

A Research Roadmap for Transportation and Public Health

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Motivation



Image Source: pedbikeinfo.org/ Toole Design Group



Image Source: pedbikeinfo.org



Image Source: Spencer Platt/Getty Images

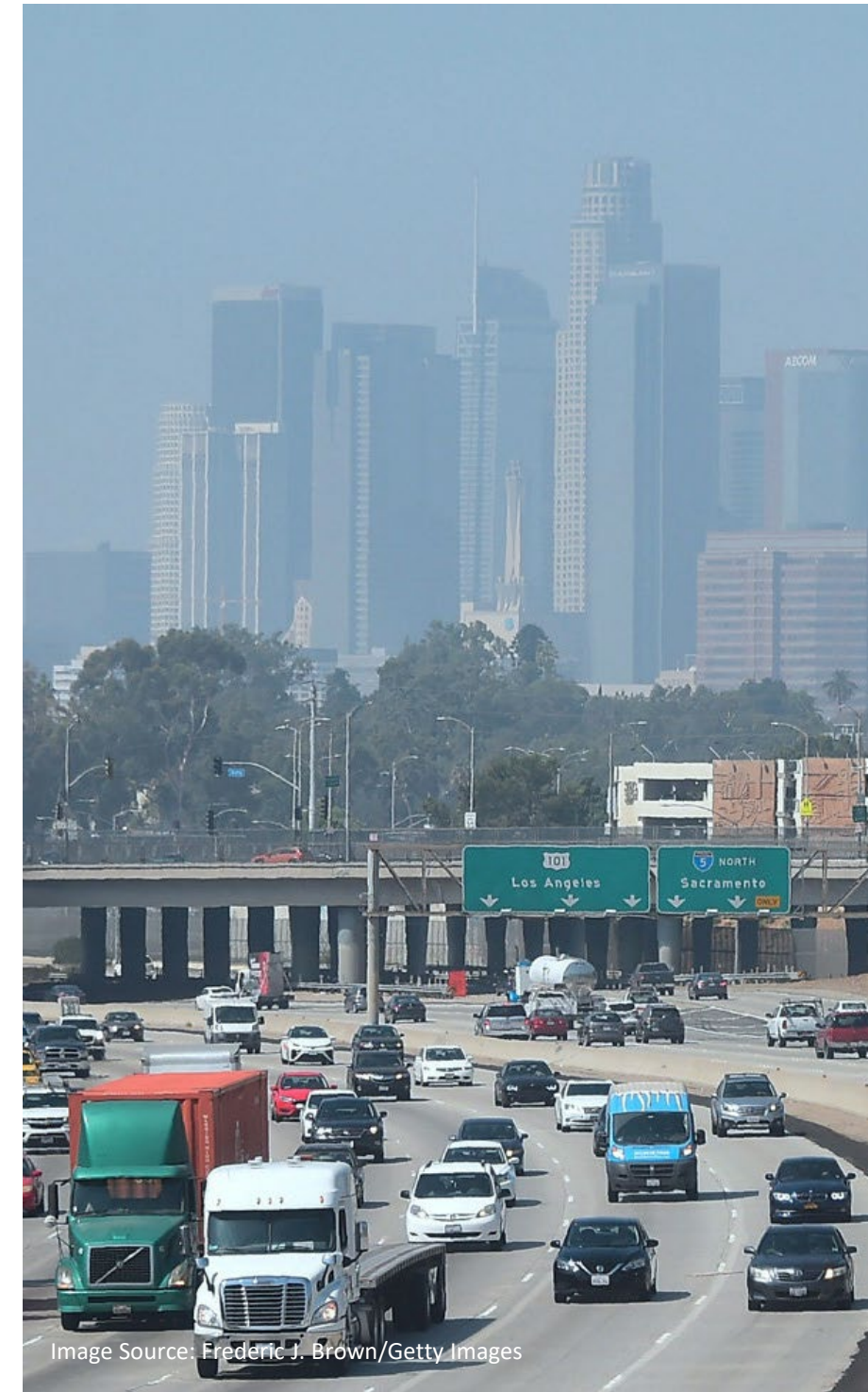
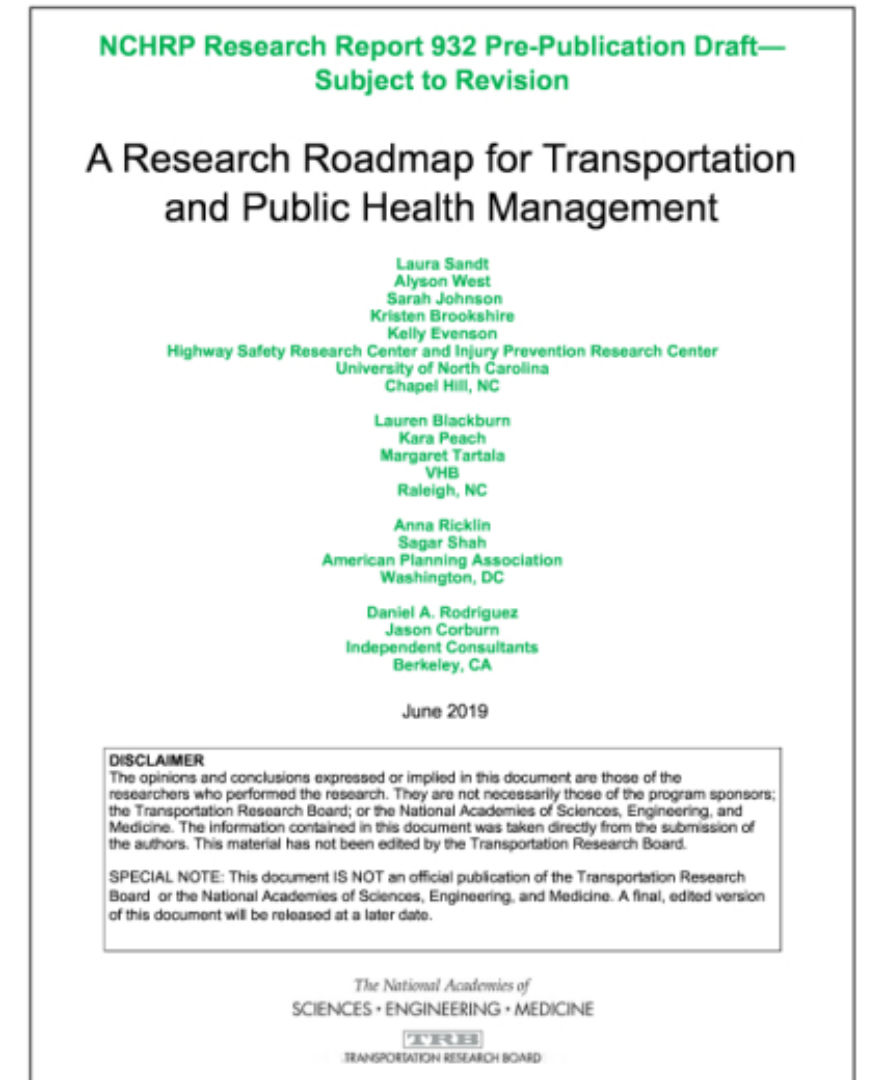


Image Source: Frederic J. Brown/Getty Images

Project scope

- Objectives:
 - Develop a holistic and strategic research roadmap
 - Identify evidence to support practical and useful information, and implementable tools, for state DOTs and partners
- Research products:
 - 10-year strategic roadmap
 - Six specific Research Problem Statements
 - Communications/implementation plan
 - PowerPoint slides
 - Technical report
 - Excel file of studies reviewed (*bonus*)



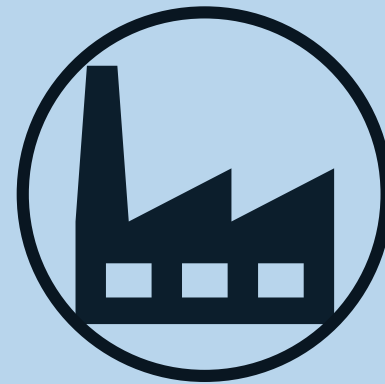
Many pathways to health in which transportation agencies play a role



Improving access to opportunities and services



Providing opportunities for physical activity



Mitigating human exposure to environmental risks (air and noise pollution)



Preventing injuries and improving safety



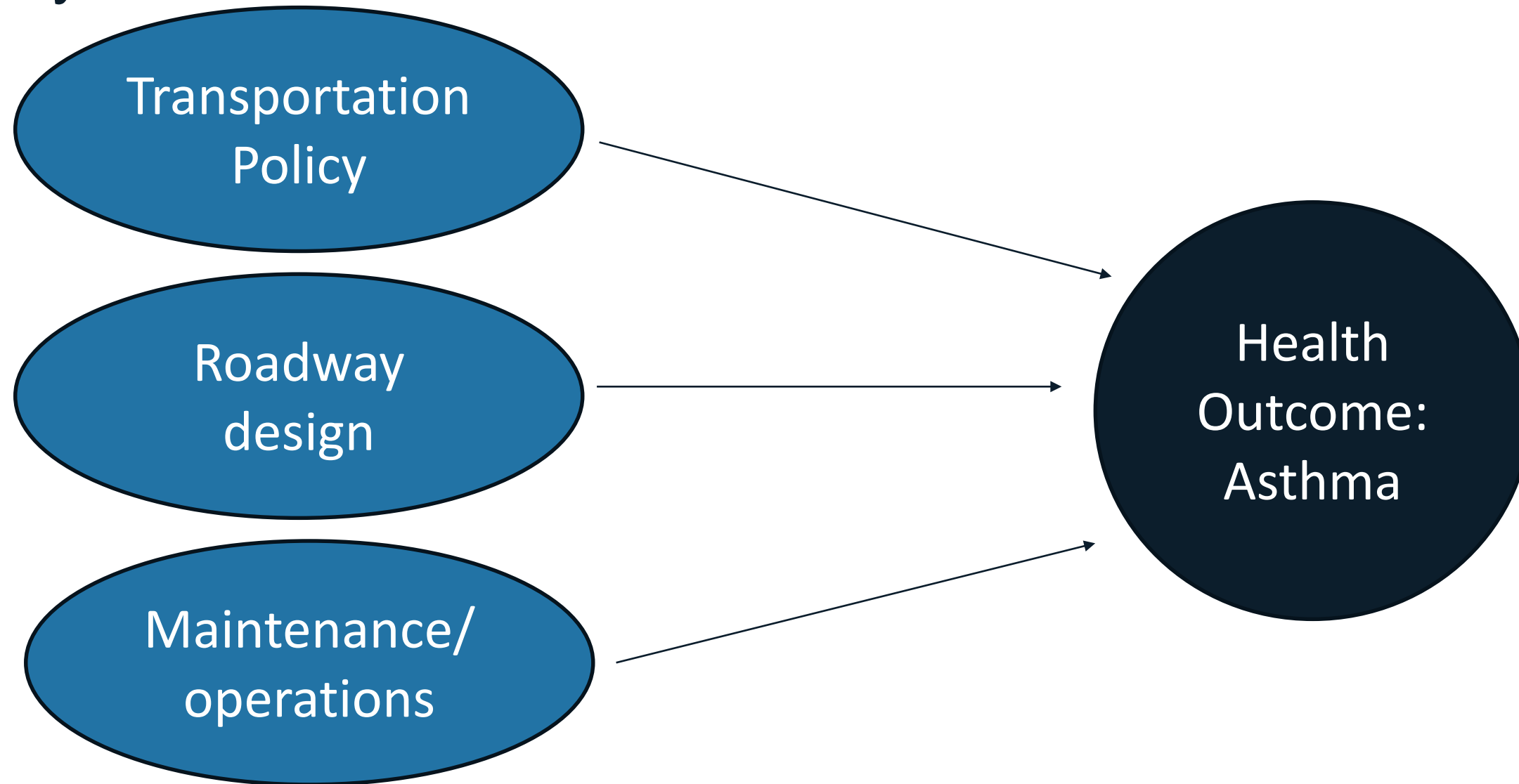
Supporting resiliency to disaster and extreme weather events



Promoting community connectedness and vitality

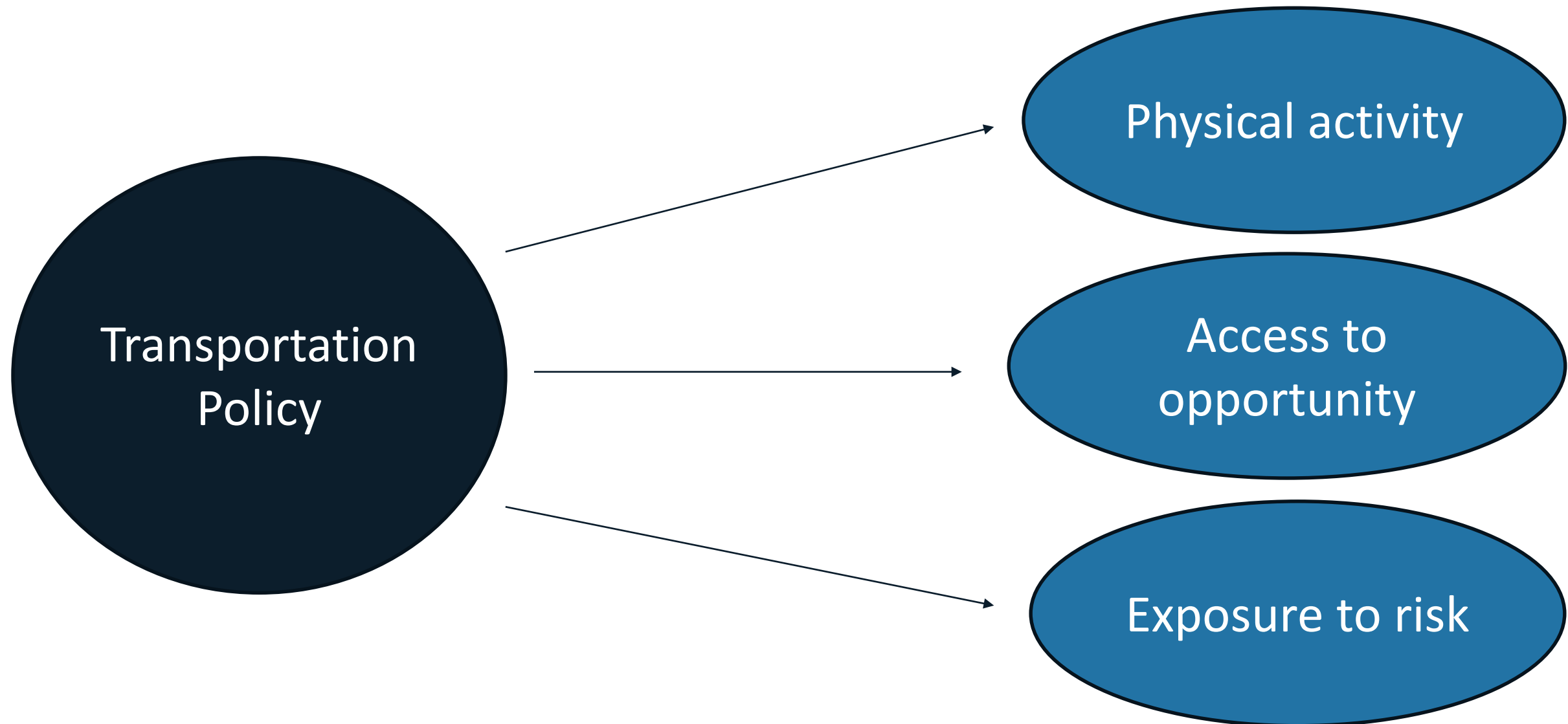
Equifinality

A given outcome can be reached from any number of different pathways

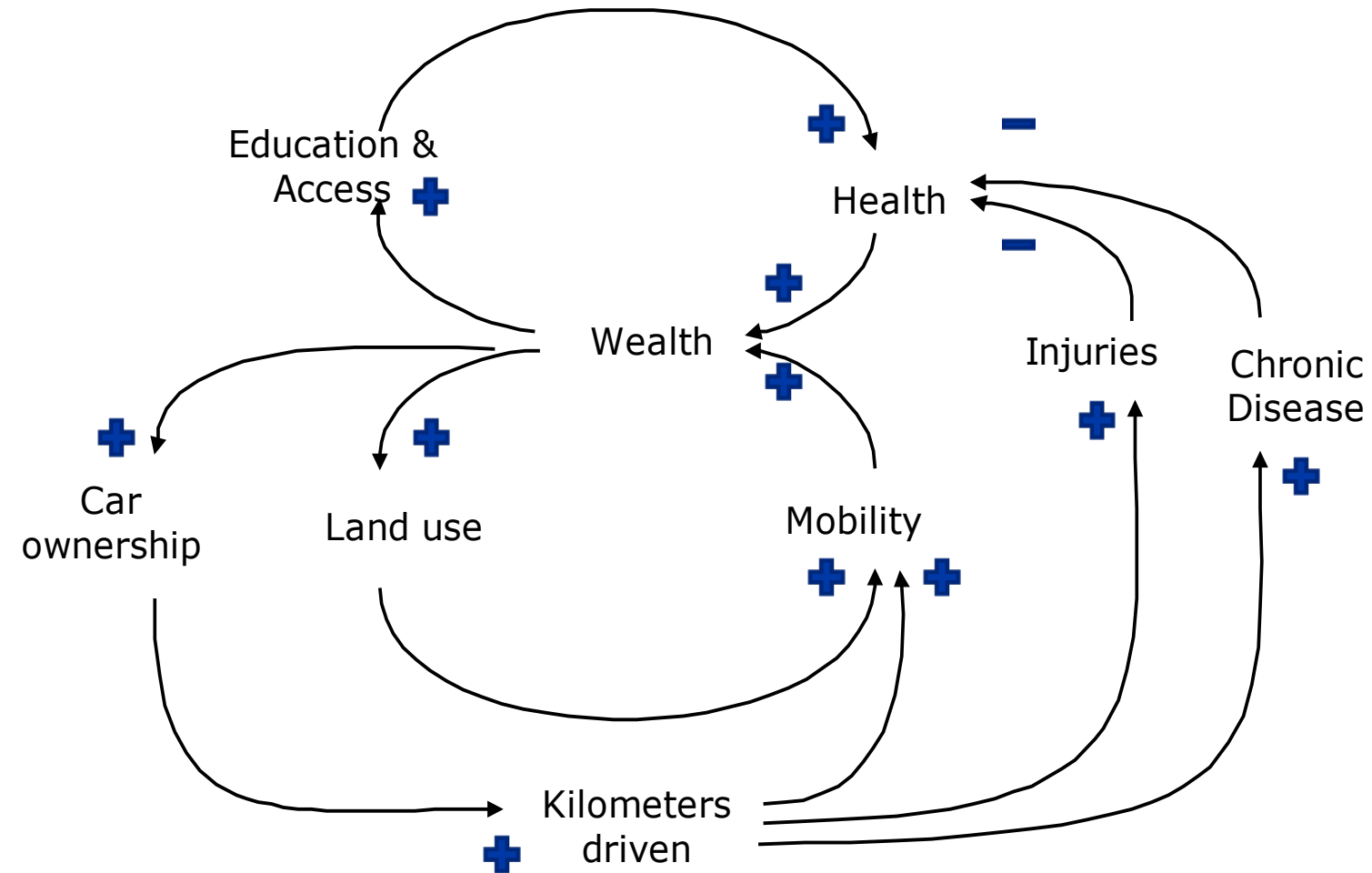


Multifinality

Similar initial action or conditions may lead to dissimilar outcomes



Inherent complexity and interconnections between health determinants and health outcomes



McClure, 2019

Iterative literature review + stakeholder engagement

- 300+ research articles referenced in Final Report
- 42+ Institutional and agency reports and strategic plans
 - Including committee/task force reports
 - State of practice/case studies and other gray literature
- 42+ TRB Research Needs Statements and Research in Progress records
- 22 interviews with federal, state, and local stakeholders
 - Rural and urban states and cities
 - Planning, engineering, transit, maintenance/ops, public health
 - TRB, FHWA, and CDC

Literature reviewed in relation to health issues/outcomes

Physical activity/active travel

Noise

Chronic disease

Access/accessibility

Safety

Stress/comfort/mental health

Resiliency

Equity

Crime/security

Literature reviewed in relation to DOT agency process

Planning/policies

Prioritization

Data/monitoring

Health impact analyses

Maintenance/operations

Interagency coordination

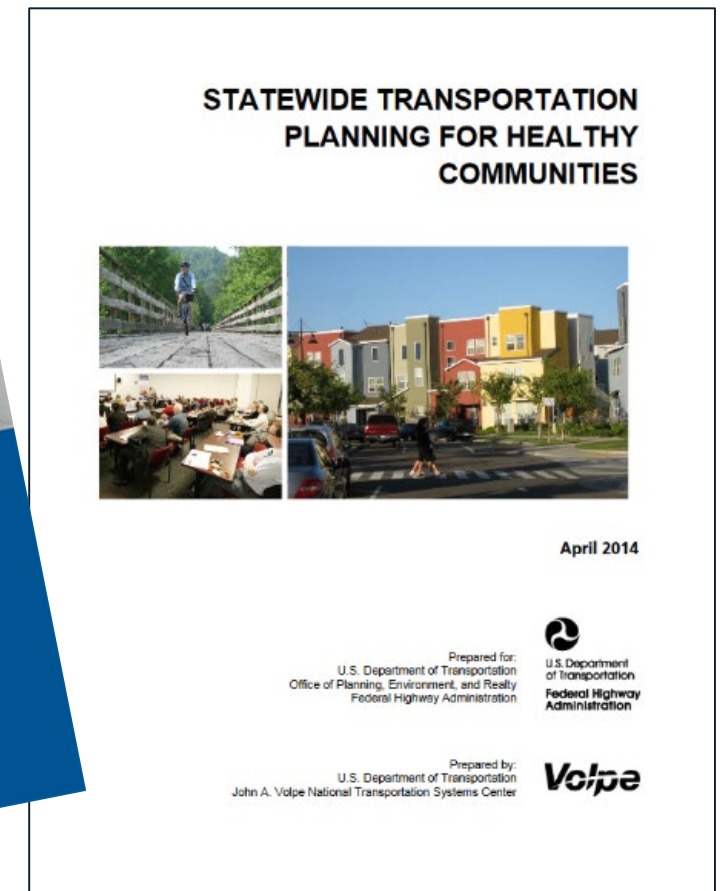
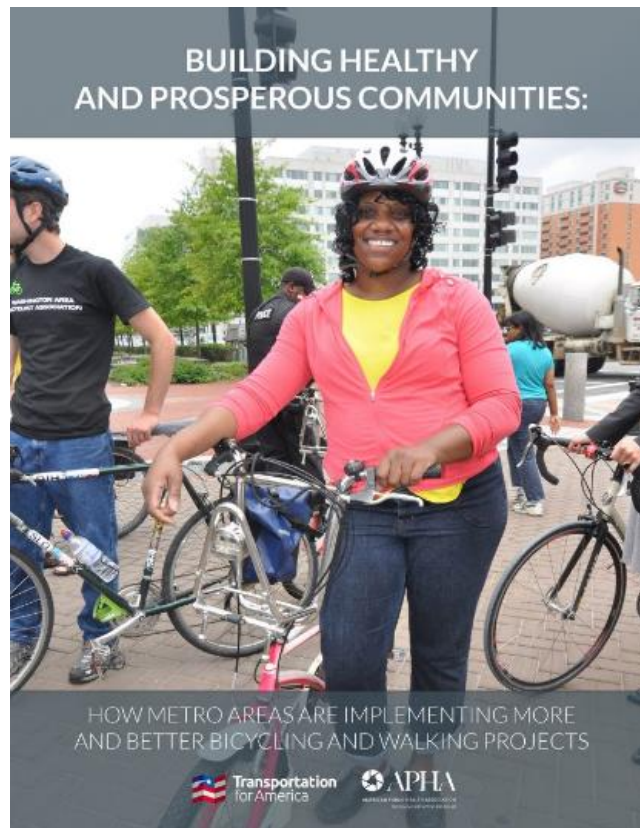
Project design

Public engagement

Performance measures

Findings: existing resources and guidance

Many reports and case studies have shown discrete examples of transportation and health agency collaborations, policies, and practices



Findings: existing tools

	Integrated Transport and Health Impact Model (ITHIM)	Health Economic Assessment Tool (HEAT)	California Public Health Assessment Model (C-PHAM)/UrbanFootprint public health module	Urban and Transport Planning Health Impact Assessment (UTOPHIA)	Environmental Benefits Mapping and Analysis Program Community Edition (BenMAP-CE)
Typical spatial scale	County/region	Project/plan	150 m gridcell	Census tract	User-specified
Developer/Sponsor	Medical Research Council, others	World Health Organization	Urban Design 4 Health	Centre for Research in Environmental Epidemiology (CREAL)	US Environmental Protection Agency
Exposure pathways considered	Physical activity from walking and cycling, traffic injuries, air pollution	Physical activity from walking and cycling	Urban form variables (indirectly linked to physical activity), earlier versions included change in injury rates and air pollution	Physical activity, air pollution, noise, heat, access to green space	Air pollution (particulate matter and ozone)
User Input	Changes in travel activity by mode (aspirational, off-model literature-based estimates, or from travel demand model outputs)	Active travel estimates can be input data from various sources (e.g. travel surveys, observed counts, predictive estimates).	Changes in built environment and transportation characteristics via the UrbanFootprint sketch planning tool	Aspirational (compliance with international exposure level recommendations) for all exposure pathways	Changes in air quality (aspirational or based on modeling) Option to modify demographics, baseline health incidence, and to add health and economic relationships.
Built-in data and relationships	Health impacts of physical activity, air pollution (in some calibrations), and collision risks are based on research literature. Region-specific calibrations include baseline health, traffic injury, air quality, and travel behavior data.	Relative risk data are from published studies. Value of a statistical life.	Directly estimated from land use and transportation characteristics, demographics, California Household Travel Survey, California Health Interview Survey	Health impacts of physical activity, air pollution, noise, heat, and access to green space based on research literature. Includes baseline data drawn from the Barcelona Health Survey (PA), land use regression (air quality), Barcelona strategic noise map, central temperature monitor, Urban Atlas (green space)	Built-in health and economic impacts of air pollution are based on research literature. Region-specific calibrations include baseline health incidence, demographics (via the pop-grid tool), and air quality monitoring data.

Table 1
Comparison of Commonly Employed Tools for Assessing the Health Impacts of Transportation Plans



Source: National Center for Sustainable Transportation, https://regionalchange.ucdavis.edu/sites/g/files/dgvnsk986/files/inline-files/NCST-TO-033.3-London_ITHIM_Final-Report_OCT-2017.pdf

Findings: existing practices

Many innovative approaches to institutionalize health considerations in transportation agency processes and practices:

- Executive or legislative mandates and policy approaches
- Intra-department and intra-agency collaboration and staffing agreements
- Data integration and sharing
- Applying health decision-making tools in various transportation processes
- Setting health performance targets and measuring outcomes
- Pilot-testing new technologies in transit projects
- Health and physical activity data collection, including ped/bike counts and travel surveys as well as qualitative methods

Findings: emerging issues

Few studies related to health impacts and transportation best practices regarding:

- Micromobility travel modes
- Highly-automated vehicles
- Practices accounting for demographic shifts and related changes in travel behaviors
- Incidence of opioid use/abuse and mental health
- New technology related to transit and shared mobility services
- Access to healthcare and physical activity opportunities in rural settings
- Big data access, management, and analytics to support decision-making

SCIENCE TRANSPORTATION RIDEABLES

Electric scooter use results in 20 injuries per 100,000 trips, CDC finds

Fast, cheap, and out of control

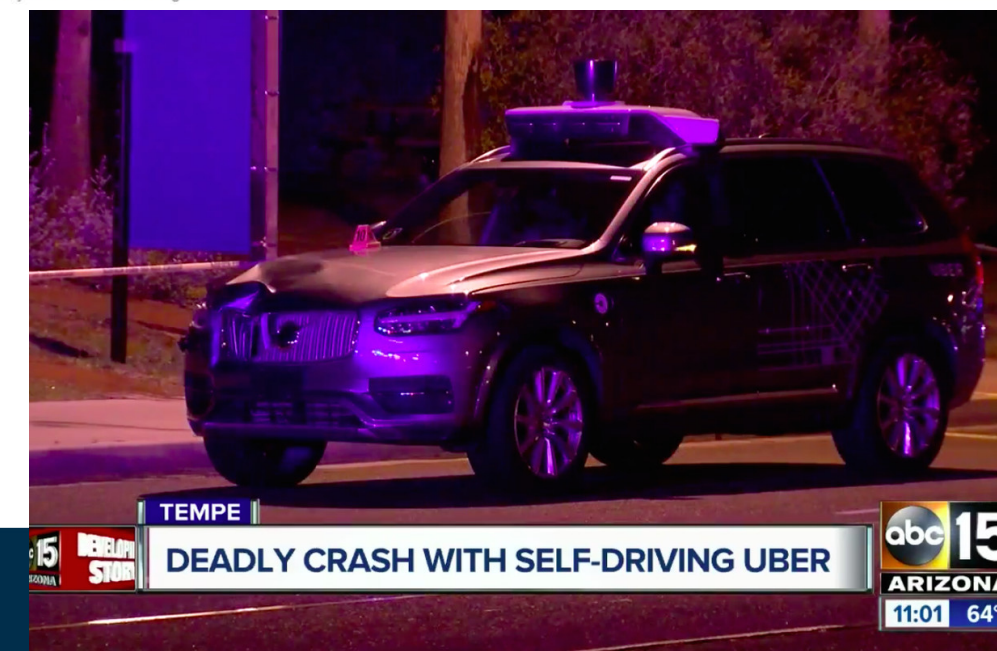
By Andrew J. Hawkins | @andyjayhawk | May 2, 2019, 1:11pm EDT

f t SHARE



Photo by Nick Statt / The Verge

MOST



TEMPE
DEADLY CRASH WITH SELF-DRIVING UBER
abc 15 ARIZONA
11:01 64°

Stakeholder/interviewee perspectives on research gaps

Many transportation staff have the right intention [to design for active travel] but struggle to communicate the specific benefits from specific projects or approaches.

The conversation and the results is the gap, not the tools available.

What gets measured gets done. Data [sharing/integration] is a good place to bring people to the table to begin relationship building.

The research community doesn't always talk to practitioners. We need a better way to make studies more practical and to capture and communicate best practices.

Findings: research gaps

- General knowledge and data gaps, such as:
 - Lack of data fundamental for understanding health costs and benefits
- Topic specific gaps, such as:
 - Lack on research on mental health, homelessness, and transportation policies
 - Lack of research to support performance measures related to equity and accessibility
- Research implementation gaps, such as:
 - Lack of knowledge on how states are institutionalizing practices for collection and integration of active travel data
 - Lack of documentation of current practices and examples from diverse contexts (e.g., rural area)

Research roadmap

Framed around key transportation agency processes and practices

Community Engagement / Data Integration

Public involvement

Coordination with local, regional, and tribal governments

Data Collection

Performance metrics



Policy-making

- Vision and/or Mission
- Statewide multimodal transportation plan
- Agency guidance



Planning

- Long-range plans
- Mode-specific plans
- Corridor studies
- Scenario plans
- Small area plans



Capital programs, projects and implementation

- Project evaluation
- Project selection
- Environmental assessment



Monitoring and Evaluation

- Design review and comparison
- Construction
- Operation
- Maintenance

Research problem statement topic identification

1. Panel ranked all “gaps” based on urgency and magnitude

2. Project team scored all “needs” based on:

- Practicality
- Innovation
- Scalability
- Potential to address health disparities/advance equity
- Multifinality (could one project examine/address multiple health outcomes and/or forms of travel)

3. Highest scoring “needs” within highest ranked “gaps” selected

Research problem statements developed

1. Synthesis of best practices for including health outcomes in transportation project prioritization

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4. A guidebook for considering the public health impacts of public transportation decisions

Research problem statements developed

1. Synthesis of best practices for including health outcomes in transportation project prioritization
2. Data sources for establishing health outcome performance measures for transportation projects
3. Practices and recommendations in reporting and integrating pedestrian and bicycle non-fatal injury data systems
4. A guidebook for considering the public health impacts of public transportation decisions
5. **Effect of demographic change on travel behavior and health**





Research problem statements developed





1. Synthesis of best practices for including health outcomes in transportation project prioritization
2. Data sources for establishing health outcome performance measures for transportation projects
3. Practices and recommendations in reporting and integrating pedestrian and bicycle non-fatal injury data systems
4. A guidebook for considering the public health impacts of public transportation decisions
5. Effect of demographic change on travel behavior and health
6. Evaluating and integrating emerging data sources to support transportation and health planning and operations

The Litmus test: are these RPS...

- **Aligned with AASHTO/State DOT interests?**
- **Oriented towards research that is:**
 - Practical
 - Innovative
 - Scalable (e.g., all states can utilize research products)
 - Oriented toward reducing disparities
 - Multimodal and addresses multiple health pathways
- **Needed before other research can be performed?**

Many avenues for research sponsorship

Focus Sectors (Examples)		Implementation Steps
 <p>AASHTO/NCHRP Research Programs</p> <ul style="list-style-type: none"> • National Interest • Data • Planning 	Coordinate through TRB committee research leads	
 <p>State DOT Research Programs</p> <ul style="list-style-type: none"> • State-Level Interest • Project Development • Operations 	Contact State DOT Research Unit	
 <p>State Health Department CDC-Funded Programs</p> <ul style="list-style-type: none"> • Policy • Process 	Coordinate with state health departments and CDC-approved workplans	
 <p>MPOs/Local Governments</p> <ul style="list-style-type: none"> • Data • Performance Measures • Planning • Equity 	Coordinate with local plans and regional models	

Focus Sectors (Examples)		Implementation Steps
 <p>Private Organizations and Foundations (i.e. AARP, BCBS, RWJF, AAA)</p> <ul style="list-style-type: none"> • Policy • Special Topics • Equity 	Apply for grant funding or capacity building	
 <p>Technical Assistance (i.e. USDOT projects)</p> <ul style="list-style-type: none"> • Training • Collaboration • Process 	Consider USDOT programs supporting technical assistance	
 <p>University Transportation Centers</p> <ul style="list-style-type: none"> • Data • Safety • Special Topics 	Contact UTC	
 <p>Member Organizations (i.e. APA Plan4 Health)</p> <ul style="list-style-type: none"> • Training • Collaboration • Process 	Apply for grant funding or technical assistance	

Next steps

Share project deliverables widely:

- AASHTO committee mid-year meetings
- TRB Executive Committee members
- TRB Health and Transportation Subcommittee
- Upcoming conferences related to health and transportation

Utilize TRB committees (particularly Health and Transportation Subcommittee) to regularly revisit roadmap and advance or update RPS

- Identify state-level champions involved with AASHTO committees
- Identify NGO, regional/local, and university-based supporters as well

Team acknowledgements



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Research Roadmap Pre-publication draft available at:

<https://www.nap.edu/catalog/25644/a-research-roadmap-for-transportation-and-public-health-management>