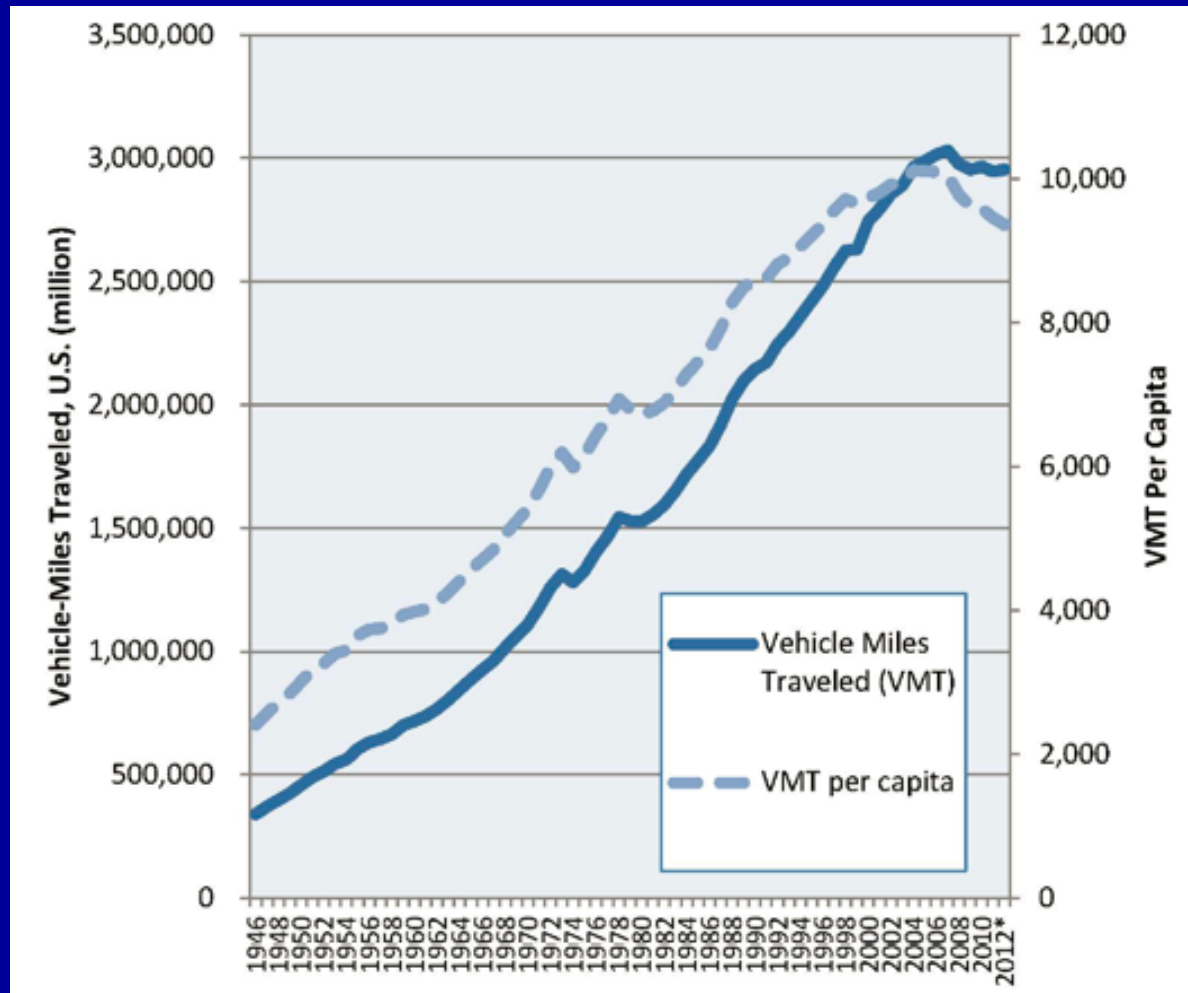


Year:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
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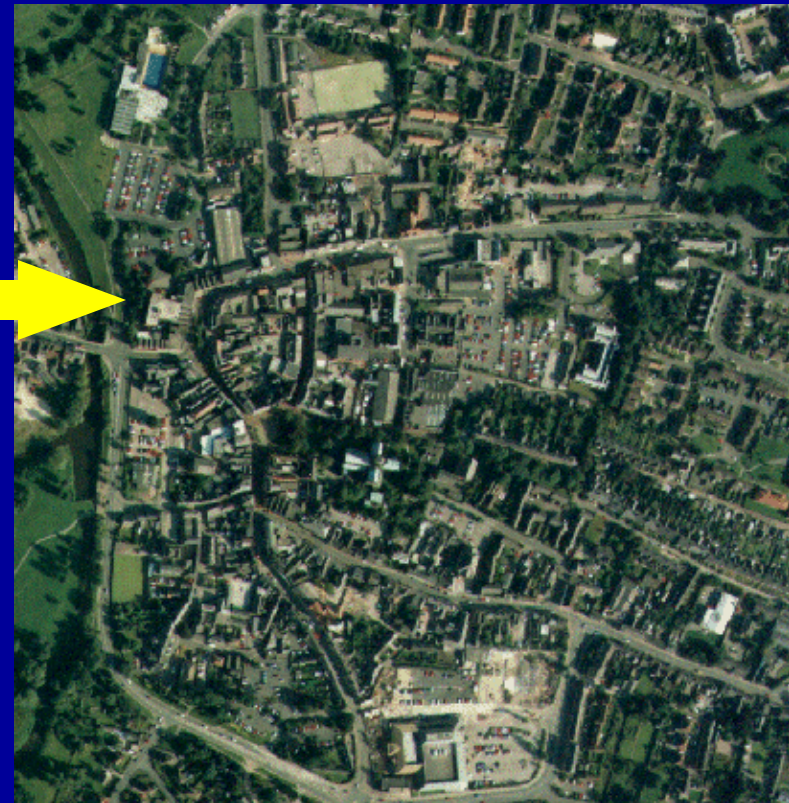
Bridge Bicycle Traffic	2,850	3,555	3,885	3,830	3,207	4,520	5,225	5,690	5,910	6,015	7,686	8,250	8,562	8,875	10,192	11,956
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Bikeway Miles	78	83	86	103	113	144	166	183	213	222	235	252	254	260	262	263
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Total and Per-Capita Vehicle-Miles Traveled, United States, 1946-2012



Evolution of a Child's Home Range: The “cradle – room – house – doorstep - neighborhood” sequence



Van Vliet W, *Environment and Behavior*
15:567-588, 1983

Age 6 months

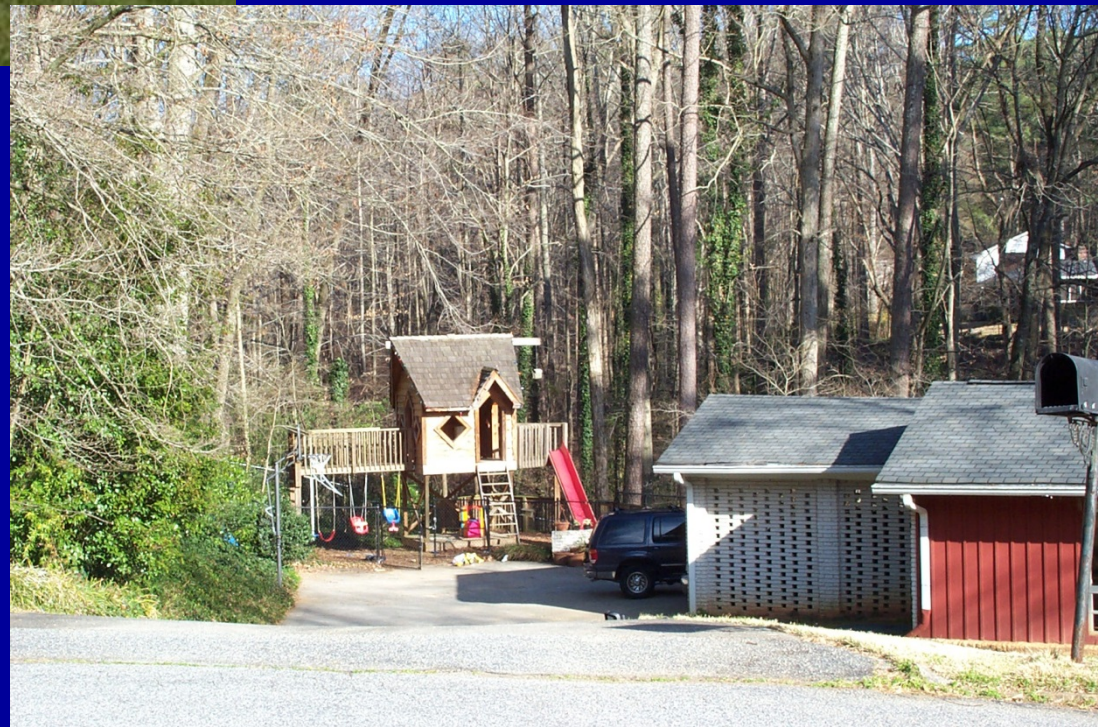


Age 2 years





Age 4 years



Age 6 years





Age 12 years

Age 16
years



This design may help at age 2, but not at age 12



8-80 Cities Philosophy

- If you create a city that's good for an 8 year old and good for an 80 year old, you will create a successful city for everyone. This is an 8-80 City.



Children Walking to School

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



Safe Routes to School: Benefits for the Larger Community

Example of 1/2 Mile School Buffers in an Urban Area:
Minneapolis--St. Paul, Minnesota (city population 2,388,593)

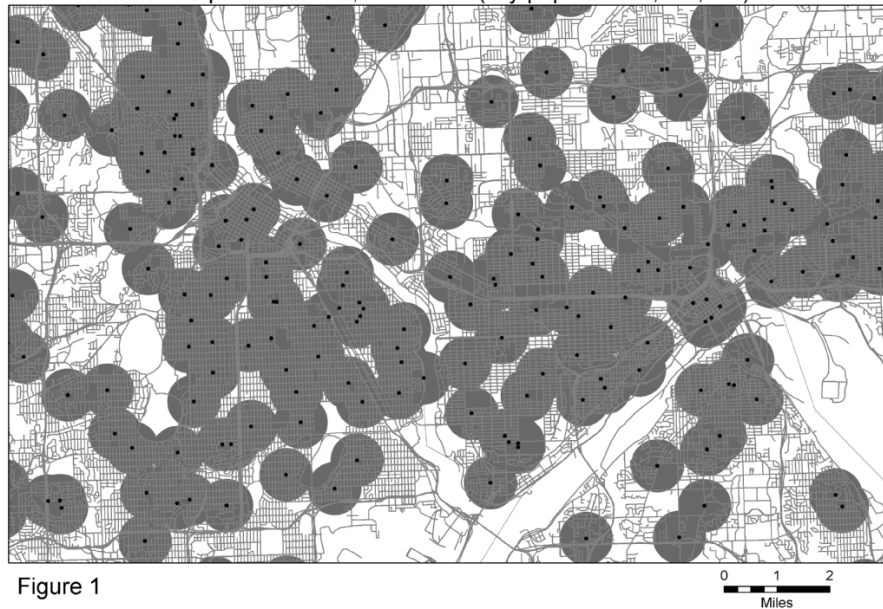


Figure 1

Example of a Metropolitan Area Excluding Urban Area with 1/2 Mile School Buffers:
Bartow County, Georgia (County Population 76,019)

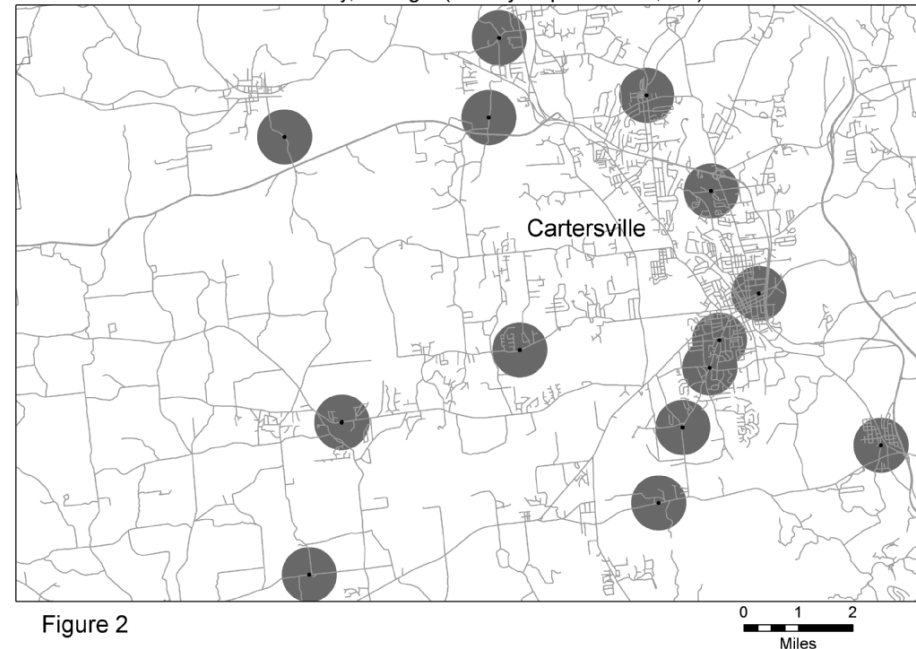


Figure 2

Ten Principles for Building Healthy Places

1. Put People First
2. Recognize the Economic Value
3. Empower Champions for Health
4. Energize Shared Spaces
5. Make Healthy Choices Easy



<http://www.uli.org/wp-content/uploads/ULI-Documents/10-Principles-for-Building-Healthy-Places.pdf>

Ten Principles for Building Healthy Places

6. Ensure Equitable Access
7. Mix It Up
8. Embrace Unique Character
9. Promote Access to Healthy Food
10. Make It Active

<http://www.uli.org/wp-content/uploads/ULI-Documents/10-Principles-for-Building-Healthy-Places.pdf>



Considerations in Healthy Places Research

- Randomized controlled trials of community design rarely possible
- Community-based participatory research: communities can help frame research questions and conduct research
- No single study is definitive; replication is needed
- Measuring exposure is often difficult; for example, what is a “dose” of exposure to access to a park?
- Outcome analyses should examine full benefits; most built environment interventions have multiple impacts on health
- Research ethics and human subjects protection are essential

Healthy Community Design Research: Before/After Studies

- Quasi-experimental study examines health impacts before and after a change occurs; may or may not have a comparison setting
 - Example: Making stairs attractive with new paint, artwork, music, and signage led to 9% increase in stairway use



Kerr NA, et al.
Am J Health Prom
18:312, 2004

Charlotte, North Carolina Light Rail Opened November, 2007

- People interviewed before/after rail service began
- Light rail users had:
 - a significant increase in meeting weekly recommended physical activity guidelines through walking (odds ratio 1.09)
 - an average reduction of 1.18 Body Mass Index points ($p < 0.05$)

MacDonald JM, et al. *Amer J Prev Med.*
2010; 39(2): 105–112



Healthy Community Design Research: Natural Experiments

- Natural experiment - research in which investigators can examine health impacts in settings where change has occurred unrelated to investigator efforts.
- Example: During 1996 Olympic Games in Atlanta, there was a temporary decline in traffic, in air pollution, and in emergency visits for children with asthma, providing suggestive evidence of the health benefits of policies to reduce driving



Healthy Community Design Research: Using Data from Non-Health Sources

- Creative analyses of data collected for reasons other than an investigation into health
- Example: data collected for transportation purposes in the National Household Travel Survey was used to examine the amount of walking associated with using public transit

Found that transit users walk a median of 19 minutes daily to and from transit

Besser & Dannenberg, *Am J Prev Med.*
29:273-280, 2005



Healthy Community Design Research: Policy Research

- Policy research: investigators examine types of built environment policies passed in various jurisdictions, ideally in conjunction with measures of health in those localities.



- Example: One survey of Utah cities examined municipal policies that promoted physical activity, such as those related to sidewalks, bicycle lanes, shared-use paths, work sites, greenways, and recreational facilities

Librett JJ, et al. *Am J Public Health.*
93:1399-1403, 2003

Healthy Community Design Research: Cohort Studies

- Large cohort studies developed for purposes other than built environment research can be used to examine cross-sectional and longitudinal impacts of the built environment on health
- Example: One study examined change in body mass index over 3 years in relation to fast food and restaurant food consumption in a large cohort of young adults (CARDIA study)

Duffey KJ, et al. *Am J Clin Nutr.*
85:201-208, 2007.



Healthy Community Design Research: Cost-Effectiveness Studies

- Cost-effectiveness studies of built environment interventions, such as ones designed to increase physical activity, are often requested by policy makers
- Example: Study estimated that by 2040, Portland, Oregon's bicycle infrastructure investments \$138 to \$605 million will result in health care cost savings of \$388 to \$594 million, fuel savings of \$143 to \$218 million, and savings in value of statistical lives of \$7 to \$12 billion



Gotschi T. *J Phys Act Health.*
8(Suppl 1):S49-S58, 2011

Healthy Community Design Research: Case Studies

- Detailed case studies can be used to document the experience in specific communities with efforts to create a healthy built environment
- Example: Evergreen Cemetery Jogging Path circles a cemetery in a low-income area in Los Angeles



www.preventioninstitute.org/index.php?option=com_jlibrary&view=article&id=114&Itemid=127

Creative Methods for Research

- New Washington DC bike lane built
- Archived traffic webcam photos (AMOS) used for before and after bike counts
- Amazon Mechanical Turk used crowd sourcing to count pedestrians, bicycles, and cars in photos
- 1200 photo counts cost \$12.00 total (\$0.01/photo)



- Counts completed in 8 hours
- Result: bicyclists increased four-fold in new bike lane

Healthy Community Design

Some Research Opportunities



Healthy Community Design

Research Questions:

Physical Activity

- Do community improvements in walking and biking facilities lead to a decline in per capita automobile use?
- Possible study design: Examine before and after person-hours of walking and biking and per capita vehicle miles traveled in neighborhoods undergoing major pedestrian and bicycling improvements.

Healthy Community Design Research Questions: Pedestrian Infrastructure

- Do communities where local governments pay for sidewalks have better sidewalk infrastructure and maintenance than places where homeowners pay for sidewalks?
- Possible study design: Compare quantity and quality of sidewalks in communities where local government pays with that in communities where homeowners pay for sidewalks.

Healthy Community Design

Research Questions:

Bicycle Infrastructure

- Do public bicycle-sharing programs increase physical activity and reduce automobile use?
- Possible study design: Examine before and after trips taken, vehicle miles traveled, and calories burned in cities that introduce bicycle-sharing programs

Healthy Community Design

Research Questions:

Injuries

- Are older teenagers better drivers if they gained road experience by riding bicycles in their younger teen years?
- Possible study design: Analyze bicycling and driving information while following a cohort of teens from age 12 to age 18

Healthy Community Design

Research Questions:

Air Pollution

- What are the health and air pollution reduction benefits of community gardens, green roofs, greenways, and parks?
- Possible study design: Compare air pollution and health status indicators in communities with and without major investments in greenspace.

Healthy Community Design

Research Questions:

Food Environment

- What are the nutritional health effects on children of school vegetable gardens?
- Possible study design: Measure student diets in a set of schools before and after implementing school vegetable gardens.

Healthy Community Design

Research Questions:

Mental Health and Social Capital

- Is the design of the built environment less important for social capital in young adults who use social media extensively?
- Possible study design: In various built environments, compare social capital among persons with high and low social media use

Healthy Community Design

Research Questions:

Social Equity

- How do communities with a narrow range of housing values compare to mixed-income neighborhoods on crime rates, chronic disease, social capital, and other indicators?
- Possible study design: Examine before and after indicators in communities where urban redevelopment is planned, controlling for confounders.

Healthy Community Design

Research Questions:

Schools

- Does shared use of school facilities by community residents after school hours have community health benefits?
- Possible study design: Examine health indicators before and after implementation of shared use agreements.

Healthy Community Design Research Questions: Transportation Policy

- What are the barriers and solutions to shifting from motor-vehicle Level of Service to multi-modal Level of Service metrics?
- Possible study design: Examine policies and infrastructure in communities before and after they implement use of multi-modal Level of Service metrics

Healthy Community Design

Research Questions:

Economics of Community Design

- What are the economic, environmental, and health costs of school busing compared with walking?
- Possible study design: Examine before and after costs in communities that make major investments in Safe Routes to Schools programs

Healthy Community Design

Research Questions:

Research Tools

- Are efficient methods available for creating inventories of sidewalks and bicycle paths?
- Possible study design: Explore use of remote sensing, GPS, GIS, Google StreetView, and other methods of gathering information about pedestrian and bicycle infrastructure

Why Measure Walkability?

(“What gets counted, counts”)

Creation or enhancement of access to places for physical activity can increase the percentage of people engaging in physical activity



www.thecommunityguide.org/pa

www.Walkscore.com



Walk Score®

Find a Walkable Place to Live.

[Rankings](#) | [Walkable Neighborhoods](#) | [How It Works](#) | [Walk Score On Your Site](#) | [Blog](#)

Type an Address:

Go

Walk Score

74
Out of 100

Very Walkable

2800 E Roy St Seattle

[Overview](#)

[Customize Map](#)

[Commute](#)

[Capitol Hill](#)

Restaurants

Cafe Flora 0.1mi

Coffee

My Coffee House 0.09mi

Groceries

Village Mart 0.13mi

Shopping

Missi Lu 0.11mi

Schools

The Valley School 0.31mi

Parks

Prentiss I Frazier P 0.3mi

Books

City of Seattle: Ma 0.92mi

Bars

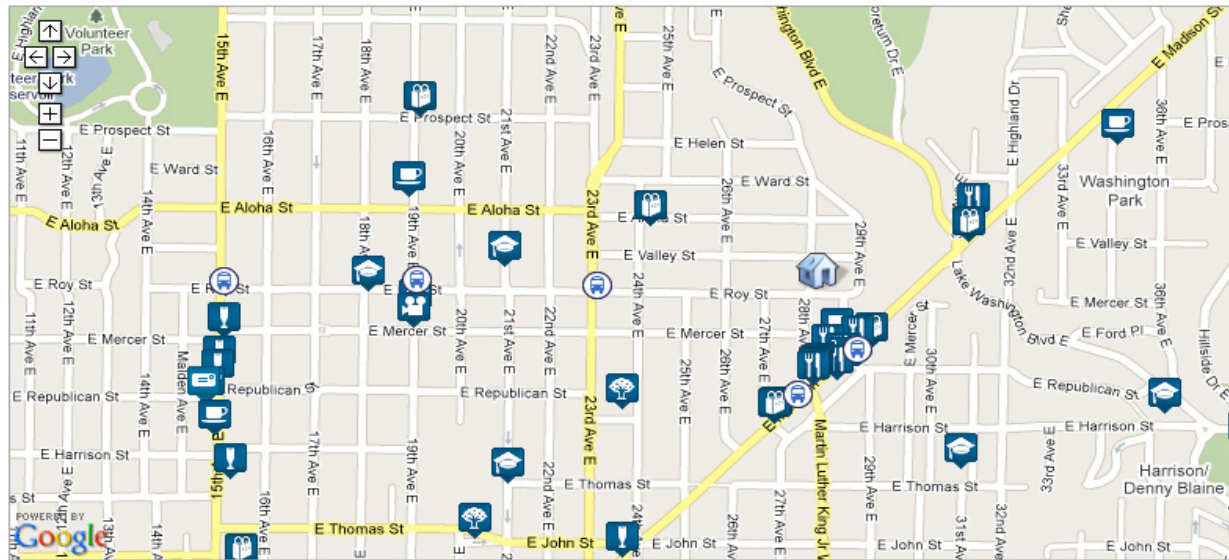
Bottleneck Lounge 0.45mi

Entertainment

Washington Ensemble 0.52mi

Post Offices

Postal Plus 0.8mi



Public Transportation

Transit Score: **60** Good Transit

9 nearby routes: 9 bus, 0 rail, 0 other

.1 mi - 11

.1 mi - 84

.15 mi - 8

.28 mi - 43

.28 mi - 48

.51 mi - 12

Compare Your Walk Score

Seattle top 10%: 99

Your score: 74

60% of Seattle residents have a higher Walk Score.

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



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 a better informed decisions

Voluntary vs. Regulatory Approach to Using an HIA

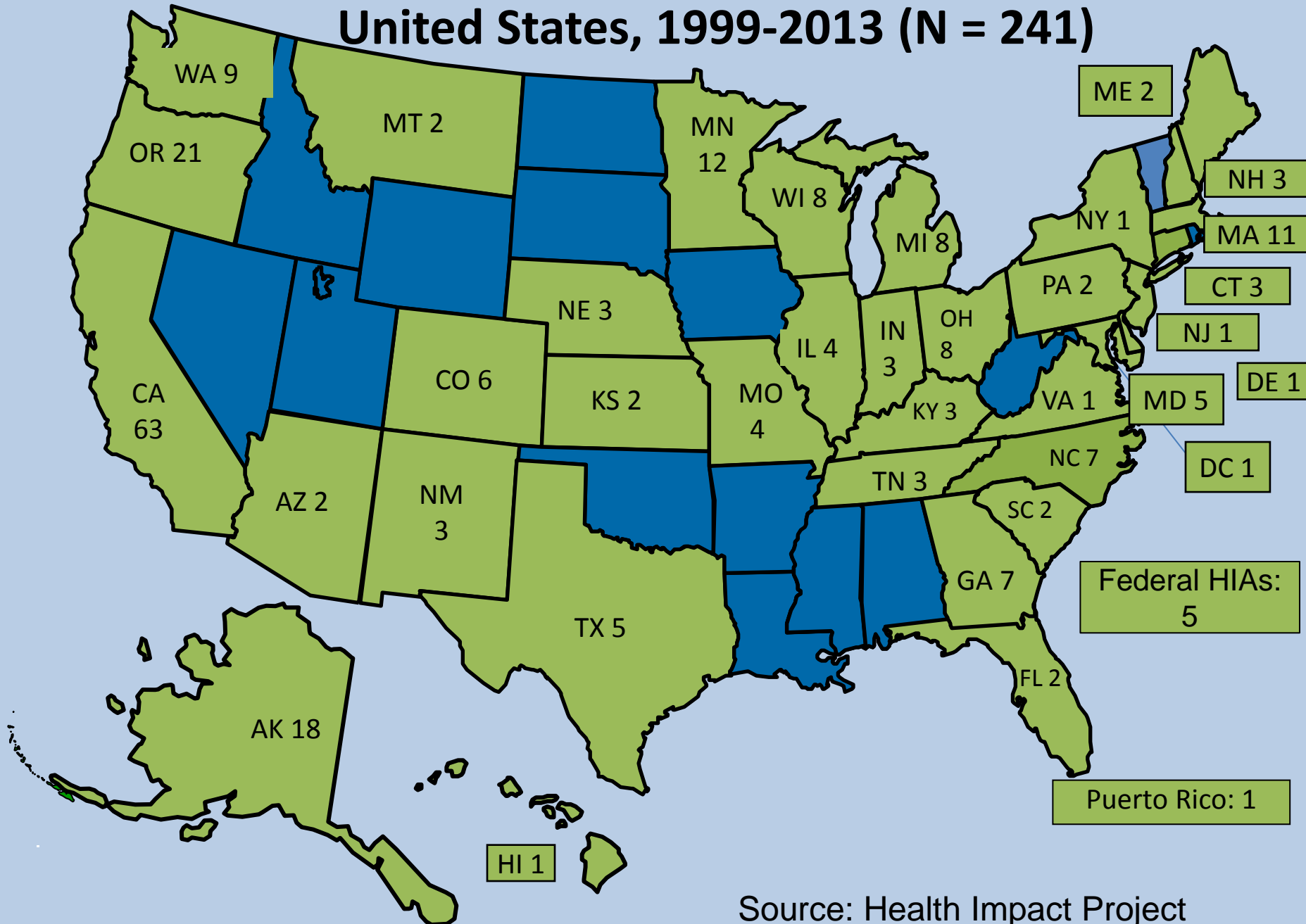
- Voluntary (a tool used by a health officer to inform a planning agency)
 - Simpler, less expensive, less litigious
 - Less likely to be used if not required
 - More politically acceptable
- Regulatory (modeled on a required environmental impact statement)
 - More complex, more expensive, more litigious
 - More likely to be used if required
 - May be less politically acceptable

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

Completed and In Progress HIAs

United States, 1999-2013 (N = 241)



Source: Health Impact Project

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

Context

“Farmers Field”, 72,000-seat football stadium in downtown LA. Local community organizations (LA CAN, LAFLA, PSR-LA) work with HIP to conduct an HIA on stadium proposal.

Analysis

Issues being ignored by existing analyses: gentrification, displacement; employment; housing; public safety; access to open space. Rapid HIA conducted within 45 day comment period; responding to 10,000 page environmental document



Outcomes

- HIA used in campaign that secured: \$15 million for affordable housing; \$5 million for parks/open space, neighborhood improvement plans, funding for a community team to promote health and protect tenant rights in the area; and local hiring commitments
- Media campaign brought attention to issues addressed in the HIA
- Residents from surrounding neighborhoods highly engaged

Health in All Policies

- Incorporates health considerations into decision making across sectors and policy areas
- Key elements
 - Embed health, equity and sustainability into decision processes
 - Support intersectoral collaboration by bringing partners together
 - Benefit multiple partners with co-benefits and win-win situations
 - Engage stakeholders across community public and private sectors
 - Create structural or process change for permanent benefits
- Examples
 - School siting
 - Food purchases across government sites – prisons, schools, etc
- Health in All Policies: A Guide for State and Local Governments
 - www.phi.org/resources/?resource=hiapguide

Healthy Planning: Plan Evaluation

- Develop a framework for key public health topics
- Identify common goals and policies
- Identify subjects not included
- Assess if health policies are supported by implementation mechanisms, indicators, time lines, funding, responsible parties



<http://www.planning.org/research/publichealth/pdf/evaluationreport.pdf>

1. ACTIVE LIVING

- General
- Active Transport
- Recreation
- Injury

2. EMERGENCY

- Climate Change
- Natural and Human-caused Disasters
- Infectious Disease

3. ENVIRONMENTAL EXPOSURES

- General
- Air Quality
- Water Quality
- Brownfields

4. FOOD & NUTRITION

- Access to food and healthy food options
- Water
- Land use

5. SERVICES

- General
- Accessibility to Health & Human Services
- Aging

6. SOCIAL COHESION & MENTAL HEALTH

- General
- Housing Quality
- Green & Open Space
- Noise
- Public safety / Security

BROAD ISSUES

- Substantive Issues: Vision Statement, Guiding Principles, and Background data
- Procedural Issues

Plan Strengths

1. Active Living: most strongly represented across plans; addressed in Parks & Open Space, Urban Design, Transportation/Circulation, and Health/ Healthy Communities plan elements.
2. Environmental Exposures: second most represented, particularly regarding water and tree planting.
3. Emergency Preparedness policies, when included, tended to be strong and specific with associated implementation mechanisms.

Plan Strengths

4. When plans addressed food issues, they did so relatively comprehensively and with attention to equity and access for vulnerable populations.
5. The plans that had a standalone Public Health Element emphasized health to a greater extent throughout the plan than those that did not.
6. Most plans were written in accessible, easy-to-follow language and format.



Plan Weaknesses

1. Relatively weak coverage of Food and Nutrition and Emergency Preparedness.
2. Very weak in coverage of Health and Human Services and Social Cohesion and Mental Health.
3. Most plans did not use images, such as maps, to convey information about the distribution of resources, other community assets, SES or health status of populations across the jurisdiction.



Plan Weaknesses

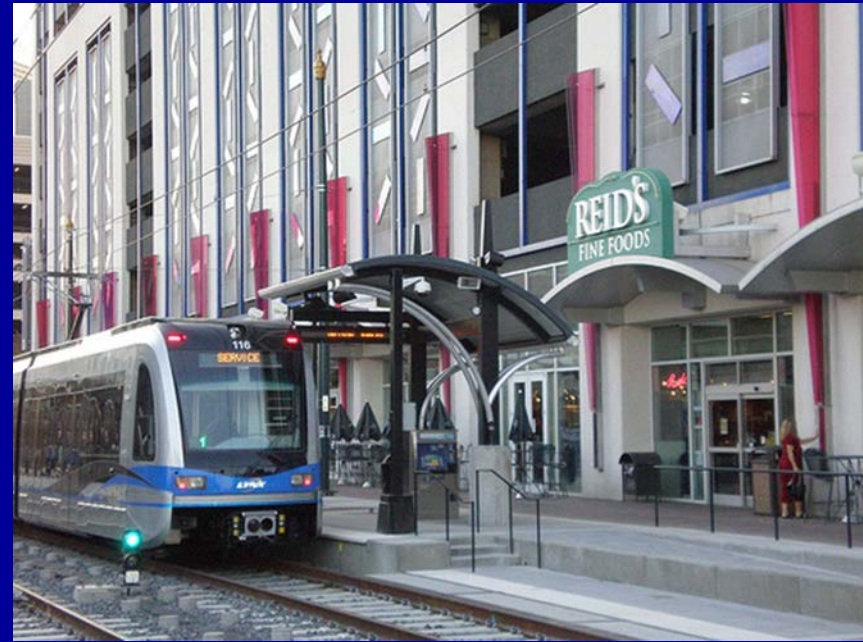
4. Even plans with strong public health-oriented policies did not utilize public health data (e.g., crash or injury rates, chronic disease rates, crime) or include information on the current distribution and accessibility of services (e.g., clinical, grocery, parks or transit).
5. Even plans with strong public health-oriented policies did not identify metrics by which to measure or track success for goals and policies.
6. Most plans lacked implementation strategies, including benchmarks, responsible parties, time lines, etc.

Architecture and Selected Societal and Health Issues

- Obesity
- Housing and social inequities
- Aging population
- Urbanization
- Energy shortages
- Water shortages and excesses
- Natural disasters
- Climate change

Examples of Architectural Design to Promote Health

- Creating *Transit-Oriented Development* to encourage walking and transit use



Examples of Architectural Design to Promote Health

- Adding an *Accessory Dwelling Unit* to a residence to provide housing for an elderly parent



Stairways Designed to Encourage or Discourage Physical Activity

Attractive stairways invite use



Trends in Health and Built Environment

- More young adults prefer mixed-use, walkable neighborhoods and short commutes
- More childless families prefer urban settings
- Decline in percent of teens obtaining driver's licenses
- Aging population who cannot drive to needed services
- Funding for research and translation on environmental factors including walkability (www.activelivingresearch.org)
- Trends in architecture and planning that promote healthy design - green buildings, smart growth, new urbanism
- Leadership from visionary mayors, governors, and legislators
- Health and built environment established as a field of academic inquiry

Progress in Health and Built Environment

- Medline search for “health” and “built environment”
 - 2003-2013: 675 articles vs. 1993-2003: 39 articles
- American Public Health Association’s annual meeting talks
 - Built environment: 159 in 2012 vs. 73 in 2006
 - Transportation: 205 in 2012 vs. 103 in 2006
- Health and built environment courses at 21 US universities
- Joint degree programs MPH / MUP at 14 US universities
- Textbooks available for teaching courses
- Cross-sector relationships established between public health and planners, architects, and transportation professionals
- Health and built environment sessions at national conferences in public health, planning, transportation, smart growth, parks and recreation

Progress in Health and Built Environment

- Increasing acknowledgement of role of built environment in health, especially related to obesity: *National Prevention Strategy, White House Obesity Initiative, Guide to Community Preventive Services*
- Increasing use of health impact assessments that incorporate health into built environment decision-making processes
- Increasing awareness of health issues related to climate change, such as creating resilient and sustainable built environments
- Increasing awareness of importance of health benefits of parks, green space, and other forms of nature contact (Richard Louv. *Last Child in the Woods*, 2005)

Health and Built Environment: Next Steps

- More research and funding on BE-related health outcomes and how to reap health benefits from good design
- Efforts should target vulnerable persons such as those living in substandard housing, those lacking access to safe places for physical activity, elderly who cannot drive
- Research translation to influence planners, architects, and developers to design, build, and market health-promoting places
- Define career pathways for students with both planning and public health degrees to obtain jobs that value their skills
- Leadership must continue including advocacy for the importance of health in design and building decisions

Selected Policies and Tools to Promote Healthy Community Design: Transportation

- Complete streets
- Bike share programs
- Safe Routes to Schools
- Safe routes to transit, parks, etc
- Walk/bike benchmarking report
- Mode balance in transport funding
- Rail to trail conversion
- Unbundling parking
- Walk/bike friendly cities certification
- Multi-modal level of service

Selected Policies and Tools to Promote Healthy Community Design: Land Use

- School siting
- LEED-ND
- WalkScore and realty listings
- Health impact assessment, checklists
- Active Design Guidelines NYC
- School/community shared use policies
- Health element in comprehensive plans
- Urban growth boundary
- Retrofit failed suburban shopping mall
- Joint Planning/Public Health degrees

Making Healthy Places: Designing and Building for Health, Well-Being, and Sustainability



**MAKING HEALTHY
PLACES** Designing and Building for Health,
Well-being, and Sustainability



Andrew L. Dannenberg, Howard Frumkin, and Richard J. Jackson

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

www.makinghealthyplaces.com

Island Press, 2011

Community design choices can promote or harm human health



www.cdc.gov/healthyplaces
www.epa.gov/smartgrowth