Health Impact Assessments (HIA)
Tools for Active, Healthy Communities
Public Health
US Health Care
% of GDP

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>5.1%</td>
</tr>
<tr>
<td>1970</td>
<td>7.0%</td>
</tr>
<tr>
<td>1980</td>
<td>8.8%</td>
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<td>1990</td>
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<td>2017</td>
<td>19.5%</td>
</tr>
<tr>
<td>2020</td>
<td>&gt; 20%</td>
</tr>
</tbody>
</table>

Transportation: 9.5%
Annual Health Care Costs/Capita

<table>
<thead>
<tr>
<th>Country</th>
<th>Cost/Capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>$2,983</td>
</tr>
<tr>
<td>Australia</td>
<td>$2,886</td>
</tr>
<tr>
<td>Denmark</td>
<td>$2,743</td>
</tr>
<tr>
<td>France</td>
<td>$3,048</td>
</tr>
<tr>
<td>Ireland</td>
<td>$2,455</td>
</tr>
<tr>
<td>Japan</td>
<td>$2,249</td>
</tr>
<tr>
<td>Sweden</td>
<td>$2,745</td>
</tr>
<tr>
<td>Switzerland</td>
<td>$3,874</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>$2,317</td>
</tr>
<tr>
<td>Canada</td>
<td>$2,998</td>
</tr>
<tr>
<td>United States</td>
<td>$5,711</td>
</tr>
</tbody>
</table>

Source: Kaiser Family Foundation, Visual Economics, 2010
Average Life Expectancy

- Japan: 82.1
- Germany: 79.0
- Switzerland: 81.3
- United Kingdom: 79.0
- United States: 77.0

Source: Kaiser Family Foundation, Visual Economics, 2010
Scale – United States Economy

($ Billions/Year)

- Cost of obesity: $147
- Cost of traffic air pollution: $80
- Cost of traffic accidents: $180
Scale – United States Economy

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation impact on public health</td>
<td>$ 407</td>
</tr>
<tr>
<td>Public sector transportation expenditures</td>
<td>$ 199</td>
</tr>
</tbody>
</table>

($ Billions/Year)
Obesity
1985
Obesity Trends Among U.S. Adults

No Data <10% 10%–14%
1990

No Data

10%–14%

<10%

No Data

10%–14%

<10%
1991

No Data <10% 10%–14% 15%–19%
Health Indicators – Poor or Fair Health

ARIZONA
- Coconino: 11%
- Maricopa: 15%
- Pima: 14%
- Pinal: 17%

NEW MEXICO
- Sandoval: 15%
- San Miguel: 24%
- Santa Fe: 13%
- Torrance: 23%

CALIFORNIA
- Calaveras: 23%
- Mendocino: 20%
- San Bernardino: 27%
- San Luis Obispo: 22%

COLORADO
- Adams: 18%
- Fremont: 15%
- Larimer: 10%
- Mesa: 12%
Health Indicators – Adult Obesity

**ARIZONA**
- Coconino: 22%
- Maricopa: 23%
- Pima: 21%
- Pinal: 28%

**NEW MEXICO**
- Sandoval: 22%
- San Miguel: 19%
- Santa Fe: 13%
- Torrance: 21%

**CALIFORNIA**
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- Mendocino: 20%
- San Bernardino: 27%
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**COLORADO**
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- Fremont: 20%
- Larimer: 17%
- Mesa: 20%
## Issues Influencing How Americans Vote

(% Very Important + Somewhat Important)

<table>
<thead>
<tr>
<th>Issue</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Economy</td>
<td>96%</td>
</tr>
<tr>
<td>Government Ethics</td>
<td>96%</td>
</tr>
<tr>
<td>National Security</td>
<td>92%</td>
</tr>
<tr>
<td>Social Security</td>
<td>89%</td>
</tr>
<tr>
<td>Taxes</td>
<td>88%</td>
</tr>
<tr>
<td>Education</td>
<td>88%</td>
</tr>
<tr>
<td>Health Care</td>
<td>87%</td>
</tr>
<tr>
<td>Immigration</td>
<td>87%</td>
</tr>
<tr>
<td>War in Iraq</td>
<td>83%</td>
</tr>
<tr>
<td>Abortion</td>
<td>64%</td>
</tr>
</tbody>
</table>

Source: Rasmussen Reports, May 2010
Public health is of critical importance to the US economy and is becoming a major transportation policy issue.
Transportation & Public Health
Transportation & Public Health

Traffic Safety + Personal Health
Annual US Traffic Fatalities

Source: NHTSA, FHWA
US Traffic Fatality Rate/HMVM

(hundred million vehicle miles)

Source: NHTSA, FHWA
US Traffic Fatality Rate/HMVM

(hundred million vehicle miles)

Source: NHTSA, FHWA
US Traffic Fatality Rate/HMVM

(hundred million vehicle miles)

SEAT BELT LAWS

Required: Federal – Jan 1, 1968
Use – New York – 1984
Use – 2009 – all but Vermont

Source: NHTSA, FHWA
US Traffic Fatality Rate/HMVM
(hundred million vehicle miles)

AIR BAGS
Ford – 1971
Chevy – 1973
Federal Req/Driver – 1989
Federal Req/Pass - 1998

Source: NHTSA, FHWA
“Changes in highway infrastructure between 1984 and 1997 have not reduced traffic fatalities and injuries, and have even had the effect of increasing total fatalities and injuries.

Other factors, primarily changes in the demographic age mix of the population, increased seat belt usage, and improvements in medical technology are responsible for the downward trend in fatal accidents.”

Noland, R. B. 2001, Transportation Research Board
Traffic accidents are the leading cause of unintentional injury death in children age 1 - 4

Source: CDC National Vital Statistics System, 2000 - 2005
Traffic accidents are the leading cause of unintentional injury death in children age 5 – 9

- Motor vehicle accidents: 53%
- Drowning: 13%
- Fires & burns: 13%
- Falls: 1%
- Suffocation: 4%
- Poisoning: 1%
- Other injuries: 15%

Source: CDC National Vital Statistics System, 2000 - 2005
Traffic accidents are the leading cause of unintentional injury death in children age 10 – 14.

- Motor vehicle accidents: 58%
- Drowning: 10%
- Fires & burns: 6%
- Falls: 2%
- Suffocation: 4%
- Poisoning: 2%
- Other injuries: 18%

Source: CDC National Vital Statistics System, 2000 - 2005
Traffic accidents are the leading cause of unintentional injury death in children age 15 – 19

Source: CDC National Vital Statistics System, 2000 - 2005
2008 Fatalities

- Vehicle Occupants: 64%
- Pedestrians: 15%
- Motorcyclists: 18%
- Bicyclists: 2%
- Other: 1%
US Injury Rate: Pedestrians Hit by Motor Vehicles

(rate/100,000 population)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Rate</th>
</tr>
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<tbody>
<tr>
<td>&lt; 5</td>
<td>10</td>
</tr>
<tr>
<td>5 - 9</td>
<td>19</td>
</tr>
<tr>
<td>10 - 15</td>
<td>39</td>
</tr>
<tr>
<td>16 - 20</td>
<td>42</td>
</tr>
<tr>
<td>21 - 24</td>
<td>34</td>
</tr>
<tr>
<td>25 - 34</td>
<td>24</td>
</tr>
<tr>
<td>35 - 44</td>
<td>19</td>
</tr>
<tr>
<td>45 - 54</td>
<td>17</td>
</tr>
<tr>
<td>55 - 64</td>
<td>20</td>
</tr>
<tr>
<td>65 - 74</td>
<td>10</td>
</tr>
<tr>
<td>75 - 85</td>
<td>10</td>
</tr>
<tr>
<td>85 +</td>
<td>10</td>
</tr>
</tbody>
</table>

Source: NHTSA, 2008
US Fatality Rate: Pedestrians Hit by Motor Vehicles

(rate/100,000 population)

Source: NHTSA, 2008
pedestrian survival rates & vehicle speed

20mph
- % survive: 95%
- % die: 5%

30mph
- % survive: 55%
- % die: 45%

40mph
- % survive: 15%
- % die: 85%
Traditional Traffic Safety Model

Based on and Revised from Ewing and Dumbaugh, Journal of Planning Literature, Vol. 23, No. 4
Context-Based Traffic Safety Model

Based on and Revised from Ewing and Dumbaugh, Journal of Planning Literature, Vol. 23, No. 4
Speed
The U-Shaped Curve

Source: FHWA-RD-98-154
Crash Severity

![Graph showing the relationship between change in speed at impact and the probability of fatality.](Source: FHWA-RD-98-154)
Changing Speed Limits

Source: FHWA-RD-98-154
Cross Section
Number of Lanes

Collision Rates – Medium Density – Controlling for ADT

Residential Land Uses
- 2 lane: 110
- 3 lane TWLTL: 180
- 4 lane undivided: 230

Commercial Land Uses
- 2 lane: 270
- 3 lane TWLTL: 210
- 4 lane undivided: 260

Source: Hummer and Lewis, FHWA/NC/2000-003, NCSU
<table>
<thead>
<tr>
<th>Intersections/Corridor Mile</th>
<th>Undivided</th>
<th>TWLTL</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20</td>
<td>3.8</td>
<td>3.4</td>
<td>2.9</td>
</tr>
<tr>
<td>20 – 40</td>
<td>7.3</td>
<td>5.9</td>
<td>5.1</td>
</tr>
<tr>
<td>40 – 60</td>
<td>9.4</td>
<td>7.9</td>
<td>6.8</td>
</tr>
<tr>
<td>&gt; 60</td>
<td>10.6</td>
<td>9.2</td>
<td>8.2</td>
</tr>
</tbody>
</table>

Source: Hummer and Lewis, FHWA/NC/2000-003, NCSU
Street Design + Urban Environment
Colonial Drive: Comparison section

Colonial Drive: Livable section
Street/Urban Design

Mid-Block Crashes/100 MVMT

"Livable" Section

Total: 95
Injury: 54
Fatality: 0

Comparison Section

Total: 102
Injury: 69
Fatality: 2

Source: Eric Dumbaugh, JAPA, Summer 2005, Vol. 71, No. 3
2 Primary Elements

Traffic Safety + Personal Health
Humans:

- recently descended from nomadic hunter/gatherers...
- walked & worked, burning calories
- experienced the world @ 2 – 3mph
- bodies were designed for collisions @ < 5 mph
we evolved as “walkers”
we are still “walkers”
human history

villagers 00:06
nomadic hunter-gatherer 23:54
this is what we do...

...but it is not who we are.
we cannot escape our DNA...
...no matter how hard we try
Research

- US Centers for Disease Control
- Robert Wood Johnson Foundation
Residents of walkable neighborhoods were more likely to meet physical activity guidelines.

![Bar graph showing the percentage of residents meeting physical activity guidelines in high and low walkability neighborhoods.]

- High walkability: 37%
- Low walkability: 18%

Driving is a risk factor for obesity

Lopez-Zetina, Health and Place, 2006
## States with the Highest Rates of Physical Inactivity

<table>
<thead>
<tr>
<th>Rank</th>
<th>State</th>
<th>Percentage of Adult Physical Inactivity (Based on 2006-2008 Combined Data, Including Confidence Intervals)</th>
<th>Obesity Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mississippi</td>
<td>31.8% (+/-0.9)</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Kentucky</td>
<td>30.4% (+/-1.0)</td>
<td>7</td>
</tr>
<tr>
<td>3 (tie)</td>
<td>Louisiana</td>
<td>30.3% (+/-0.9)</td>
<td>8</td>
</tr>
<tr>
<td>3 (tie)</td>
<td>Oklahoma</td>
<td>30.3% (+/-0.8)</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Tennessee</td>
<td>29.8% (+/-1.2)</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Alabama</td>
<td>29.5% (+/-1.0)</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Arkansas</td>
<td>28.8% (+/-0.9)</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>Texas</td>
<td>28.4% (+/-0.9)</td>
<td>14</td>
</tr>
<tr>
<td>9</td>
<td>West Virginia</td>
<td>28.3% (+/-1.0)</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>New Jersey</td>
<td>26.7% (+/-0.8)</td>
<td>42</td>
</tr>
</tbody>
</table>

*Note: For rankings, 1 = Worst Health Outcome. 1 = Highest Rates of Physical Inactivity.*
Research Conclusion #1:

People who are active as part of a regular daily routine are less obese and are healthier

“Active Living...”
Research Conclusion #2:

People who live where walking and bicycling are convenient, safe and comfortable are much more active.

“...by Design”
“Active Living by Design”
<table>
<thead>
<tr>
<th>MAJOR SOURCES</th>
<th>HEALTH EFFECTS</th>
<th>ENVIRONMENTAL EFFECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SO₂</strong></td>
<td>Respiratory and cardiovascular illness</td>
<td>Precursor to acid rain, which damages lakes, rivers, and trees; damage to cultural relics</td>
</tr>
<tr>
<td><strong>NOₓ</strong></td>
<td>Respiratory and cardiovascular illness</td>
<td>Nitrogen deposition leading to over-fertilization and eutrophication</td>
</tr>
<tr>
<td><strong>PM</strong></td>
<td>Particles penetrate deep into lungs and can enter bloodstream</td>
<td>Visibility</td>
</tr>
<tr>
<td><strong>CO</strong></td>
<td>Headaches and fatigue, especially in people with weak cardiovascular health</td>
<td></td>
</tr>
<tr>
<td><strong>Lead</strong></td>
<td>Accumulates in bloodstream over time; damages nervous system</td>
<td>Fish/animal kills</td>
</tr>
<tr>
<td><strong>Ozone</strong></td>
<td>Respiratory illness</td>
<td>Reduced crop production and forest growth; smog precursor</td>
</tr>
<tr>
<td><strong>VOCs</strong></td>
<td>Eye and skin irritation; nausea; headaches; carcinogenic</td>
<td>Smog precursor</td>
</tr>
</tbody>
</table>
Air Pollution & Health

- Importance of proximity
- Accumulation over time: children
- Tie to equity & environmental justice
- $80 million/year
Transportation planning & design are major determinants of public health.
3

Health Impact Assessments
2 Potential Perspectives

- Assessing impacts of proposed actions to improve public health
- Assessing impacts of proposed transportation projects on public health
We Make Choices

Transportation Planning and Design

Physical Activity
- Obesity, Diabetes, Cardiovascular Disease

Air Quality
- Respiratory & Cardiovascular Disease

Climate Change
- Flood, Drought, Fires, Storms, Food Availability

Traffic Safety
- Injuries, Fatalities

Equity, Fairness
- Health Care, Stress-Related Disease, Crime

Physical Activity

Air Quality

Climate Change

Traffic Safety

Equity, Fairness
Local Health Policy

Baseline Assessment (measurement)

Local Goals & Objectives Development

Criteria, Regulations

Plans, Programs

HIA Requirements & Procedures
Local Goals & Objectives Structure

VISION
GOAL
STRATEGIC OBJECTIVE
ACTION
PERFORMANCE MEASURE

<table>
<thead>
<tr>
<th>POLICY</th>
<th>STUDY</th>
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<tbody>
<tr>
<td>ORDINANCE</td>
<td>PLAN</td>
</tr>
<tr>
<td>GUIDELINE</td>
<td>PROCEDURE</td>
</tr>
<tr>
<td>CAPITAL PROJECT</td>
<td></td>
</tr>
</tbody>
</table>

BENCHMARK
TARGET
Health Impact Assessment Process

1. Screening
2. Scoping
3. Map & Estimate Risks & Benefits
4. Mitigate, Modify, Forego
5. Measure & Report Outcomes
Health Impact Assessment Process

1. Screening
2. Scoping
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Screening – Level

- Programs?
- Specific Capital projects?
- Operations, procedures?
Screening – Project Type

**Screen In:**
- Add lanes projects?
- New centerline projects?
- Major transit corridors?

**Screen Out:**
- Maintenance?
- Rehab & repair?
- Bridge replacement?
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Scoping

- Who prepares HIA?
- Public process?
- Which potential health impacts to be studied?
- Methodology?
- Scale:
  - Rapid
  - Intermediate
  - Comprehensive
Health Impact Assessment Process

- Screen
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Health Impact Assessment Process

- Screen
- Scope
- Map & Estimate Risks & Benefits
  - Mitigate, Modify, Forego
    - Measure & Report Outcomes
Mapping & Estimating Challenges

- Determining scale
  - corridor?
  - neighborhood?
  - city?
  - region?
- Estimating impacts
  - lack of baseline data
  - lack of funding for HIA
  - no proof of cause-effect relationships
  - common measure of outcome – value of health
Health Impact Assessment Process

- Screen
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Health Impact Assessment Process

- Screen
- Scope
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Recommendations

- Who decides?
- How are changes funded?
Health Impact Assessment Process

1. Screen
2. Scope
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Health Impact Assessment Process

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PERFORMANCE MEASURE

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GUIDELINE
CAPITAL PROJECT

STUDY
PLAN
PROCEDURE

BENCHMARK
TARGET
Health impact assessment techniques are being developed by health professionals; best practices for transportation are just now being established.
Wrap Up
Public Health
US Health Care
% of GDP

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</tr>
<tr>
<td>1990</td>
<td>12.1</td>
</tr>
<tr>
<td>2001</td>
<td>14.1</td>
</tr>
<tr>
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Health impact assessment techniques are being developed by health professionals; best practices for transportation are just now being established.
Thanking You

www.charlier.org