

The Honorable Kenneth Wilber, Chairman



NASHVILLE AREA

Metropolitan Planning Organization

Middle Tennessee Transportation & Health Research Study

MPO Technical Coordinating Committee

August 6, 2014

Making the Case for Health Integration

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Transpo & Health: Obvious Connections

➔ Roadway Safety

➔ Air Quality

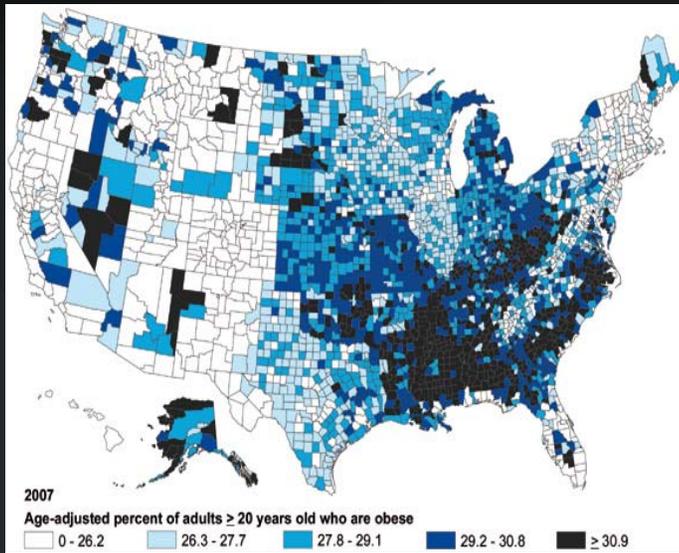
➔ Physical Activity

➔ Equity

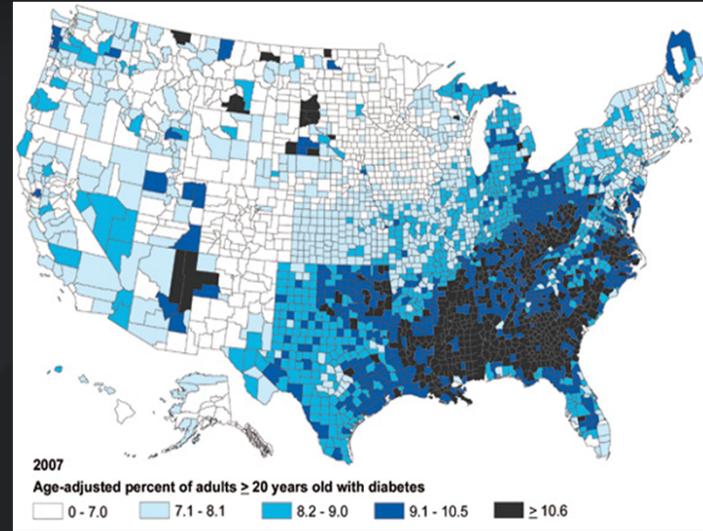
➔ Built Environment

➔ Human Behavior and Lifestyle Choices

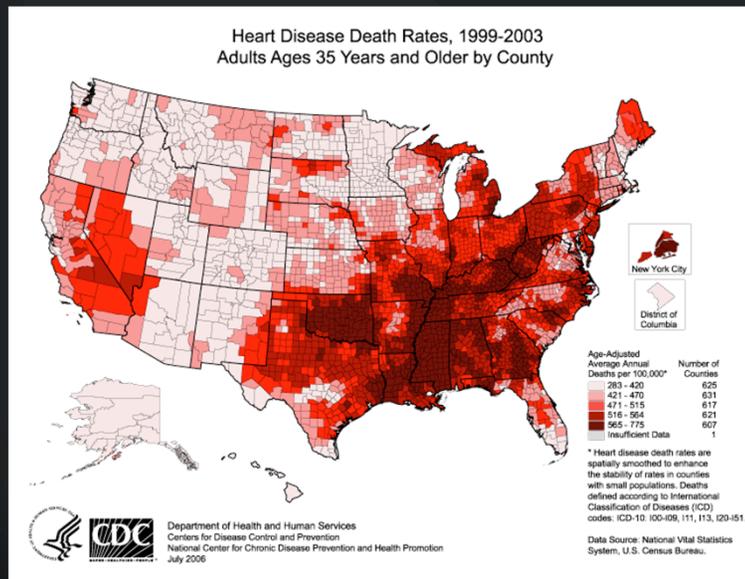
Obesity



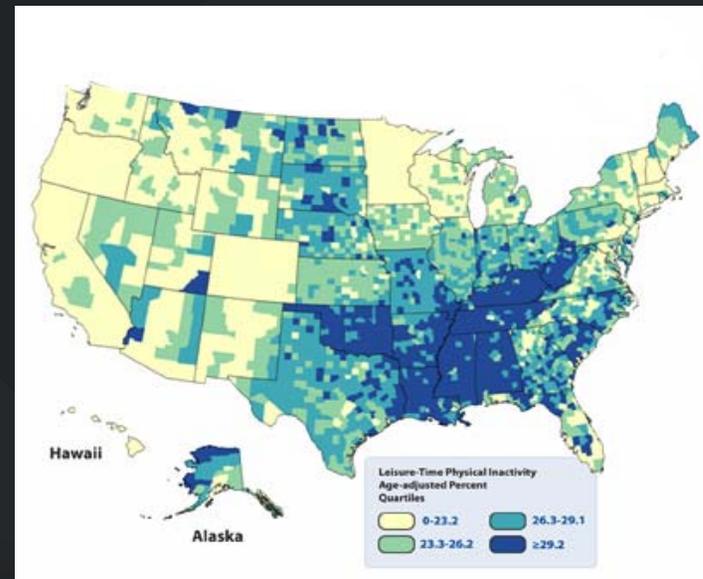
Diabetes



Heart Disease

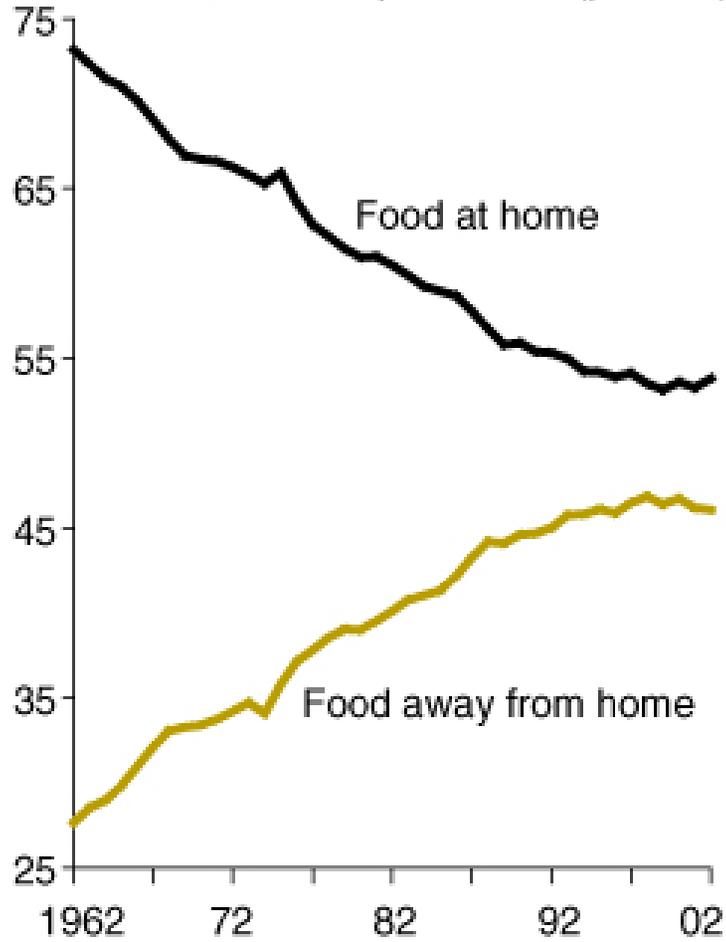


Physical Inactivity



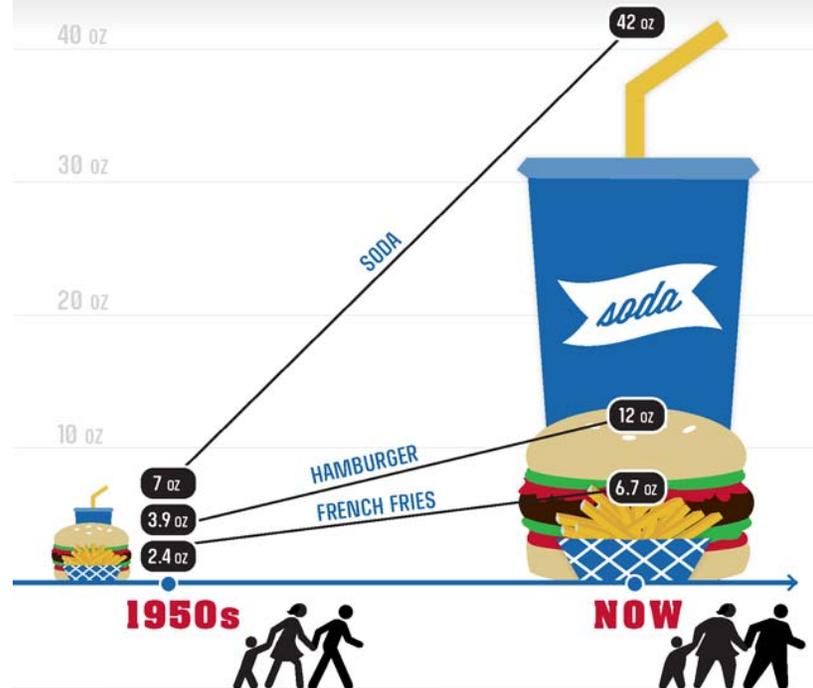
Obesity in America

Share of total food expenditures (percent)



THE NEW (AB)NORMAL

Portion sizes have been growing. So have we. The average restaurant meal today is more than four times larger than in the 1950s. And adults are, on average, 26 pounds heavier. If we want to eat healthy, there are things we can do for ourselves and our community. Order the smaller meals on the menu, split a meal with a friend, or eat half and take the rest home. We can also ask the managers at our favorite restaurants to offer smaller meals.



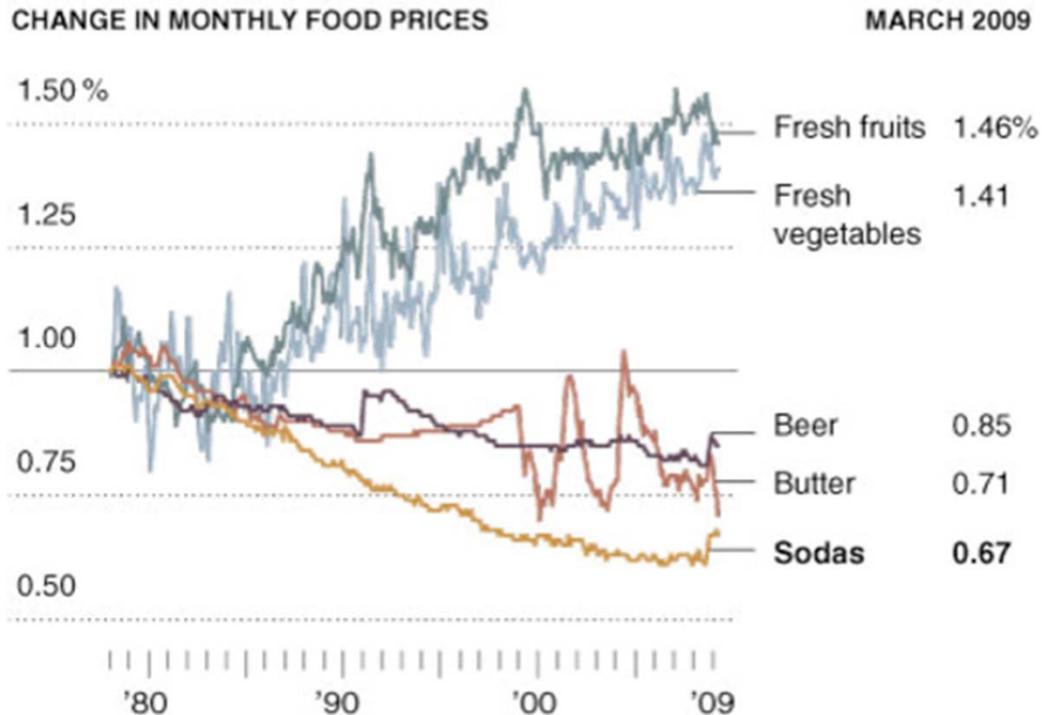
FOR MORE INFORMATION, VISIT MakingHealthEasier.org/NewAbNormal

Sources: Food Consumption Data System, USDA, Economic Research Service
Centers for Disease Control – National Health and Nutrition Examination Survey/

Obesity in America

The Cost of Healthy Eating

The cost of many unhealthy foods, like soda, butter and beer, has fallen in the last three decades, while the cost of fruits and vegetables has risen substantially.



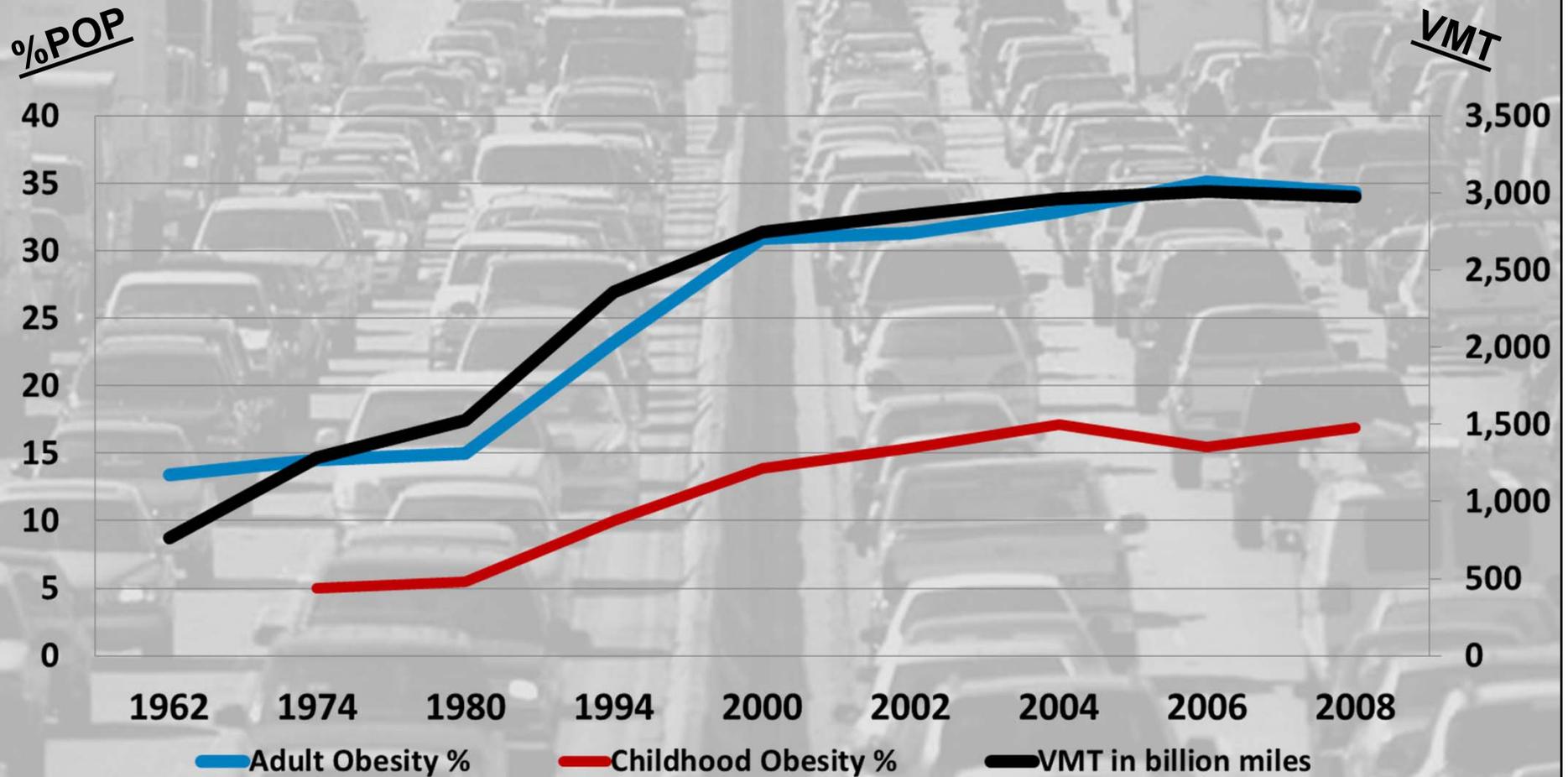
Lines show change in price of items since 1978, relative to overall inflation as measured by the Consumer Price Index. The price of vegetables, for example, has risen 40 percent faster than the overall index.

Source: Bureau of Labor Statistics, via Haver

Courtesy: The New York Times 5.20.09

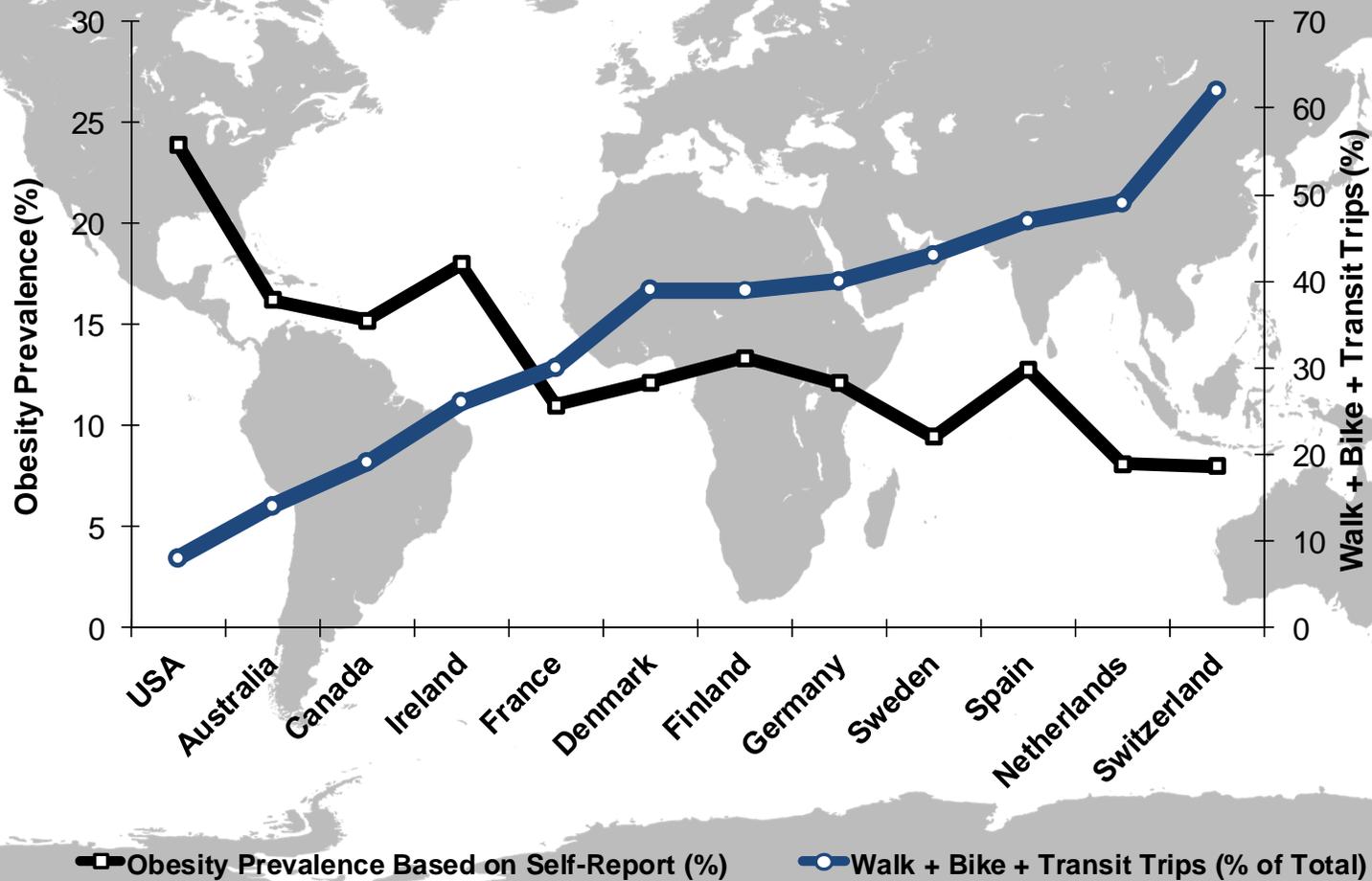
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Vehicle Miles Traveled and Obesity



Sources: Centers for Disease Control – National Health and Nutrition Examination Survey/
U.S. DOT – Federal Highway Administration, Annual Vehicle Distance Traveled in Miles and Related Data

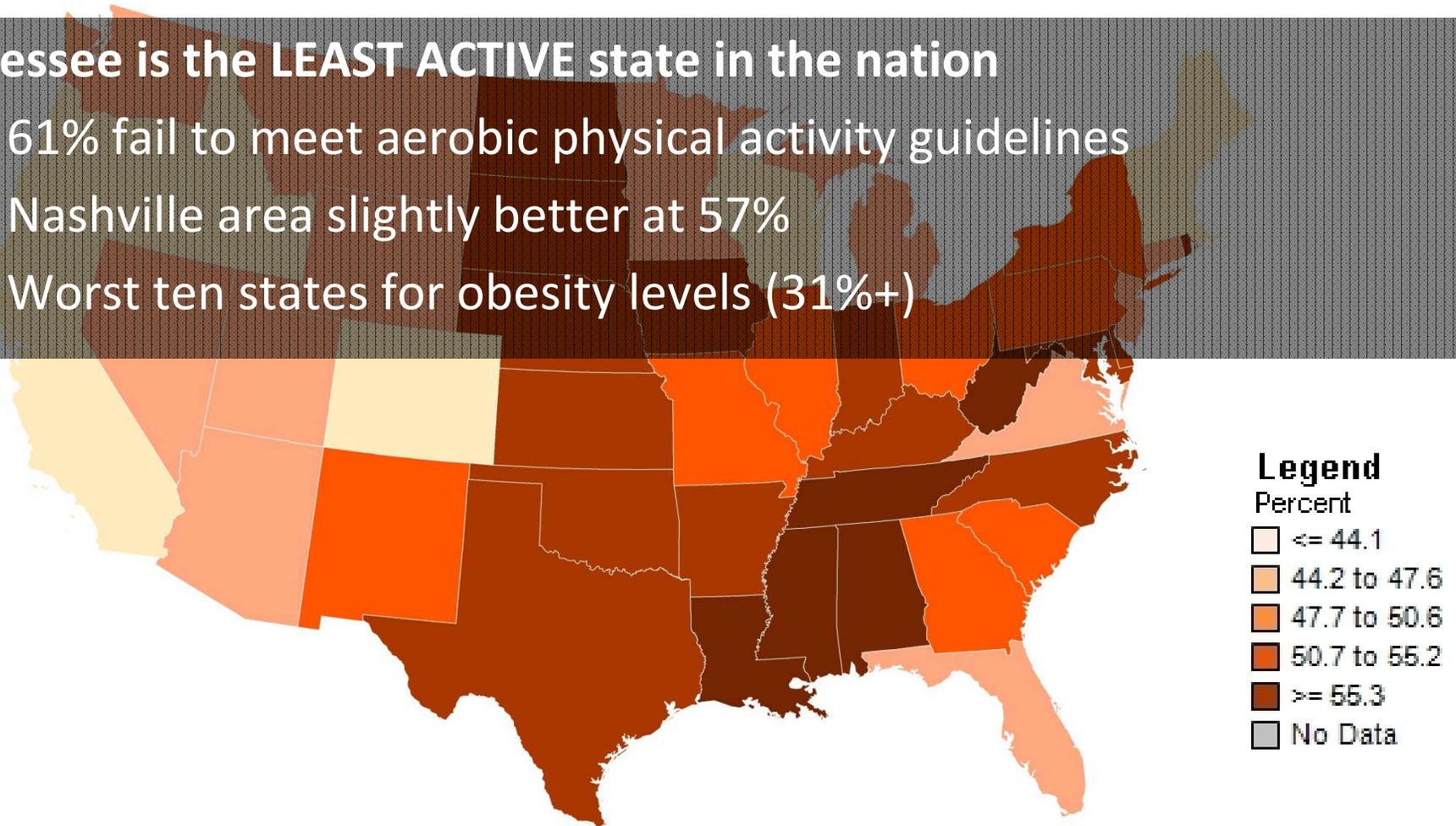
Active Transportation & Obesity Rates



Physical Inactivity in Tennessee

Tennessee is the **LEAST ACTIVE** state in the nation

- ↘ 61% fail to meet aerobic physical activity guidelines
- ↘ Nashville area slightly better at 57%
- ↘ Worst ten states for obesity levels (31%+)



Legend

Percent

- ≤ 44.1
- 44.2 to 47.6
- 47.7 to 50.6
- 50.7 to 55.2
- ≥ 55.3
- No Data

Physical inactivity: 2011 BRFSS;
obesity: 2012 BRFSS

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“ Eat Well Play More TENNESSEE ”

Eat Well, Play More Tennessee is Tennessee's statewide nutrition and physical activity plan to reduce obesity and chronic disease in Tennessee by 2015. It is our vision to create an environment in which every Tennessean has the ability to make healthy lifestyle choices regarding nutrition and physical activity.



About The Tennessee Plan

Eat Well, Play More Tennessee is Tennessee's statewide nutrition and physical activity plan to reduce obesity and chronic disease in Tennessee by 2015.



Action Teams

Each Action Team works closely with statewide partners to drive the efforts toward formulating and implementing annual action plans.



Resources & Tools

Get a jumpstart in achieving objectives with recommendations of resources & tools.



Data & Evidence

This section provides information on the risks, consequences, and economic costs of obesity as well as discusses the disparities in select populations affected by obesity.



Workgroup Web Site

Resources for implementation and evaluation of state plan.



Consumer Panel

An online consumer panel to gather data on a monthly basis. Learn how you can participate.



How to Become Involved

For interested individuals or groups that want to help reduce the burden of obesity in Tennessee.



MPO Public Health Initiatives

➔ New Policy Development

- Dedicated staffing to build partnerships across silos
- Identified active transport as a major regional initiative

➔ Reprioritizing of Funding

- Updated project scoring criteria to include health in evaluation of transportation projects
- Restructured existing funding sources so more money is spent on active transportation

➔ Research & Modeling

- Regional data collection effort to provide baseline evidence for policy benchmarking
- Implementation of health outcome model

Recent Public Health Products

- ➔ Regional School Siting Symposium
- ➔ Health Impact Assessment for a Proposed School Siting within a Transit Oriented Development at Hamilton Springs
 - Partnership with Washington University in St. Louis
- ➔ HIA on Proposed Transit Ready Development along NE Corridor
 - Partnership with Vanderbilt University
- ➔ Middle Tennessee Transportation & Health Study
 - Partnership with TDOT, Clarksville MPO, CDC
- ➔ Nashville Region's Vital Signs – Annual Indicators for Health
 - Partnership with Nashville Area Chamber of Commerce
- ➔ “Shaping Healthy Communities” Publication
 - Partnership with Nashville Civic Design Center

National Spotlight

- ➔ Keynote speaker at **Southeast Region HIA Summit** in Davidson, North Carolina
- ➔ Recognition of MPO work in the **National Prevent Strategy**
 - [Publication of the US Surgeon General](#)
- ➔ National **Transportation Planning Excellence Award** for integration of public health considerations
 - [US DOT, APA](#)
- ➔ Publication of MPO work in various books, academic journals, white papers
- ➔ Participation on expert panel hosted by **HHS** and **DOT** to develop a national **health and transportation index** tool
- ➔ Participation on expert panel hosted by **FHWA** to develop a **practitioners handbook** for incorporating public health into transportation planning
- ➔ **Kresge Foundation grant** award recipient (along with Transportation for America) to develop health-related performance measures, targets, and tools
- ➔ Presentations at many national conferences including Healthy Homes, American College of Sports Medicine, AMPO, TRB, APA



Middle Tennessee Transportation and Health Study

Final Report

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NASHVILLE AREA
Metropolitan Planning Organization



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Research Corporation®



**PARSONS
BRINCKERHOFF**

**Dr. Daniel
Rodriguez**

Grant funding provided by the Federal Highway
Administration and Federal Transit Administration

Household Travel Surveys

- ➔ A typical research project for MPOs, conducted in most major US metro areas every 10 to 15 years
- ➔ Major research effort aimed at observing personal daily travel behaviors
- ➔ Modeled after the National Household Travel Survey
- ➔ Until 2001, most surveys were based on one-day self-report “travel diary” collection
- ➔ Since then, HHTS have evolved to incorporate GPS to help correct for underreporting
- ➔ Nashville is just the second region to integrate a major health component (Atlanta 2001)

Research Design

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Research Objectives

- ➔ Collect behavioral data for regional travel demand modeling and forecasting
 - Traditional 4-step model update
 - Activity based modeling (ABM) transition
- ➔ Collect baseline data for initial exploration of local links between built environment, transport, & public health
 - Socio-economics, travel behaviors, area types, physical activity, eating behaviors, personal health outcomes
- ➔ Inform regional policy discussions related to the 2040 Regional Transportation Plan

Study Design

Traditional Diary Study – 6,000 Households

- Collect detailed personal and household level demographics
- Collect one day travel data (diary) – all persons age 5 and older
- Collect basic health information (six questions)

Health / Physical Activity Study – 600 Household Subsample

- Stratified by Urbanicity (rural, suburban, urban)
- Collect one day travel data (diary) – all persons age 5 and older
- Collect four days of travel data (GPS) – all adults (16-75)
- Collect four days of PA data (accelerometer) – HPA member only
- Complete Health Survey – HPA member only (18-75)

Health Questions – All Persons / All Households

Q1 During the last 7 days, how much time did you usually spend *sitting* on a **weekday**?
(Please report in hours; for example: 8.5 hours)

Q2 Which of the following statements best describes how physically active you are in a typical week.

1. I rarely or never do any physical activity.
2. I do some light or moderate physical activities.
3. I do some vigorous physical activities.

Q3 In general, how healthy is your overall diet?

1. excellent
2. very good
3. good
4. fair
5. poor

Q4 Would you say that, in general, your health is:

1. excellent
2. very good
3. good
4. fair
5. poor

Q5 About how much do you weigh without shoes?

Q6 About how tall are you without shoes?

Health Study Questions – 600 HHs

➔ Food Access (Respondent Only)

- Food Access & Quality
- Food Intake (4 days)

➔ Physical Activity (Respondent Only)

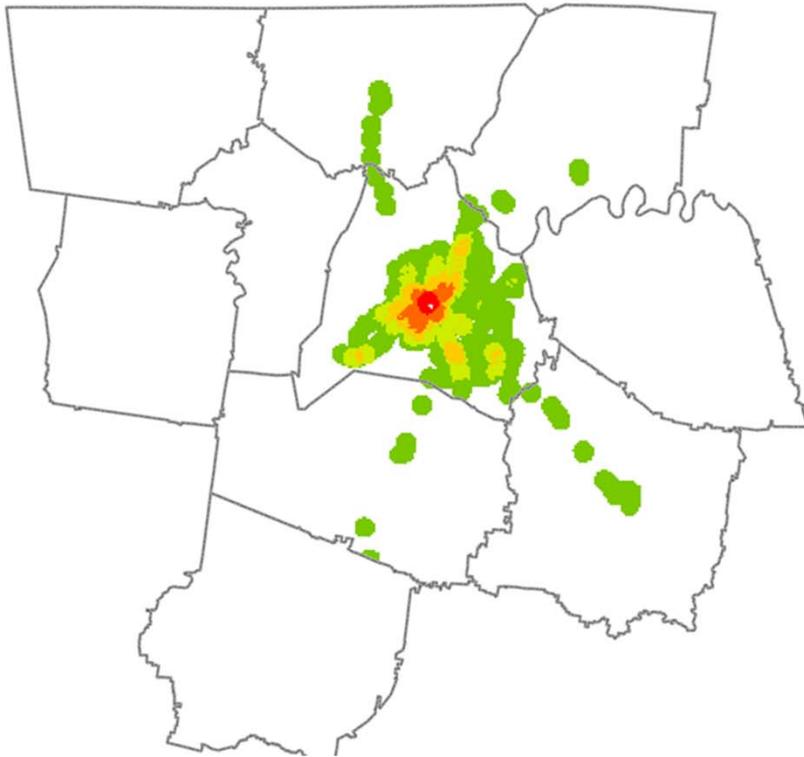
- Average daily time spent in physical activity during the last 7 days
- Average daily time sitting/inactive during the last 7 days
- Average daily time spent traveling during the last 7 days
- Average daily time spent walking and bicycling

➔ Health Outcomes (Household Members)

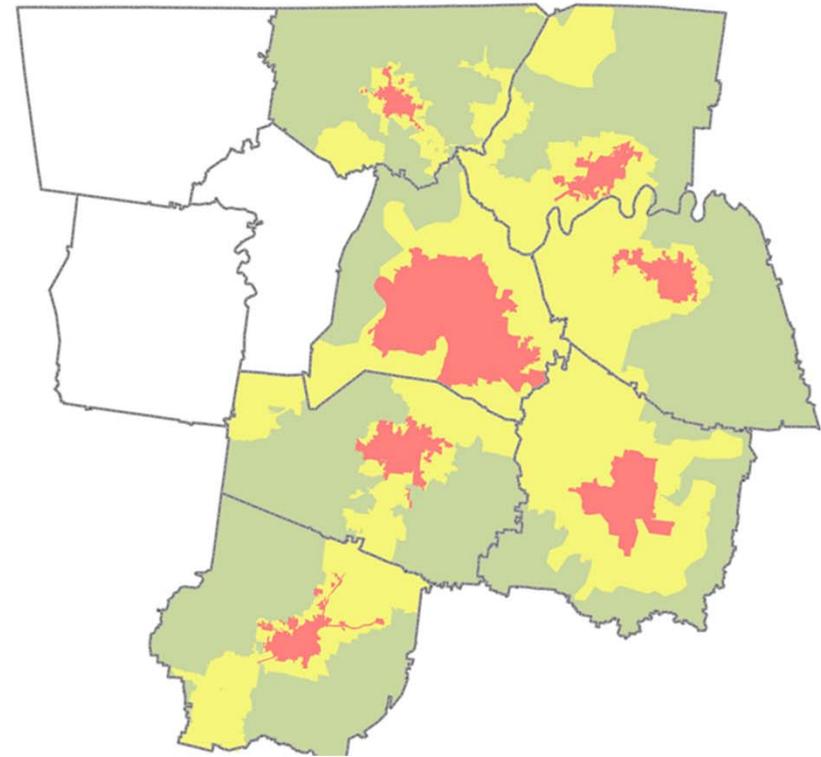
- Number of days in past month in bad physical health, mental health
- Number of days where bad health impacted activities
- Medical conditions – high blood pressure, heart attack, coronary disease, stroke, asthma & other respiratory diseases, diabetes, depression

Sampling Plan

Addressed-based, random sampling with oversamples & stratification



Transit Oversampling
(All Households)



Area Type Stratification
(HPA households only)

Data Collection Process

➔ Sample Selected

- Address-based sample, stratified
- Health study respondents were pre-assigned
- Randomly assigned travel day

➔ Households Recruited

- Invitation to participate sent by mail
- Follow-up phone calls
- Respondents encouraged to participate by web with incentive
- Remainder of respondents interviewed by telephone
- Recruitment process collected basic household and personal info

➔ Materials Mailed to Households

➔ Travel Day/ Observation Period

➔ Phone/Web Retrieval of Travel and Health Data

Respondent Materials & Equipment

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Middle Tennessee Transportation and Health Study



[Welcome](#) [About the Study](#) [Invited to Join?](#) [Report Travel](#) [FAQs](#) [Materials](#) [Contact Us](#)

[Ver en español](#)

Step 1

Invited to join? Complete a Household Questionnaire.

[Start Here](#)

Step 2

Record your travel on your assigned day using your travel log.

[Learn More...](#)

Step 3

After your travel date, please report your travel information.

[Report Travel](#)

Step 4

If selected, complete the additional Health Survey.

[Take Health Survey](#)

Welcome! The Middle Tennessee Transportation and Health Study is sponsored by the **Nashville Metropolitan Planning Organization**, the **Clarksville Urbanized Area Metropolitan Planning Organization**, and the **Tennessee Department of Transportation**. If you have received a participation letter, please [Start Here](#) to begin the survey.



Every day, thousands of people move through the middle Tennessee region—in cars, on buses, by foot, on bikes. To plan for the projects of *tomorrow*, we need to understand how you travel *today*. Your participation in this important survey will help improve the future of transportation for all of us.



Middle Tennessee Transportation and Health Study

Study sponsored by:
Nashville Area MPO
Clarksville Urbanized
Area MPO
Tennessee Department
of Transportation

Questions?
www.middleTNstudy.com
Toll-free hotline: 1-888-648-1756

Travel
Log
For:

Name:
Travel Date:
PIN#:

	A FOR EACH PLACE YOU VISIT: What is this PLACE? If it is an "Other Place" or "Transit Stop," tell us the: 1) Place Name 2) Address and City - provide what you can. <i>*Record each bus stop and train station as its own PLACE.</i>	B What TIME did you ARRIVE?	C HOW did you GET there?	D IF AUTO/TRUCK: How much did you PAY to park?	E IF BUS/TRAIN: How did you PAY for the trip?	F Other than yourself, HOW MANY people traveled with you?	G What did you DO there? List ALL activities you did. <i>*For transit stops or carpool/vanpool meeting places: please record your activity as "Transferred."</i>	H What TIME did you LEAVE?
PLACE 1	PLACE 1: <input type="checkbox"/> My Home <input type="checkbox"/> My Work <input type="checkbox"/> My School <input type="checkbox"/> Transit Stop <input type="checkbox"/> Other Place Place name: Address: City:						List ALL the activities you did at this PLACE	_____ : _____ <input type="checkbox"/> am <input type="checkbox"/> pm <input type="checkbox"/> Did not leave
PLACE 2	PLACE 2: <input type="checkbox"/> My Home <input type="checkbox"/> My Work <input type="checkbox"/> My School <input type="checkbox"/> Transit Stop <input type="checkbox"/> Other Place Place name: Address: City:	_____ : _____ <input type="checkbox"/> am <input type="checkbox"/> pm	<input type="checkbox"/> Walk <input type="checkbox"/> Bicycle <input type="checkbox"/> Auto/Truck <input type="checkbox"/> Bus/Train <input type="checkbox"/> Vanpool <input type="checkbox"/> Other: (specify) _____	\$ _____ per _____ <input type="checkbox"/> Did not pay <input type="checkbox"/> Did not park	<input type="checkbox"/> Cash: \$ _____ <input type="checkbox"/> Pass: \$ _____ <input type="checkbox"/> Transfer: \$ _____ <input type="checkbox"/> Other: (specify) _____	# of people traveling with you: _____ <i>(Not including yourself)</i>	List ALL the activities you did at this PLACE	_____ : _____ <input type="checkbox"/> am <input type="checkbox"/> pm <input type="checkbox"/> Did not leave
PLACE 3	PLACE 3: <input type="checkbox"/> My Home <input type="checkbox"/> My Work <input type="checkbox"/> My School <input type="checkbox"/> Transit Stop <input type="checkbox"/> Other Place Place name: Address: City:	_____ : _____ <input type="checkbox"/> am <input type="checkbox"/> pm	<input type="checkbox"/> Walk <input type="checkbox"/> Bicycle <input type="checkbox"/> Auto/Truck <input type="checkbox"/> Bus/Train <input type="checkbox"/> Vanpool <input type="checkbox"/> Other: (specify) _____	\$ _____ per _____ <input type="checkbox"/> Did not pay <input type="checkbox"/> Did not park	<input type="checkbox"/> Cash: \$ _____ <input type="checkbox"/> Pass: \$ _____ <input type="checkbox"/> Transfer: \$ _____ <input type="checkbox"/> Other: (specify) _____	# of people traveling with you: _____ <i>(Not including yourself)</i>	List ALL the activities you did at this PLACE	_____ : _____ <input type="checkbox"/> am <input type="checkbox"/> pm <input type="checkbox"/> Did not leave
PLACE 4	PLACE 4: <input type="checkbox"/> My Home <input type="checkbox"/> My Work <input type="checkbox"/> My School <input type="checkbox"/> Transit Stop <input type="checkbox"/> Other Place Place name: Address: City:	_____ : _____ <input type="checkbox"/> am <input type="checkbox"/> pm	<input type="checkbox"/> Walk <input type="checkbox"/> Bicycle <input type="checkbox"/> Auto/Truck <input type="checkbox"/> Bus/Train <input type="checkbox"/> Vanpool <input type="checkbox"/> Other: (specify) _____	\$ _____ per _____ <input type="checkbox"/> Did not pay <input type="checkbox"/> Did not park	<input type="checkbox"/> Cash: \$ _____ <input type="checkbox"/> Pass: \$ _____ <input type="checkbox"/> Transfer: \$ _____ <input type="checkbox"/> Other: (specify) _____	# of people traveling with you: _____ <i>(Not including yourself)</i>	List ALL the activities you did at this PLACE	_____ : _____ <input type="checkbox"/> am <input type="checkbox"/> pm <input type="checkbox"/> Did not leave
PLACE 5	PLACE 5: <input type="checkbox"/> My Home <input type="checkbox"/> My Work <input type="checkbox"/> My School <input type="checkbox"/> Transit Stop <input type="checkbox"/> Other Place Place name: Address: City:	_____ : _____ <input type="checkbox"/> am <input type="checkbox"/> pm	<input type="checkbox"/> Walk <input type="checkbox"/> Bicycle <input type="checkbox"/> Auto/Truck <input type="checkbox"/> Bus/Train <input type="checkbox"/> Vanpool <input type="checkbox"/> Other: (specify) _____	\$ _____ per _____ <input type="checkbox"/> Did not pay <input type="checkbox"/> Did not park	<input type="checkbox"/> Cash: \$ _____ <input type="checkbox"/> Pass: \$ _____ <input type="checkbox"/> Transfer: \$ _____ <input type="checkbox"/> Other: (specify) _____	# of people traveling with you: _____ <i>(Not including yourself)</i>	List ALL the activities you did at this PLACE	_____ : _____ <input type="checkbox"/> am <input type="checkbox"/> pm <input type="checkbox"/> Did not leave
PLACE 6	PLACE 6: <input type="checkbox"/> My Home <input type="checkbox"/> My Work <input type="checkbox"/> My School <input type="checkbox"/> Transit Stop <input type="checkbox"/> Other Place Place name: Address: City:	_____ : _____ <input type="checkbox"/> am <input type="checkbox"/> pm	<input type="checkbox"/> Walk <input type="checkbox"/> Bicycle <input type="checkbox"/> Auto/Truck <input type="checkbox"/> Bus/Train <input type="checkbox"/> Vanpool <input type="checkbox"/> Other: (specify) _____	\$ _____ per _____ <input type="checkbox"/> Did not pay <input type="checkbox"/> Did not park	<input type="checkbox"/> Cash: \$ _____ <input type="checkbox"/> Pass: \$ _____ <input type="checkbox"/> Transfer: \$ _____ <input type="checkbox"/> Other: (specify) _____	# of people traveling with you: _____ <i>(Not including yourself)</i>	List ALL the activities you did at this PLACE	_____ : _____ <input type="checkbox"/> am <input type="checkbox"/> pm <input type="checkbox"/> Did not leave
Continue with PLACES 7 - 13 on back								

Middle Tennessee

Transportation and Health Study



After you return your GPS and pedometer like devices we will contact you again to complete a brief health survey. As part of the survey we will ask you about the meals and snacks that you ate just on the days that you were wearing the equipment that we sent you. To make recalling that information easier we are including this card and ask that at the end of each day, you complete this general food diary card.

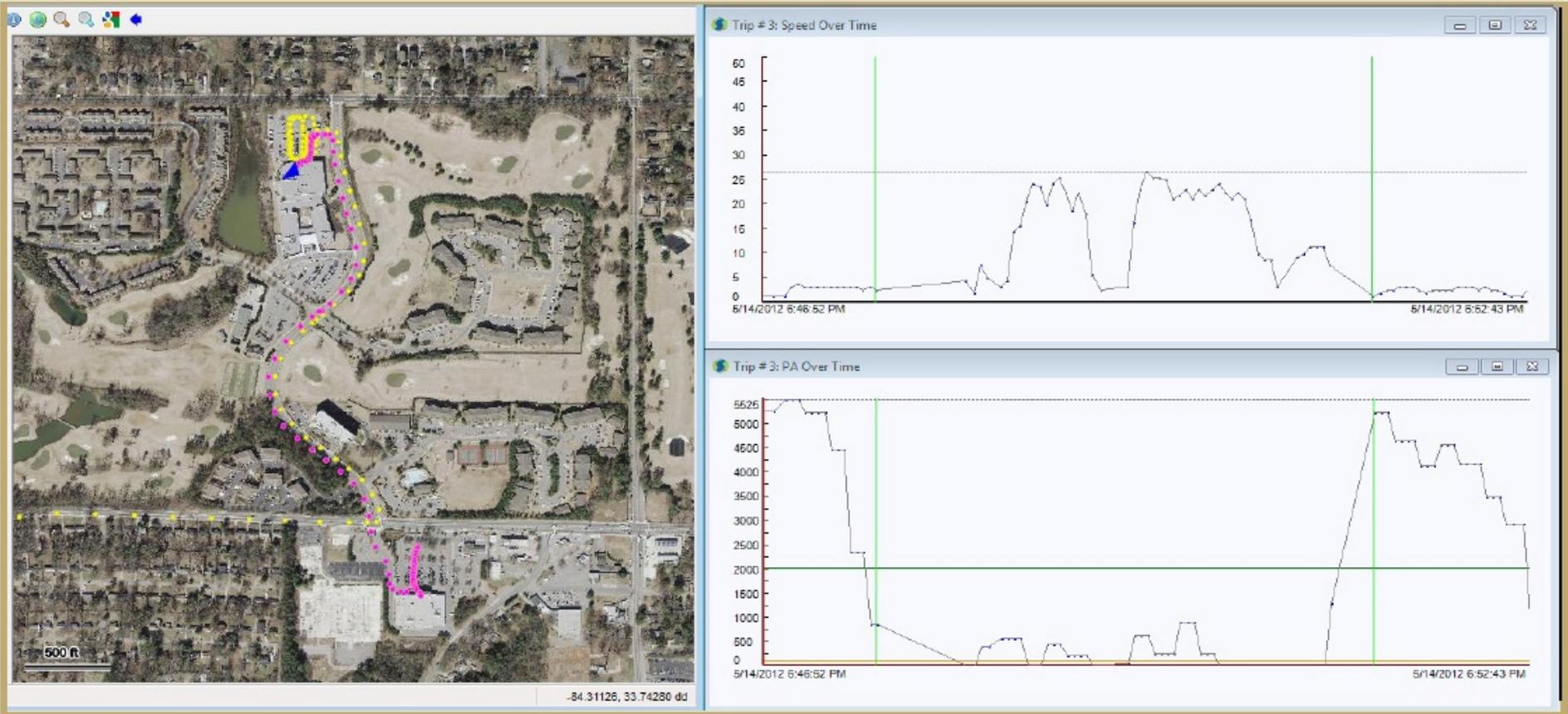
Keep this card handy for when it's time to complete the health survey.

	DAY 1	DAY 2	DAY 3	DAY 4
Total number of meals you ate				
Number of meals you ate that were prepared at home				
Number of meals you ate that were prepared at a fast food restaurant				
Total number of snacks you ate				
Number of meals or snacks that contained fruits or vegetables				

GPS and Accelerometer Devices



GPS and Accelerometer Data



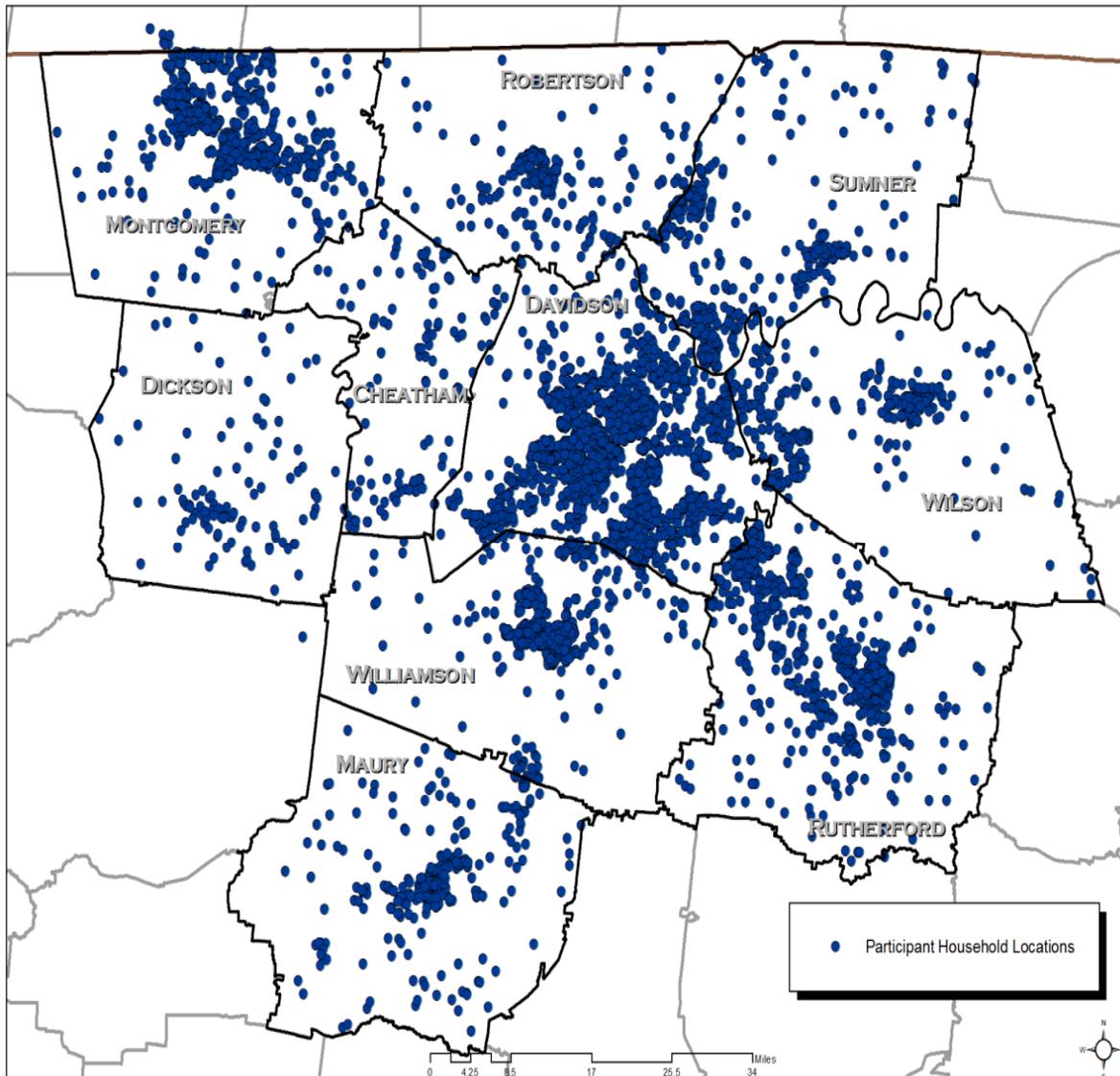
Survey Results & General Findings

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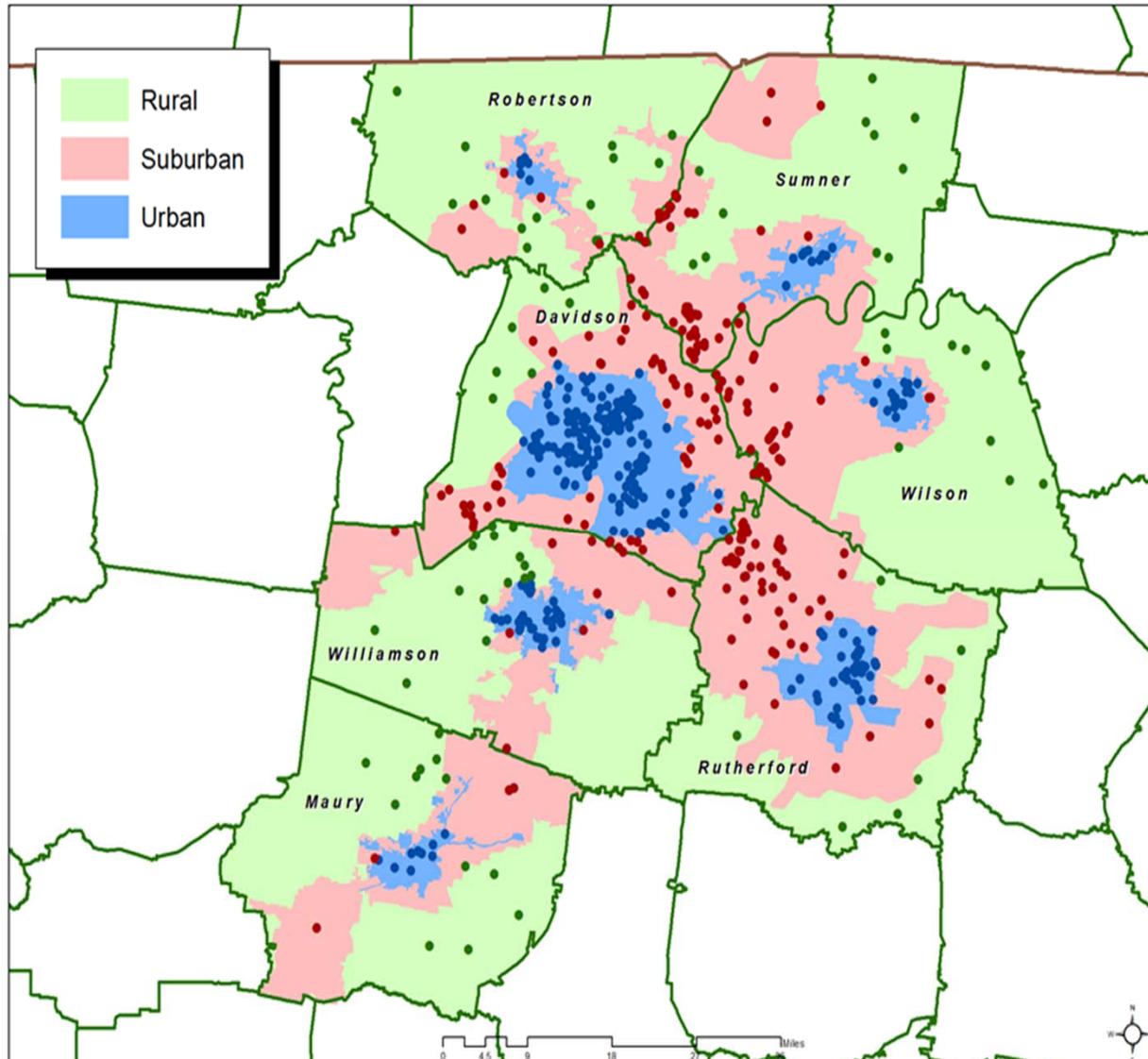
Survey Respondents – Main Study

County	Actual	Retrieval	
		Target	Percentage
Davidson	2,231	2,148	105%
Maury	316	262	122%
Robertson	240	200	122%
Rutherford	883	796	112%
Sumner	522	504	105%
Williamson	596	538	112%
Wilson	376	352	109%
Nashville Area MPO Total	5,164	4,800	108%
Cheatham	124	100	124%
Dickson	106	100	106%
Montgomery	862	900	96%
Outer Counties Total	1,092	1,100	99%
Grand Total	6,256	5,900	106%

Survey Respondents – Main Study



Survey Respondents – Health Study



600 Households:

300 Urban
200 Suburban
100 Rural

Findings: Drivers/Vehicles

- ⇒ **97%** of households have a **licensed driver**
- ⇒ **6%** of households are **carless**
- ⇒ **19%** of **vehicles** are less than **5 years** old
- ⇒ **46%** are **10 years** or older
- ⇒ **96%** are powered by **gasoline**, **2%** diesel, **2%** alternative



Findings: Travel Behaviors

- ⇒ Households make on average **9.22** trips per day
- ⇒ Individuals make on average **4.25** trips per day
- ⇒ **70%** of diary trips were made by a driver, **18%** by a passenger, **7%** on foot
- ⇒ **6%** of urban residents use transit at least once per week, compared with **2%** in rural areas
- ⇒ **12%** of urban residents bicycle, and **77%** walk at least once per week for transportation purposes

Findings: Commuting

- ⇒ **87%** of workers **drive** to work
- ⇒ **7%** of workers **walk** to work
- ⇒ **Employers provide parking** for **86%** of workers
- ⇒ **Employers provide transit pass** for **14%** of workers
- ⇒ **98%** **park at jobsite**
- ⇒ **3%** of workers **pay to park**



Findings: Self-Report Health

- ⇒ **10%** of residents report **rarely** being physically active, **30%** report having **vigorous** activity each week
- ⇒ **2%** of adults with **poor health** report being **vigorously active**, compared with **55%** of those in **excellent health**
- ⇒ **39%** of adults in **poor health obese**, compared with **5%** of adults in **excellent health**
- ⇒ **37%** of **inactive** adults are **obese**, compared with **15%** of **vigorously active** adults
- ⇒ **41%** of adults with a **poor diet** are **obese**, compared with **8%** of adults

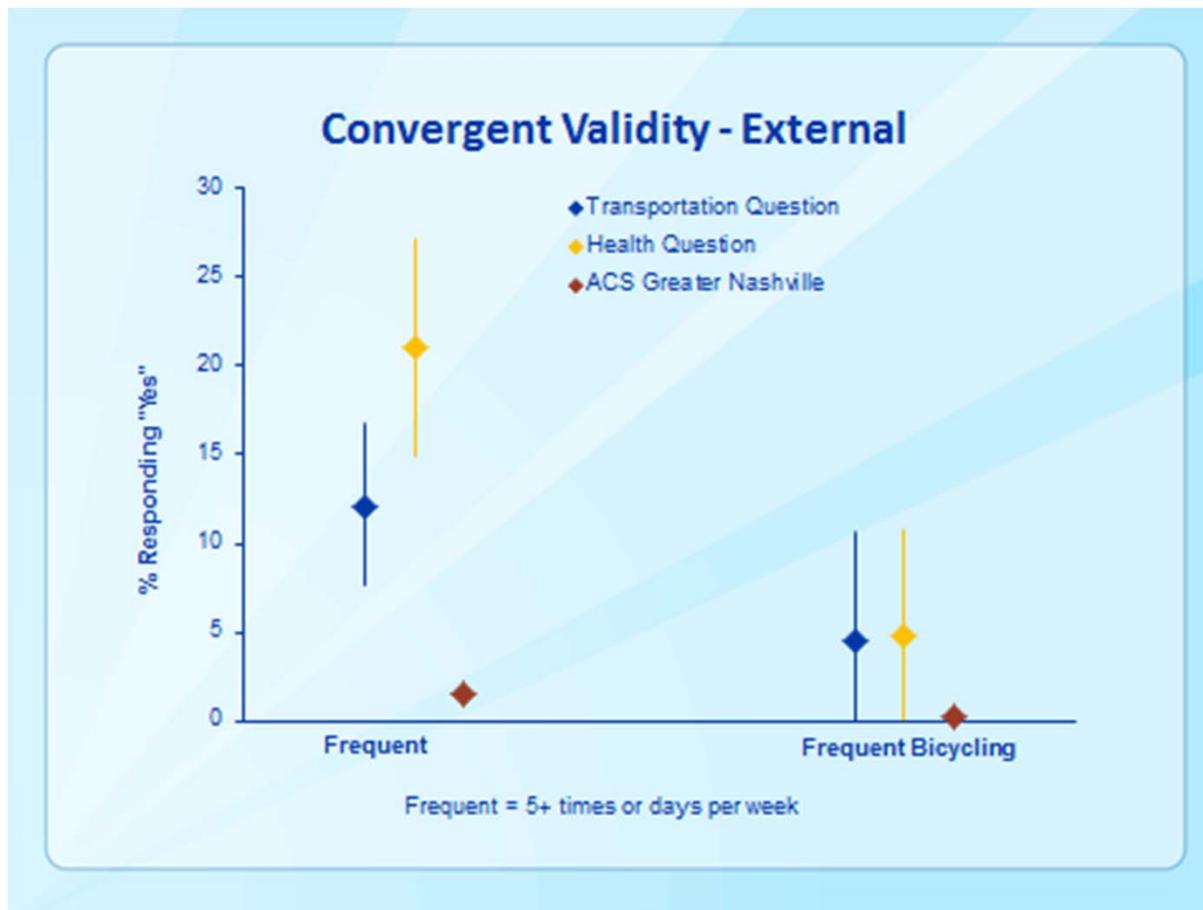
Findings: Implications

➔ Work commuting is not the predominant reason for travel in Middle Tennessee (or anywhere else)

Purpose	Expanded Trips	Percent of Total
HBO	1,131,176	20%
HBPD	387,529	7%
HSch	510,161	9%
HShp	652,318	12%
HBW	1,057,738	19%
NHBO	1,121,506	20%
NHBW	761,280	14%
Total	5,621,708	100%

Findings: Implications

- ➔ More people walk and bike (and use transit) than you might think based on prior conversations



General Conclusions

- ➔ Basic hypothesis is true:
 - Health is influenced by BMI
 - BMI is influenced by diet and physical activity
 - Physical activity is influenced by travel behaviors
 - Travel behaviors are influenced by built environment and household characteristics
- ➔ Resulting travel behaviors largely mirror that of other research
- ➔ Resulting health measures largely mirror that of other health studies

General Conclusions

General Health Status	Weighted n	Weighted
Excellent	108,276	16%
Very Good	232,981	34%
Good	237,119	35%
Fair	76,869	11%
Poor	21,888	3%



Health Impact Modeling

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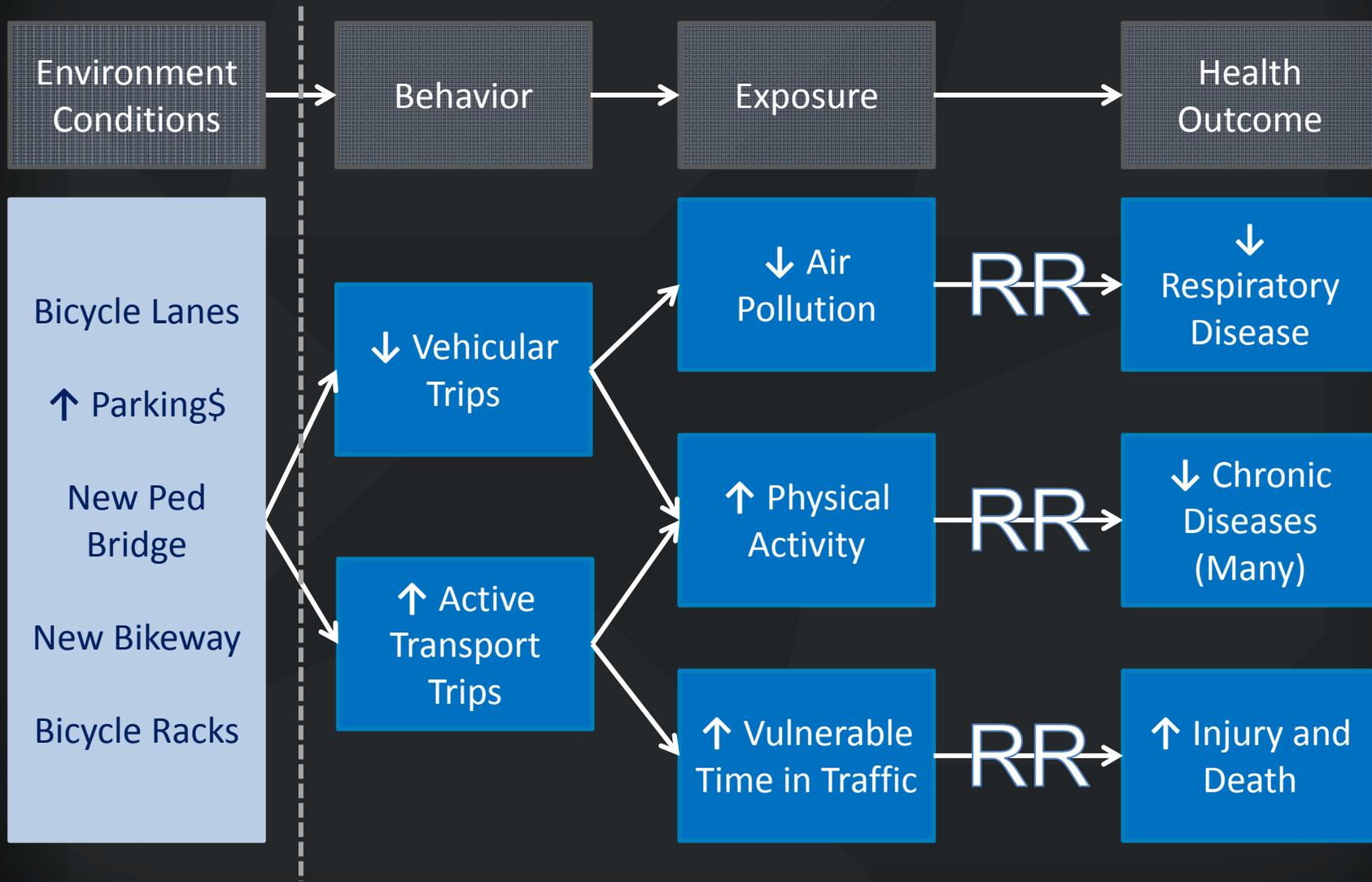
Integrated Transportation and Health Impact Model

ITHIM provides integrated health impact assessment of transport through changes in physical activity, road traffic injury risk, and urban air pollution.

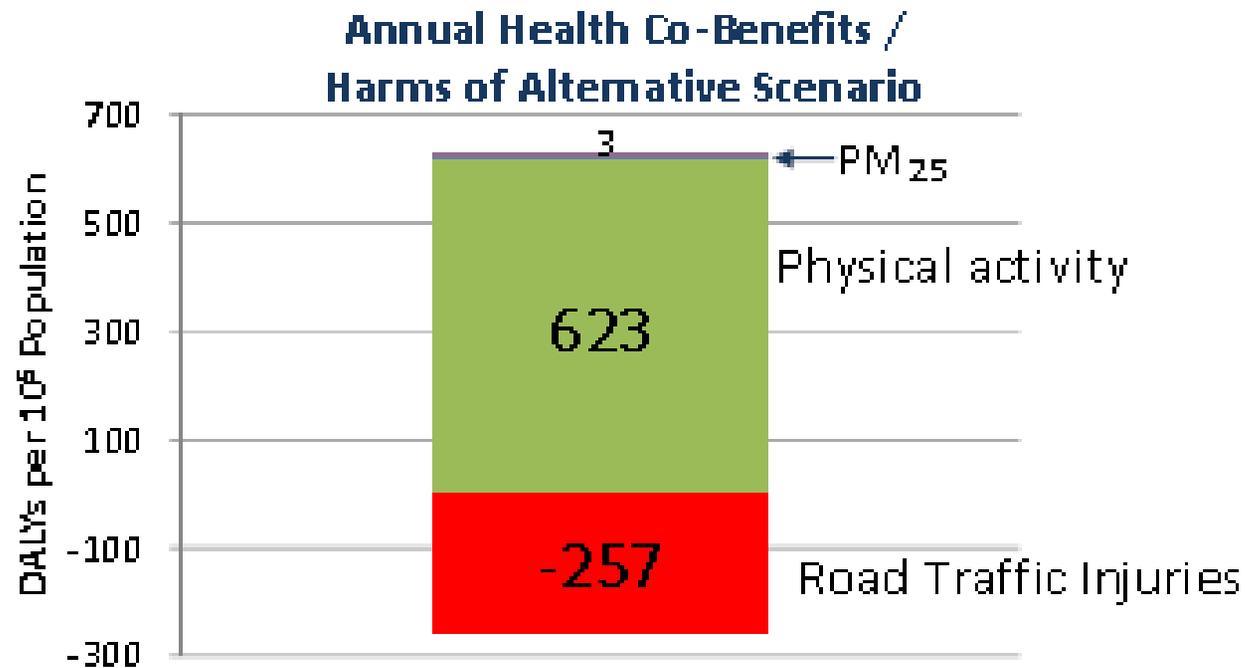
See more at: <http://www.cedar.iph.cam.ac.uk/research/modelling/ithim>

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ITHIM Model Schematic



Example ITHIM Results



- **Increased activity = 623 DALYs averted per 100,000 people**
- **Increased injuries = 257 DALYs incurred per 100,000 people**

Sourced from Neil Maizlish, California Department of Public Health, ITHIM Developer
Data presented do not represent Nashville health impacts

Next Steps

- ➔ Analyze Basic Research Questions (examples)
 - Do travel behaviors affect health outcomes
 - How does area type influence activity and health
- ➔ Integrated Transport and Health Impact Model
 - Transportation investment strategy – increase p.a.
 - Input physical activity, air quality and injury data
 - Health outcomes: cancer, injury, asthma, etc. rates
- ➔ 2040 Regional Transportation Plan
 - Increase policy and funding considerations
 - Use ITHIM outputs in decision-making
 - Develop health performance measures



- About the MPO
- Multi-Media Center
- Transportation Projects
- Plans & Programs
- Regional Planning
- Growth Trends & Forecasts
- Publications & Documents
- Public Notices

Regional Planning

- Planning Overview
- Roadways
- Mass Transit
- Walking & Bicycling
- Freight Movement
- Land Use & Urban Design
- Environment
- Health & Well Being



Health & Well Being

The Nashville Area MPO is committed to forming policy, funding and research that support the improvement of health outcomes through active transportation - transportation that requires physical activity - such as transit, walking and bicycling. One-third of Americans do not drive or own cars, and 12 percent of all U.S. trips are made by walking or bicycling, yet these modes account for 14 percent of traffic fatalities and only 1.6 percent of federal transportation funding. Of the trips taken in U.S. metros, 50 percent are three miles or less; nearly 30 percent are one mile or less. And despite the fact that 55 percent of Americans want to bike more, drive less and walk more than they do now, 85 percent of trips under one mile are still taken by automobile due to inadequate facilities for active transportation. With Tennessee ranked fourth in the nation for obesity rates, the MPO is pursuing infrastructure policies that reflect a desire for healthier options to get around communities - including safer, more convenient means to walk or cycle for routine trips.

RELATED RESOURCES

- Health & Well Being:
- Nashville Public Television
- NPT Children's Health Crisis Obesity
- CDC
- CDC Health Community Design
 - Obesity Epidemic Video
 - Healthy Community Design 101
 - Healthy Community Design Checklist
 - Transportation Recommendations and

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Livability. Sustainability. Prosperity. Diversity.