

# Emerging Issues in Transportation and Health Research: Highlights of NCHRP Research Roadmap for Transportation and Public Health

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# How Does Transportation Affect Health?

- Physical activity and obesity
- Air pollution and asthma
- Motor vehicle crashes and pedestrian injuries
- Other impacts
  - Noise
  - Water quality
  - Climate change
  - Mental health
  - Community connectedness
  - Environmental justice
  - Access to goods and services
  - Resilience in disasters



# Transportation is one of the Social Determinants of Health



# Challenges in Transportation and Health Intersectoral Collaboration

- Language barriers such as
  - Non-motorized transportation (walking and biking)
  - Morbidity (diseases and injuries)
- Transportation professionals may find public health data do not align well with their needs
  - Impacts for injury interventions may be rapid
  - Impacts for chronic disease (diabetes, heart disease) interventions are long term
- “Health is not in my department’s mission”

# Mission of the USDOT

- Ensure our nation has the safest, most efficient and modern transportation system in the world; that improves the quality of life for all American people and communities, from rural to urban, and increases the productivity and competitiveness of American workers and businesses.

- **SAFETY** – reduced injuries
- **EFFICIENCY** – for peds, bikes, transit & cars
- **QUALITY OF LIFE** – clean air, less congestion
- **EQUITY** – accessibility for all people

# Built Environment Recommendation

- [Guide to Community Preventive Services](#) recommends built environment strategies combining pedestrian, bicycle, and transit interventions with land use and environmental design interventions **based on sufficient evidence of effectiveness in increasing physical activity**

<https://www.thecommunityguide.org/findings/physical-activity-built-environment-approaches>



# Health & Transportation Subcommittee

TRB

Home Subcommittee activities TRB meetings Research Newsletter Highlights Young professionals

Transportation Research Board Health & Transportation Subcommittee established in 2011

[www.trbhealth.org](http://www.trbhealth.org)

## Health and Transportation Subcommittee Call for Papers TRB 2020 Annual Meeting

- [Subcommittee call for papers](#)

## Summary of Sessions from the TRB 2019 Annual Meeting

### Advancing Public Health in Transportation is Critical for a Smart, Sustainable, and Equitable Future Parts 1 and 2

Public health and transportation is the theme of the [September-October 2015 issue of TR News](#)

Friends of the Health and Transportation Subcommittee were central to organizing the issue and providing content.

## Working paper: [TRB Centennial Paper](#)

The TRB Task Force on Arterials and Public Health and Friends of the Health and Transportation Subcommittee celebrate the 100th anniversary of TRB in 2020 and showcase health in transportation.

2019 TRB Annual Meeting Sessions 1108 and 1180 Summary

Session 1108: Advancing Public Health in Transportation is Critical for a Smart, Sustainable, and Equitable Future, Part 1

Description:  
Summary:  
Slides

Session 1180: Advancing Public Health in Transportation is Critical for a Smart, Sustainable and Equitable Future, Part 2

Description:  
Summary:  
Slides

This document was put together in an attempt to capture the main ideas and thoughts presented in these two sessions. The first session, 1108 was focused around communicating between transportation and health professionals. The second session, 1180 was focused on IT mobility 2019.

Coming soon:  
TRB Health and Transportation Committee

# A Research Roadmap for Transportation and Public Health

National Cooperative Highway  
Research Program  
Research Report 932  
2019

**NCHRP**  
RESEARCH REPORT 932

NATIONAL  
COOPERATIVE  
HIGHWAY  
RESEARCH  
PROGRAM

**A Research Roadmap for  
Transportation and Public Health**

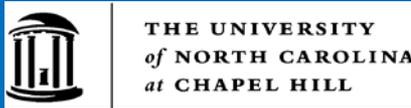


The National Academies of  
SCIENCES • ENGINEERING • MEDICINE  
OF THE NATIONAL RESEARCH COUNCIL ON  
TRANSPORTATION AND SAFETY

<http://www.trb.org/Main/Blurbs/179959.aspx>

# Project Team

## NCHRP Research Report 932



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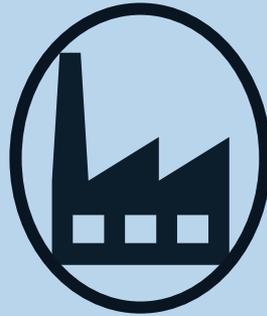
# Many pathways to health in which transportation agencies play a role



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

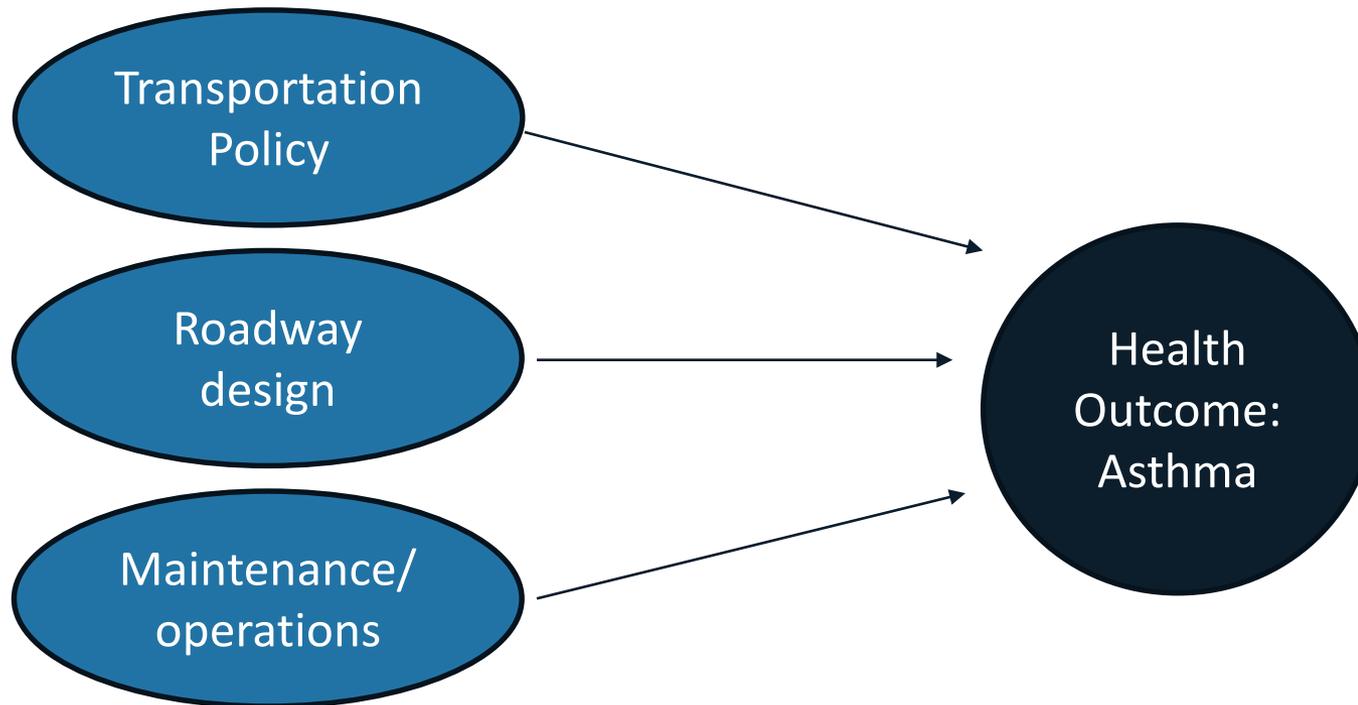


Supporting resiliency to disaster and extreme weather events

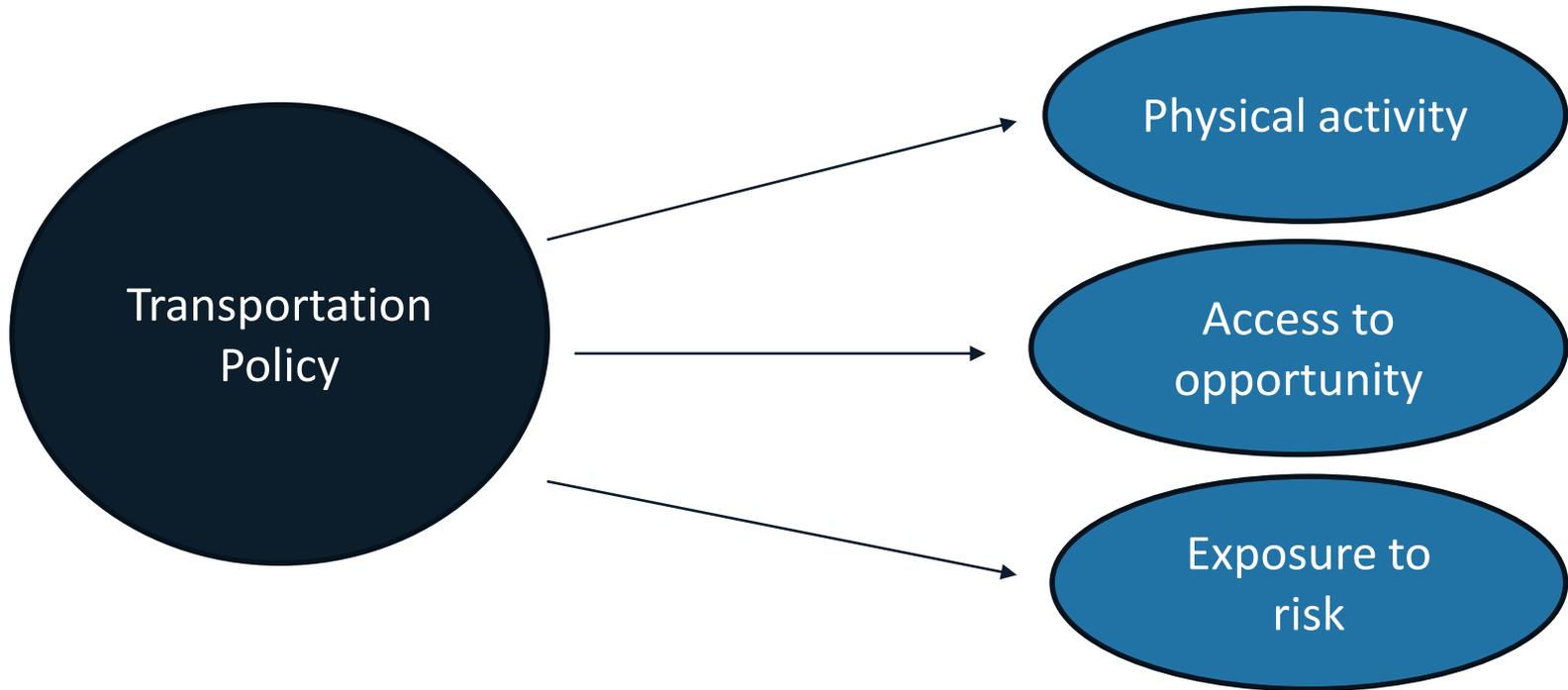


Promoting community connectedness and vitality

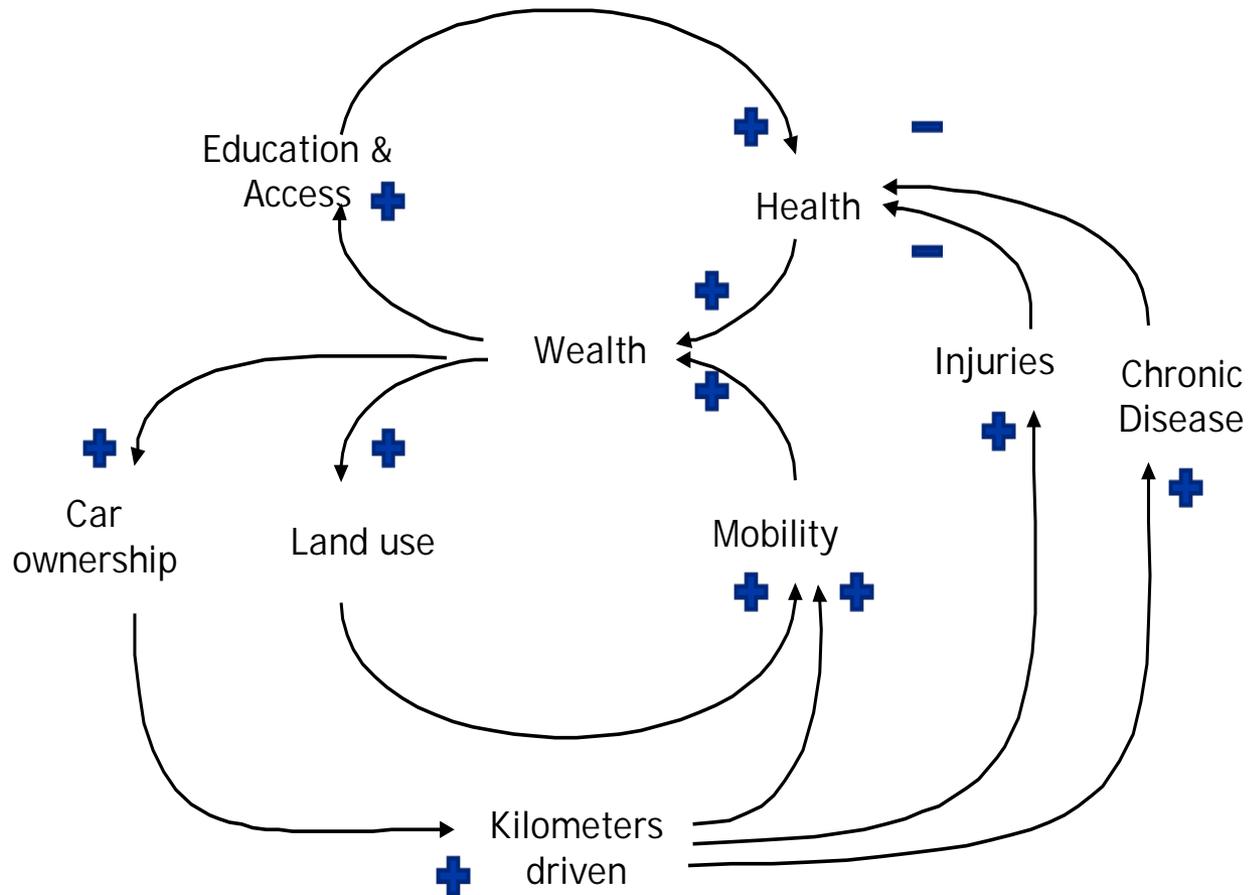
# A given outcome can be reached from any number of different pathways



# Similar initial action or conditions may lead to dissimilar outcomes



# Interconnections between health determinants and health outcomes



McClure, 2019

# Research Roadmap Methods: Iterative literature review + stakeholder engagement

- 300+ research articles referenced in Final Report
- 42+ institutional and agency reports and strategic plans
- 42+ TRB Research Needs Statements & 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 for health issues/outcomes

## Physical activity/active travel

Noise

Chronic disease

Access/accessibility

Safety

Stress/comfort/mental health

Resiliency

Equity

Crime/security

# Literature reviewed for transportation agency processes

## Planning/policies

Prioritization Data/monitoring

Health impact analyses

Maintenance/operations

Interagency coordination

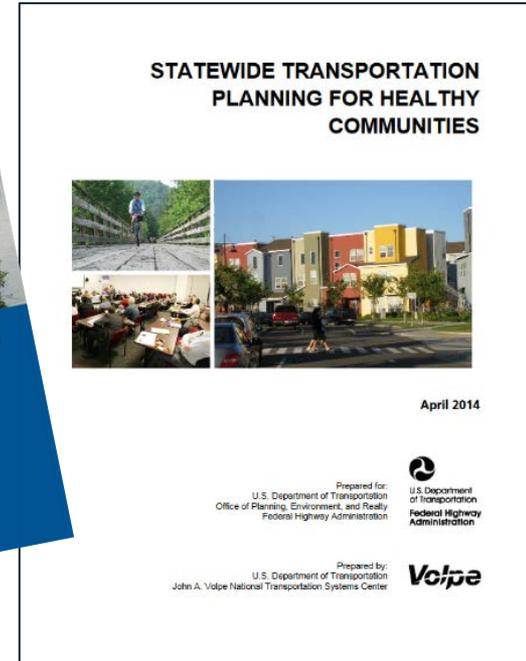
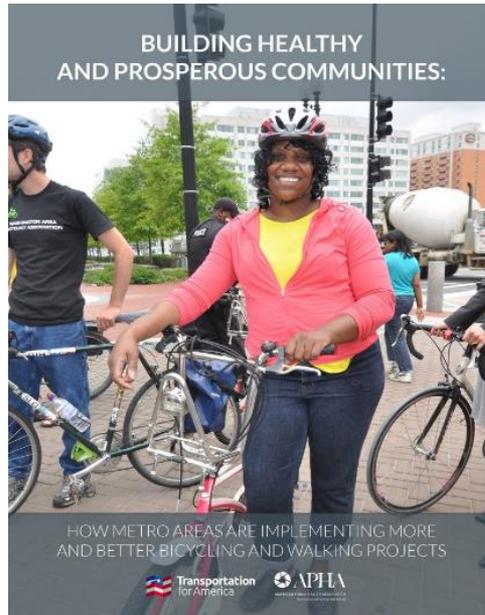
Project design

Public engagement

Performance measures

# Findings: Existing resources

Many reports show examples of transportation and health agency collaborations, policies, and practices



# Findings: Existing tools for assessing the health impacts of transportation plans

- Integrated Transport and Health Impact Model (ITHIM)
- Health Economic Assessment Tool (HEAT)
- California Public Health Assessment Model (CPHAM)/UrbanFootprint public health module
- Urban and Transport Planning Health Impact Assessment (UTOPHIA)
- Environmental Benefits Mapping and Analysis Program Community Edition (BenMAP-CE)

**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](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

## **Approaches to institutionalize health 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; also qualitative methods

# Findings: Emerging issues

- Micromobility travel modes
- Autonomous vehicles
- Demographic shifts and in travel behavior change
- Opioid use/abuse; mental health
- Shared mobility services
- Physical activity in rural settings
- Big data 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 | @andysayhawk | May 2, 2019, 1:11pm EDT

f t SHARE



Photo by Nick Statt / The Verge



# Research roadmap

## Framed around key transportation agency processes and practices

### Community Engagement / Data Integration

Public involvement

Coordination with local, regional, tribal govts

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



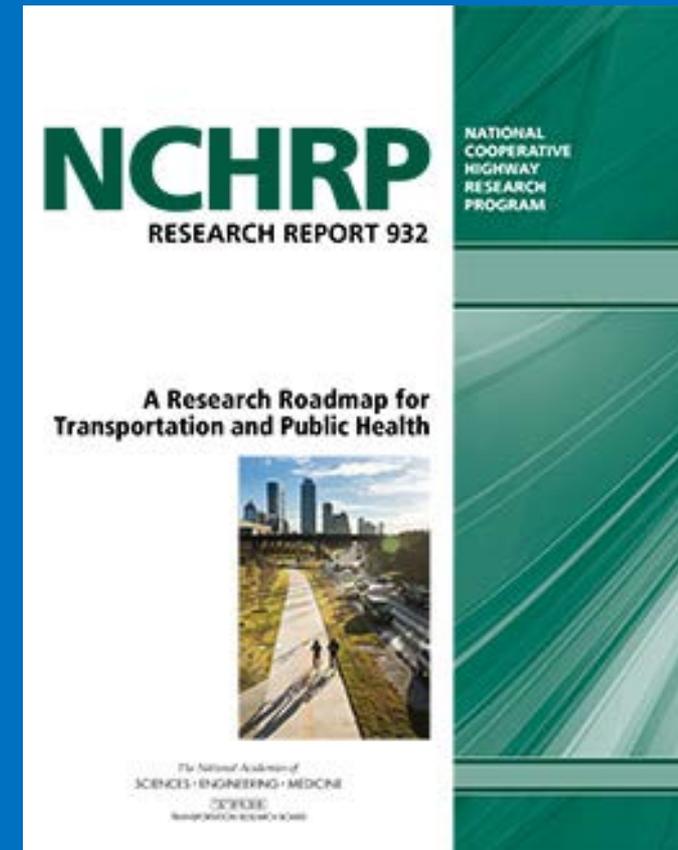
#### Monitoring and Evaluation

- Design review and comparison
- Construction
- Operation
- Maintenance

# A Research Roadmap for Transportation and Public Health

## Contains

- 64 pages
- 44 research gaps
- 122 research needs
- + Background materials



<http://www.trb.org/Main/Blurbs/179959.aspx>

# Selecting 20 Research Ideas

- Linked to health and to transportation
- Specific and feasible for academic researchers
- May influence policy (not limited to state DOTs)
- Benefit to underserved populations
- Useful as long-term investment
- Innovative for practice, methods, or policy
- Focus on >1 health outcomes or travel modes



# Transportation and Health Research Needs

1. How can land use, travel pricing, transit, and other Transportation Demand Management (TDM) tools be evaluated in relation to health and equity outcomes?
2. How can federal, state, and local transportation agencies align policy goals with advancing health and equity by shifting from automobile-oriented measures of performance (such as level of service) to measures of performance aligned with health co-benefits (such as reduction in vehicle miles traveled)?

# Transportation and Health Research Needs

3. How can policies designed to support transportation systems that are resilient to disasters incorporate adaptation and mitigation for the short- and long-term health effects of hurricanes, flooding, drought, temperature extremes, and urban heat islands? What are the health implications for disaster planning and recovery of emerging technologies such as micromobility and autonomous vehicles?

4. What tools exist or could be developed for more robust travel demand modeling and forecasting, especially for estimating pedestrian, bicycle, and transit travel demand in various contexts?

# Transportation and Health Research Needs

5. What existing and emerging technologies (such as mobile device Bluetooth tracking) can be used and validated to better measure physical activity and travel behaviors? How can pedestrian and bicycle counts be derived from such technologies? How can such data sources contribute to a health and equity perspective of travel behavior?

6. Which state, MPO, and city transportation agencies currently integrate health questions into travel surveys? Would the development of a bank of validated and reliable health questions contribute to health by making it easier to incorporate such questions into travel surveys?

# Transportation and Health Research Needs

7. What practices are now used by MPOs or state DOTs that include health indicators in their transportation project prioritization criteria? Are other MPOs and state DOTs interested in incorporating health into project prioritization and programming decisions, and what barriers do they face to do so?

8. Which transportation agencies now collect and review health data for potential impacts as part of their screening of proposed transportation projects? What new methods and data are needed to expand such efforts?

# Transportation and Health Research Needs

9. What are examples of transportation and health interagency collaboration to advance health in transportation processes and practices in rural and urban settings? What are examples of “bridge” staff being hired or loaned between transportation and health agencies to help develop cross-sector collaboration tools, training, and capacity?

10. What rigorous economic evaluations have been done to assess the short-term and long-term health impacts of transportation capital projects and programs? What data and new methods are needed for such economic evaluations?

# Transportation and Health Research Needs

11. How are communities now funding, using, and maintaining online mapping or data visualization platforms as well as other innovative experiential ways of community involvement (e.g., from temporary pop-ups to virtual reality)? How are new data are being integrated into transportation practices and public engagement?

12. What practices are used in states to report non-fatal crashes and other morbidities? What recommendations can be developed for collecting nationally comparable morbidity data, especially non-fatal injuries sustained by pedestrians and bicyclists?

# Transportation and Health Research Needs

13. What methods or simulation models can be developed to forecast long-term health impacts of heat island effects and impervious surface-induced local flooding related to land use decisions, parking policies, and roadway expansion efforts?

14. What metrics and models can be developed to evaluate how health-oriented transportation policies, such as Complete Streets or Safe Routes to Schools, change transportation decisions and outcomes?

# Transportation and Health Research Needs

15. What are current practices in offering public health training opportunities for transportation planners, designers, and engineers? Can course learning objectives and model curricula be developed to improve workforce knowledge and skills in transportation and health issues?

16. What are the challenges, opportunities, and best practices for leveraging recovery funds to integrate health considerations into new transportation investments after a disaster?

# Transportation and Health Research Needs

17. What are the overall and potential benefits of transit use on specific attributes of health such as health equity, social cohesion, air quality, road safety, pollutants, physical activity, and well-being? How can these findings be combined to show system level benefits on multiple health domains?

18. How can the health benefits of transit implementation be quantified and translated into metrics for health outcome improvements and health care cost savings?

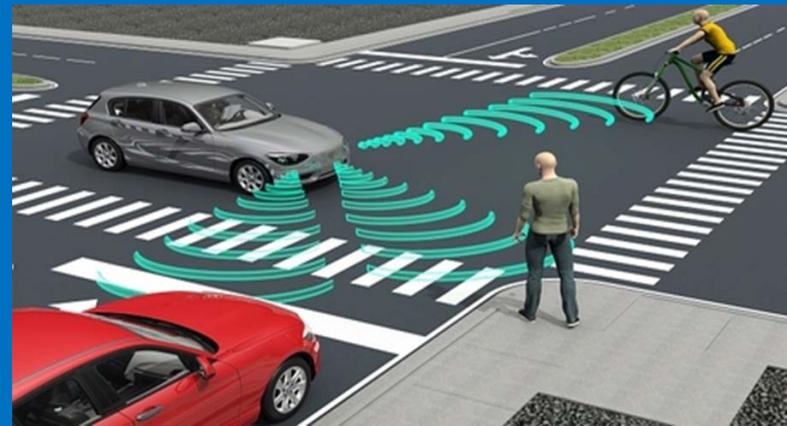
# Transportation and Health Research Needs

19. How are specific populations using emerging micromobility modes, especially bicycle sharing and scooters? What are the health impacts of using these forms of mobility and from policies related to these technologies? Do these policies increase or reduce disparities among various sub-populations?

20. What are the estimated changes in sedentary behaviors and concomitant health and equity outcomes that may result from the predicted widespread use of autonomous vehicles?

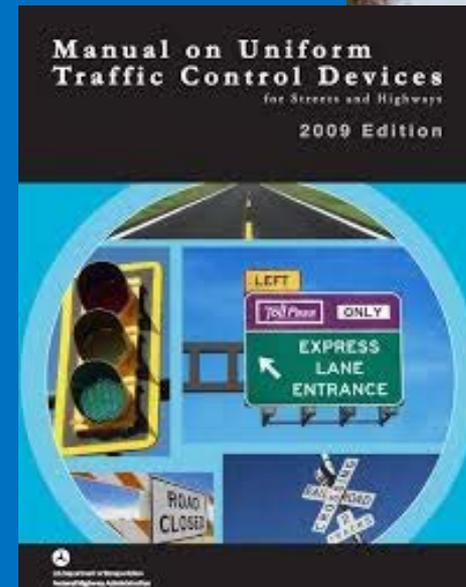
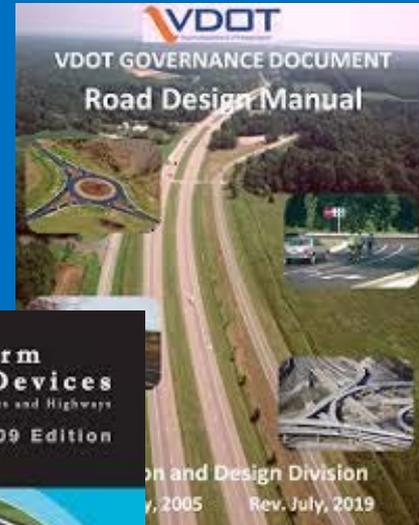
# Emerging Issues: Health and Equity in relation to Autonomous Vehicles

- Decreased motor vehicle related crashes
- Equity, accessibility, and mobility for vulnerable populations
- Land use choices if parking needs decrease
- Decreased walking and public transit use
- Change in VMT and exposure to traffic
- Pedestrian and bicyclist environment
- Access to health care
- Potential reduction in organ donors
- Job losses from automation



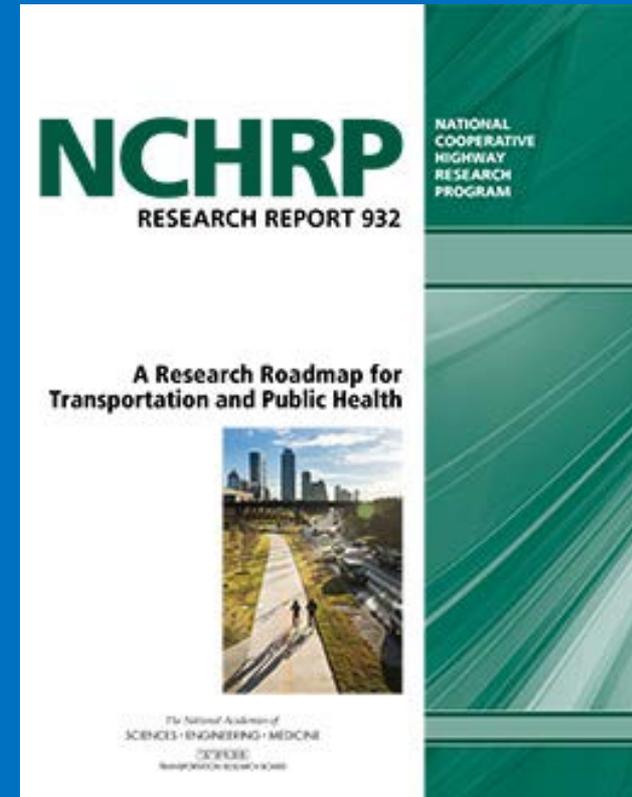
# Translation and Implementation

- Research adds to evidence base for policy decisions
- Research needs to be generalizable, but need not be repeated in every setting
- Resistance to change
- Implementation science can help



# NCHRP Research Roadmap for Transportation and Public Health

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<http://www.trb.org/Main/Blurbs/179959.aspx>

See also Roadmap methods and background materials at same link