The Built Environment Is Health Policy in Concrete

http://designinghealthycommunities.org/

Richard J Jackson MD MPH FAAP
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UCLA Fielding School of Public Health
What is the greatest threat to humanity?

First Earth Photo
Jan 23, 2017 GOES-16 Satellite
(full color)
Houston, August 27, 2017
People who were rescued from Houston's Meyerland neighborhood on Sunday waited to be taken
Houston’s Hospitals Treat Storm Victims and Become Victims Themselves

By SHERI FINK and ALAN BLINDER     AUG. 28, 2017

Emergency medical technicians transported a patient from the Citizens Medical Center in Victoria, Tex., to another hospital on Saturday. Alyssa Schukar for The New York Times
There’s an “Unbearable” Chemical Smell Hovering Over Parts of Houston, and Experts Are Worried.

The communities “can’t leave or evacuate so they are literally getting gassed.”

EMILY ATKIN  AUG. 28, 2017 2:30 PM

A Coastal Houston Oil Refinery  Thomas Northcut/Getty
Hurricane Harvey’s Public Health Impact Extends Beyond Flooding

“Disasters magnify fragilities that are already present in society.”

By Erin Schumaker
Antecedents
Hell and High Water

Houston is the fourth-largest city in the country. It’s home to the nation's largest refining and petrochemical complex, where billions of gallons of oil and dangerous chemicals are stored. And it’s a sitting duck for the next big hurricane. Learn why Texas isn’t ready.

by Neena Satija for The Texas Tribune and Reveal; Kiah Collier for The Texas Tribune; and Al Shaw and Jeff Larson for ProPublica,
March 3, 2016

It is not if, but when Houston’s perfect storm will hit...

They called it “the monster hurricane.”
Hundreds of miles wide. Winds at more than 100 mph. And — deadliest of all — the power to push massive wall of water into the upper Texas coast, killing thousands and shutting down a major international port and industrial hub.

That was what scientists, public officials, economists and weather forecasters thought they were dealing with on Sept. 11, 2008, as Hurricane Ike barreled toward Houston, the fourth-largest city in the United States and home to its largest refining and petrochemical complex. And so at 8:19 p.m., the National Weather Service issued an unusually dire warning.

“ALL NEIGHBORHOODS, AND POSSIBLY ENTIRE COASTAL COMMUNITIES, WILL BE INFIRMED.” the alert read. “PERSONS NOT
It is not if, but when Houston’s perfect storm will hit...

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That was what scientists, public officials, economists and weather forecasters thought they were dealing with on Sept. 11, 2008, as Hurricane Ike barreled toward Houston, the fourth-largest city in the United States and home to its largest refining and petrochemical complex. And so at 8:39 p.m., the National Weather Service issued an unusually dire warning.

“ALL NEIGHBORHOODS, AND POSSIBLY ENTIRE COASTAL COMMUNITIES, WILL BE INUNDATED,” the alert read. “PERSONS NOT
Development Regulations

The Department of Planning and Development regulates land development in its extraterritorial jurisdiction (ETJ). The city of Houston does not have zoning regulations that address how property can be subdivided. The City land use.

No Zoning Letter - 2017

The Department checks subdivision plats for the proper subdivision of land or right-of-way, building lines and for compliance with Chapter 42, the City ordinance. Development site plans are checked for compliance with regular parking, tree and shrub requirements, setbacks, and access.

To: Whom It May Concern

From: Patrick Walsh, P.E., Director
Planning and Development Department

Effective Date: January 1, 2017

The City of Houston does not have a zoning ordinance. This is the city of Houston’s no zoning letter applicable to any property inside the city of Houston. This does not address any separately filed restrictions that may be applicable to the property. You may use this letter to present to your lender. This letter will be updated on January 1, 2018.

All applicable development regulations and subdivisions laws can be obtained through a review of the City Code of Ordinances, which is located on the City of Houston internet site accessed through www.houstonplanning.com or www.houstontx.gov/planning.
Land subsidence along the Texas Gulf Coast due to oil and gas withdrawal

Abstract
Land subsidence caused by groundwater withdrawal in the Houston-Galveston region is a well-documented phenomenon. Subsidence of up to 3m (10ft) has been calculated in the region since 1905. Hydrocarbon withdrawal is a plausible cause of subsidence where groundwater withdrawal has diminished and significant petroleum production has occurred for over 70 years. Sixteen fields were investigated by acquiring reservoir bottom hole pressure data (BHP) near bore-hole extensometers set up by the Harris-Galveston Coastal Subsidence District (HGCS). All reservoirs were found to be well below hydrostatic pressure; a few of them were underpressured even before production began showing a possible hydraulic connection between fields. BHP data was used in a reservoir model and a boundary clay reservoir model to calculate subsidence. Subsidence under these fields is predicted to be as high as 0.30 m (~1.00 ft) in a nine-year period or 33.33 mm yr⁻¹ (1.3 in yr⁻¹) at the Goose Creek field and as low as 0.007 m (0.023 ft) in a twenty-year period or 0.33 mm yr⁻¹ (0.01 in yr⁻¹) at the Gillock field. Elevation benchmark data used in producing a cross section of a line of oil fields

Texas Gulf Coast - Hydrocarbon and groundwater withdrawal since 1905 has caused an estimated subsidence of 3 meters. (10ft)
It is the policy of the United States to improve the resilience of communities and Federal assets against the impacts of flooding. These impacts are anticipated to increase over time due to the effects of climate change and other threats. Losses caused by flooding affect the environment, our economic prosperity, and public health and safety, each of which affects our national security.
Harvey Is What Climate Change Looks Like

It’s time to open our eyes and prepare for the world that’s coming.

By ERIC HOLTHAUS | August 28, 2017
Pedestrians tried to escape along Interstate 610 as Harvey flooded Houston on Sunday.

Alyssa Schukar for The New York Times
From the US National Climate Assessment   August 2017

Key Message: Recent U.S. Temperature Trends

U.S. average temperature has increased by 1.3°F to 1.9°F since record keeping began in 1895; most of this increase has occurred since about 1970. The most recent decade was the nation's warmest on record. Temperatures in the United States are expected to continue to rise. Because human-induced warming is superimposed on a naturally varying climate, the temperature rise has not been, and will not be, uniform or smooth across the country or over time.

US – the most recent decade was the warmest on record.
Temperature changes over 1991-2012 compared to 1901-1960

US National Climate Assessment August 2017
Ocean Changes 1950-2010

Heat Content

Upper ocean heat content

http://www.climatechange2013.org/images/report/WG1AR5_Chapter03_FINAL.pdf
2017: For the first time in recorded history, Gulf of Mexico temperatures never dropped below 73 degrees F
It Rains Harder Than It Used To…

- US: increase in water vapor is 3 to 4% since the 1970s (most of the human-caused global warming has occurred since then).
- …Amounts to 1-2 trillion gallons more per year over the Continental US.
Presidential Executive Order
1-30-2015

It is the policy of the United States to improve the resilience of communities and Federal assets against the impacts of flooding. These impacts are anticipated to increase over time due to the effects of climate change and other threats. Losses caused by flooding affect the environment, our economic prosperity, and public health and safety, each of which affects our national security.

Presidential Executive Order
8-15-2017

Trump FEMA Chief Supports Cutting Coverage for Flood-Prone Homes

By Christopher Flavelle

August 23, 2017, 1:00 AM PDT
Texas Lawmakers Who Voted Against Relief for Hurricane Sandy Now Ask For Help With Harvey

All of a sudden, Ted Cruz is a big fan of disaster relief.

ASHLEY DEJEAN  AUG. 28, 2017 6:16 PM

Before Hurricane Harvey hit this weekend, Texas senators Ted Cruz and John Cornyn sent a letter to the president urging him to sign the major disaster declaration that had been requested by Gov. Greg Abbott, so the state could access key federal resources as swiftly as possible.

“Given the potential catastrophic impact that the Hurricane may have on Texas communities,” the senators wrote, “we strongly support this request and urge you to provide any and all emergency protective measures available by a major disaster declaration.”

The irony of this request was not lost on lawmakers from states that had been devastated by hurricane Sandy in 2012. At that time, Texas lawmakers overwhelmingly voted against recovery assistance for New York and New Jersey. When asked about that hypocrisy today on MSNBC, Cruz dodged the question. “There’s time for political sniping later,” he said. “I think our focus needs to
Atmospheric Carbon Dioxide
Measured at Mauna Loa, Hawaii
Global Temperature Increase
Since 1880: 1.4 F

Global Land–Ocean Temperature Temperature Index

(NASA)
Since the Industrial Revolution, the oceans have become 30 percent more acidic -- the pH of ocean surface water has dropped from roughly 8.18 to 8.07.
Expenditure Cascades

By

Robert H. Frank,¹ Adam Seth Levine,² and Oege Dijk³

¹ Cornell University, Johnson Graduate School of Management, Ithaca, NY 14853
² University of Michigan, Department of Political Science, Ann Arbor, MI 48109
³ European University Institute, Department of Economics, Fiesole, Italy 50014

Changes in Before Tax US Household Incomes 1949-1979

- Bottom 20%: +3.5%
- Second 20%: +9.1%
- Middle 20%: +12.6%
- Fourth 20%: +21.5%
- Top 20%: +45.7%
- Top 5%: +68.0%
Changes In After-Tax US Household Income 1979-2000

- Bottom 20%: +9%
- Second 20%: +13%
- Middle 20%: +15%
- Fourth 20%: +24%
- Top 20%: +68%
- Top 1%: +201%
What is the greatest threat to humanity?

First Earth Photo
Jan 23, 2017 GOES-16 Satellite
(full color)
--greed as the 'mother and matrix, root and consort' of all sins.

--“The most insidious and least obvious of offenses”…transformed from a specific offense against godliness to a brutal but amoral force of society”
The middle class doesn’t want a tax cut. It wants better government.

By Steven Pearlstein  September 27 at 9:51 AM

During a speech in Indianapolis, Sept. 27, President Trump said the GOP tax plan is a “once-in-a-generation opportunity” to lower taxes on the middle class and businesses. (Brentin Inzaurralde/The Washington Post)

One of the great canards of American politics these days is that the “struggling” middle class needs and wants a tax cut. It doesn’t. What it needs and wants after years of tax and spending cuts is more and better government services for the taxes it already pays.
CDC Headquarters - Atlanta
Buford Highway     Atlanta, Georgia
• The Built Environment – how we build our homes, workplaces, towns, cities and world
The purpose of public health is to fulfill society’s interest in assuring the conditions in which people can be healthy.
The United States has now paved over the equivalent area of the entire state of Georgia.

And Photosynthesis is our friend!
Sitting in a Car is Mostly Not Good for You.

Traffic along LA freeways and Wilshire Blvd.
Asthma Study in Southern California High Schools
Six with High & Six with Low Levels of Air Pollution

• Over 5 years:
  – High ozone high schools:
    • asthma rate was 3.3x higher in children playing three or more sports.
  – Low ozone high schools:
    • sports had no effect on asthma rates
As Air Pollution in Los Angeles Decreased, Children’s Lungs Improved

Pedestrian Fatality Rates for Collisions at Different Speeds

Zegeer et al. 2002
US Adult Obesity Rates 1990

Adult Obesity Rate by State, 1990

Percent of obese adults (Body Mass Index of 30+)

0 - 9.9%  10 - 14.9%  15 - 19.9%  20 - 24.9%  25 - 29.9%  30 - 34.9%  35% +
US Adult Obesity Rates 2016

http://stateofobesity.org/adult-obesity/
Heart Disease Death Rates, 2011-2013
Adults, Ages 35+, by County

Rates are spatially smoothed to enhance the stability of rates in counties with small populations.

Data Source:
National Vital Statistics System
National Center for Health Statistics

CDC
Relationship Between BMI and Risk of Type 2 Diabetes

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<th>Body Mass Index (kg/m²)</th>
<th>Women</th>
<th>Men</th>
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<tr>
<td>&lt;22</td>
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<td>1.0</td>
</tr>
<tr>
<td>23-23.9</td>
<td>2.9</td>
<td>1.0</td>
</tr>
<tr>
<td>24-24.9</td>
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<td>8.1</td>
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<td>15.8</td>
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<td>28-28.9</td>
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<td>29-29.9</td>
<td>40.3</td>
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<td>30-30.9</td>
<td>54.0</td>
<td>27.6</td>
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<tr>
<td>31-31.9</td>
<td>93.2</td>
<td>42.1</td>
</tr>
</tbody>
</table>

US Diabetes Rates 1995

Percent of adults with diabetes:
- 0 - 3.9%
- 4 - 7.9%
- 8 - 11.9%
- 12 - 15.9%
- 16%+

Map showing the distribution of diabetes rates across the United States.
“[over 30 years in the Pediatric Diabetes Clinic] the percentage of new-onset type 2 diabetes in adolescence has increased from 3% to ~50% today”.

A Clinical Trial to Maintain Glycemic Control in Youth with Type 2 Diabetes

TODAY Study Group

BACKGROUND
Despite the increasing prevalence of type 2 diabetes in youth, there are few data to guide treatment. We compared the efficacy of three treatment regimens to achieve durable glycemic control in children and adolescents with recent-onset type 2 diabetes.

METHODS
Eligible patients 10 to 17 years of age were treated with metformin (at a dose of 1000 mg twice daily) to attain a glycated hemoglobin level of less than 8% and were randomly assigned to continued treatment with metformin alone or to metformin combined with rosiglitazone (4 mg twice a day) or a lifestyle-intervention program focusing on weight loss through eating and activity behaviors. The primary outcome was loss of glycemic control, defined as a glycated hemoglobin level of at least 8% for 6 months or sustained metabolic decompensation requiring insulin.

The members of the writing group — Phil Zucker, M.D., Ph.D., University of Colorado Denver, Aurora; Kathryn Hiri, Ph.D., and Laura Yale, M.S., George Washington University, Washington, DC; Barbara Linder, M.D., Ph.D., National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD; Kenneth Copeland, M.D., University of Oklahoma Health Sciences Center, Oklahoma City; Sira Aslanian, M.D., Children’s Hospital of Pittsburgh, Pittsburgh; Leona Coffer, M.D., Case Western Reserve University, Cleveland; David M. Nathan, M.D., Massachusetts General Hospital, Boston;
Prevalence of and Trends in Diabetes Among Adults in the United States, 1988-2012

Andy Menke; Sarah Casagrande; Linda Geiss, Catherin Cowie

Diabetes Prevalence NHANES 2011-12

(using Hemoglobin A$_{1c}$, FPG)

Sample of US Population
All Age Groups, Races, Income and Education

Diabetes 12.4%
Prediabetes 36.5%
10,000 steps

- 3234 people with Pre-Diabetes (IGT – Impaired Glucose Tolerance)
- Walked or exercised five times a week for 30 minutes for six months
- Lost 5% to 7% of their body weight
- Reduced their risk of diabetes by 58%
Survival of 1263 men with Type 2 Diabetes: Fit vs Unfit

Low Cardiorespiratory Fitness and Physical Inactivity as Predictors of Mortality in Men with Type 2 Diabetes. " 18 April 2000 Annals of Internal Medicine 132, pp 605-611 M. Wei et al
MRI Study of Brain Scans of 120 older adults over 12 months

Half – Moderate aerobic exercise 45 minutes, three days a week, mostly walking.

Brain size increased

Half— No extra aerobic exercise –

Brain Size Decreased 1.5%

Result: 3.5% difference

Further tests showed that increased brain volume translated into better memory.
Creating A Healthy Environment:
The Impact of the Built Environment on Public Health

"In its broadest sense, environmental health comprises those aspects of human health, disease, and injury that are determined or influenced by factors in the environment. This includes not only the study of the direct pathological effects of various chemical, physical, and biological agents, but also the effects on health of the broad physical and social environment, which includes housing, urban development, land-use and transportation, industry, and agriculture."

—Healthy People 2010, U.S. Department of Health and Human Services

Richard J. Jackson, MD, MPH
Chris Kochtitzky, MSP

Centers for Disease Control and Prevention
Sprawl Watch Clearinghouse Monograph Series
A Big Shift in Public Health’s Awareness of Built Environment as a Core Determinant of Health
Urban Sprawl and Public Health
DESIGNING, PLANNING, AND BUILDING FOR HEALTHY COMMUNITIES
Howard Frumkin, Lawrence Frank, and Richard Jackson

DESIGNING HEALTHY COMMUNITIES
RICHARD J. JACKSON WITH STACY SINCLAIR

MAKING PLACES
Designing and Building for Health, Well-being, and Sustainability
Andrew L. Dannenberg, Howard Frumkin, and Richard J. Jackson
The Built Environment: Designing Communities to Promote Physical Activity in Children

Policy Statement American Academy of Pediatrics

June 2009

ARTICLE

ABSTRACT

An estimated 30% of American children are overweight, and physical inactivity contributes to this high prevalence of overweight. This policy statement highlights how the built environment of a community affects children's opportunities for physical activity. Neighborhoods and communities can provide opportunities for recreational physical activity with parks and open spaces, and policies must support this activity. Children can engage in physical activity as a part of their daily lives, such as on the way to school. Factors such as school location and access to physical activity policies that promote more active travel among children and adults, costs will be able to achieve the recommended 60 minutes of daily physical activity by walking, running, or doing other activities. In addition, the overall structure of the built environment of a child's community can be as important as the activity itself. The built environment can also affect health in its own right.

INTRODUCTION

A child's life is affected by the environment in which he or she lives. Relationships between the quality of air, water, and food are well recognized. The physical environment of the home and school can influence health through exposure to lead, mold, noise, or ambient light. In addition, the overall structure of the built environment of a child's community can be as important as the activity itself. The built environment can also affect health in its own right.

As cities have expanded into rural areas, large tracts of land have been transformed into low-density developments. "Seepage" theory has shown that the movement of people can increase travel time, which increases air pollution as well as passenger and parking traffic. Factors, however, must not only improve access to fresh fruits and vegetables. The physical environment of a community's surrounding opportunities for play and access to a central park for physical activity in children's neighborhoods can be important for physical activity. Opportunities for recreational physical activity in urban areas can be encouraging. "Active" physical activity, such as walking or bicycling to school and to other activities, is an important part of a child's daily environment that promotes more active lifestyles among children and adults will be important in enabling them to achieve recommended levels of physical activity.

BACKGROUND

The term "built environment" refers to spaces such as buildings and streets that are deliberately constructed as well as outdoor spaces that are cleared in some way by human activity. This term may be misleading in most clinics, but the high prevalence of childhood overweight and obesity, the subject is increasingly relevant.
Goal 1: Make physical activity an integral and routine part of life.

Recommendation 1: Communities, transportation officials, community planners, health professionals, and governments should make promotion of physical activity a priority by substantially increasing access to places and opportunities for such activity.
Surgeon General’s Call to Action

Promote Walking
People Creating Change

Designing Healthy Communities

Episode 1: Retrofitting Suburbia

Dr. Richard Jackson MD MPH, investigates the link between our nation’s obesity and Type 2 Diabetes epidemic with urban sprawl fueled by car dependency. To prevent disease through better urban planning, Boulder, CO redesigns the city to make bicycles a safe alternative transportation.

Related Topics or Episodes:
- New Designing Healthy Communities first Town Hall Meeting on April 30, 2013
- Designing Healthy Communities promotional video
- Episode 2: Rebuilding Places of the Heart
- Episode 3: Social Policy in Concrete
- Episode 4: Searching for Shangri La

Continue reading »

Atlanta Citizens Turning Out To Help Get Ready for The Belt Line
Environmental Impact Assessment Is Stuck in the 20th Century

- Impact Assessments must emphasize health and well-being, and capture health and societal benefits, as well as environmental impacts.
IMPROVING
HEALTH
IN THE
UNITED STATES

The Role of
Health Impact Assessment

Committee on Health Impact Assessment
Board on Environmental Studies and Toxicology
Division on Earth and Life Studies
National Research Council

COMMITTEE ON HEALTH IMPACT ASSESSMENT

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AARON A. WERNHAM, Pew Charitable Trusts, Washington, DC

Integrating HIA into environmental impact assessment (EIA). The U.S. National Environmental Policy Act (NEPA) and some related state laws explicitly require the identification and analysis of health effects when EIA is conducted. EIA, however, has traditionally included at most only a cursory analysis of health effects. Some argue that health analysis should be integrated into EIA because NEPA and related state laws provide a mechanism for achieving the same substantive goals as HIA. Others contend that EIA has become too rigid to accommodate a comprehensive health analysis and that attention should be focused on the independent practice of HIA. The committee emphasizes that the appropriate assessment of direct, indirect, and cumulative health effects in EIA under NEPA is a matter of law and not discretion, and recent efforts have successfully integrated the HIA framework into EIA. Thus, where legal standards for NEPA have not been met, EIA does not include integrated health analysis.
“...the appropriate assessment of Direct, Indirect, and Cumulative Health Effects in Environmental Impact Assessment Under the National Environmental Policy Act is a Matter of Law and Not Discretion.”
A Big Shift in Public Health’s Awareness of Built Environment as a Core Determinant of Health
2011 APHA Annual Meeting

“land use” 102 matches

“built environment” 182 matches
“Land Use” 1000 matches

“Built Environment” 703 matches
Medline Keyword Search:
“Built Environment” and “Health”

Sept 1993 – Sept 2003
58 Articles

Sept 2003 – May 2013
665 Articles

American Journal of Public Health
Built Environment and Health Issue
September, 2003
US Joint Degree Programs in Urban Planning and Health

Before 2003 -- None

2013 -- 14 Joint Programs
Physical Activity: Built Environment Approaches Combining Transportation System Interventions with Land Use and Environmental Design

Summary of Task Force Finding

The Community Preventive Services Task Force (CPSTF) recommends built environment strategies that combine one or more interventions to improve pedestrian or bicycle transportation systems with one or more land use and environmental design interventions to increase physical activity.

https://www.thecommunityguide.org/sites/default/files/assets/PA-Built-Environments.pdf
Caltrans Mission, Vision, Goals

**Mission:** Caltrans provides a safe, sustainable, integrated, and efficient transportation system to enhance California's economy and livability.

This transportation system must accommodate all modes of travel – highway users, transit users, pedestrians, and bicyclists. We know California's transportation system cannot meet our state's needs with just highways. We can only make a safe, sustainable, effective and efficient transportation system if we work to improve all modes of travel.

**Goals:** Safety and Health

Provide a safe transportation system for workers and users, and promote health through active transportation and reduced pollution in communities.

**Sustainability, Livability and Economy**

Make long-lasting, smart mobility decisions that improve the environment, support a vibrant economy, and build communities, not sprawl.

Effective 2014
Two Cities -- 5 million+ population

POPULATION: 5.25 MILLION
URBAN AREA: 4.280 KM²

POPULATION: 5.33 MILLION
URBAN AREA: 162 KM²
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<td>Tonnes CO₂ per Person</td>
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<td>(Public + Private</td>
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<td>Transport)</td>
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<td>0.7</td>
</tr>
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Source: Bertaud and Richardson, 2004.
Systemic Disorders Require Systemic Treatments

http://designinghealthycommunities.org/

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