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U.S. Transportation and Health Tool: Data for action

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Abstract

Transportation investments have the potential to improve health, but readily available data to guide transportation decisions that could promote health are limited. In October 2015, the U.S. Department of Transportation (USDOT) and the Centers for Disease Control and Prevention (CDC) released the Transportation and Health Tool (THT). The tool is a resource to help transportation professionals in states and metropolitan areas access data about transportation and health in their jurisdictions and stimulate discussions on how to improve public health through transportation planning and policy. To develop the tool, a multidisciplinary team identified 190 possible data indicators. Using input from expert panel workshops and criteria that addressed data availability, geographic scale, timeliness, feasibility, validity, and topic area, the team selected 14 transportation and health indicators that covered the four priority topic areas of safety, active transportation, air quality, and connectivity. The THT contains the raw values for each indicator and a standardized score to enable comparisons. Additionally, the THT contains 25 evidence-

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Disclaimers

The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the Centers for Disease Control and Prevention or the Agency for Toxic Substances and Disease Registry.

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based strategies that can help practitioners in states and metropolitan areas take action to improve health outcomes.

Keywords

data; indicators; evidence-based interventions; public health; transportation systems; website

1. Introduction

Transportation investments have the potential to substantially improve health in the United States. Transportation strategies can reduce traffic-related injuries and fatalities, increase physical activity, reduce emissions of traffic-related air pollutants, and increase access to health-promoting destinations (Battele and Texas A&M Transportation Institute, 2014; Goodwin et al., 2015; Heath et al., 2006). Despite growing awareness of the connection between public health and transportation, data to guide decisions about how transportation investments can promote health are limited. The availability and consistency of data that address the breadth of health outcomes related to transportation could be enhanced at the local, state, and national level.

Improving health through transportation is a goal of multiple federal endeavors, including the U.S. Department of Transportation's (USDOT) *Safer People, Safer Streets* initiative (2015), the U.S. Department of Health and Human Services' *Healthy People 2020* (2010) and *Step It Up! The Surgeon General's Call to Action to Promote Walking and Walkable Communities* (2015), and the Centers for Disease Control and Prevention's (CDC) *Recommendations for Improving Health Through Transportation Policy* (2010). In addition, the U.S. National Prevention Strategy identifies "healthy and safe community environments" as one of four strategic directions to improve health and well-being. The strategy includes recommendations to integrate health criteria into decision making across multiple sectors and enhance cross-sector collaboration in community planning and design to promote health and safety (National Prevention Council, 2011).

In 2012, USDOT and CDC began an interagency collaboration to jointly sponsor a resource for states and metropolitan areas to promote transportation decision making that supports health. The vision of the effort was to provide a web-based tool that could easily identify opportunities to improve public health through transportation planning and policy. The resulting Transportation and Health Tool (THT) has three overarching goals: (1) increase awareness about the links between transportation and health, (2) support collaboration between transportation and public health sectors, and (3) provide data to guide health-supportive transportation policies and project decisions at the federal, state, and local levels. The THT was released in October 2015 and is available at www.transportation.gov/ transportation-health-tool. This paper describes the development of the THT and how to use the tool.

2. Development and content

A multidisciplinary team of transportation and public health professionals from USDOT, CDC, and the American Public Health Association (APHA) formed the core project team. The project team also convened an expert panel to help guide the THT development. Based on input from the expert panel, the THT was designed so that users can view and compare data on a set of transportation and health indicators. It also identifies evidence-based strategies for improving the indicators and health outcomes. The project team identified transportation professionals as the primary audience for the THT and public health professionals as the secondary audience.

The simplified logic model in Fig. 1 shows how meeting the THT goals of increased awareness and cross-sector collaboration can lead to more fully informed decisions and the implementation of health-promoting transportation policies. Ultimately, these steps can improve the THT indicators and health outcomes related to health equity, safety, physical activity, air quality, and access to destinations. More information on the five pathways through which transportation influences health can be found in the "Literature and Resources" section of the THT (https://www.transportation.gov/mission/health/literature-and-resources).

2.1. Indicator data

The primary component of the THT is a set of indicators that link health and transportation and provide a basis to assess performance. An initial list of 190 potential indicators was identified through a comprehensive literature review. Using criteria that addressed data availability, geographic scale, timeliness, feasibility, validity, and topic area, the project team narrowed the list to 45 indicators. Based on input provided by the expert panel in a series of workshops, the project team selected a final set of 14 indicators that covered the priority topic areas of safety, active transportation, air quality, and connectivity (Table 1). More information on the indicator selection process can be found online (https:// www.transportation.gov/mission/health/indicator-selection-process). During the scoping process, the team decided that the THT should present nationally available data for states and metropolitan areas. In the THT, metropolitan area refers both to metropolitan statistical areas (MSA) and to urbanized areas (UZA), as defined by the U.S. Office of Management and Budget (2010) and U.S. Census Bureau (2011), respectively.

Twelve of the 14 indicators are available for states, eight are available for MSAs, and two are available for UZAs. Some of the smaller MSAs and UZAs are missing data for certain indicators. For each geographic area, the THT provides raw values and "standardized scores" for all the available indicators. Standardized scores provide a consistent measurement scale across a diverse set of indicators. Standardized scores are percentile-based and presented on a 1-100 point scale where 50 is the median and higher scores always represent better performance from a health perspective. In some instances, a higher raw value corresponds to a higher score (e.g., seat belt use). In other instances, a higher raw value corresponds to a lower score (e.g., vehicles miles traveled per person). Scores also allow for comparisons across locations within the same geographic level. For example, states, MSAs, or UZAs with a score > 50 are above the median for that indicator compared

with all other states, MSAs, or UZAs, respectively. More information about the THT indicator scores can be found online (https://www.transportation.gov/mission/health/tool-scoring-methodology).

2.2. Strategies

The THT provides detailed information on strategies, interventions, and policies shown to have a positive influence on health. The project team identified 115 potential strategies, which they systematically reviewed and categorized to combine similar strategies. Using a matrix that identified the related THT indicators, priority topic areas, and potential health effects of each proposed strategy, the project team selected a comprehensive set of 25 evidence-based strategies (Table 2). Each strategy profile includes a description of the strategy, related THT indicators, a list of health benefits, examples of how the strategy has worked in practice, and additional resources. Some of the strategies, such as traffic calming, can help with multiple indicator. The strategies listed for each indicator are not comprehensive; they are examples of evidence-based approaches that could lead to improved health outcomes.

3. Data display and interpretation

The THT website design intentionally caters to the transportation and public health audiences by offering common language and translations of terms for both sectors. Care was taken to make the information and data easy to access and interpret. To obtain indicator data, users first select a tab for the appropriate geographic level (state, MSA, or UZA) and then click on the interactive map to select a specific location of interest. The indicator results page shows the raw value, standardized score, and a bar graph representing the score for each indicator. The bar graph display allows for a quick visual appraisal of the location's performance compared with other locations. Longer bars (higher scores) always represent better performance. From the results page, users can click on an indicator name to view the full indicator profile, which provides information about the indicator, related strategies, the transportation and health connection, data sources, and how to move forward to improve the indicator, as well as references.

The standardized scores provide a means to rapidly compare performance within an indicator; the raw values contribute additional perspective. As illustrated in the subset of data in Table 3, the magnitude of difference in raw values does not correspond equally to differences in scores across various indicators. For example, daily vehicle miles traveled (VMT) per capita in Sheboygan, WI, (13.0) is 3-fold less than in Jackson, MS (42.9), but the difference in their scores (92 versus 3) is 89. Sheboygan and Denver have a larger (9-fold) difference in commute mode share-transit, but the difference in scores is smaller (68). The raw values can also provide an indication of the changes needed to improve scores. For example, Phoenix, AZ, has a land use mix score of 8, corresponding to a raw value of 0.41. If the land use mix value was 0.51, similar to that of Los Angeles, CA, Phoenix would have a score above 50. Both raw values and scores can help inform decisions.

4. Using the Transportation and Health Tool

The THT was designed to help practitioners in states and metropolitan areas make datadriven decisions about improving public health through transportation planning and policy. This can happen through several scenarios.

- a. The THT provides standardized scores for 14 indicators that allow practitioners in a specific state or metropolitan area to see how their location performs compared with all other states or metropolitan areas, respectively. Many locations will have a mix of higher performing and lower performing indicators (e.g., see scores for Atlanta, GA, and New Orleans, LA, in Table 3). Given that the scores represent a comparison with other states or metropolitan areas, there are no specific thresholds for what represents a "good" or "bad" score. One approach is to review all the indicator scores for a location and identify those with a score below a certain cut point (e.g., 25th or 50th percentile) or those that are in the bottom tertile or quartile for that location. Practitioners can use this information to explore why particular indicators scored lower than others and prioritize topic areas for improvement.
- b. Although the scores give an overall comparison between locations, users from specific states or metropolitan areas might be interested in seeing how they compare with geographic neighbors or peer locations that share similar characteristics. Using the metropolitan areas in Table 3 as an example, users in Sheboygan, WI might consider comparing their performance with that of Columbia, MO, rather than that of a large metropolitan area such as New York, NY, or Phoenix, AZ. Comparisons can be made with specific indicators or with the entire set of indicators. This type of analysis could be done by viewing the results for each location on the website individually or by downloading a spreadsheet of the complete dataset from the "Indicator Data" page.
- **c.** The THT strategies linked to each indicator can help practitioners in states and metropolitan areas take action to improve health outcomes. For example, users in Jackson, MS, might be interested in learning about strategies for reducing VMT per capita (score = 3, Table 3). From the "Indicator Profile" page for VMT per capita, users can quickly find a list of different strategies for reducing VMT. By clicking on a specific strategy, such as ride sharing programs, users can learn what the strategy is, how it has been implemented in other locations, and where they can find additional information. With these resources, practitioners can examine potential strategies and develop recommendations that are feasible and appropriate for their location.
- **d.** Finally, although the THT provides data about a number of health-related factors, users might want different or more specific data for their location. The THT can help practitioners think strategically about additional data they might need to help guide transportation decisions and prioritize investments. This could also present an opportunity for transportation professionals to seek assistance from public health professionals who can share their expertise on relevant health data.

5. Discussion

The THT provides transportation and public health professionals with easy access to data to support transportation decisions that promote health. It brings together existing data and presents standardized scores on 14 transportation and health indicators that can be used to assess how a state or metropolitan area performs relative to other states or metropolitan areas, respectively. By providing this information, the THT can promote collaboration between transportation and public health sectors to identify opportunities to improve health through transportation investments and align their efforts to better serve their constituents. To guide these discussions, the THT provides 25 evidence-based strategies that can be used to improve health outcomes through actions such as expanding bicycle and pedestrian infrastructure, improving roadway safety, promoting connectivity, and improving multimodal access to public transportation.

The THT is subject to certain limitations. First, it only provides indicator data at the state, MSA, and UZA levels, based on the availability of the data used for the indicators. Locallevel data are not available for neighborhoods or cities within the larger metropolitan areas. Second, data in the THT might not reflect the most current version of the source data. Third, although the indicators were chosen to represent a spectrum of topics at the intersection of health and transportation, important topic areas might be missing. Fourth, pursuing a recommended strategy does not guarantee improvement in THT indicators or health outcomes because implementation approaches and the strength of evidence across strategies can vary. Finally, the individual data sources included within the THT are subject to their own limitations, which are not discussed here.

The development of the THT helped to identify key data needs, such as where future improvements in national data collection or local efforts to capture additional information might be of value. For example, data collection for transportation-related injuries and physical activity could be improved. Although fatalities from motor vehicle crashes are captured in the National Highway Traffic Safety Administration's Fatality Analysis Reporting System, data on non-fatal injuries from motor vehicle crashes are less comprehensive. Recent policies might help fill this gap. Under new performance measures established by USDOT's Federal Highway Administration, state departments of transportation and metropolitan planning organizations will be required to track and report the number of non-motorized fatalities and non-motorized serious injuries, beginning in 2018 (Federal Highway Administration, 2016b). The THT has data on transportation-related physical activity at the state level, as captured through the National Household Travel Survey (Federal Highway Administration, 2016a), but these data are not available at the MSA level. The relative contribution of transportation-related physical activity to total physical activity could provide additional insight into the health benefits of active transportation investments. Further information about data gaps and opportunities are detailed in the "Indicator Profiles" section of the THT (https://www.transportation.gov/ mission/health/indicator-profiles).

6. Conclusions

Since releasing the THT in October 2015, USDOT, CDC, and APHA have used press releases, blogs, webinars, social media, and other communication strategies to promote the THT and encourage its use. The project team has conducted workshops for state DOTs and MPOs to demonstrate how the THT can be used in real world scenarios to guide health-based decision making for transportation projects. Additionally, there is an ongoing effort to collect and share case studies that feature communities using the THT in their work. Because these strategies involve encouraging people to use the THT website, monitoring the number of website visits will provide a basic means of evaluating the combined communication efforts.

USDOT and CDC developed the THT to be a resource to help inform transportation decision making by bringing together relevant transportation and health data in a single location. The tool provides an opportunity for transportation planners and decision makers and their public health counterparts to collaborate to identify transportation improvements that meet transportation demands in ways that benefit public health and enhance quality of life.

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Boehmer et al.

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Boehmer et al.



Fig. 1.

Simplified logic model showing how the U.S. Transportation and Health Tool can improve health outcomes.

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Table 1

Description, data source, and geographic scale of 14 indicators provided in the U.S. Transportation and Health Tool.

Indicator	Description	Data source, year or version	Geogr	aphic sca	le
			State	MSA	NZA
Alcohol-impaired fatalities	Annual rate per 100,000 residents of fatalities from traffic collisions involving a driver who is impaired by alcohol	NHTSA Fatality Analysis Reporting System, 2012; ACS, 2012	х	x	
Commute mode share: Automobile, Bicycle, Walk, Public transportation	Percent of workers aged 16 years who commute primarily by automobile (or other private vehicle), bicycle, walking, or public transportation	State: ACS, 2012; MSA: ACS, 2008–2012	х	х	
Complete Streets policies	Presence or absence of a complete streets policy. $0 = no$ policy; $1 = policy$ in place	National Complete Streets Coalition Policy Atlas, February 2012	х	х	
Housing and transportation affordability	Percent of income that the average household spends on housing and transportation combined	HUD Location Affordability Index, version 2		Х	
Land use mix	Neighborhood-level diversity of destinations based on mix of eight employment types within block groups. Values range between 0 and 1.	EPA Smart Location Database, version 2.0		x	
Person miles traveled by mode: Private vehicle, Walking	Average annual distance driven or walked per person	National Household Travel Survey, 2009	х		
Physical activity from transportation	Percent of all trips made by foot or bicycle that are at least 10 minutes long	National Household Travel Survey, 2009	Х		
Proximity to major roadways	Percent of population who live within 200 m of a high traffic road that carries > 125,000 vehicles per day	National Transportation Atlas Database, 2011; US Census, 2010	х	x	
Public transportation trips per capita	Average annual number of public transportation trips per person	APTA 2013 Public Transportation Fact Book	Х		х
Road traffic fatalities by mode: Vehicle occupant, Bicyclist, Pedestrian	Annual rate per 100,000 residents of fatalities from traffic collisions involving a vehicle occupant (driver or passenger in a vehicle that is moving or parked), bicyclist, or pedestrian	NHTSA Fatality Analysis Reporting System, 2008–2012; ACS, 2008–2012	×	×	
Road traffic fatalities exposure rate by mode: Vehicle occupant, Bicyclist, Pedestrian	Risk of a vehicle occupant, bicyclist, or pedestrian dying in a traffic collision. Calculated by dividing the mode-specific road traffic fatality rate (per 100,000 residents) by the commute mode share (percent) for the same mode	NHTSA Fatality Analysis Reporting System, 2008–2012; ACS, 2008–2012	×	×	
Seat belt use	Percent of drivers and front-seat passengers who report wearing a seat belt	NHTSA Report: Seat Belt Use in 2012—Use Rates in the States and Territories	х		
Use of federal funds for bicycle and pedestrian efforts	Percent of federal transportation dollars that go to bicycle and pedestrian infrastructure projects	FHWA Fiscal Management Information System, 2009–2012	X		
Vehicle miles traveled (VMT) per capita	State: Total annual miles of vehicle travel per person UZA: Total daily miles of vehicle travel per person	FHWA Highway Statistics, 2011	x		×
ACS, American Community Survey; AF Housing and Urban Development: MSA	TA, American Public Transportation Association; EPA, U.S. Environmental Protection A metropolitan statistical area: NHTSA. National Highway Traffic Safety Administration:	gency; FHWA, Federal Highway Administration; 117A urhanized area	HUD, U	.S. Depar	tment of

Table 2

Evidence-based strategies, interventions, and policies to improve public health through transportation described in the U.S. Transportation and Health Tool.

1	Built environment strategies to deter crime
2	Child passenger safety laws, child safety seat distribution programs, education, and enhanced enforcement
3	Clean freight (reduce diesel emissions)
4	Complete Streets
5	Distracted driving
6	Encourage and promote safe bicycling and walking
7	Expand bicycle and pedestrian infrastructure
8	Expand public transportation
9	Graduated driver licensing systems
10	Health impact assessment (HIA)
11	Health performance metrics
12	High-occupancy vehicle lanes
13	Impaired driving laws
14	Improve roadway safety
15	Improve vehicles and fuels
16	Integrate health and transportation planning
17	In-vehicle monitoring and feedback
18	Multimodal access to public transportation
19	Promote connectivity
20	Ride sharing programs
21	Rural public transportation systems
22	Safe Routes to School programs
23	Seat belt laws
24	Strengthen helmet laws
25	Traffic calming to slow vehicle speeds

Additional information on each strategy is available at: https://www.transportation.gov/mission/health/strategies-interventions-policies

Table 3

Indicator results from the U.S. Transportation and Health Tool for a sample of metropolitan areas.

			Raw value (standardized sco	Jre) ^a	
Metropolitan area	Commute mode share: public transportation	Land use mix	Pedestrian road traffic fatalities per 100,000 residents	Pedestrian road traffic fatality exposure rate b	Daily vehicle miles traveled per capita ^c
Atlanta, GA	3.2% (85)	0.55 (81)	1.5 (34)	114.2 (17)	28.7(21)
Boston, MA	11.9% (100)	0.60 (96)	1.0 (66)	18.2 (86)	22.4 (46)
Columbia, MO	0.6% (26)	0.62 (98)	0.8 (73)	17.6 (87)	21.2 (52)
Denver, CO	4.5% (94)	0.45 (20)	1.2 (53)	54.9 (49)	20.8 (54)
Jackson, MS	0.4% (21)	0.48 (35)	1.4 (39)	128.3 (14)	 b>42.9 (3)
Los Angeles, CA	6.1% (98)	0.51 (56)	1.7 (26)	63.9 (38)	22.3 (46)
Minneapolis, MN	4.7% (95)	0.48 (38)	0.7 (82)	30.9 (69)	24.4 (36)
Nashville, TN	1.1% (45)	0.44 (18)	1.2 (52)	96.6(22)	35.8 (8)
New Orleans, LA	2.6% (78)	0.42 (8)	2.0(17)	79.8 (29)	16.4 (78)
New York, NY	30.7% (100)	0.45 (22)	1.7 (27)	27.4 (74)	15.6 (82)
Omaha, NE	0.9% (38)	0.41 (8)	0.5 (89)	26.5 (75)	18.6 (66)
Phoenix, AZ	2.1% (70)	0.41 (8)	1.7 (26)	108.8 (19)	21.4 (51)
Seattle, WA	8.3% (100)	0.44 (16)	0.9 (70)	25.2 (77)	23.1 (42)
Sheboygan, Wl	0.5% (26)	0.55 (80)	1.0 (61)	36.9 (62)	13.0 (92)
Washington, DC	14.1% (100)	0.47 (29)	1.4 (41)	43.6 (55)	21.3 (51)
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Standardized scores are percentile-based and presented on a 1-100 point scale where 50 is the median and higher scores always represent better performance from a health perspective.

 $b_{
m The}$ pedestrian road traffic fatality rate per 100,000 residents divided by walking commute mode share.

^CThe vehicle miles traveled per capita indicator is available for urbanized areas (UZAs) only. The other four indicators shown in this table are presented for metropolitan statistical areas (MSAs).

Key:

Highest performing quartile (score 75)

lowest performing quartile (score 25)