

Health Strategic Plan



Supporting a diversity of trips
and modes of travel that aid
in the achievement of diverse
community health goals.

January 2022

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Glossary of Health Terms

CHA/CHNA – Each county in the Florida Department of Health integrated public health system produces a periodic assessment of the overall health of the community referred to as a Community Health Assessment or Community Health Needs Assessment.

CHIP – Each county in the Florida Department of Health is required to prepare a long-term systematic implementation plan to address public health issues referred to as a Community Health Improvement Plan.

Community Health – The overall health status of a community.

Determinants of Health – The factors influencing the health of an individual or population, including genetics, behavior, environmental and physical factors, medical care and social factors. This document refers specifically to Transportation-Related Determinants of Health.

Health Outcomes – Measures of the health status of an individual or a group, including constructs such as life expectancy, chronic disease occurrence, and mental health status.

HIATP – ‘Health in All Transportation Policies’ refers to the idea that health considerations should be integrated into transportation-related policy making and programming.

Morbidity – Refers to the state of having illness or condition. Morbidity data is often presented as the proportion of a population that has a condition or illness.

Mortality – Refers to the occurrence of death. A mortality rate measures the frequency of death within a given time period for a defined population.

PATHS – Acronym for the conceptual framework, Planning and Analysis of Transportation and Health Strategies, that was developed for the MetroPlan Orlando health strategic planning process. The PATHS framework facilitates an evidence-based understanding of the connections between transportation and health, toward development of appropriate and informed strategies and actions with potential for real impact.

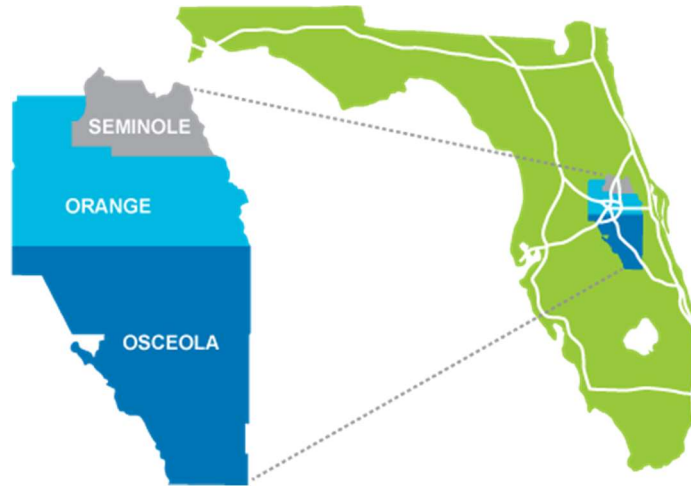
Public Health – The science of protecting and improving the health of entire populations, from a local neighborhood to a county, region, state, or nation. Strategies include promotion of healthy lifestyles, reduction of systemic social and environmental inequities, prevention of injury, prevention and management of chronic diseases, and prevention of and response to infectious diseases.

Introduction

ABOUT METROPLAN ORLANDO

The transportation system affects the experiences of every resident, visitor, and business in Central Florida. Planning done years ago touches us today, and likewise, the planning we do today shapes tomorrow.

MetroPlan Orlando leads transportation planning efforts in **Orange, Osceola, and Seminole counties**. We coordinate closely with elected officials, industry experts, and the community to shape a future system that offers a variety of travel options. As the metropolitan planning organization for Central Florida, we also **set priorities** and determine **how federal and state transportation dollars are spent** in the region.



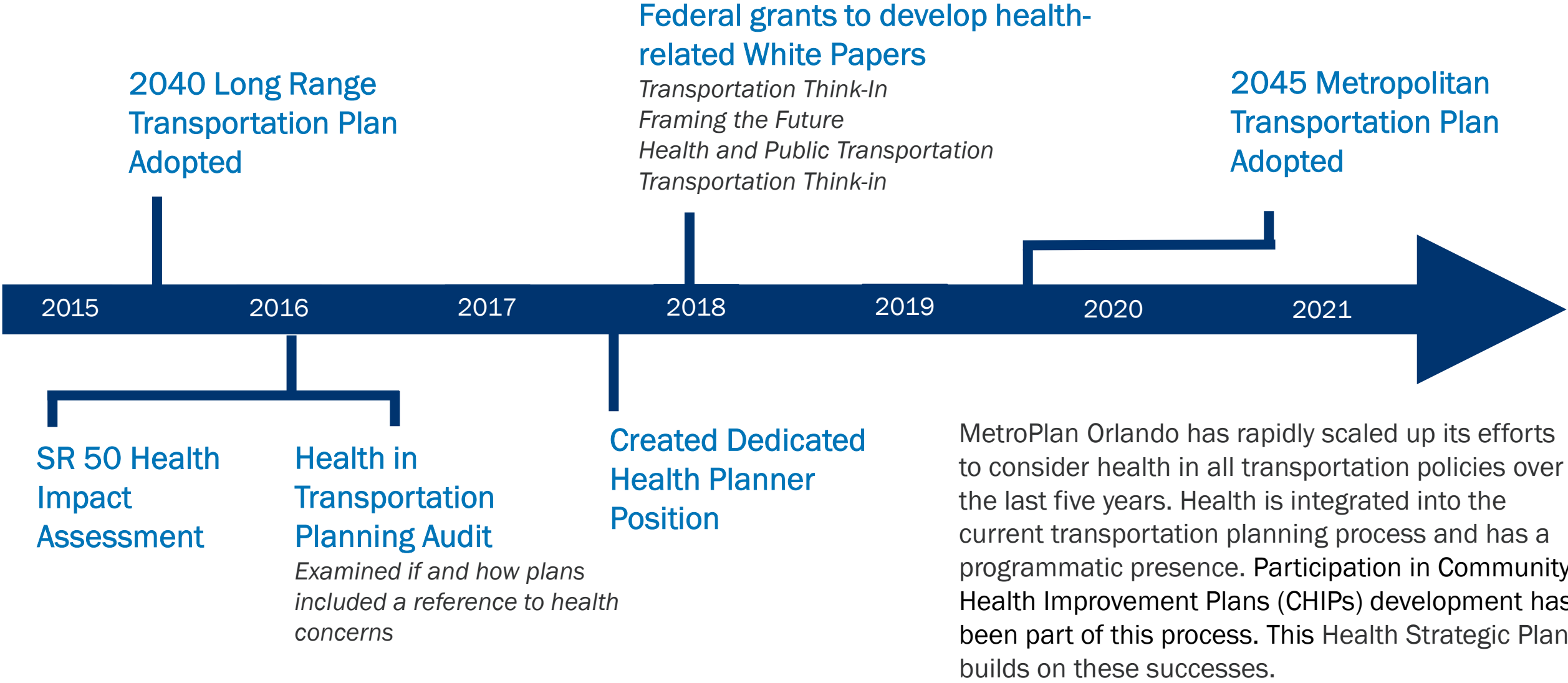
THE HEALTH STRATEGIC PLAN

The Health Strategic Plan provides a framework for understanding our community's connections between transportation and health. The plan also provides a **guide** for how MetroPlan Orlando can plan the region's transportation system to **improve community health**.

The Health Strategic Plan reaffirms the mission and vision of MetroPlan Orlando by a defining and outlining five health-specific strategic goals to incorporate into plans and processes.

The Health Strategic Planning Process

History of MetroPlan Orlando's Integration of Health into Transportation Planning



Why a Health Strategic Plan?



MetroPlan Orlando's broader strategic planning efforts define the organization's vision, mission, goals, objectives, strategies, and actions over a five-year period. The priorities in the strategic plan reflect a need to enhance the planning process to give greater attention to access to jobs, affordable workforce housing, public health, equity, land use, and other emerging issues.

The Health Strategic Plan builds on this effort by

- Creating a **health-specific vision** for MetroPlan Orlando activities,
- Developing an **evidence-based framework** to understand and conceptualize health-transportation connections and to identify the most effective actions, and developing focused, clear **strategies** that take into consideration organizational capabilities and community needs on critical health issues.

Health Strategic Plan

Vision and Goals



Building upon MetroPlan Orlando's national leadership in integrating health and transportation planning, the vision defined for the Health Strategic Plan is to

Support a diversity of trips and modes of travel that aid in the achievement of diverse community health goals.

The region faces several challenges, including accommodating growing demand for residents, visitors, and freight traveling to, from, and within the region; the unique transportation and health needs of the population; and the potential impacts of transportation on public safety and health. MetroPlan Orlando's history of innovation and future-oriented thinking is reaffirmed in the following five goals:

- 1 | Supporting Healthy Lifestyles
- 2 | Implementing Healthy Transportation Infrastructure
- 3 | Providing a Safe Transportation System
- 4 | Improving Health Care Access through Transportation
- 5 | Integrating Health Equity into Transportation Planning

The Health Strategic Planning Process

The eight-month Health Strategic Planning Process leveraged multiple sources of knowledge to develop a framework conceptualizing the connections between transportation and health in our community and to engage public and community health expertise to prioritize community needs.



Define Success

Define success for health strategic planning by taking stock of MetroPlan Orlando's current practice and engaging experts from the region to develop a vision

- Visioning Workshop with Advisory Team
- Synthesis of MetroPlan Orlando's current integration of health into planning practice



Develop Framework & Insights

- Develop whole of community framework for understanding how transportation affects community health (PATHS Framework)
- Literature Review
- Synthesis of CHA & CHIP documents
- Advisory Team Inputs
- Determinants of Health Prioritization Survey

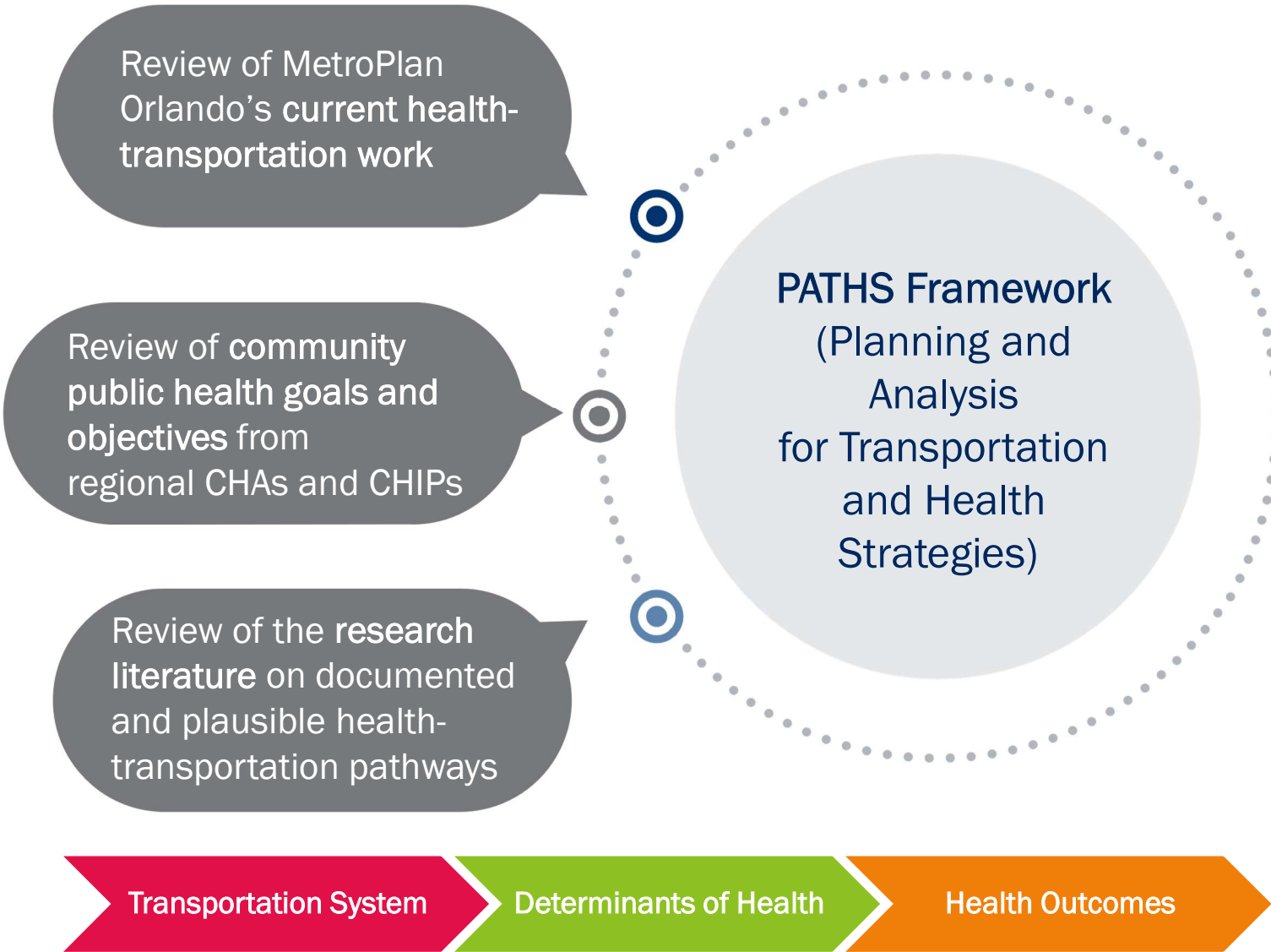


Goals, Objectives, Strategies, and Actions

- Translate vision, framework, and prioritization insights into a set of goals, objectives, strategies, and actions
- Advisory Team Inputs
- Identify indicators for taking stock of transportation-related determinants of health.

PATHS Framework

PATHS: Planning and Analysis of Transportation and Health Strategies



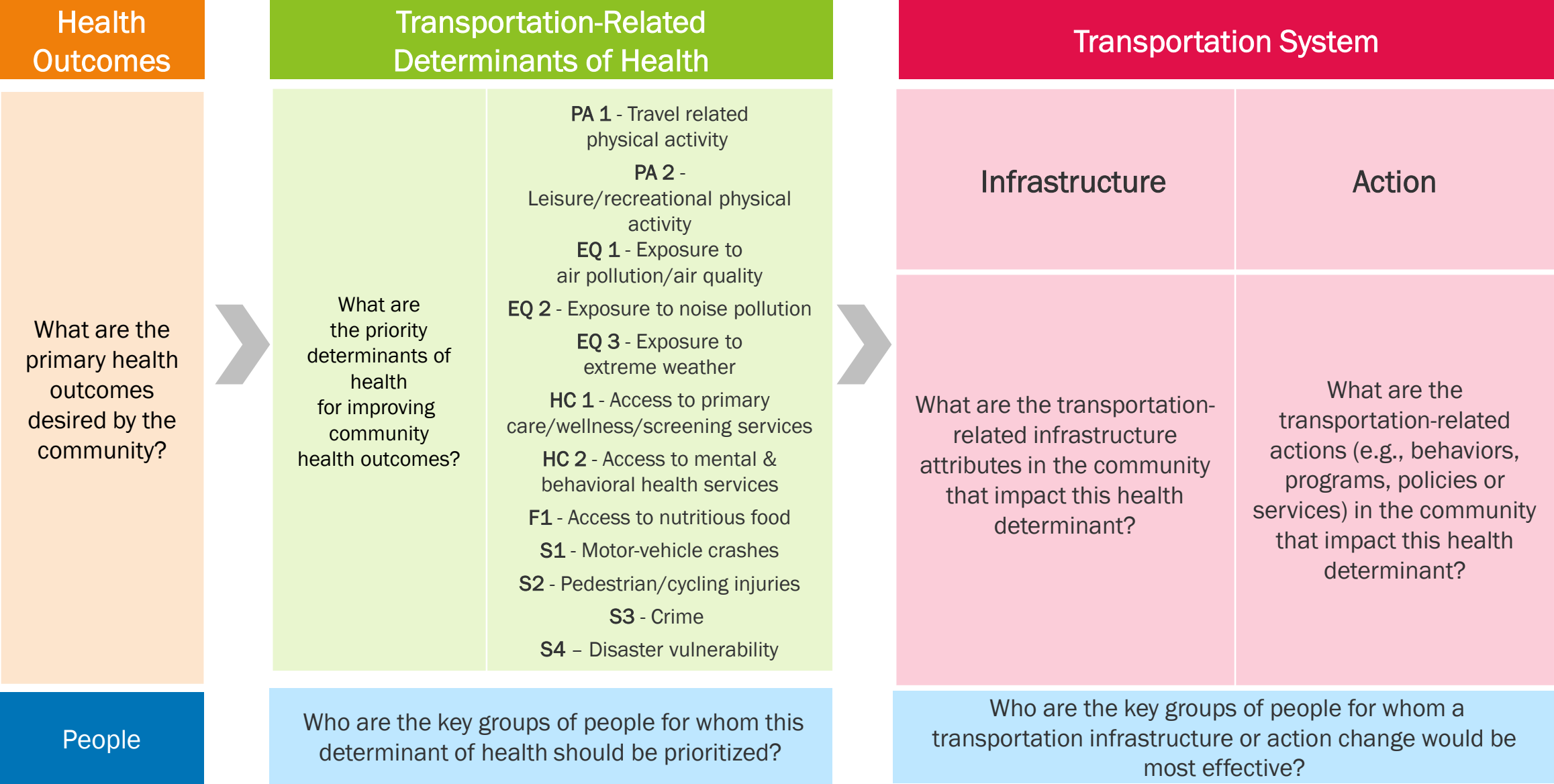
To align transportation planning with community health, it was important to identify the primary **Health Outcomes** in regional public health studies. Examples include life expectancy, chronic disease occurrence, and mental health status.

Based on regional public health and literature inputs, *Physical Activity, Environmental Quality, Access to Health Care, Access to Food, and Safety* were identified as the key transportation-related **Determinants of Health**. The Determinants of Health serve as the backbone of the *PATHS Framework*.

The **Transportation System** includes both *infrastructure* and *actions*. More specifically, it consists of both the built environment and services that may support a diversity of trips and modes of travel.

Health and transportation mean different things to different **people**. Identifying and addressing this differentiation is crucial for health-oriented and equitable transportation planning.

PATHS: Planning and Analysis of Transportation and Health Strategies



PA = Physical Activity
EQ = Environmental Quality
HC = Access to Health Care
F = Access to Nutritious Food
S = Safety

Goals, Objectives, Strategies, and Actions

MetroPlan Orlando Health Strategic Plan Goals

1 | Supporting Healthy Lifestyles

2 | Implementing Healthy Transportation Infrastructure

3 | Providing a Safe Transportation System

4 | Improving Health Care Access through Transportation

5 | Integrating Health Equity into Transportation Planning

To establish relevant health strategic planning goals

- The transportation-related determinants of health were mapped from components of the PATHS framework into broader categories,
- Objectives were defined for each Goal Area based on the determinants of health falling into each area, and
- Strategies and actions were articulated, taking into consideration MetroPlan Orlando's transportation planning mission and an evidence-based understanding of transportation-health relationships.

The future orientation of the goals, objectives, and strategies supports a transportation system that serves community health now and in the future.

Mapping the Goals to the Transportation-Related Determinants of Health													
Health Determinants		PA 1 – Travel related physical activity	PA 2 – Leisure/recreational physical activity	EQ 1 - Exposure to air pollution/air quality	EQ 2 - Exposure to noise pollution	EQ 3 - Exposure to extreme weather (heat)	HC 1 - Access to primary care/wellness/screening services	HC 2 - Access to mental & behavioral health services	F1 - Access to nutritious food	S1 - Motor-vehicle crashes	S2 – Pedestrian /cycling injuries	S3 - Crime	S4 - Disaster vulnerability
MetroPlan Orlando Goals													
1	Supporting Healthy Lifestyles	✓	✓						✓				
2	Implementing Healthy Transportation Infrastructure			✓	✓	✓							
3	Keeping the Transportation System Safe									✓	✓	✓	✓
4	Improving Health Care Access through Transportation						✓	✓					
5	Integrating Health Equity into Transportation Planning	PRIORITIZING PEOPLE											

Goal 1 |
Supporting
Healthy Lifestyles



Goal 1 | Supporting Healthy Lifestyles

Taking steps to support a culture of active and healthy lifestyles will help the people of Central Florida maintain healthy weight, reduce chronic disease, and improve mental health.

Promotion of *healthy weight, healthy diet, and physical activity* are important regional public health outcomes.

These outcomes are determined in part by volume of travel-related and recreational physical activity, as well as access to nutritious food, though it is well understood that availability of nutritious foods does not necessarily result in healthy eating behaviors.



With respect to physical activity, the transportation system is primarily viewed as infrastructure, and it is varied infrastructure that supports a diversity of trip and activity types.



Pedestrian-friendly infrastructure is shown to be positively associated with both recreational and travel-related physical activity. For adults, destinations such as shops, public transport, parks, and public spaces are important drivers of routine physical activity. For children, sidewalks and controlled crossings are positively associated with physical activity, and traffic calming interventions are shown to reduce childhood pedestrian injuries.



Creating more accessible grocery options, expanding transportation services, and providing financial support for transportation services are possible interventions, but require further study.

Goal 1 | Supporting Healthy Lifestyles

Objectives	Strategies	Actions
<p>1.1: Increase availability and attractiveness of active travel.</p> <p>1.2: Increase opportunities for participation in recreational and leisure activities.</p> <p>1.3: Improve opportunities for people to access nutritious foods.</p>	<ul style="list-style-type: none">• Support the development of pedestrian infrastructure that links residents and visitors to meaningful destinations.• Facilitate innovative interventions for keeping pedestrian and cycling infrastructure safe for children to engage in safe travel and recreation activities.• Develop a better understanding of how the food environment and the transportation system interact to improve healthy eating behaviors.	<ul style="list-style-type: none">• Pursue additional Complete Streets planning studies and funding for implementation.• Provide planning support for transit-oriented development and redevelopment, taking into consideration regional need to support service sector jobs and safe, reliable commutes for low-income residents.• Seek partnership opportunities with groups working to provide Safe Routes to School.• Seek partnerships for research to further understand how transportation can contribute to community health in terms of eating behaviors.

Goal 2 |
Implementing Healthy
Transportation
Infrastructure



Goal 2 | Implementing Healthy Transportation Infrastructure

Investing in a transportation system that reduces pollution and provides protection from extreme weather will lead to better health outcomes for the people of Central Florida. Exposure to extreme heat, particularly for the elderly, is a concern for the region.

There are many potential pathways through which exposure to pollution impacts human health.

Exposure to poor air quality, noise pollution, and extreme heat are directly detrimental to human health and often correlated with noncommunicable disease risk.



Exposure to air and noise pollution are associated with **poor cardiovascular health and chronic disease**, which in turn overlaps with several social determinants of health. However, exposures are not everything. While active travel increases exposure to air pollution, the **benefits of physical activity** are believed to outweigh the consequences of reasonable exposure.



Likewise, there is an association between transportation-related noise and health, but the key factor in this relationship is proximity.



From a systems perspective, there are complicated social and economic determinants of land use that make changing proximity to transportation especially challenging. The extent to which the transportation system contributes to specific urban heat exposure is not fully understood, but from an infrastructure perspective there is indication that impervious surfaces, road orientation, and green space contribute to increase or decrease urban heat island effect.



Goal 2 | Implementing Healthy Transportation Infrastructure

Objectives	Strategies	Actions
<p>2.1: Reduce exposure to transportation-related air pollution.</p> <p>2.2: Reduce exposure to transportation-related noise pollution.</p> <p>2.3: Mitigate heat exposure for users of the transportation system.</p>	<ul style="list-style-type: none">• Support a transportation system that reduces users' exposure to air and noise pollution. These users may include pedestrians, cyclists, or transit users.• Develop a better understanding of the relationship between transportation-related noise and health outcomes.• Facilitate transportation system innovations that reduce people's exposure to extreme heat.	<ul style="list-style-type: none">• Seek opportunities to improve modality options that offer people opportunities to reduce their travel-related carbon footprint, including pedestrian and cyclist infrastructure.• Support future infrastructure planning for alternative fuels.• Pursue research and analytics to support mapping of transportation-related noise associated with individual transportation and mass transit.• Prioritize considerations for comfort-focused infrastructure, such as shade trees, transit shelters, and other heat exposure interventions.

Goal 3 | Providing a Safe Transportation System



Goal 3 | Providing a Safe Transportation System

Providing a safe transportation system is essential for the people of Central Florida. The region's goal of zero transportation deaths and injuries means we will have to reduce crashes involving pedestrians and bicyclists—our most vulnerable travelers.

In addition to morbidity and mortality, injury rates are fundamental indicators of public health. The transportation system, because it is so integral to everyday life, contributes uniquely to these statistics.



For the nation, motor-vehicle traffic crashes are declining overall, as is the injury rate per vehicle miles traveled (VMT). In recent years, however, injuries to pedestrians and pedal cyclists have increased. That said, there is evidence that design and engineering interventions can improve safety for pedestrians and pedal cyclists. For instance, research shows that raised crosswalks may reduce pedestrian crashes by up to 45%.

It is also important to recognize that transportation safety does not just mean crashes. Regarding crime in the transportation system, the evidence is still limited, but transportation safety and security strategies, such as purposeful landscaping, street lighting and urban placemaking, have been proposed as ways to reduce situational crime.

Goal 3 | Providing a Safe Transportation System

Objectives	Strategies	Actions
<p>3.1: Reduce the number of motor-vehicle crashes.</p> <p>3.2: Reduce the number of pedestrian and cycling injuries.</p> <p>3.3: Plan with crime reduction strategies in mind.</p>	<ul style="list-style-type: none">• Support the growth of a transportation system that provides a safe environment for vulnerable road users.• Encourage new thinking on the ways transportation infrastructure design that decreases perceived and actual risks to crime incidents.• Facilitate interventions and improve citizen education to reduce all crashes.	<ul style="list-style-type: none">• Pursue additional Complete Streets and Roadway Safety studies.• Strengthen ties with local governments, transportation agencies, and Community Traffic Safety Teams (CTSTs) to address pedestrian and bicyclist safety.• Partner to collect knowledge resources and pursue best practices for urban design and transportation infrastructure that mitigates crime incidents.• Support partnerships building on the Safe Routes to School paradigm for other populations and destinations.

Goal 4 |
Improving Health
Care Access through
Transportation



Goal 4 | Improving Health Care Access through Transportation

Some populations in the region do not have adequate health care services, including medical, mental, and dental health. MetroPlan Orlando's 2021 Regional Transportation Survey found that nearly one in five (18%) respondents had skipped or missed a doctor's appointment in the past year because they did not have reliable transportation.

MetroPlan Orlando's 2021 Regional Transportation Survey also found that transit riders missed doctor's appointments three times more often than non-riders.

Health outcomes are the consequence of complex social, behavioral and physical dynamics, but a key dimension of both individual and community-wide health is the ability of people to access both routine and emergency care.



Reliable access and regular use of health services have clear impacts on community mortality and morbidity rates. Barriers to access include physical, financial, and cultural factors. For example, lack of individual transportation options in some communities is a well-documented barrier to preventive care, and difficult logistics and travel costs are known to be barriers to mental health services. However, there is little evidence that transportation interventions improve actual health care utilization. In other words, it is possible that physical access to care via proximity or transportation services can be improved without actual change in the use of such services. Social and cultural factors, including attitudes towards care, are shown to be stronger deterrents than transportation.



Nevertheless, providing safe and convenient routes to health care, as well as understanding how health care can be transported into underserved communities, is an important step in creating more equitable health outcomes.

Goal 4 | Improving Health Care Access through Transportation

Objectives	Strategies	Actions
<p>4.1: Improve physical access to primary health care services and routine preventive care.</p> <p>4.2: Improve physical access to mental health services.</p> <p>4.3: Improve physical access to dental care services.</p>	<ul style="list-style-type: none">• Support a transportation system that provides multi-modal transportation options to health care destinations for all communities.• Facilitate interventions that bring people to health care and bring health care to people.• Partner with marginalized and underserved communities to understand local impediments to health care utilization.	<ul style="list-style-type: none">• Pursue partnerships in research that improves our understanding of the gap between physical access and health care utilization.• Seek partnership opportunities with organizations providing mobile health services.• Partner with local governments to pursue best land use practices that offer opportunities for easy physical access to health care.• Strengthen ties and seek additional opportunities to support the ACCESS LYNX program, the Transportation Disadvantaged Local Coordinating Board, and others.

Goal 5 |
Integrating Health
Equity into
Transportation
Planning



Goal 5 | Integrating Health Equity into Transportation Planning

Health equity, the idea that health outcomes and the opportunity to receive care are fair and just, is an important concern for the region's public health community. Health inequities are reflected in multiple health outcomes including morbidity and mortality rates and quality of life.

*The PATHS Framework recognizes that **different groups of people have unique health and transportation perspectives and needs.***

MetroPlan Orlando's 2021 Regional Transportation Survey revealed unique challenges for users of the region's roads, pedestrian and cycling infrastructure, and public transit options.



Recognizing the importance of social and cultural determinants of health is central to addressing health outcomes in Black, Spanish-speaking, low-resource, and other transportation disadvantaged communities. Similarly, children and older people require specific considerations.



This means thinking about the prioritization of different health determinants with respect to desired health outcomes, and understanding different groups' perspectives and needs with respect to transportation infrastructure and services.



Goal 5 | Integrating Health Equity into Transportation Planning

Objectives	Strategies	Actions
5.1: Provide a transportation system that serves people with diverse transportation and health perspectives and needs.	<ul style="list-style-type: none">• Develop a better understanding of the ways the transportation system currently does and does not serve the cultural and day-to-day needs of the population.• Identify and support transportation projects that include safe, equitable, and inclusive modes of travel that link people with essential services and employment.• Provide leadership in defining and pursuing an equitable transportation system.	<ul style="list-style-type: none">• Support partners in identifying unique transportation needs of underserved communities and the barriers to use for vulnerable road users.• Continue to evolve the prioritization process to ensure consideration of all community segments in the region as transportation technology and regional populations change.• Complete a regional Transportation Equity Audit.

Implementation & Next Steps

Implementation and Next Steps

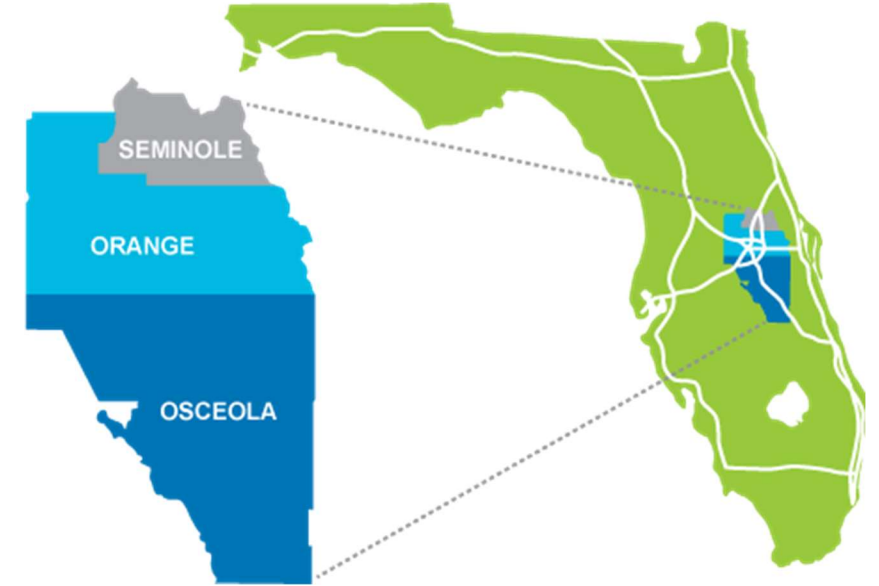
MetroPlan Orlando is dedicated to developing innovative solutions to meet the region's transportation needs. In addition to setting priorities for the transportation system in Orange, Osceola, and Seminole Counties, the organization is responsible for guiding how federal and state transportation funds are invested to support these efforts.

As a regional Metropolitan Planning Organization (MPO), MetroPlan Orlando follows a planning process that is continuous, cooperative, and comprehensive to facilitate successful project outcomes. The Health Strategic Plan is the result of these core planning principles.

The Health Strategic Plan will serve as a guide to support the development of MetroPlan Orlando's overall Strategic Plan, which charts the course for the organization's areas of focus over the next several years.

The Health Strategic Plan also provides a framework for how to better integrate health into the transportation planning process. Some next steps for taking the plan further include:

- Better define roles and responsibilities
- Consider needed updates to complementary transportation and health plans
- Identify opportunities for collaboration
- Determine methods of coordination
- Define progress monitoring and measurement



Appendix

List of Appendices

- A. Health Strategic Plan Advisory Team
- B. Visioning Meeting Summary
- C. Taking Stock of Current Health Transportation Planning Success
- D. PATHS Framework Development
- E. PATHS Framework Evidence Summaries
- F. Potential Health Determinant Indicators

Appendix A

Health Strategic Plan Advisory Team



Health Strategic Plan Advisory Team

On July 17, 2021 and October 11, 2021 the Project Team met with a group of community health representatives who agreed to review progress and provide input on the Health Strategic Plan. The expertise and insights of this Advisory Team helped to inform health priorities for MetroPlan Orlando's Health Strategic Planning, and ultimately to guide strategic priorities and actions with meaningful impacts on community health goals.

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Appendix B

Visioning Meeting Summary



Health Strategic Plan Visioning Process

On March 26, 2021, the Project Team met with a small group of key Community Health representatives to ideate and craft a vision statement to guide the development of the Health Strategic Plan.

Discussion topics included:

- *Current State of Community Health* – A discussion of the key issues facing the region
- *A Vision of Health* – Ideating and describing a healthy central Florida
- *Integrating Transportation* – Answering the question of what transportation means for people and where it fits in the vision of health
- *From Vision to Vision Statement* – A discussion summarizing the key elements of a Health Strategic Plan vision statement


















Appendix C

Taking Stock of Current Health Transportation Planning Success



Health Indicator Accounting in the 2045 MTP

Percentage of health-related 2045 MTP indicators within each goal area:

	Goals & Objective Indicators - (MTP TS 1)					Prioritization Process Indicators (TS 6)					Congestion Management Indicators				
Goal Area	 Physical Activity	 Environmental Quality	 Access to Medical Care	 Access to Food	 Safety	 Physical Activity	 Environmental Quality	 Access to Medical Care	 Access to Food	 Safety	 Physical Activity	 Environmental Quality	 Access to Medical Care	 Access to Food	 Safety
Safety & Security	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Reliability & Performance	0.0%	16.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Access & Connectivity	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	0.0%	8.3%	8.3%	0.0%	8.3%	8.3%	0.0%	0.0%	0.0%
Health & Environment	0.0%	66.7%	0.0%	0.0%	0.0%	50.0%	16.7%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
Investment & Economy	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
All Goal Areas Combined	0.0%	16.1%	0.0%	0.0%	16.1%	17.9%	3.6%	1.8%	1.8%	14.3%	3.8%	7.7%	0.0%	0.0%	15.4%

Health in MTP 2045 Objectives and Indicators

	Objectives	Indicators
Physical Activity	<ul style="list-style-type: none"> • Increase population/employment densities and mix of land uses • Reduce adverse health impacts associated with physical inactivity 	
Environmental Quality	<ul style="list-style-type: none"> • Reduce per capita vehicle miles traveled (VMT) • Expand conservation lands and minimize land consumption for future development • Reduce per capita related air quality pollutants and greenhouse gas emissions • Plan and develop transportation systems in a manner that protects and restores the function and character of the natural environment and avoids or minimizes adverse environmental impacts • Reduce transportation system impacts caused by stormwater issues and flooding 	<ul style="list-style-type: none"> • Number of vehicle hours traveled (VHT) per capita • Number of developed and conservation acres per capita • Units of carbon dioxide (CO₂), Ozone (O₃) precursor emissions, particulate matter (PM), and other transportation-related greenhouse gas equivalencies • Percent of public transportation infrastructure within wetlands or the 100-year flood plain • Percent of system miles that have documented stormwater issues
Access to Health Care		
Access to Food		
Safety	<ul style="list-style-type: none"> • Eliminate the rate and occurrence of transportation system fatalities, injuries, and crashes with high emphasis on the most vulnerable users • Provide infrastructure and services to help prepare for, respond to, and recover from emergencies • Prevent and mitigate transportation-related security risks • Improve emergency response and incident clearance times • Increase the resiliency of infrastructure to risks, including extreme weather and environmental conditions 	<ul style="list-style-type: none"> • Number of fatalities, serious injuries, and crashes by mode/user • Rate of fatalities, serious injuries, crashes per 100 million vehicle miles traveled (VMT) for all modes/users • Number of evacuation route lane miles per 1,000 households • Average emergency response time by incident occurrence and notification time • Average crash/incident clearance time (return to baseline operating capacity)
Other		<ul style="list-style-type: none"> • Public health indicators including rates of asthma, obesity and diabetes • Consumption and density of new growth/development

Health in the MTP 2045 Prioritization Process

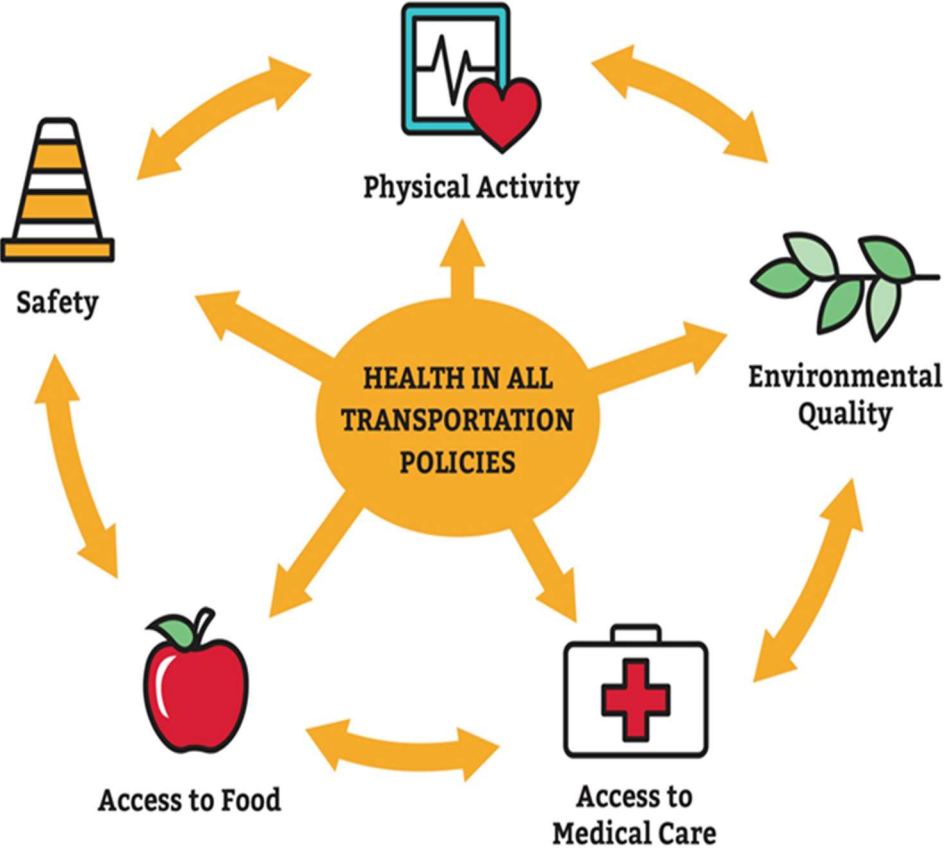
	Safety & Security	Reliability & Performance	Access & Connectivity	Health & Environment	Investment & Economy
Physical Activity			<ul style="list-style-type: none"> Centrality Analysis Score (Critical Sidewalk Need) Cultural & Recreational Locations: ½ Mile of Corridor 	<ul style="list-style-type: none"> Residential Density: ¼ Mile of Multimodal Facility Non-Residential Density: ¼ Mile of Multimodal Facility 	
Environmental Quality				<ul style="list-style-type: none"> Intensity & Proximity: Environmental Justice Populations Relative Change: Vehicle Miles Traveled 	
Access to Health Care			<ul style="list-style-type: none"> Food & Health Care Locations: ½ Mile of Corridor 		
Access to Food			<ul style="list-style-type: none"> Food & Health Care Locations: ½ Mile of Corridor 		
Safety	<ul style="list-style-type: none"> Crash Rates Fatal & Serious Injury Crash Rates Number of Pedestrian & Bicycle Crashes 			<ul style="list-style-type: none"> Bicycle Level of Traffic Stress 	
Other				<ul style="list-style-type: none"> Public health indicator rates 	

Health in the MTP 2045 Congestion Management Process

	Safety & Security	Reliability & Performance	Access & Connectivity	Health & Environment	Investment & Economy
Physical Activity			<ul style="list-style-type: none"> %Population/Acreage within a 10- minute walk/bike ride 		
Environmental Quality				<ul style="list-style-type: none"> Air Quality Index 	
Access to Health Care					
Access to Food					
Safety	<ul style="list-style-type: none"> # Crashes (fatal, serious, total) Crash Rates Average Response Times Average Clearance Times 				

Health in All Transportation Policies (HIATP) Wheel

MetroPlan Orlando's Health in All Policies Framework



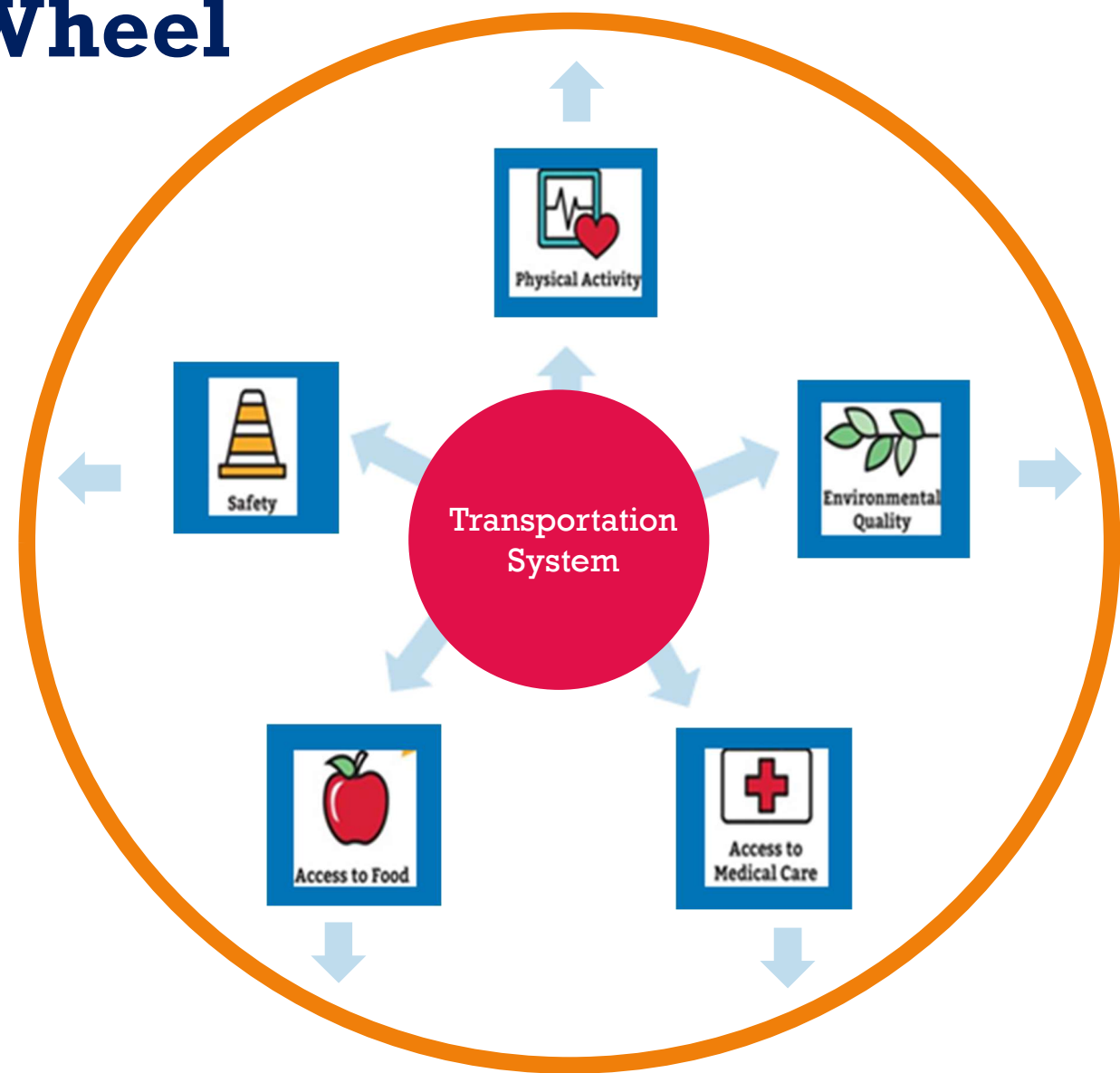
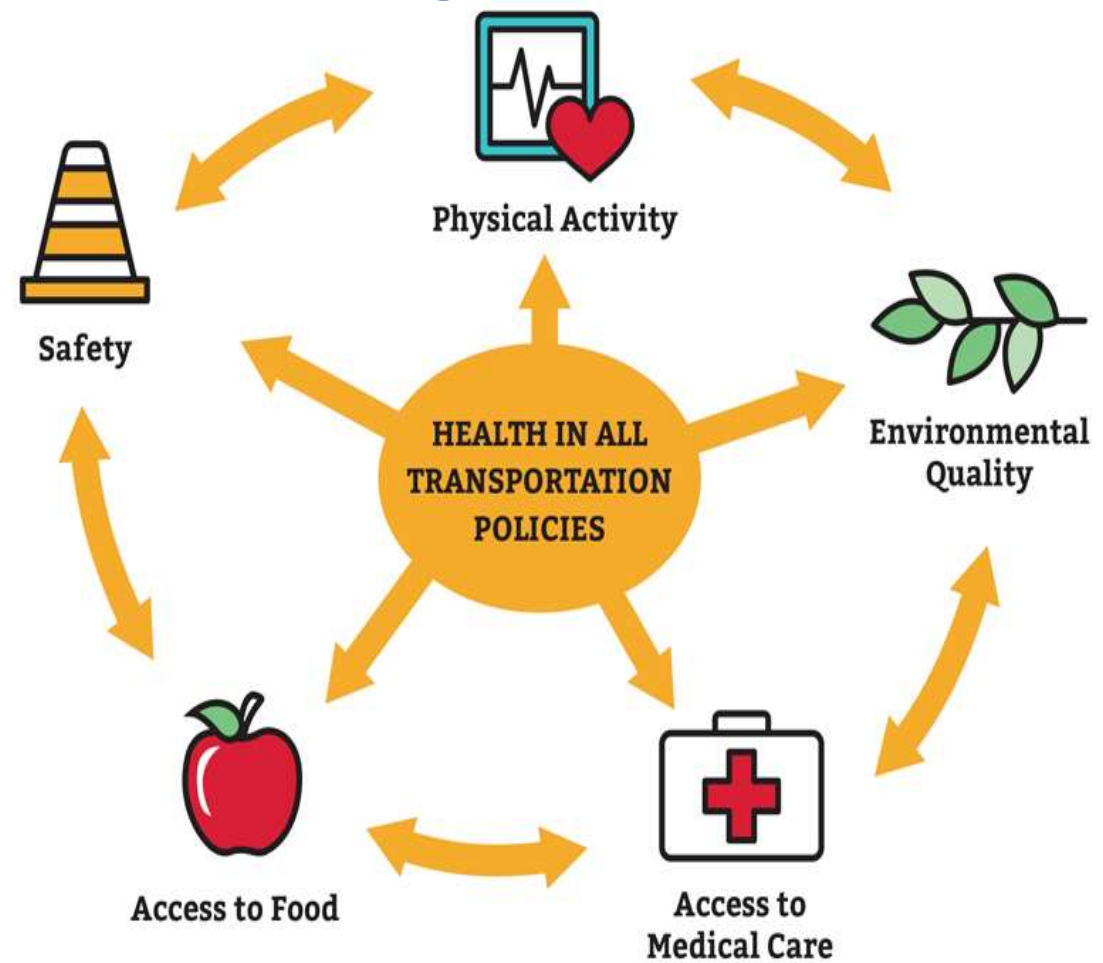
Taking a holistic approach to transportation planning improves quality of life and promotes better health for everyone in Central Florida. **Transportation professionals work with health, housing, parks, and other community areas to create healthy, sustainable, inclusive places.** MetroPlan Orlando uses its Health in all Transportation Policies initiative to advance transportation options that improve our quality of life.

Appendix D


PATHS Framework Development



Expanding Upon the HIATP Wheel



Starting from Health Outcomes



Health outcomes are measures of the health status of an individual or a group.

Our starting point for thinking about the connections between transportation and health was to look beyond the Health in All Transportation Policies (HIATP) wheel. We asked what the regional public health community is working to achieve, and the answer to that question was a range of improved community Health Outcomes.

Some examples of community health outcomes include:

- Increased life expectancy
- Reduced chronic disease
- Improved mental health

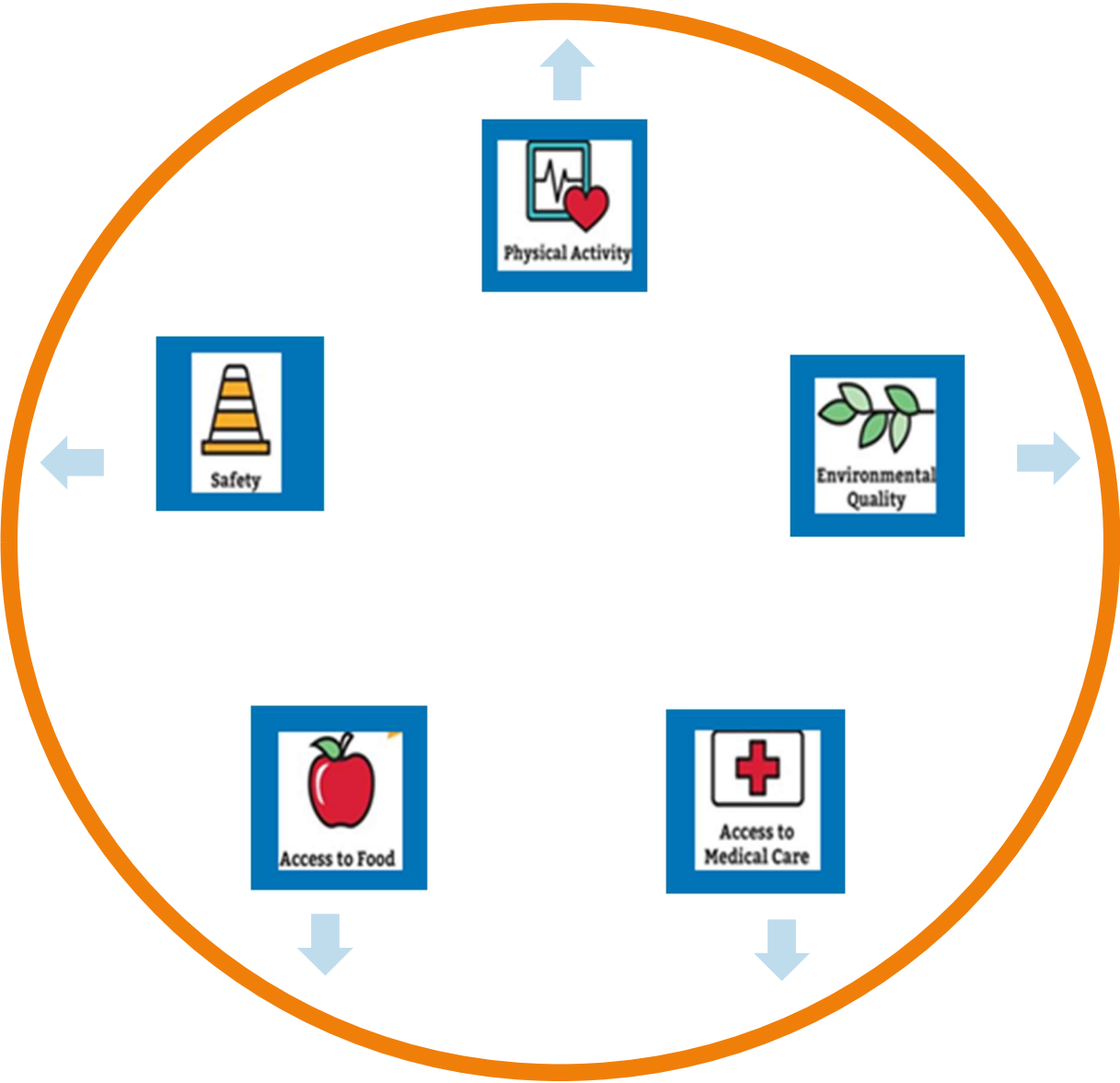
We conceptualized Health Outcomes as the final point along transportation-health pathways that encompass non-transportation factors as well.

Transportation
System

Health
Determinants

Health
Outcomes

Expanding the HIATP Wheel To More Specific Health Determinants



Many factors contribute to community Health Outcomes, with several most plausibly related to transportation.

We conceptualized *Physical Activity*, *Environmental Quality*, *Access to Health Care*, *Access to Food*, and *Safety* as key Determinants of Health along transportation-health pathways. The Health Determinants serve as the backbone of the new *PATHS Framework*.






While it may be tempting to think about transportation factors as direct causes of outcomes such as morbidity and mortality, the transportation system's impact on health outcomes occur primarily via these key Health Determinants.



Health Determinants to Health Outcomes: Examples

Health Determinant Domains	Example Relationships to Outcomes
Physical Activity	Regular physical activity is known to reduce the risk of noncommunicable diseases, help maintain a healthy bodyweight and improve mental health.
Environmental Quality	Exposure to toxic substances, poor air quality, noise pollution, and extreme heat are directly detrimental to human health and often correlated with noncommunicable disease risk.
Access to Health Care	A key dimension of both individual and community-wide health is the ability of people to access both routine and emergency care. There are physical, financial and cultural barriers to access.
Access to Food	Access to nutritious food, including fruits and vegetables, are important to maintaining a healthy bodyweight, maintaining mental health, and reducing risk of noncommunicable diseases.
Safety	Incidents involving threats to personal safety, either due to criminal activity, exposure to disasters, or from motor-vehicle related crashes may result in death, injury or disability.

Breaking Down the Health Determinant Domains

Physical Activity	Environmental Quality	Access to Health Care	Access to Food	Safety
				
<p>PA 1 – Travel related physical activity</p> <p>PA 2 – Leisure/recreational physical activity</p>	<p>EQ 1 - Exposure to air pollution / air quality</p> <p>EQ 2 - Exposure to noise pollution</p> <p>EQ 3 - Exposure to extreme weather</p>	<p>HC 1 - Access to primary care/wellness/screening services</p> <p>HC 2 - Access to mental & behavioral health services</p>	<p>F1 - Access to nutritious food</p>	<p>S1 - Motor-vehicle crashes</p> <p>S2 – Pedestrian/cyclist injuries</p> <p>S3 - Crime</p> <p>S4 - Disaster vulnerability</p>

PA = Physical Activity
EQ = Environmental Quality

HC = Access to Health Care
F = Access to Nutritious Food

S = Safety

A Prioritization Approach to Taking Stock of Transportation-Health Pathways

We know...

- Not all health determinant domains equally contribute to community health outcomes
- Not all health determinants have equal potential to be substantially impacted by changes to the transportation system



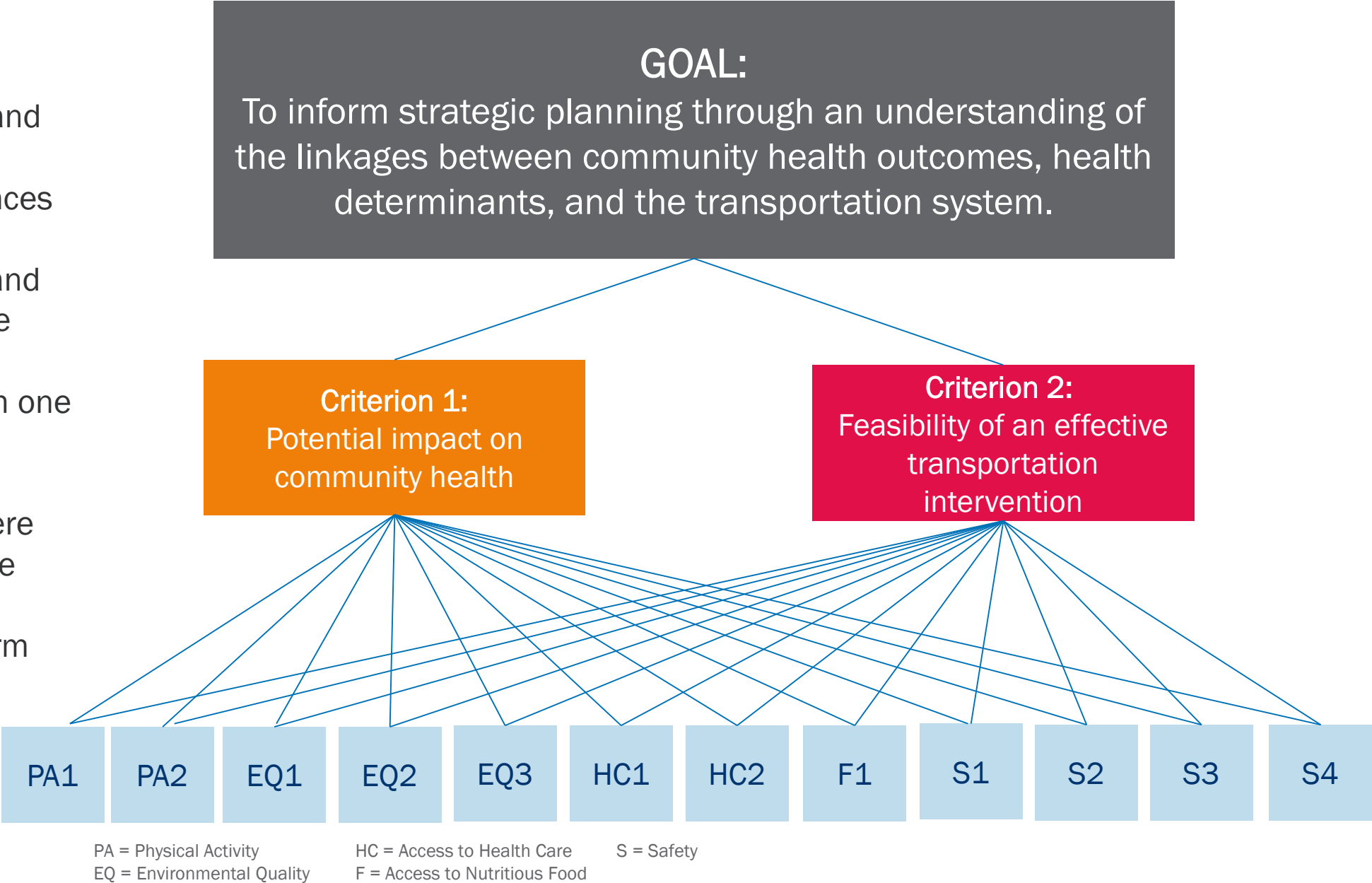
For input on these differences, we used a multi-criterion decision analysis approach called Analytic Hierarchy Process (AHP) to assess local expert opinions as to which health determinants have the greatest potential to:

- (1) Impact community *health outcomes*, and
- (2) Most feasibly be impacted by a *transportation intervention*.

Analytic Hierarchy Process

AHP (Saaty, 1994) is a flexible approach for both qualitative and quantitative decision-making problems. AHP allows preferences across multiple pairwise alternatives to be expressed, and the descriptive expressions are systematically translated into numerical values, ranging from one to nine (and reciprocals).

These pairwise alternatives were weighed by experts in an online survey format and input subsequently analyzed to inform prioritization.



AHP Survey

Criterion 1 Survey	Criterion 2 Survey
8 Public Health Professionals	5 Transportation Professionals
Asked to evaluate the relative impact of health determinants on community health outcomes.	Asked to evaluate the relative feasibility of a health determinant being impacted by changes to the transportation system.

Notes:

- These are small samples that captured select expert judgements about transportation-health relationships.
- Respondents were inconsistent in their responses, suggesting that it is difficult to clearly prioritize the health determinants.
- Although the survey findings are useful as a representation of these experts’ points of view about the importance of factors linking transportation and health, they do not fully and clearly delineate priorities for strategic planning.

GOAL:

To inform strategic planning through an understanding of the linkages between community health outcomes, health determinants, and the transportation system.

Ranking for Criterion 1: Potential impact on community health outcomes	Ranking for Criterion 2: Feasibility of an effective transportation intervention
F1 - Access to nutritious food	F1 - Access to nutritious food
EQ 3 - Exposure to extreme heat	EQ 3 - Exposure to extreme heat
S3 - Crime	HC 2 - Access to mental & behavioral health services
S4 - Disaster vulnerability	HC 1 - Access to primary care/wellness/screening services
S2 - Pedestrian/cyclist injuries	PA 1 - Travel related physical activity
HC 2 - Access to mental & behavioral health services	EQ 1 - Exposure to air pollution/air quality
S1 - Motor-vehicle crashes	PA 2 - Leisure/recreational physical activity
HC 1 - Access to primary care/wellness/screening services	S2 - Pedestrian/cyclist injuries
EQ 1 - Exposure to air pollution/air quality	S1 - Motor-vehicle crashes
PA 1 - Travel related physical activity	S4 - Disaster vulnerability
PA 2 - Leisure/recreational physical activity	EQ 2 - Exposure to noise pollution
EQ 2 - Exposure to noise pollution	S3 - Crime

PA = Physical Activity
EQ = Environmental Quality

HC = Access to Health Care
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GOAL:

To inform strategic planning through an understanding of the linkages between community health outcomes, health determinants, and the transportation system.

Potential impact on community health outcomes



Feasibility of an effective transportation intervention

Criterion Weights (50%, 50%)	Criterion Weights (75%, 25%)	Criterion Weights (25%, 75%)
F1 - Access to nutritious food	F1 - Access to nutritious food	F1 - Access to nutritious food
EQ 3 - Exposure to extreme heat	EQ 3 - Exposure to extreme heat	EQ 3 - Exposure to extreme heat
HC 2 - Access to mental & behavioral health services	S3 - Crime	HC 2 - Access to mental & behavioral health services
S4 - Disaster vulnerability	S4 - Disaster vulnerability	HC 1 - Access to primary care/wellness/screening services
S3 - Crime	HC 2 - Access to mental & behavioral health services	S4 - Disaster vulnerability
HC 1 - Access to primary care/wellness/screening services	S2 - Pedestrian/cyclist injuries	S2 - Pedestrian/cyclist injuries
S2 - Pedestrian/cyclist injuries	S1 - Motor-vehicle crashes	S1 - Motor-vehicle crashes
S1 - Motor-vehicle crashes	HC 1 - Access to primary care/wellness/screening services	EQ 1 - Exposure to air pollution/air quality
EQ 1 - Exposure to air pollution/air quality	EQ 1 - Exposure to air pollution/air quality	PA 1 - Travel related physical activity
PA 1 - Travel related physical activity	PA 1 - Travel related physical activity	PA 2 - Leisure/recreational physical activity
PA 2 - Leisure/recreational physical activity	PA 2 - Leisure/recreational physical activity	S3 - Crime
EQ 2 - Exposure to noise pollution	EQ 2 - Exposure to noise pollution	EQ 2 - Exposure to noise pollution

PA = Physical Activity
EQ = Environmental Quality

HC = Access to Health Care
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Key Insights from the AHP Survey



The top rankings on both Criterion 1 (health outcomes) and Criterion 2 (transportation impact) were Access to nutritious food (F1) and Exposure to extreme heat (EQ3). The inconsistent responses indicate the findings should be interpreted with some caution, but the food environment and climate-related environmental health concerns are important considerations as planning priorities.



Access to nutritious food is ranked first in terms of health outcomes and the potential to be impacted by transportation. The former is consistent with the regional CHAs and CHIPs that identify Healthy Weight, Nutrition, and Physical Activity as strategic priorities, and chronic disease and morbidity as key health outcomes. With respect to transportation, it should be noted that empirical research demonstrating links between GIS-based (distance) measures of the environment and healthy eating behavior are not robust. Prioritizing the food environment in Transportation-Health Strategic Planning will require innovative thinking about how the transportation system can be changed to affect this determinant. Multi-disciplinary partnerships and community engagement will be important to understand and impact social and cultural factors beyond mapped distance that affect healthy eating behaviors.

Appendix E

PATH Framework Evidence Summaries



Research Literature Summary – Physical Activity

Key People Differentiator: Age, especially Children and Older Adults

Key Conception of Transportation: Transportation as Infrastructure

Relevant Findings:

- Strong evidence of positive associations between walkability, access to destinations and services, personal safety from crime, and total PA.¹
- Walking is the only type of PA related to residential density.¹
- Destinations such as shops, public transport, parks and public open space, and recreational facilities support PA.¹
- Pedestrian-friendly infrastructure matters. Street lighting, greenery, and aesthetically pleasing scenery are positively associated with PA, but pavement/foot quality are not.¹
- Positive association between the presence of sidewalks, controlled crossings, and children's physical activity.²
- No evidence that physical environmental variables correlate with PA in children between 0 and 6.³

Research Literature Summary – Environmental Quality

Key People Differentiator: Location/Geography

Key Conception of Transportation: Transportation as Infrastructure

Relevant Findings:

Exposure to air pollution

- Travel mode matters. Car commuters have the highest exposure to all pollutants than do active commuters, but active commuters had higher inhalation doses. Physical activity benefits of active commuting outweigh negative impacts from air pollution exposure.⁵
- Proximity to transportation is a strong determinant of exposure.⁵

Noise pollution

- Positive association between transportation-related noise and non-auditory health conditions.
- There is limited research identifying transportation factors, but proximity to transportation (roads, rail, aviation) are known to be key sources of transportation-related noise exposure.

Urban heat⁴

- There is a research gap in understanding the extent that transportation factors contribute to urban heat.⁴
- Transportation infrastructure (e.g., impervious surfaces, road orientation, green space) contributes to the urban heat island effect.⁴
- Motor vehicle transportation is itself a source of anthropogenic heat.⁴

Research Literature Summary – Access to Health Care

Key People Differentiator: Socioeconomics/Culture

Key Conception of Transportation: Transportation as Action

Relevant Findings:

Access to primary care

- Transportation is a well-documented barrier to engaging in the care of chronic diseases, and is especially prevalent among older adults.⁷
- Little evidence that transportation service interventions improve health care utilization.⁸
- Transportation interventions must serve the cultural and material day-to-day needs of the population (e.g., bus vouchers may have no impact if not preferred transportation mode among recipients).⁷

Access to mental health services

- Evidence that parents perceive logistics and travel costs as barriers to seeking behavioral care for children and adolescents.⁹
- Younger adults cite costs as barrier to seeking care, while older adults frequently cite transportation as barrier. However, research shows that intrinsic factors and attitudes are stronger deterrents to care than extrinsic factors such as transportation.¹⁰

Research Literature Summary – Access to Food

Key People Differentiator: Race/Socioeconomics

Key Conception of Transportation: Transportation as Action

Relevant Findings:

Access to nutritious food

- GIS (distance-based) measures less consistently revealed a significant relationship between food environment features and dietary outcomes than other measures.¹¹
- Almost all research operates under an assumption that people use what is geographically proximate, or what is in their neighborhood, but there is no strong evidence that this is actually the case.¹¹
- Access to private transport and walkability impacts access, but public transport is largely viewed as an impractical solution for provisioning groceries.^{12,13}

Research Literature Summary – Safety

Key People Differentiator: Age, Socioeconomics, Location/Geography

Key Conception of Transportation: Transportation as Infrastructure/Transportation as Action

Relevant Findings:

Motor-vehicle/pedestrian injuries

- There is little reliable evidence that traffic calming reduces motor-vehicle crashes, but a reduction in speed may reduce injuries.¹⁴
- Most environmental variables are shown to be inconsistent in their association with childhood pedestrian injuries.¹⁵
- Traffic volume and pedestrian volume are key determinants of crashes. There is a simple logic at play. More cars, and more people, means more opportunities for crashes.¹⁶

Crime

- Little evidence that street lighting improvements reduce fear of crime, but conditional evidence that it reduces situational crime in some narrow instances.¹⁷
- With respect to potential transportation landscaping, there is little overarching evidence that urban greenspace leads to a reduction in crime.¹⁸

Disasters/disaster evacuation

- Transportation, or lack thereof, increases vulnerability to disasters.¹⁹
- Transportation engineering research has focused on the logistics of evacuation.²⁰ No synthesis on transportation in a broader context.

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Appendix F

Potential Health Determinant Indicators



Potential Indicators of Health Determinants

Monitoring community health outcomes is an important consideration. However, because the impact of the transportation system on health outcomes for the most part occurs through pathways including health determinants, it is equally important to find ways to monitor this pathways component.

A scoping review was conducted to identify the different ways health determinants are measured. This Appendix identifies potential indicators for monitoring and assessment of transportation-related health determinants.

While measures of health outcomes are often concrete and easily identifiable, particularly at the community level, measures of health determinants vary and are often not available at the optimal spatial resolution for continuous monitoring.

Scoping Review – Access to Health Care

Health Determinant Operationalization	References
Distance to service provider (primary, mental/substance, emergency)	(Allard, Rosen, and Tolman 2003; Carr et al. 2009; Vanderwielen et al. 2015)
Has a regular service provider?	(Prentice 2006)
Utilization (e.g., number of visits)	(Ghorbanzadeh et al. 2020; Hiscock et al. 2008; Prentice 2006; Ryvicker, Gallo, and Fahs 2012)
Usual source of care?	(Chaiyachati et al. 2018)
Transportation Differentiation	
Access to automobile	(Allard, Rosen, and Tolman 2003; K. M. Brown et al. 2021; Fishman, McLafferty, and Galanter 2018; Iezzoni, Killeen, and O'Day 2006)
Distance to bus transit	(Allard, Rosen, and Tolman 2003)
Cost of transportation	(Iezzoni, Killeen, and O'Day 2006; Kamimura et al. 2018; Ross et al. 2015)
Availability of public transit (general)	(Chaiyachati et al. 2018; Kamimura et al. 2018; Ryvicker, Gallo, and Fahs 2012)
Travel time (distance/speed)	(E. J. Brown et al. 2016; K. M. Brown et al. 2021; Carr et al. 2009; Ghorbanzadeh et al. 2020)
Perceptions of emergency travel time	(K. M. Brown et al. 2021)
Walkability	(Chaiyachati et al. 2018)
People Differentiation	
Race	(Allard, Rosen, and Tolman 2003; Vanderwielen et al. 2015)
Urban/Rural	(K. M. Brown et al. 2021; Iezzoni, Killeen, and O'Day 2006)
Ability/Disability	(Iezzoni, Killeen, and O'Day 2006)
Mental health issues	(Priester et al. 2016; Ross et al. 2015)
Substance abuse issues	(Priester et al. 2016; Ross et al. 2015)

Scoping Review – Access to Food

Health Determinant Operationalization	References
Location (spatial accessibility) of food store/restaurant	(Caspi et al. 2012; Fuller, Cummins, and Matthews 2013; Inagami et al. 2009; Pinho et al. 2018; Shannon and Christian 2017; Smith et al. 2010)
Difficulty shopping for groceries	(Crabtree and Mushi-Brunt 2013)
Perceptions of food access	(Cummins, Flint, and Matthews 2014)
Online grocery delivery service	(Dillahun, Simioni, and Xu 2019)
Food venue availability	(Gustafson et al. 2013)
Revealed accessibility (distance x usage)	(Rybarczyk et al. 2020)
Transportation Differentiation	
Access to automobile (car ownership)	(Caspi et al. 2012; Inagami et al. 2009; Tenkanen et al. 2016)
Travel time (distance/speed)	(Caspi et al. 2012; Smith et al. 2010)
Walking	(Crabtree and Mushi-Brunt 2013; Rybarczyk et al. 2020)
Use of public transit	(Crabtree and Mushi-Brunt 2013; Shannon and Christian 2017; Tenkanen et al. 2016)
Transportation scarcity	(Dillahun, Simioni, and Xu 2019)
Transportation mode (car/van/truck (own), car/van/truck (other family/friend), taxi, bus (public transportation), bicycle, walk, or other)	(Fuller, Cummins, and Matthews 2013; Krukowski et al. 2013)
Daily travel patterns	(Gustafson et al. 2013; Shannon and Christian 2017)
Active travel (walking, cycling)	(Rybarczyk et al. 2020)
People Differentiation	
Ability/disability	(Crabtree and Mushi-Brunt 2013)
Income	(Shannon and Christian 2017)
Health status	(Crabtree and Mushi-Brunt 2013)

Scoping Review – Physical Activity

Health Determinant Operationalization	References
Active travel (walking/cycling)	(Adams et al. 2015; Cerin et al. 2017; Evenson et al. 2006; Chanam Lee and Moudon 2016; Morency, Trépanier Martin, and Demers 2011; Porter et al. 2018)
Volume of physical activity (incl. accelerometer)	(A. R. Cooper et al. 2005; Davis et al. 2011; Evenson et al. 2006; Kligerman et al. 2007; MacDonald et al. 2010)
Out-of-home physical activity (weekends)	(Copperman and Bhat 2007)
Recreational walking/cycling	(Adams et al. 2015; Chanam Lee and Moudon 2016; Porter et al. 2018; Xing, Handy, and Mokhtarian 2010)
Transportation Differentiation	
Network attributes (e.g., street connectivity, block size)	(Adams et al. 2015; Cerin et al. 2017; Copperman and Bhat 2007; Kligerman et al. 2007; Sallis et al. 2004)
Walkability	(Adams et al. 2015; Cerin et al. 2017; Kligerman et al. 2007)
Pedestrian and cycling infrastructure	(Cerin et al. 2017; Chanam Lee and Moudon 2016)
Use of motorized transport	(A. R. Cooper et al. 2005; Lachapelle and Frank 2009)
Transport mode	(Davis et al. 2011; Evenson et al. 2006)
Safety (transport/destinations)	(Evenson et al. 2006; Xing, Handy, and Mokhtarian 2010)
Frequency of travel	(Lachapelle and Frank 2009)
Commute vs. Non-commute	(Sahlqvist, Song, and Ogilvie 2012)
Public transit	(MacDonald et al. 2010)
Distance	(Xing, Handy, and Mokhtarian 2010)
People Differentiation	
Age (adults, older adults)	(Cerin et al. 2017; Davis et al. 2011; Porter et al. 2018)
Age (children, adolescents)	(A. R. Cooper et al. 2005; Kligerman et al. 2007)
Gender (girls)	(Evenson et al. 2006)
Health status	(Forsyth et al. 2009)

Scoping Review – Safety

Health Determinant Operationalization	References
Accidents involving pedestrians	(Dumbaugh 2016; Hess, Moudon, and Matlick 2004; J. Lee et al. 2019; Liang et al. 2019; Miranda-Moreno, Morency, and El-Geneidy 2011)
Accidents involving vehicles	(Dumbaugh 2016; Kingham, Sabel, and Bartie 2011; Wang, Huang, and Zeng 2017)
Accidents involving bicycles	(Wang, Huang, and Zeng 2017)
Crime incidents	(Abenoza et al. 2018)
Evacuation difficulty	(Church and Sexton 2002)
Transportation Differentiation	
Walking, Driving, Transit	(Dumbaugh 2016; Wier et al. 2009), (Dumbaugh 2016)
Pedestrian infrastructure attributes	(J. Cooper et al. 2012; Landis et al. 2001; J. Lee et al. 2019)
Traffic volume/characteristics	(Gitelman, Doveh, and Bekhor 2017; Hess, Moudon, and Matlick 2004; Landis et al. 2001; Wier et al. 2009)
Motor vehicle mix	(Landis et al. 2001)
Road infrastructure attributes	(Gitelman, Doveh, and Bekhor 2017; Hess, Moudon, and Matlick 2004; Miranda-Moreno, Morency, and El-Geneidy 2011; Wier et al. 2009)
Vehicle speeds	(Gitelman, Doveh, and Bekhor 2017; Hess, Moudon, and Matlick 2004)
Frequency of travel	(Híjar et al. 2000)
Transit infrastructure attributes	(Abenoza et al. 2018)
Traffic controls	(Church and Sexton 2002; J. Cooper et al. 2012; Chris Lee and Abdel-Aty 2005; Wang, Huang, and Zeng 2017; Wier et al. 2009)
Individual Behavior	(J. Cooper et al. 2012; Craig et al. 2019)
School travel	(Kingham, Sabel, and Bartie 2011)
People Differentiation	
Age (older adults)	(Dumbaugh 2016; Shankar et al. 2006; Wang, Huang, and Zeng 2017)
Age (general)	(Híjar et al. 2000; Wang, Huang, and Zeng 2017)
Age (children/students)	(Mendoza et al. 2010)
Occupational driving	(Ma et al. 2010; Williamson et al. 2009)

Scoping Review – Environmental Quality

Health Determinant Operationalization	References
Air quality/pollution	(Anenberg et al. 2019; Chenyihsu and Whalley 2012; Clark, Millet, and Marshall 2011; Raza et al. 2018)
Railway and traffic noise	(Dratva et al. 2012)
Water quality	(Nixon and Saphores 2007)
Transportation Differentiation	
Transit supply	(Chenyihsu and Whalley 2012; Clark, Millet, and Marshall 2011)
Vehicle miles traveled (VMT)	(Clark, Millet, and Marshall 2011)
Traffic restrictions	(Titos et al. 2015)
Vehicle maintenance	(Nixon and Saphores 2007)
Highway stormwater infrastructure	(Nixon and Saphores 2007)
Travel mode	(Raza et al. 2018)

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Indicators: Environmental Quality

Indicator	Operationalizations in Transportation-related Research	Measurement Assessment	Example Data Sources
EQ 1 - Exposure to air pollution/air quality	Single site measurements of PM 2.5, NO ₂ , & SO ₂ , Census tract measurements of PM2.5, AQI	Ozone, PM 2.5 and other related Air Quality Indices are widely available through government environmental protection sources.	Florida Department of Environmental Protection Air Quality Monitoring (Multisite and Single Site Data: https://floridadep.gov/air/air-monitoring/content/floridas-air-quality ; Florida Environmental Public Health Tracking: https://www.floridatracking.com/healthtracking/topic.htm?i=18
EQ 2 - Exposure to noise pollution	Objectively measured noise levels (decibels)	Noise levels measured in decibels (dBA) is an optimal measure, though not widely available in the US. Only select cities have mapped noise, but derived measures of noise level are available.	National Transportation Noise Map: https://maps.dot.gov/BTS/NationalTransportationNoiseMap/
EQ 3 - Exposure to extreme heat	Mean summer Temperature maximum/minimum; Land cover; Surface temperatures	Derived Heat Vulnerability measures are increasingly available to capture both the environmental and non-environmental.	Extreme Heat Vulnerability Map Tool: https://nihhis.cpo.noaa.gov/vulnerability-mapping

Indicators: Physical Activity

Indicator	Operationalizations in Transportation-related Research	Measurement Assessment	Example Data Sources
PA 1 – Travel related physical activity	Self-reported active travel (walking or cycling to work), Objective (accelerometer, smart-phone tracking) measured active travel.	Self-reported travel related physical activity is the most widely available measure.	MetroPlan Orlando Regional Transportation Survey, National Household Travel Survey: https://nhts.ornl.gov/
PA 2 – Leisure/recreational physical activity	Self-reported leisure-time physical activity (recreational walking, cycling and sports), Objective (accelerometer) measured leisure physical activity.	Self-reported leisure time physical activity is reported through CDC survey data and is an increasingly available measure.	CDC PLACES Data: https://www.cdc.gov/places/index.html

Indicators: Access to Health Care & Nutritious Food

Indicator	Operationalizations in Transportation-related Research	Measurement Assessment	Example Data Sources
HC 1 - Access to primary care / wellness / screening services	Physical distance to providers, health care utilization, health care visitation rates, insurance coverage	There are currently no measures that capture the multiple dimensions of access to preventive and acute care. Physical distance measures can be derived in GIS but provide limited correlation information.	Florida Health Finder: https://www.floridahealthfinder.gov/facilitylocator/facloc.aspx
HC 2 - Access to mental & behavioral health services	Physical distance to service providers, availability of on-demand services, insurance coverage, availability of mobile mental health and social work service	There are currently no measures that capture the multiple dimensions of access to behavioral health care. Physical distance measures can be derived in GIS but provide limited correlation information. Broad scale measures of availability of services can be derived.	Florida Health Finder: https://www.floridahealthfinder.gov/facilitylocator/facloc.aspx
F1 - Access to nutritious food	Spatial accessibility, food venue availability, usage of food venues, perceptions of food access	Spatial accessibility (GIS-based) measures are available as indices. Physical GIS based measures can be derived but are not robust indicators of health eating behavior.	Food Access Research Atlas: https://www.ers.usda.gov/data-products/food-access-research-atlas/

Indicators: Safety

Indicator	Operationalizations in Transportation-related Research	Measurement Assessment	Example Data Sources
S1 - Motor-vehicle crashes	Crashes involving motor-vehicles	Crash rate; Fatal & Serious Injury Crash Rate are valid indicators already widely in use.	Sources already identified and in use in the MTP 2045 System Performance Report & Project Prioritization Process
S2 – Pedestrian/cyclist injuries	Crashes involving motor-vehicles and pedestrian/cyclists.	Number of Pedestrian & Bicycle Crashes are valid indicators already widely in use.	Sources already identified and in use in the MTP 2045 System Performance Report & Project Prioritization Process
S3 - Crime	Geographic distribution of crime incidents, crime proximity to transit stations, location of crime within transportation facilities	Crime occurring in, near, or otherwise associated with the transportation can be derived from standard crime reporting data.	Uniform Crime Reporting (UCR) Program: https://www.fbi.gov/services/cjis/ucr
S4 - Disaster vulnerability	National Hazard Vulnerability, Evacuation difficulty	Disaster risk indicators by specific hazard type are widely available, as well as compositive indicators measuring multiple dimensions of vulnerability.	The National Risk Index of Natural Hazards: https://www.fema.gov/flood-maps/products-tools/national-risk-index

Indicators: Health Equity

Indicator	Operationalizations in Transportation-related Research	Measurement Assessment	Example Data Sources
People	<p>Geographic disparities in health outcomes</p> <p>Physical distance from health care providers</p>	Health inequities are closely related to the social determinants of health.	<p>DC/ATSDR Social Vulnerability Index (CDC/ATSDR SVI) (https://www.atsdr.cdc.gov/placeandhealth/svi/index.html).</p> <p>CDC PLACES Data: https://www.cdc.gov/places/index.html</p>



Health Strategic Plan

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