

THE HONORABLE KEN WILBER, CHAIRMAN



NASHVILLE AREA

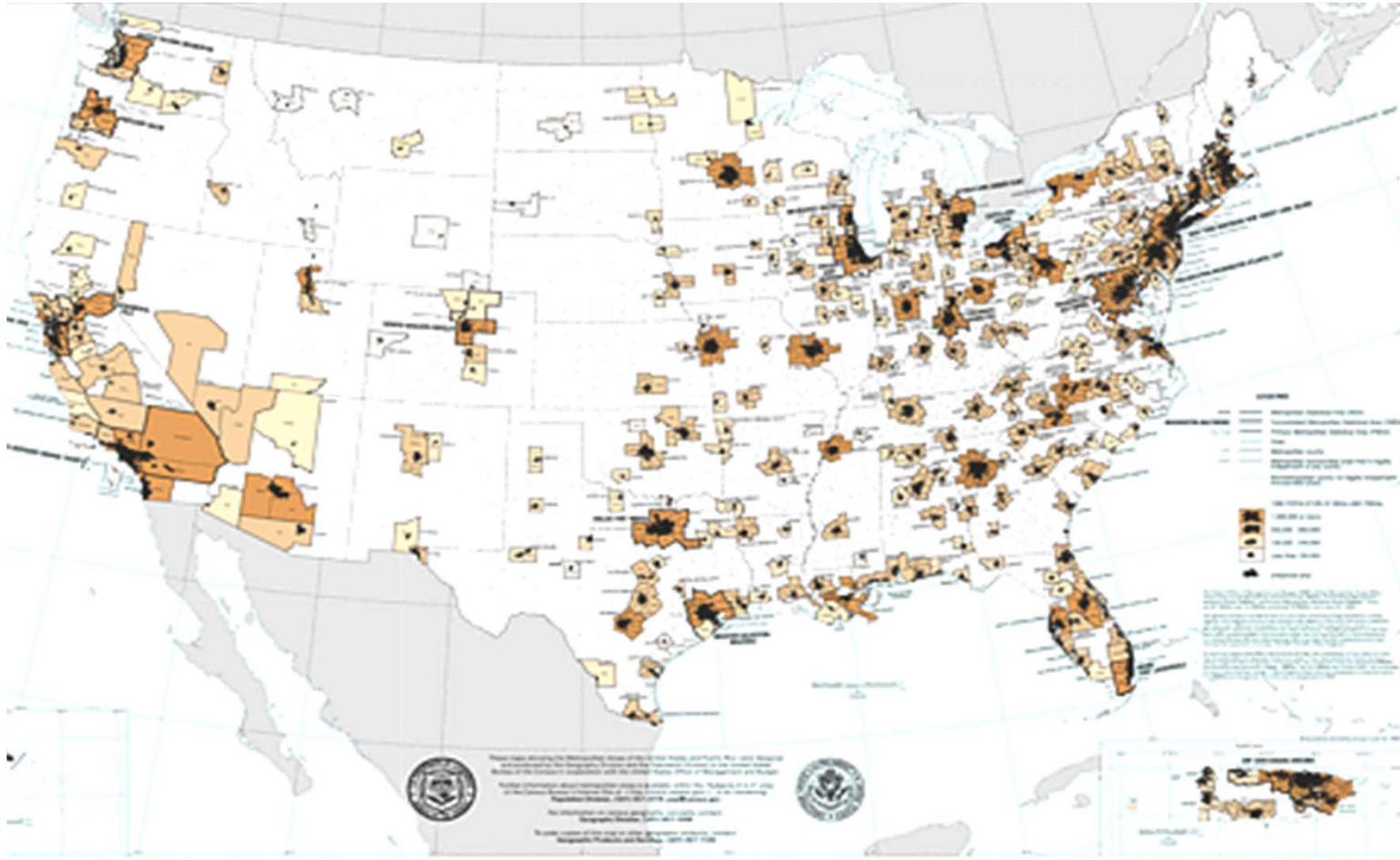
Metropolitan Planning Organization

Health and Transportation: Integrated Transport and Health Impact Model in the Nashville Region

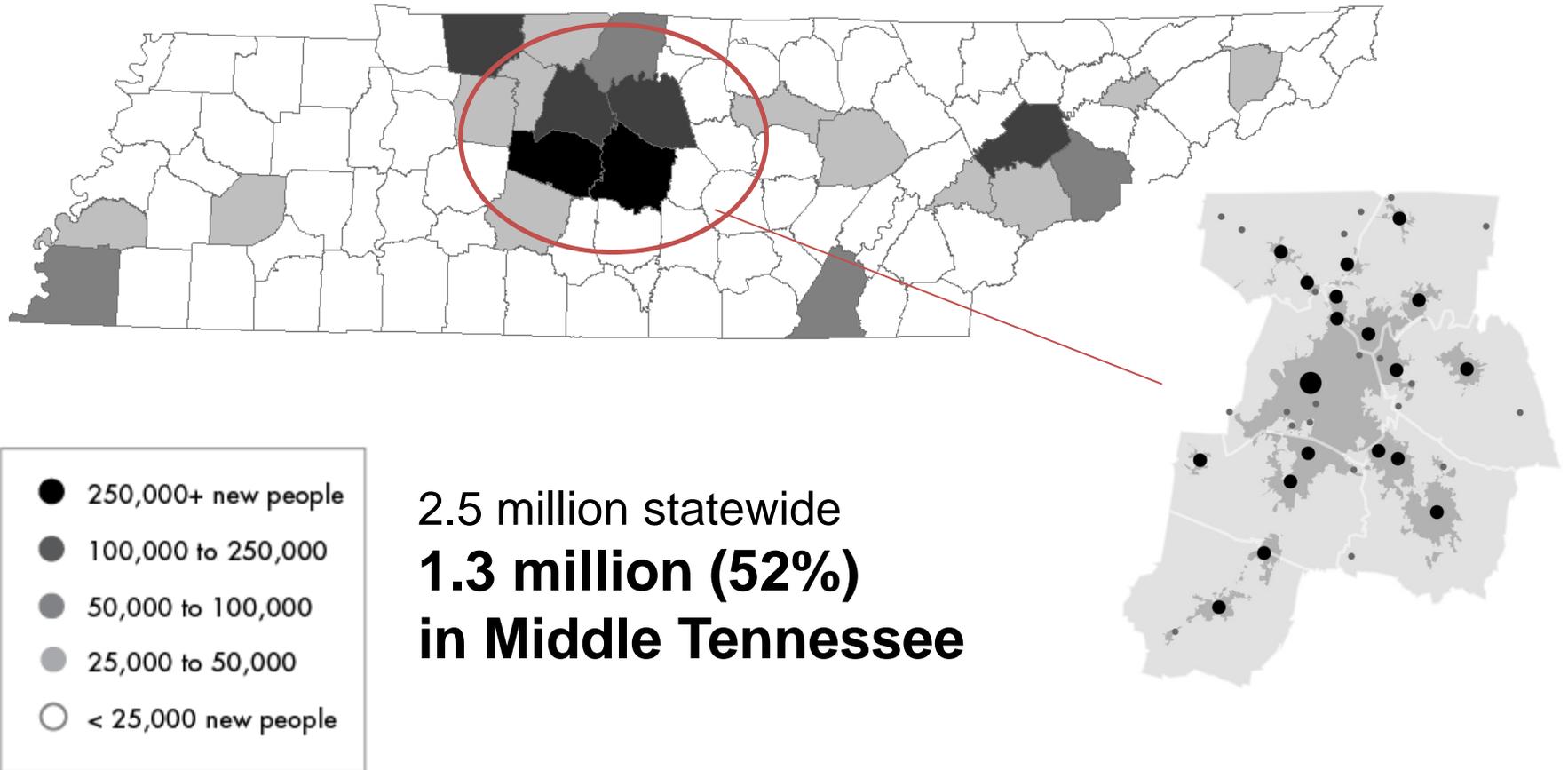
Leslie Meehan, AICP

June 2015

Metropolitan Planning Organizations



Nashville Area MPO



Policy: Public Opinion

1st choice: improve and expand mass transit options

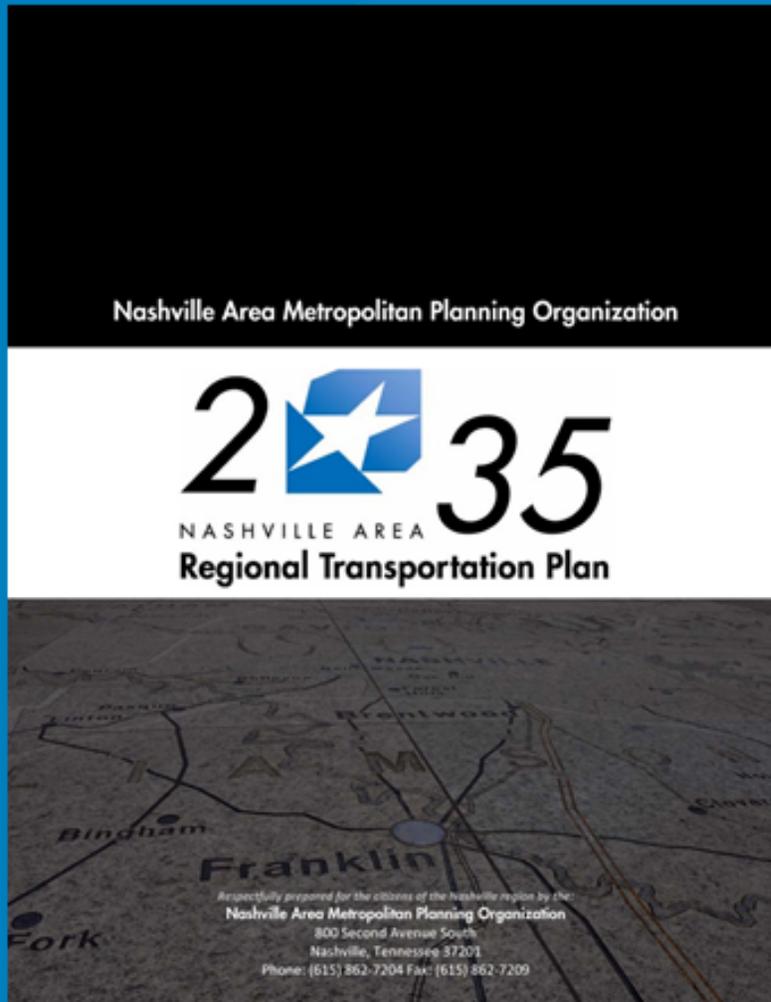


2nd choice: make communities more walkable & bike-friendly

3rd choice: build new or widen existing roadways



Policy: Public Opinion



#1

A Bold, New Vision
for Mass Transit

#2

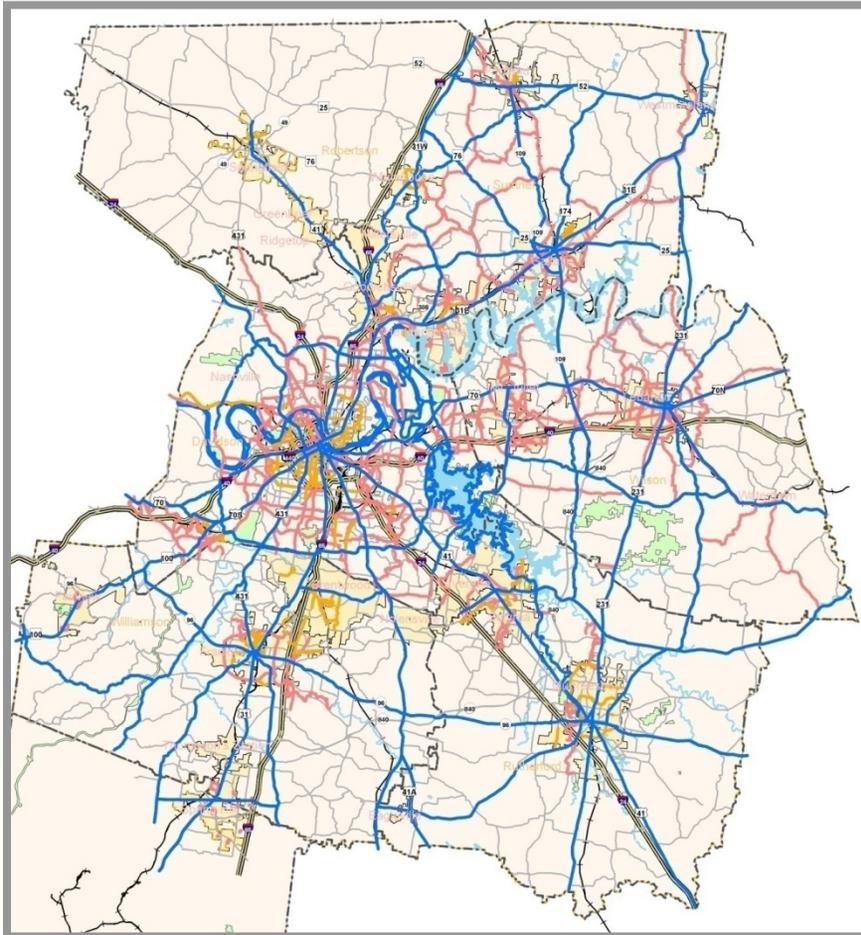
Support for
Active Transportation
& Walkable Communities

#3

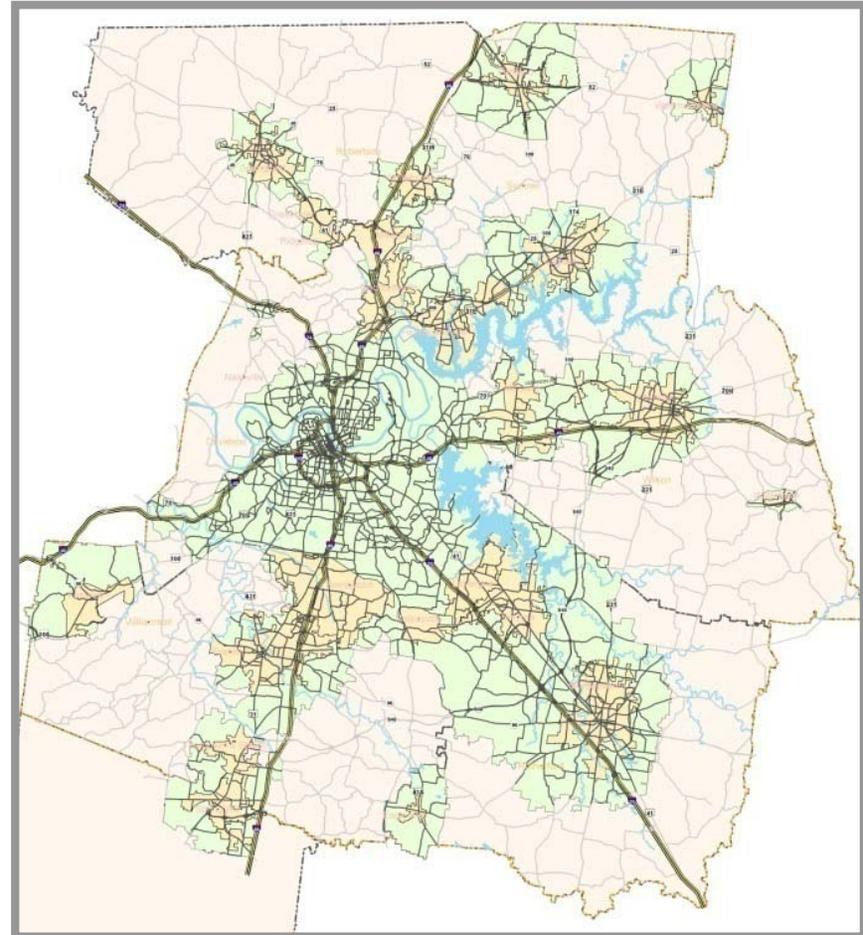
Preservation &
Enhancement of
Strategic Roadways

A Regional Vision for Non-Motorized Modes

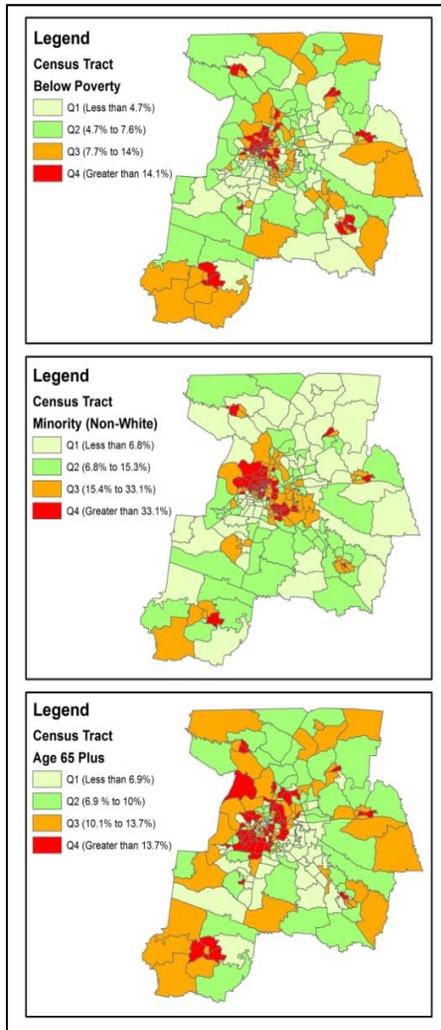
Bikeways



Sidewalks



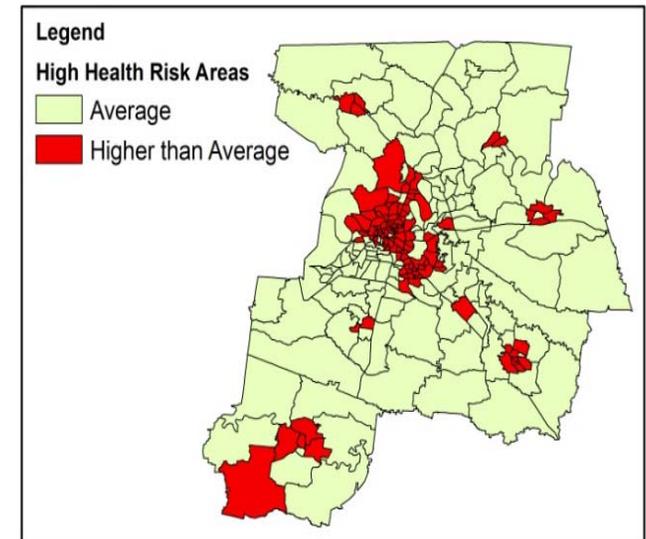
Prioritizing Projects – Health Analysis



There is a strong link between the lack of physical activity and health (e.g. heart disease, obesity, and other chronic conditions).

Research has also shown certain population groups have a higher disparity. These groups include:

- Low Income
- Minority
- Older Adults (over 65)

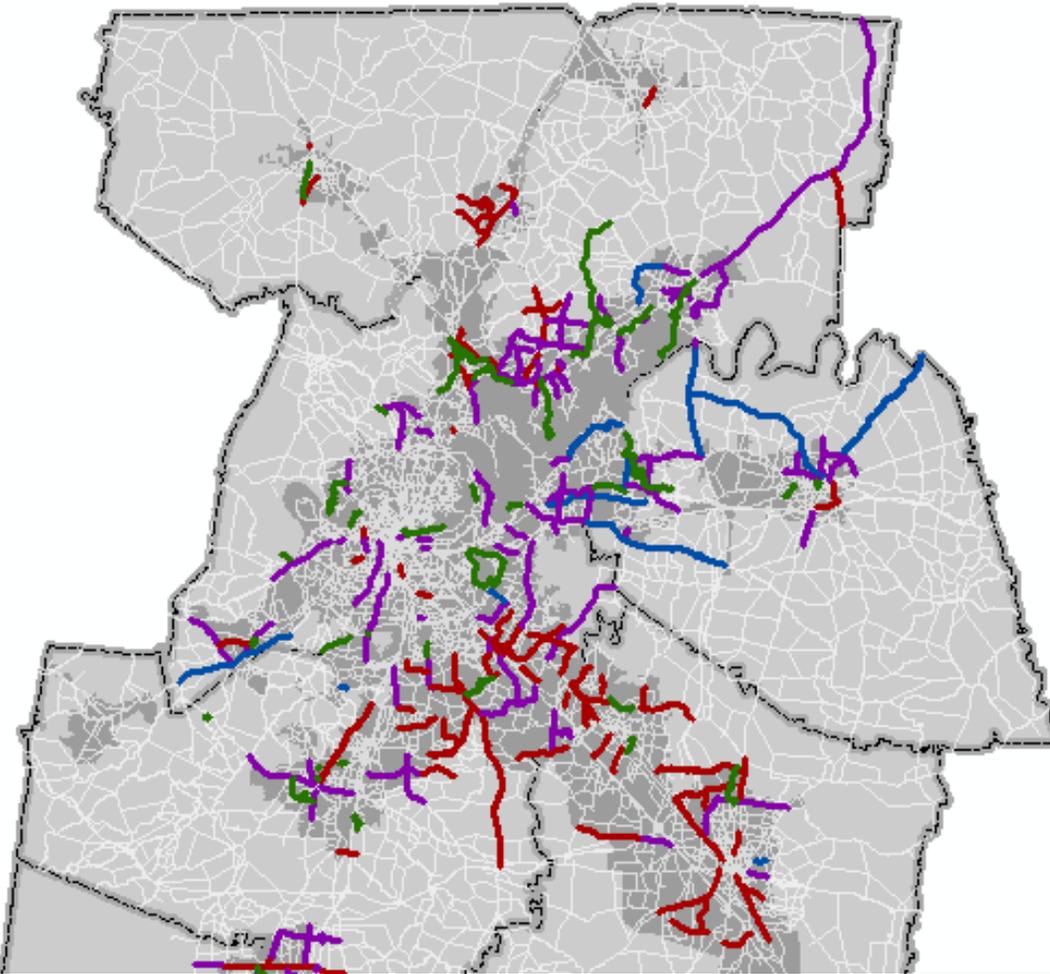


MPO's Health Investment Strategy

Roadway Funding:

- ➔ 70% - Roadway projects that improve health
- ➔ 15% - Sidewalks, bicycle lanes, greenways, transit stops, and education
- ➔ 10% - Transit
- ➔ 5% - Intelligent Transportation Systems

Projects: Complete Streets



2035 Plan: 70% of adopted roadway projects include sidewalks, bicycle lanes, or shared-use lanes (up from 2%)

➡ 70% roadway \$ to projects that improve health

MPO's Urban STP Investment Strategy

- ➔ 70% - Roadway projects that improve health
- ➔ 15% minimum investment in Active Transportation & Walkable Communities
 - Sidewalks, bicycle lanes, greenways, transit stops, and education
- ➔ 10% minimum flexed to Transit
 - Combined with Federal Transit Administration funds to help implement regional vision for mass transit
- ➔ 5% Intelligent Transportation Systems
 - Using technology to manage traffic

Data Collection: Middle Tennessee Transportation and Health Study

Transportation, Physical Activity and Health Data Collection and Analysis

Middle Tennessee Transportation and Health Study

Welcome | About the Study | Invited to Join? | Report Travel | FAQs | Materials | Contact Us

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.



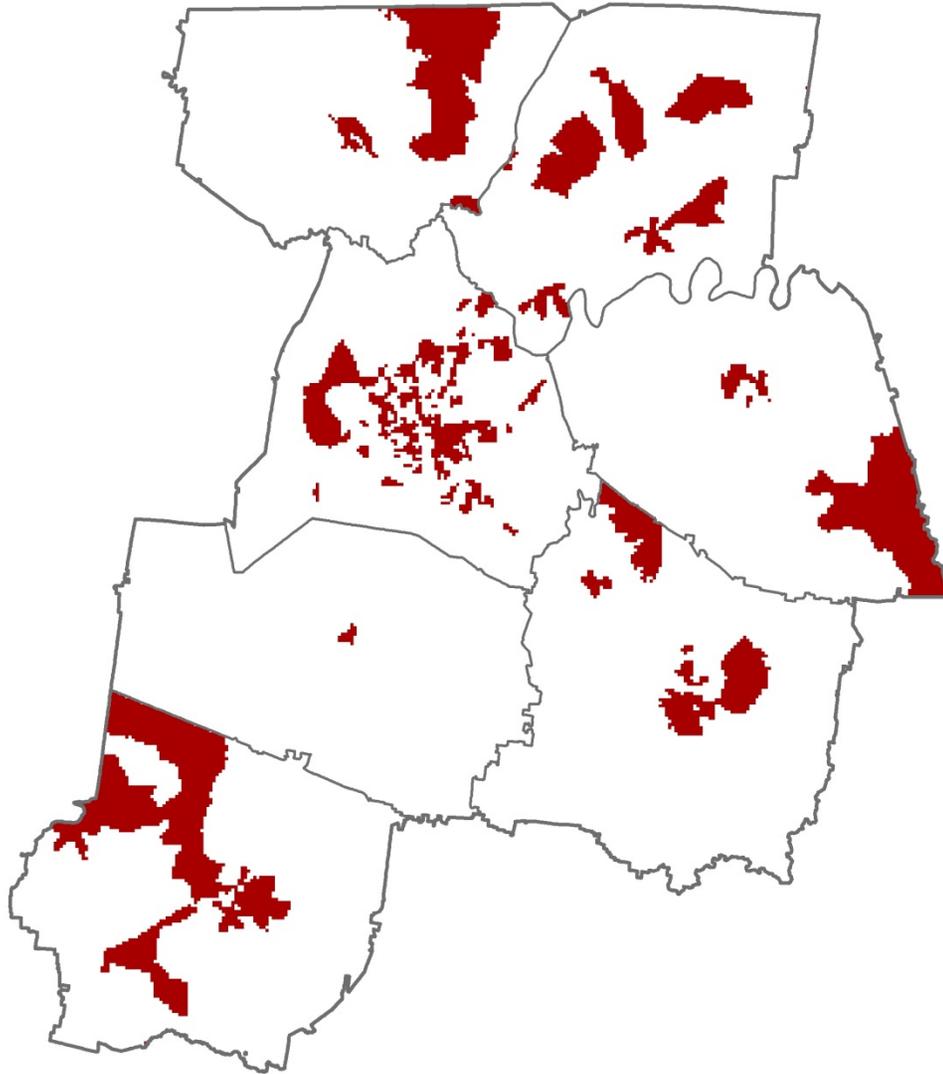
Every day, thousands of people move through the middle Tennessee region—in cars, on buses, by foot, on bikes. To plan for the projects of *tomorrow*, we need to understand how you travel *today*. Your participation in this important survey will help improve the future of transportation for all of us.



www.middletnstudy.com

nashvillempo.org

Prioritization: Health Priority Areas



Health Priority Areas

3 out of 4:

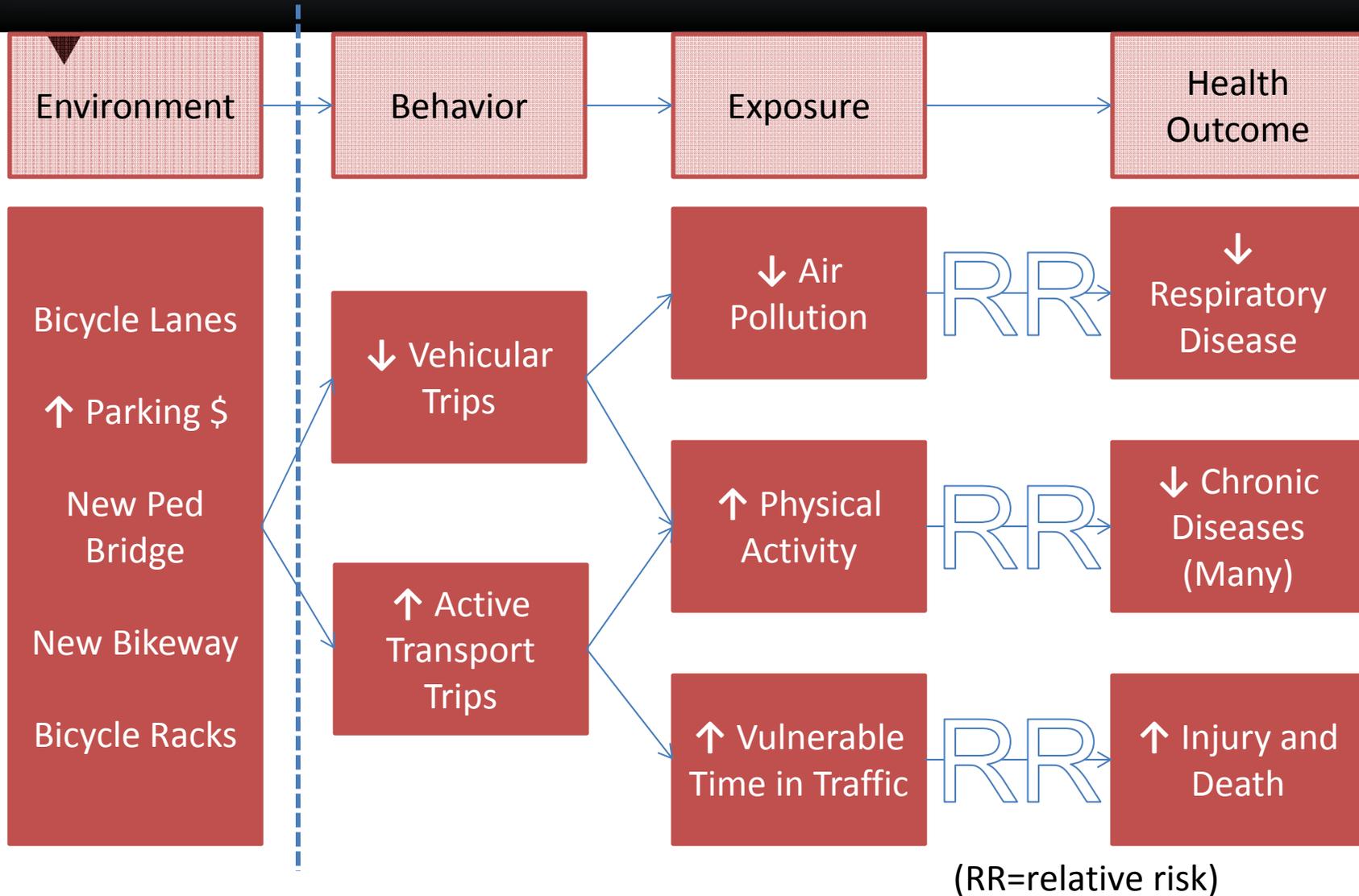
- Poverty
- Unemployment
- Carless Household
- Aging (over age 65)

Integrated Transportation and Health Impact Modeling (ITHIM) Tool

- ➔ ITHIM is a comprehensive health impact model
 - Health benefits of physical activity
 - Health benefits of reduced air pollution
 - Health risks of bike/ped vs auto accidents

 - Age/Sex effects

ITHIM Model Schematic



Diseases and Exposures

Physical Activity	Air Pollution	Collisions	
Ischemic Heart Disease	Respiratory Infections	Auto	} MODE
Depression	Cardiovascular Disease	Bicycle	
Dementia	Hypertensive Heart Disease	Pedestrian	
Diabetes	Inflammatory Heart Disease	Bus	
Colon Cancer	Lung Cancer	Truck	
Breast Cancer	Respiratory Disease (kids)	Highway	} ROAD TYPE
All-Cause Mortality	Stroke	Arterial	
		Local	
		Fatal	} SEVERITY
		Non-Fatal	

ITHIM Calculations

➔ **Baseline “knowns”:**

- Physical activity (transportation)
- Physical activity (other)
- Disease burdens
- Air pollution
- Collision and travel history

➔ **Scenario “hypotheticals”**

- Physical activity (transportation)
- Vehicle/transit miles traveled

➔ **Epidemiological calculations**

- Comparative risk assessment based on relative risk

Comparative Risk Assessment

For each disease (and by age and sex), ITHIM uses comparative risk assessment:

$$PAF = \frac{\int_{Xmin}^{Xmax} RR(x)B(x) - \int_{Xmin}^{Xmax} RR(x)S(x)}{\int_{Xmin}^{Xmax} RR(x)B(x)}$$

Extensive data on baseline diseases and exposures is critical!

PAF = Population Attributable Fraction. RR= Relative Risk. B=Baseline. S=Scenario

#	Item Definition	Units	Strata
1	Per capita mean daily travel distance	Miles/Person/Day	Mode
2	Per capita mean daily travel time	Min/Person/Day	Mode
3	Per capita mean daily AT time (ratio)	Dimensionless	Walk, Bike
4	SD of mean daily active travel time	Min/Person/Day	Walk, Bike
5	Walk speed	Miles/Hour	None
6	Personal travel distance and time	Miles & Hours/Day	Drive, Passenger
7	Ratio daily per capita bicycling to walking	Dimensionless	None
8			
9			
10			
11			
12			
13			
14			

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7	Ratio daily per capita bicycling to walking	Dimensionless	None
8	Vehicle miles traveled	Miles/Day	Mode, Road type
9	Emissions of PM _{2.5} per vehicle mile traveled	µg / m ³	None
10			
11			
12			
13			
14			

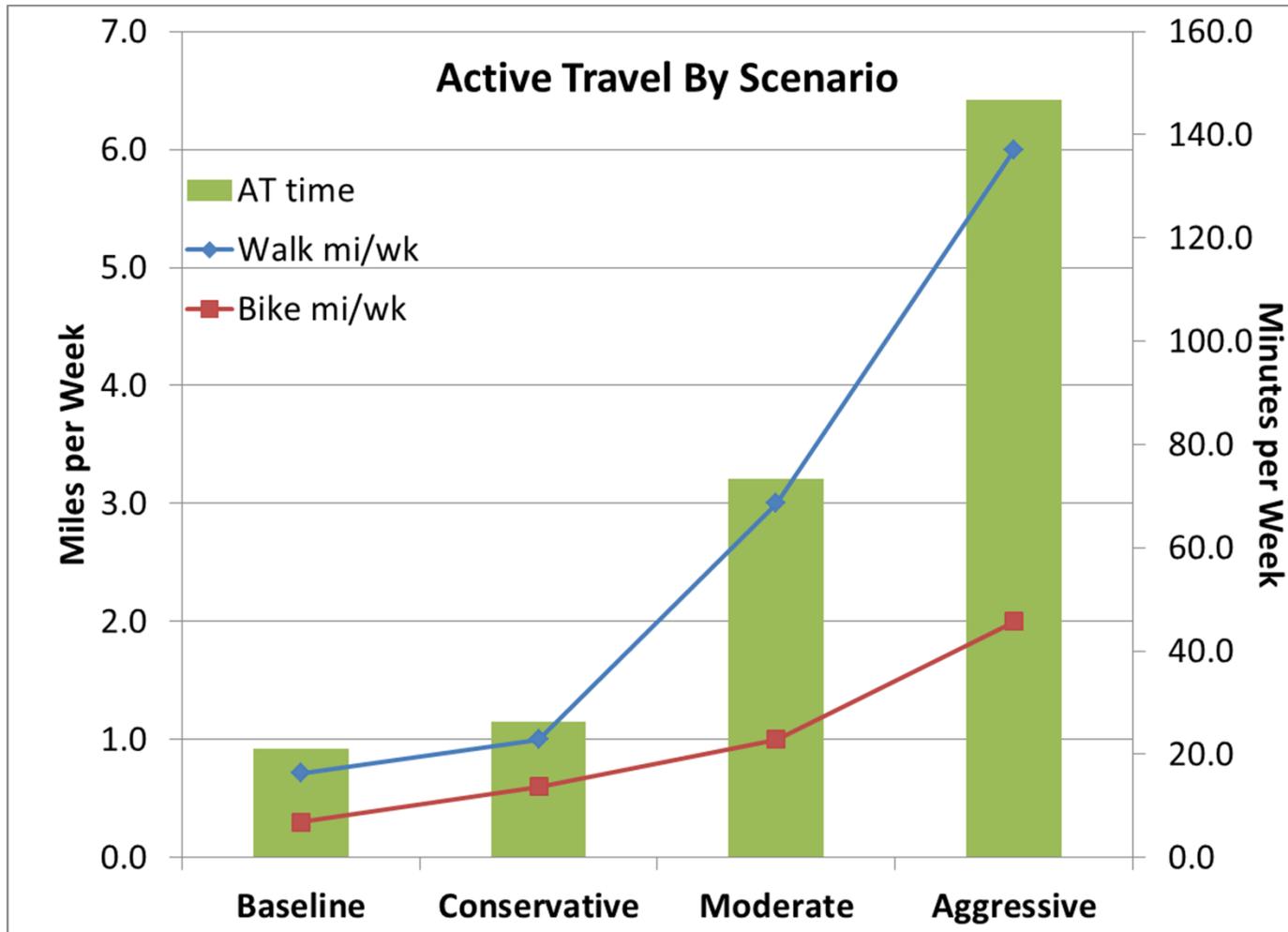
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10	Disease-specific mortality rate (Ratio)	Dimensionless	Age, Sex, Disease
11	Proportion of colorectal cancers at the colon	%	None
12	Serious and fatal injuries from collisions	Injuries	Mode (2), Road type
13			
14			

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11	Proportion of colorectal cancers at the colon	%	None
12	Serious and fatal injuries from collisions	Injuries	Mode (2), Road type
13	Per capita non-travel physical activity	MET-hours/Week	Travel PA, Age, Sex
14	Population Distribution	Percent	Age, Sex

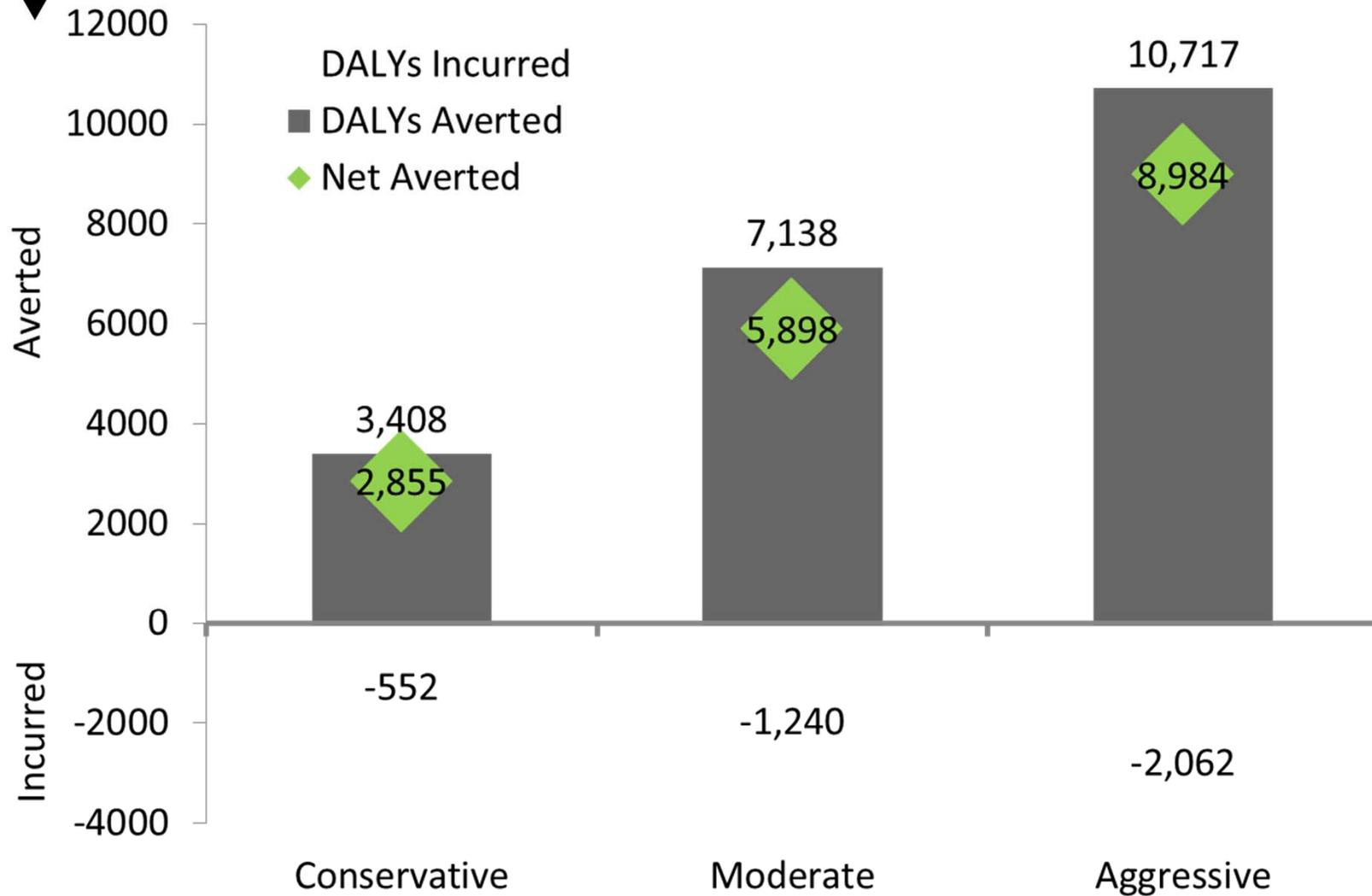
Running the Model

- **After calibration, enter scenarios for comparison**
- **Following slides present shifts from car to bike/ped:**
 - Conservative
 - Moderate
 - Aggressive

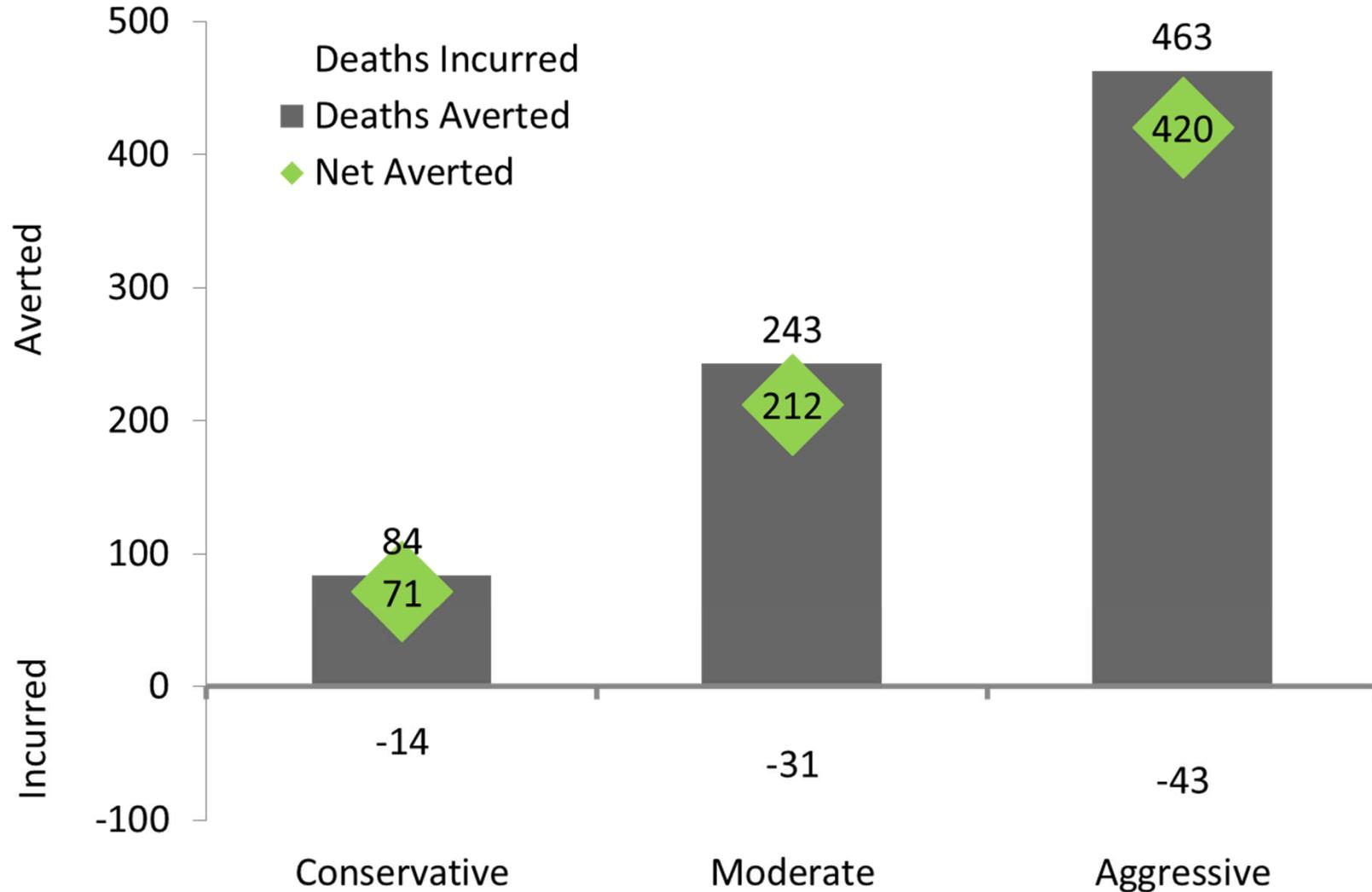
ITHIM Scenarios



Change in DALYs by Scenario

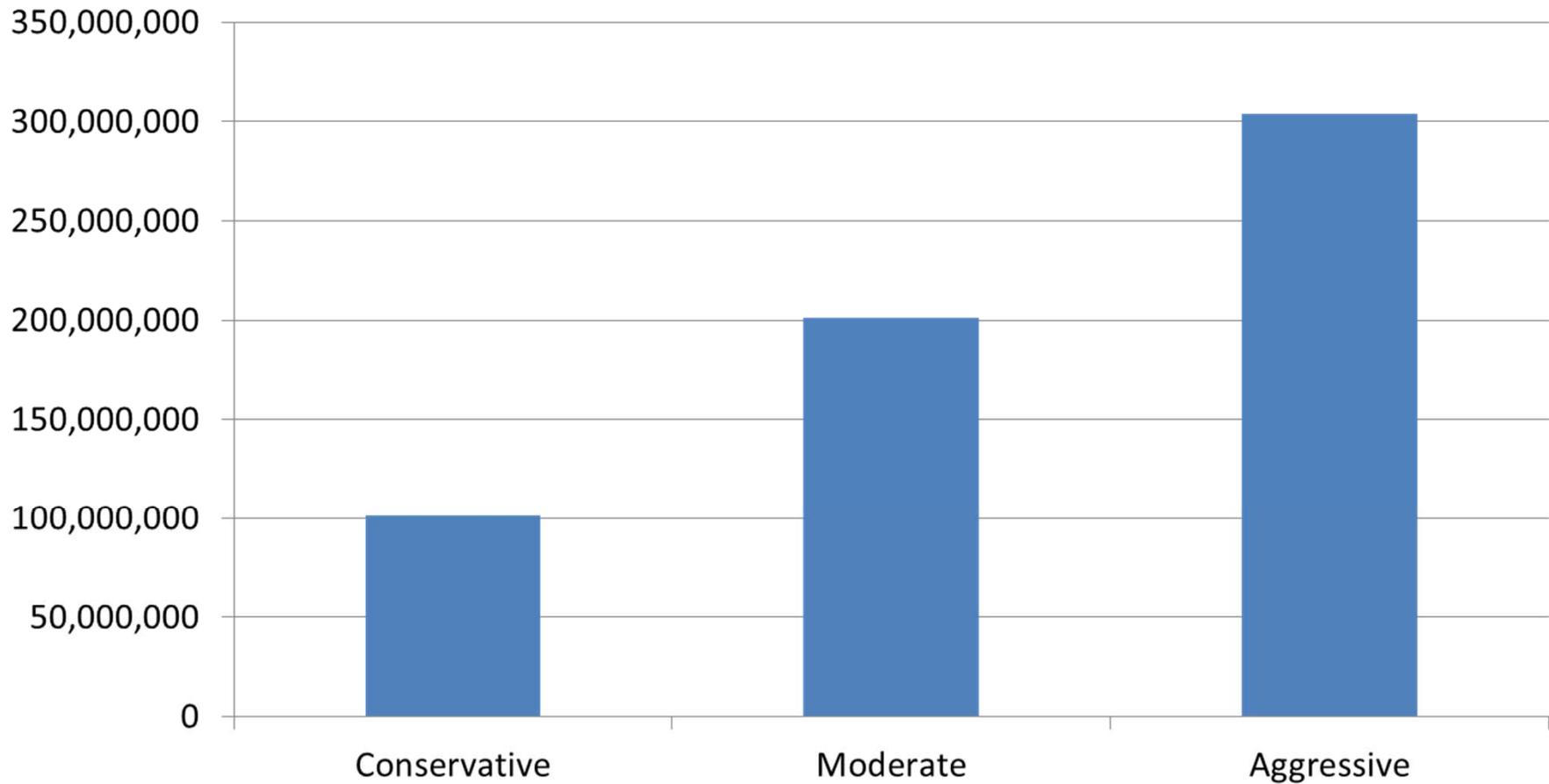


Change in Deaths by Scenario



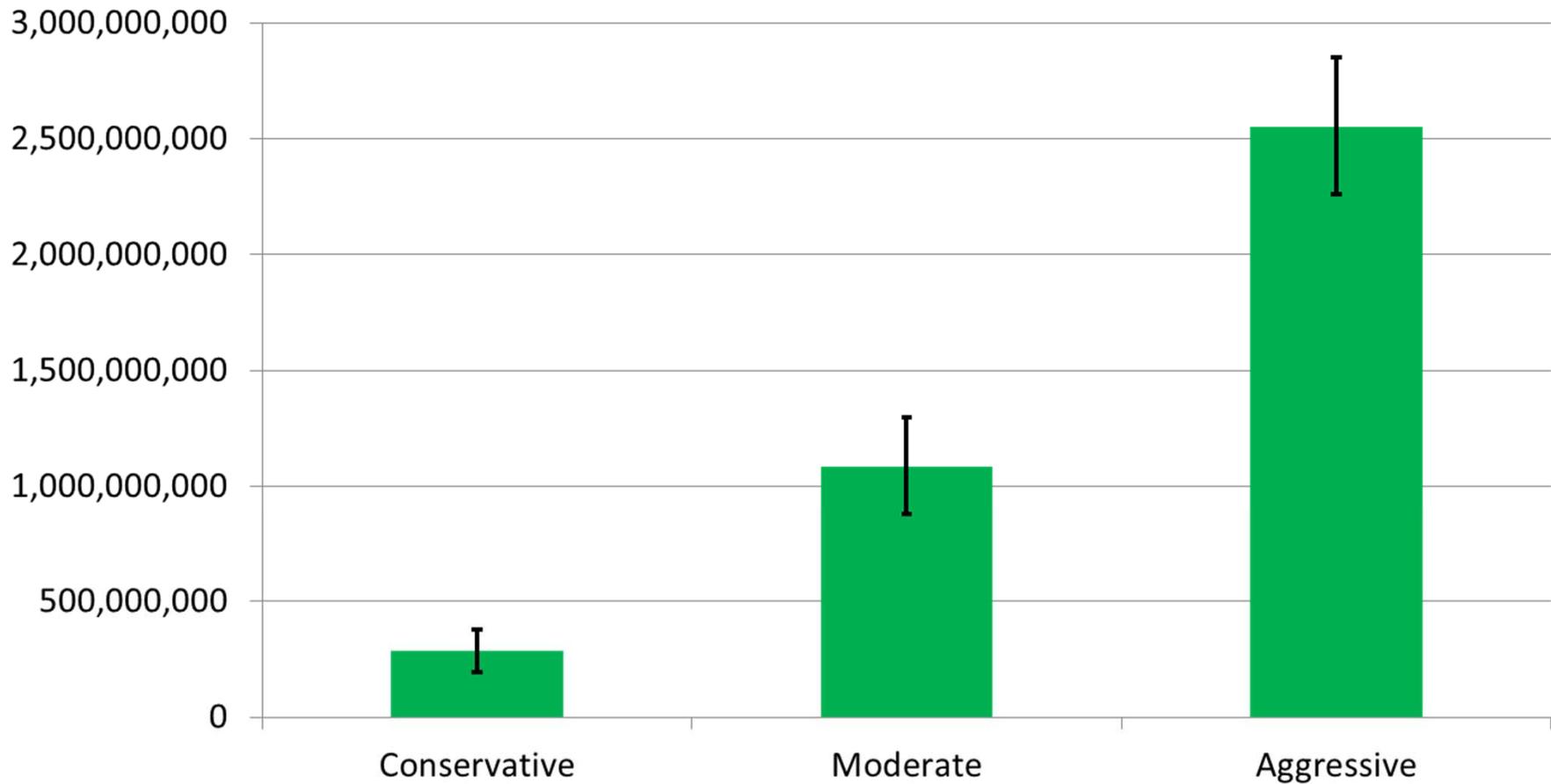
Cost Analysis – Results

Impact - Cost of Illness Method



Cost Analysis – Results

Impact - Willingness to Pay



Monetization: Impacts of Physical Activity via Transportation on Health

Moderate Scenario	Change in disease burden	Change in DALYs per year
Cardiovascular Diseases	10.4%	1442
Diabetes	11.2%	1252
Depression	2.7%	460
Dementia	3.9%	879
Breast cancer	2.8%	124
Colon Cancer	2.6%	94
Collisions	13.8%	1240



Savings:
\$200 Million
 per year in healthcare costs

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Acknowledgements

CDC

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Arthur Wendel

ITHIM Developers

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James Woodcock



Livability. Sustainability. Prosperity. Diversity.

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