IMPROVING ARTERIAL ROADS TO SUPPORT PUBLIC HEALTH: HOW CAN WE DO THIS?

By Ed Christopher and Carolyn McAndrews

A desire to protect and enhance public health has motivated improvements to arterial roads and corridors. There are countless “on the ground” examples that illustrate this. In 2016, the Urban Land Institute (ULI) published a report on its Healthy Corridor Project describing how four communities in the United States implemented improvements along specific corridors with the goal of making positive changes in the health of the people who live, work, and travel along them. The improvements targeted health by expanding the set of relevant issues to include food access, physical activity, economic opportunities, and affordable housing in addition to pedestrian and bicycle safety.1

In 2017, ULI added four more sites to its Healthy Corridor Project. The new sites will build upon lessons learned from the initial phase, including the refinement of what constitutes a “healthy corridor,” strategies to incorporate these elements, and ways to engage local stakeholders to use a health lens while revitalizing the areas.2

In 2016, the Federal Highway Administration (FHWA) released the Health in Transportation Corridor Planning Framework. The FHWA framework provides action-oriented information about incorporating health into the corridor planning process. In addition, it includes a step-by-step guide for transportation practitioners. Five communities beta-tested the framework.3

We can point to many other examples of transportation practitioners integrating public health into their work, but the examples above are unique because they focus on arterial roads. When thinking about public health, arterials are important because of their intense automobile use, and the array of health and health equity outcomes they influence. Perhaps more importantly, cities and states frequently redesign and reconstruct arterials which presents timely opportunities to experiment with and learn from innovations in health-focused design, operations, and maintenance strategies.

Coinciding with these high profile efforts to bring a health lens to corridor and arterial improvements, in 2015 the Transportation Research Board’s (TRB) Technical Activities Council voted unanimously to establish a new task force on the topic—the Task Force on Arterials and Public Health. The purpose of the task force is to develop a portfolio of research needs to inform the planning, design, and operation of arterial roads while considering both their positive and negative health implications.

Of the many topics the task force has discussed, the one that comes up at every meeting is how to bring health considerations into corridor analysis. Although both the ULI and FHWA efforts addressed this, they focused on a high-level policy and planning perspective. The opportunity now is to focus on the needs of transportation engineers, who often manage the technical analysis and implementation of the policy and planning goals. What seems to be missing is a way to infuse health-related metrics and thinking into the analytical and design processes.

Traffic engineers use a suite of measures and metrics that typically include:

- Delay and level of service;
- Travel time and speed;
- Peak hour excessive delay;
- Travel time reliability;
- Traffic density;
- Queue length;
- Crashes, injuries, and fatalities;
- Fuel consumption and emissions; and
- Noise.

www.ite.org  May 2018  13
These metrics can answer certain health-related questions about fatal and serious injury crashes, noise and air pollution, and even a project’s effect on active transportation, but they only brush the surface. Engineers still struggle with broader questions dealing with equity, competing social agendas, and deceptively simple tradeoffs between level of service improvements and quality of life. In short, the typical transportation metrics do not address many of the critical health outcomes associated with arterials. Before suggesting what the transportation community could do about this, it is worthwhile to look at the issue from the public health professionals’ perspective.

In 2017, members of the TRB Arterial Health Task Force argued why practitioners in public health and transportation should be concerned with arterials.\(^1\)

1. There is extensive health literature documenting adverse effects of pollution from the transportation system. These adverse effects include increased risk of cancer, respiratory and cardiovascular disease, poor birth outcomes, and many other negative effects.\(^5\) For example, research has shown that a mother’s exposure to traffic on nearby streets increases the odds of low birthweight, and these odds increase with traffic density.\(^6\) The high traffic density on arterial roads may be a significant source of these negative health effects.

2. Arterials are generally smaller than major freeways, but they can cause equivalent noise and air pollution. Depending on traffic conditions, these problems may be even greater on arterials.\(^6\) Indoor air quality near arterials has also been a major concern as cities and regions increasingly adopt policies that encourage high-density housing and transit-oriented development along existing arterial corridors.\(^5\)

3. Injury prevention is another area that calls attention to arterials. Arterials expose all of its users—motorists, pedestrians, cyclists, and transit riders—to safety hazards such as high speeds without sufficient protection. Transportation injury metrics do not generally report separately for arterial roads in the United States, but research about road design and traffic suggest that arterials are an injury risk factor.

4. Arterials can function as physical barriers that diminish neighborhood-level social and economic connections. Barriers to access are a transportation and health problem for many people, particularly older and younger travelers, people with limited physical mobility, and people living in low-income communities.\(^10,\,11\) On some arterials, exposure to incivilities such as graffiti, litter, and drug and alcohol use can limit access and may be associated with stigma and chronic stress.\(^12,\,13\)

A few themes are salient in the health professionals’ perspective. The first is that their focus goes far beyond that of roadway operation, vehicle and pedestrian flows, and optimization. They are concerned with a much broader picture, commonly referred to as the social determinants of health (SDOH). The SDOH are the conditions in our everyday environments that affect a wide range of health, functioning, and quality-of-life outcomes and risks. The SDOH include economic stability, education, social and community connections, health care, neighborhoods and other everyday built environments.\(^14\) If one does a deep dive into the SODH, they would find that transportation themes run through all of them—themes that transportation engineers face on a daily basis.

A second point is that tradeoffs or conflicting goals characterize arterials. Transportation engineers face new tradeoffs as they encounter health as a social goal for the transportation system. At a session of the 2018 TRB Annual Meeting, Shawn J. Leight, Vice President at CBB Transportation Engineers + Planners and Past International President of ITE, identified several of these tradeoffs. According to Mr. Leight:

Vision Zero seeks to reduce vehicular fatalities and serious injury crashes, which is a good thing. Safe Routes to School seeks to promote health through active living, another good thing. However, in some communities, pedestrian access to schools conflicts with safety because schools are located on high-speed or high-volume roadways that are unsafe for children to cross. How does the traffic engineer quantify the tradeoffs between promoting active transportation and the increased risk to young travelers?\(^25\)

Tradeoffs are an age-old issue for arterials. How does one decide on the design of an

<table>
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<tr>
<th>Table 1. Selected Design Characteristics of Arterials that Potentially Promote or Hinder Health.(^4)</th>
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<tr>
<td><strong>Health-Promoting Design</strong></td>
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<tr>
<td>Neighborhood asset for access and commerce</td>
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<tr>
<td>Supports neighborhood social and cultural connections</td>
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<td>Safe travel speeds for all users</td>
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<td>Comfortable for all users to cross</td>
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<tr>
<td>Link within pedestrian and bicycle networks</td>
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<tr>
<td>Designed to mitigate air pollution</td>
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<td>Designed to mitigate noise</td>
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<tr>
<td>Accessible to users of all abilities</td>
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<tr>
<td>Supports green infrastructure systems</td>
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<td>Contributes to revitalization without displacement</td>
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arterial while accounting for the competing demands of motorists, freight, transit, and active travelers? Consult the manual? And where does health come in?

Mr. Leight offered another useful example: A corridor design allows for enhanced transit service and a protected bicycle facility. The reduced vehicle speeds enhance the attractiveness of the bicycle facility, but this attribute increases transit travel times, negatively impacting transit riders. As the engineer on the job, he wondered how he could quantify the tradeoff between the negative impact to accessibility and the positive impact to active living.\(^{15}\)

According to Brian Ray, Senior Principal with Kittelson & Associates, Inc. and TRB Design Section Chair and Arterial Task Force member, “We should follow the lead of what we have been doing with safety.”\(^{16}\) He continued:

> We know that safety should be part of our projects, but we have not always been able to accomplish this. As we have been able to better quantify safety, we have been able to make better choices. Improved safety metrics have been a major advance. For me, as an engineer, integrating quantitative public health performance metrics into our projects would allow us to evaluate a range of potential project solutions with public health as one of the guiding factors.\(^ {16}\)

Do these metrics exist?

Combining arterials and public health is not a one-way street in terms of tradeoffs. Table 1 suggests that the goals for arterials could include health promotion as well as prevention. How can we achieve the positive benefits and outcomes while reducing the negative ones?

Some would suggest using Health Impact Assessments (HIAs) on all projects. But as one study found, HIAs have been driven by the public health sector with inconsistent support from transportation.\(^ {17}\)

Leslie Meehan, Tennessee Department of Health, has discussed developing a Health Level of Service. Matthew Ridgway, Fehr & Peers DC, has also pointed to level of service as a framework that currently falls us from the health perspective because it does not give perspective about physical activity, safety, and equity.\(^ {18}\) Ms. Meehan has noted that the tools that we have (e.g., Integrated Transport and Health Impact Modelling Tool) are designed for regional and macro analysis and not easily adapted to street-level analysis.\(^ {18}\)

Another approach might be to develop a highway health manual given the growing interest in public health, the complexity of the questions facing planners, and the reoccurring tradeoffs that transportation engineers face.\(^ {19}\) However, producing a manual is not a simple task. It will take years and years of discussion, leadership, and perseverance to create such a resource. Before we can collect data and develop metrics, we ought to think about what those metrics should be, how to produce them, and what will the product look like.

Despite these gaps in practice, we need to keep moving forward and stay coordinated. A variety of health and transportation activities are happening in the nooks and crannies of many organizations. Depending on one’s perspective, these efforts might be seen as separate uncoordinated activities. On the other hand, one might see these efforts as Ken Rose, Policy Analyst at the Centers for Disease Control and Prevention, does: “For once there is so much activity underway that it’s hard to keep track of everything going on.”\(^ {10}\) Regardless of one’s perspective, the point remains that transportation professionals struggle to know that they are doing the right thing for public health.

Bringing the disciplines together to work on a highway health manual might be fruitful. Practitioners in transportation, urban planning, and public health all have a desire for guidance and evidence to make decisions about arterial roads. When a roadway designer, operations engineer, public health professional, and sustainability planner work together, they may ask what makes for a “high-performing arterial.” Yet, researchers, practitioners, and planners have different criteria for performance. The key opportunity is to bring together transportation and public health to incorporate different performance measures into decision-making about arterial design while balancing the complementary and competing demands of transportation and health related goals.

Recognizing that developing a manual has some attractiveness there is also a concern that arterials might defy the notion of a manual because they are much more complex than what a manual captures. Tackling this is not a simple task. The problem we face is twofold. How to deal with health? And, how to adapt transportation practices, tools, and models to accommodate public health considerations? This manual would need to be nimble about multi-sector and multi-jurisdictional tradeoffs and conflicts, as well as dealing with limited evidence and competing social values. We cannot ignore the opportunity to address these problems.

In transportation, we have experience developing handbooks, manuals, guidance, and even regulations. We also know that they take time, patience, and resources. None of our manuals, e.g. the Traffic Safety Manual, the Highway Capacity Manual, the American Association of State Highway and Transportation Officials Green Book or even the Highway Performance Management System field manual were developed overnight or in a vacuum. They have taken years and even decades to assemble, adjust, and fine tune. They represent a process not an end. Yet, all the transportation manuals had a starting point. Does the transportation and public health community have the wherewithal to begin such an undertaking? The challenge and ultimate success are ready for our action. So how do we begin?
Acknowledgment

The authors acknowledge valuable discussions with members of the Transportation Research Board Task Force on Arterials and Public Health.

References


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