CENTER FOR ADVANCING RESEARCH IN
Transportation Emissions, Energy, and Health
A USDOT University Transportation Center

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Center Director:	Josias Zietsman, Ph.D., P.E., j-zietsman@tti.tamu.edu (979) 317-2796
Submitting Official:	Haylee Yung Assistant Director, Administration h-yung@tti.tamu.edu (979) 317-2804
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Signature of Submitting Official:	

OVERVIEW

The Center for Advancing Research in Transportation Emissions, Energy, and Health (CARTEEH) continued to make substantial progress during this reporting period, which was marked by significant changes in day-to-day operations due to the ongoing COVID-19 pandemic. Member universities grappled with classes being moved online, field and laboratory work being postponed, and students working from home—however, CARTEEH continued to build on the successes of the last four years. In addition to continued progress on projects and strategic initiatives, CARTEEH continues to develop and disseminate research and technology transfer products. We initiated a new set of collaborative projects focused on the transportation infrastructure-health nexus (the SMART Initiative) and issued a solicitation for a final round of competitive projects in Fall 2020. At the end of this reporting period, CARTEEH continues to be proud of our progress and excited about upcoming activities in all our goal areas.

ACCOMPLISHMENTS

Major Goals of the Program

CARTEEH brings together experts from transportation and public health, two disciplines that have not traditionally worked together. CARTEEH's focus is to advance research on transportation emissions in a comprehensive manner, mapping the holistic tailpipe-to-lungs spectrum, as shown in Figure 1.

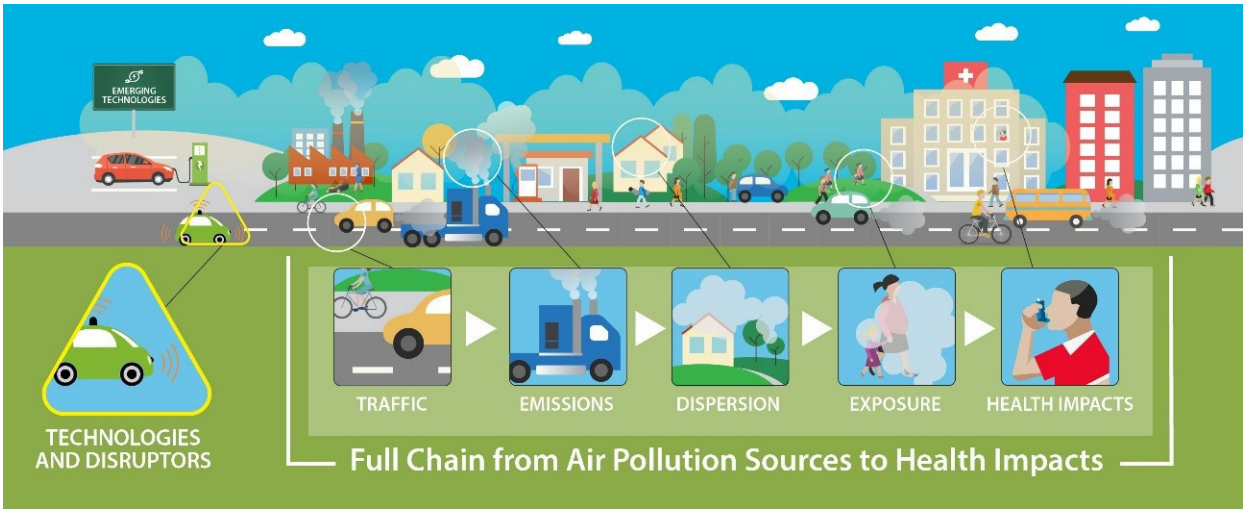

Figure 1. Tailpipe to Lungs Spectrum.

CARTEEH identified the following research focus areas to cover this spectrum:

- Transportation System
- Emissions and Energy Estimation
- Exposure and Health Impacts
- Data Integration
- Policy and Decision-Making

Progress in each of CARTEEH's three goal areas are detailed in the following sections.

CARTEEH Goal #1: Research Program

CARTEEH's research program includes collaborative research projects conducted jointly among consortium members, competitive program awards, and other initiatives that support our strategic research, education, and technology transfer goals. These are all included as part of our project portfolio in Table 1 below, though some initiatives are discussed further under the education and technology transfer sections of this report. For completed projects, CARTEEH staff members continue to work with researchers to finalize their reports and upload their data to the CARTEEH Data Hub. A new webpage on the CARTEEH website was developed to house these reports in an easily navigable and user-friendly layout.

In this reporting period, CARTEEH launched its new "Healthy People through SMART Infrastructure" initiative. This initiative is an ambitious, forward-looking undertaking that links the need for transportation infrastructure that is Sustainable, Multi-modal, Accessible, Resilient, and Technological (SMART), while also enhancing health outcomes. The initiative includes collaborative projects and strategic initiatives within a framework as shown in Figure 2 below

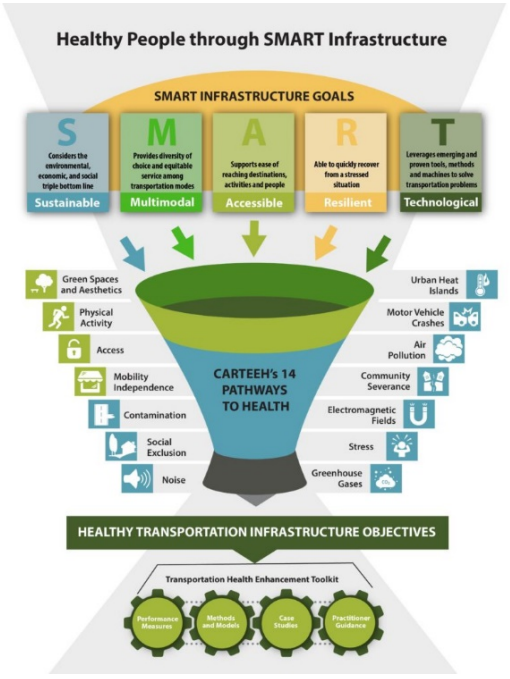

Figure 2. SMART Framework Conceptual Model with14 Pathways to Health.

Under the SMART initiative, CARTEEH is developing a framework linking transportation infrastructure to health. The framework can be used by professionals to meet the transportation needs of their constituents, while simultaneously enhancing the public health benefits for the general public. The initiative pulls together the strengths of our consortium members and builds on our previous research efforts. The individual projects under the SMART umbrella are currently being initiated and will

be added to the CARTEEH project portfolio in the next reporting period.

CARTEEH also issued a Call for Problem Statements for the next round of competitive project awards. Researchers from each consortium member institution were invited to submit their ideas for projects that align with CARTEEH's mission and with the SMART initiative. We will finalize project selections in the next reporting period and anticipate the projects to start in Spring 2020.

Table 1. CARTEEH Project Portfolio

Project	Lead Institution	Principal Investigator
Transportation Emissions and Health Data Hub	TTI	Dr. Andrew Birt
Reconciles differences in characteristics of transportation and health data; develops a platform to house datasets		
Truck Emissions Exposure Study in Ports	GaTech	Dr. Michael Rodgers
Assesses pollutant emissions at selected major ports; evaluates the potential reduction of exposure using multiple methodologies		
Border Crossing Emissions Impact Study	TTI	Dr. Tara Ramani
Characterizes the emissions impact of border crossings and identifies population groups most affected by the emissions		
Healthy Living and Traffic-Related Air Pollution in an Underserved Community	UTEP	Dr. Wen-Whai Li
Quantifies traffic-related air pollution and the associated respiratory health for vulnerable school children in El Paso, Texas		
Development and Evaluation of Connected Vehicle Application for Alternative Fuel Trucks	UCR	Dr. Peng Hao
Evaluates benefits of battery-electric trucks and plug-in hybrid electric trucks over conventional diesel trucks		
Health Risk Characterization for Transportation Users	JHU	Dr. Mary Fox
Develops a cumulative exposure and risk profile for transportation workers and/or system users considering chemical and other stressors		
Assessing Regulatory Compliance and Community Air Pollution Impacts of Crude Oil by Rail (CBR) Transport in Baltimore City, Maryland	JHU	Dr. Genee Smith
Delivers evidence-based characterization of emissions impacts of CBR within Baltimore City, Maryland		
PM Exposure for Paratransit Transport	GaTech	Dr. Alex Samoylov

Characterizes exposure to PM faced by sensitive populations using paratransit transport

Project	Lead Institution	Principal Investigator
Traffic-Related Air Pollution and Childhood Asthma in the United States: A Burden of Disease Assessment	TTI	Dr. Haneen Khreis
Conducts a burden of disease estimate of childhood asthma attributable to traffic-related air pollution within the US		
Characterizing In-Cab Air Quality in Heavy-Duty Diesel Construction Equipment	TTI	Dr. Phil Lewis
Analyzes air quality and driver exposure inside the cabs of heavy-duty diesel construction equipment		
Dockless Mobility: Addressing Safety, Emissions, and Gaps in Policy Making	TTI	Dr. Suriya Vallamsundar
Examines emissions exposure on dockless mobility users in Dallas, Texas		
Quantifying Bioavailable Metals and Potential Dust Emissions from Highway-Related and Desert Sediments at Lordsburg Playa, New Mexico	UTEP	Dr. Thomas Gill
Scopes the presence of bioavailable metals and potential dust emissions from highway-related and desert sediments in New Mexico		
Secondary Particulate Matter Exceed Primary Emissions from Current Gasoline Vehicles: Air Quality and Public Health Implications	UCR	Dr. Georgios Karavalakis
Assesses emissions from gasoline direct injection and multipoint injection vehicles when operated under different driving cycles		
Quantifying Traffic Congestion-Induced Change of Near-Road Air Pollutant Concentration	UCR	Dr. Jill Luo
Develops a statistical model to quantify the contribution to the ambient air quality degradation due to traffic congestion		
Transportation and Health - Conceptualization and Quantification	TTI	Dr. Haneen Khreis
Addresses the transportation-health nexus beyond air quality and emissions; develops a comprehensive conceptual "pathways" model		
Urban Policy Interventions and Their Effectiveness in Reducing Traffic Emissions and Traffic-Related Air Pollution	TTI	Dr. Haneen Khreis
Identifies policy interventions to effectively reduce traffic emissions and traffic-related air pollution from on-road mobile sources		

Project	Lead Institution	Principal Investigator
Technology Landscape and Future Direction for Transportation Emissions, Energy, and Health	TTI	Dr. Yanzhi (Ann) Xu
Develops a technology roadmap for transportation emissions, energy, and health		
Curriculum for Transportation Emissions and Health	TTI	Dr. Haneen Khreis
Development of a unique, cross-disciplinary course titled "Traffic-Related Air Pollution: Emissions, Human Exposures, and Health.", which can be used for undergraduate, graduate, and practitioner education.		
Transportation Emissions and Health Literature Library	TTI	Dr. Haneen Khreis
Downloadable spreadsheet resource tabulating and categorizing literature on transportation emissions, energy, and health.		
Innovative Data Applications using CARTEEH's Data Hub	TTI	Dr. Yanzhi (Ann) Xu
Use of CARTEEH's data hub infrastructure for data integration applications, including the development of a national emissions map		
Development of an Emission-Based Selection Algorithm to Optimize Variable Message Signs Location *(student project)*	TTI	Ms. Farinoush Sharifi
Develops an algorithm to identify locations of variable message signs to maximize emissions savings in situations of nonrecurring congestion		
Real-World Data Measurement of Factors Affecting Air Quality for Nonroad Diesel Equipment Operators	TTI	Dr. Phil Lewis
Characterizes the various factors affecting equipment operators' exposure to poor air quality, using real-world data and measurements.		
Trace Metals in Airborne Particulate Matter and Genomic Characterization of Associated Microorganisms: Insights into Health Effects from an Industrialized, Near-Roadway Site in Houston	TTI	Dr. Shankar Chellam
Investigates vehicular contributions of PM10, and its elemental components and microorganisms, to understand health effects and implications.		
Making New Mobility a "Win" for Public Health	JHU	Dr. Johnathon Ehsani
Investigates the use of new mobility options as a public health intervention, through simulation of scenarios and validation with real-world data.		
Improved Vehicle Emissions and Near-Road Dispersion Modeling Tool for Project Evaluation: Integrating MOVES-Matric, the FEC, and AERMOD	GaTech	Dr. Haobing Liu
Developing a tool to streamline and integrate transportation emissions modeling and dispersion modeling for a more straightforward assessment of air quality impacts.		
Modeling Air Quality Impacts of Pollution Mitigation Scenarios at a Multimodal Inland Port	GaTech	Dr. Franklin Gbologah
Assessment of Nox and PM emissions and dispersion for various pollution control scenarios in an inland port.		

Project	Lead Institution	Principal Investigator
Association of Traffic and Related Air Pollutants on Cardiorespiratory Risk Factors from Low-Income Populations in El Paso, TX.	UTEP	Dr. Jsoyoung Jeon
Studies linkages between cardiorespiratory risk factors and levels of traffic-related air pollutants.		
Onboard Sensing, Analysis, and Reporting (OSAR): Expanded Field Demonstrations and Development of Associated Visual Aids	UCR	Dr. Kent Johnson
Develops the capability for spatial and temporal visualization of emissions from the OSAR on-board emissions measurement system.		
Development of Full-Chain Transportation Emissions, Exposure and Health Modeling Platform	TTI	Dr. Yanzhi (Ann) Xu
Models the "full-chain" between transportation and health, building on an advanced transportation emissions modeling platform developed by CARTEEH researchers		
Transportation as a Disease Vector - a Modeling Approach	TTI	Dr. Joe Zietsman
Investigates the role of transportation vehicles and infrastructure in the spread of disease.		

Research Results Disseminated

Though impacted by cancellation of meetings and conferences due to COVID-19, CARTEEH researchers continued to disseminate their research results through various venues whenever possible. This includes the CARTEEH website, presentations at virtual meetings and conferences, paper submittals to journals, and other interactions and outreach with stakeholders.

Plans for Next Reporting Period to Accomplish Research Goal

In the next reporting period, CARTEEH leadership will continue working with the principal investigators of ongoing projects to ensure the successful completion of their projects. CARTEEH leadership will work to develop alternative or contingency plans as needed to ensure successful completion of projects that may have been impacted by the COVID-19 pandemic. We anticipate awarding several new research projects, including student-led projects based on the responses to our call for problem statements. We expect to leverage our research results for further education and technology transfer activities, with an emphasis on stakeholder engagement in line with our Health People Through SMART Infrastructure initiative.

CARTEEH Goal #2: Education and Workforce Development

CARTEEH research projects are catalysts for CARTEEH student involvement, with the number of students involved with CARTEEH increasing each semester.

Texas A&M University College of Education Collaboration

CARTEEH is working with the Department of Teaching, Learning, and Culture in the Texas A&M College of Education with a Capstone project for on the development of a wearable pollution detection device, which can take samples from the air and measure particulate matter. During this reporting period a web portal was created to capture real-time readings of the device, though further progress is on hold until staff and student activity on campus normalize in the next reporting period. The goal of the development of this device is to enable mass distribution of units to middle school students throughout Texas to increase students' interests in STEM while spreading knowledge and awareness about air pollution.

Elementary School Student Outreach

Dr. Shankar Chellam and his team are working on a project titled *Trace Metals in Airborne Particulate Matter and Genomic Characterization of Associated Microorganisms: Insights into Health Effects from an Industrialized, Near-Roadway Site in Houston,* which is funded by CARTEEH. The team has developed an outreach project with a lesson plan aimed at 4th graders. The goal of the outreach program is to educate elementary school students on air pollution, especially air pollution that emanates from motor vehicles. The outreach program was originally planned to be conducted at Southwood Valley Elementary School. While these plans are currently on hold due to COVID-19, the research team is investigating alternative delivery methods (such as a virtual class on Zoom) to disseminate this information.

CARTEEH Summer Internship Program

The third annual CARTEEH Summer Internship program successfully concluded in early August 2020. The internship program was originally planned as an on-campus program like previous years. Once the on-campus program was no longer feasible, we adapted the program to a 10-week remote schedule in conjunction with the SAFE-D and NICR University Transportation Centers (UTCs), also located at the Texas A&M Transportation Institute. Interns worked on the development and completion of an individual project guided by an assigned mentor and conducted their final presentations through a WebEx video conference (shown in Figure 3). Interns gained valuable experience in presenting their research. In addition to conducting their projects, interns also participated in other online activities—such as brown-bag luncheons—where various Texas A&M Transportation Institute researchers presented on areas of transportation-related research.

Figure 3. TTI Summer Intership Final Presentation.

Education Results Disseminated

In addition to the educational and outreach activities outlined in this section, CARTEEH's curriculum on Transportation Emissions and Health was made available through the CARTEEH website, with several of the lectures complete and available for use.

Plans for Next Reporting Period to Accomplish Education Goal

During the next reporting period, the current education initiatives will continue and CARTEEH will look for additional opportunities for education and workforce development growth.

CARTEEH Goal #3: Technology Transfer

CARTEEH recognizes that technology transfer as a vital part of the research process that must be integrated with our R&D activities. We place a high value on stakeholder identification and engagement. In addition, CARTEEH emphasizes information dissemination and the creation of open-access tools and methods that enable practical application of cutting-edge research findings.

CARTEEH has made progress on several technology transfer activities, though opportunities for stakeholder outreach were limited due to the ongoing COVID-19 pandemic.

Transportation, Air Quality, and Health Symposium

The next CARTEEH Transportation, Air Quality, and Health Symposium—which was originally scheduled for May 18-20, 2020, in Riverside, California—was postponed to May 17-19, 2021. We are currently working on contingency planning for this event and will be deciding on if and how to move forward with this event as scheduled. In the interim, CARTEEH is working on a "virtual panel" webinar, where consortium members will present their work related to transportation emissions, health, and the impacts of the COVID-19 pandemic. This event is scheduled for the

next reporting period and will serve as a platform to showcase CARTEEH research and engage stakeholders until in-person events become possible.

Transportation Emissions and Health Data Hub

Researchers are still actively publishing new datasets to the CARTEEH Data Hub, including emissions rate data tables, electric vehicle survey data, and emissions impacts of crash warning systems. Multi-county emission maps for the eight county Houston area were also developed, with the resulting dashboard made available on the Transportation and Emissions Modeling Platform for Optimization (TEMPO), which is a tool developed by TTI.

CARTEEH Literature Library

The CARTEEH literature library continues to be updated on a periodic basis. It serves as a resource for students, researchers, and practitioners interested in transportation and health—especially the impact of transportation emissions and air pollution on human health. During this period, approximately 115 additional studies were added to the library, bringing the total to 1,055. The additional studies address the full chain of events between transportation pollution sources and health impacts. This reference list will continue to be updated periodically as new studies become available.

Technology Transfer Results Disseminated

All Center activities are posted to the CARTEEH website. While some technology transfer activities were impacted by COVID-19 during this reporting period, the CARTEEH team continues to utilize all available opportunities to disseminate research results and knowledge to the research community and beyond.

Plans for Next Reporting Period to Accomplish Technology Transfer Goal

In the next reporting period, CARTEEH will focus on the planned webinar, as well as move forward on planning the CARTEEH Symposium. CARTEEH will also focus on engaging stakeholders and conducting technology transfer activities aligned with the SMART initiative.

PARTICIPANTS AND COLLABORATING ORGANIZATIONS

CARTEEH is made up of a consortium of five institutions. TTI is a member of the Texas A&M University System and home to the Center. Faculty and students from other colleges—such as the Texas A&M Health Science Center—are also engaged in Center activities and research. Johns Hopkins University, Georgia Tech, University of Texas-El Paso, and the University of California, Riverside, complete the partnership.

Partner Organizations and Other Significant Collaborators

CARTEEH's focus areas span multiple disciplines, bringing opportunities for a unique collaborative effort with institutions and individuals. These partners are essential to the success of the Center. Organizations and individuals show in Table 2 and 3 below have directly supported or collaborated on Center activities.

Table 2. CARTEEH Partner Organizations.

Organization Name	Location	Contribution
Air Alliance Houston	Houston, Texas	Collaboration
American Thoracic Society	New York	Collaboration
Atlanta Bicycle Council	Atlanta, Georgia	Collaboration, In-kind support
Atlanta Bike Coalition	Atlanta, Georgia	In-kind support
Atlanta Regional Commission	Atlanta, Georgia	Data, Collaboration
Breathe Easy Dallas	Dallas, Texas	Collaboration
Broadway Services	Baltimore, Maryland	Access to facilities and data
California Air Resources Board	Sacramento, California	In-kind support
California Energy Commission	Sacramento, California	In-kind support
Cherry Hill Neighborhood	South Baltimore, Maryland	Collaboration
Chesapeake Climate Action Network	Takoma Park, Maryland	Collaboration
City of Austin Department of Transportation	Austin, Texas	Collaboration
City of Carson	Carson, California	Personnel
City of Dallas	Dallas, Texas	Collaboration
City of Los Angeles	Los Angeles, California	Data
Clean Water Action	Washington, D.C.	Collaboration
Dallas Independent School District	Dallas, Texas	Access to facilities
El Paso Independent School District	El Paso, Texas	Facility and student access

El Paso Health Department	El Paso, Texas	Data sharing
El Paso Metropolitan Planning Organization	El Paso, Texas	Data sharing
Emory University	Atlanta, Georgia	Personnel, Collaboration
Environmental Defense Fund	Austin, Texas	Collaboration
George Mason University	Fairfax, Virginia	Collaboration, data
Georgia Department of Transportation	Atlanta, Georgia	Data
Georgia Ports Authority	Savannah, Georgia	Data, access to facilities, in-kind support
Georgia Tech Research Institute	Atlanta, Georgia	Data, personnel, access to facilities
Health Effects Institute	Boston, Massachusetts	Collaboration
Houston-Galveston Area Council	Houston, Texas	Collaboration
Institute for Healthy Living at the University of Texas at El Paso	El Paso, Texas	Collaboration, facility and student access
Kelly Burt Dozer	College Station, Texas	In-kind support
Larry Young Paving	College Station, Texas	In-kind support
Los Angeles County Metropolitan Transportation Authority	Los Angeles, California	In-kind support
Maryland Institute College of Art	Baltimore, Maryland	In-kind support
Metropolitan Atlanta Rapid Transit Authority	Atlanta, Georgia	Collaboration, in-kind support
Mississippi State University	Starkville, Mississippi	Collaboration
Mount Winans Community Association	Baltimore, Maryland	Collaboration, facility access
Nashville Metropolitan Transit Authority	Nashville, Tennessee	Collaboration, in-kind support
National Weather Service	Santa Teresa, New Mexico	Information/data sharing, collaboration
New Mexico Department of Environment	Santa Fe, New Mexico	Data, collaboration
New Mexico Department of Health	Santa Fe, New Mexico	Data, collaboration
New Mexico Department of Transportation	Santa Fe, New Mexico	Data, collaboration, access to facilities (field site)
North Central Texas Council of Governments	Arlington, Texas	Collaboration
Oak Ridge National Laboratory	Oak Ridge, Tennessee	Computer models
Port of Galveston	Galveston, Texas	Facilities
Port of Houston	Houston, Texas	Facilities
Port of Long Beach	Long Beach, California	Facilities
Port of Los Angeles	Los Angeles, California	Personnel
South Baltimore Go! Pilot Project	South Baltimore, Maryland	Collaboration
South Coast Air Quality Mgmt. District	Diamond Bar, California	Data, equipment, and facilities
Tampere University of Technology	Tampere, Finland	Collaboration, personnel exchange, in-kind support
TAMU Department of Construction Science	College Station, Texas	Facilities

Texas Department of Transportation	Austin, Texas	In-kind support, collaboration
The City of Dallas	Dallas, Texas	Collaboration
The Nature Conservancy	Austin, Texas	Collaboration
U.S. Department of Agriculture	Big Spring, TX and Fort Collins, CO	Collaboration, in-kind support, data, equipment, student access
U.S. Geological Survey	Reston, Virginia	Data, in-kind support, access to equipment
University of Delaware	Newark, Delaware	Collaboration
University of Miami	Miami, Florida	Collaborative research
University of Southern California	Los Angeles, California	Collaboration
The University of Texas, El Paso Department of Public Health	El Paso, Texas	Data sharing
University of Texas Houston School of Public Health	Houston, Texas	Collaboration and student access
University of Washington	Seattle, Washington	Collaboration
USDA Agricultural Research Service	Big Spring, Texas	In-kind support, equipment, collaboration
USDA Agricultural Research Service	Fort Collins, Colorado	In-kind support, equipment, collaboration
USDA Agricultural Research Service	Las Cruces, New Mexico	Equipment, collaboration
WeGo Public Transit	Nashville, Tennessee	In-kind support, access to facilities

Table 3. CARTEEH Collaborators.

Name	Affiliation	Contribution	Country
Dr. Ananya Roy	Environmental Defense Fund	Collaboration	USA
Dr. Andrea Polidori	University of California - Riverside	In-kind contributions	USA
Dr. Bakeyah Nelson	Air Alliance Houston	Collaboration	USA
Dr. Cassandra Gaston	The University of Miami, Miami, FL	Contact/Collaboration/data sharing/leveraging	USA
Dr. Chanam Lee	Texas A&M University	Collaboration	USA
Dr. Daniel Tong	NOAA, Washington DC	Contact/leveraging	USA
Dr. David Cocker	UCR, Department of Chemical and Environmental Engineering	Experimental Design and Data Analysis	USA
Dr. David Dubois	Office of the State Climatologist, Las Cruces, NM	Collaboration	USA
Dr. Dongjoo Park	University of Seoul	Collaboration	Korea
Dr. Ellen MacKenzie	Dean, JHU Bloomberg School of Public Health	Collaboration	USA
Dr. Eun Sug Park	TTI – Mobility Analysis Program	Collaboration	USA
Dr. Gabriel Ibarra-Mejia	The University of Texas at El Paso, Department of Public Health	Collaboration, Data, Faculty	USA

Dr. George Delclos	University of Texas Health Science Center at Houston	Collaboration	USA
Dr. George Thrushton	New York University School of Medicine	Collaboration	USA
Dr. Jennifer Horney	University of Delaware	In-kind support	USA
Dr. Jenny Mindell	University College London	Collaboration	The U.K.
Dr. Jeremy Sarnat	Emory University	Collaboration, Faculty	USA
Dr. Joan Reibman	New York University School of Medicine	Collaboration	USA
Dr. Joao Ferreira-Pinto	The University of Texas at El Paso, Department of Public Health	Collaboration, Data, Equipment, In-kind, Faculty	USA
Dr. John Tatarko	USDA Agricultural Research Service, Fort Collins, CO	Collaboration	USA
Dr. John Wright	Bradford Institute for Health Research	Collaboration	The U.K.
Dr. Jorma Keskinen	Tampere University of Technology	In-kind contributions	Finland
Dr. Julian Marshall	University of Washington	Collaboration	USA
Dr. Kai Zhang	University of Texas Health Science Center	Collaboration	USA
Dr. Karen Lucas	University of Leeds	Collaboration	The U.K.
Dr. Kees de Hoogh	Swiss Tropical and Public Health Institute	Collaboration	Switzerland
Dr. Kent Johnson	University of California, Riverside	Data	USA
Dr. Kyuok Kim	Korea Transport Institute	Collaboration	Korea
Dr. Leah Whigham	University of Texas Houston Health Center	Collaboration, Data, Equipment, In-kind, Faculty	USA
Dr. Lixin Jin	The University of Texas at El Paso	Collaboration, Data, Equipment, In-kind, Faculty	USA
Dr. Liz York	Centers for Disease Control and Prevention	Collaboration	USA
Dr. Mark Benden	TAMU Health Science Center	Collaboration	USA
Dr. Mark Burris	TAMU – Civil Engineering	Collaboration	USA
Dr. Michael de Miranda	TAMU - College of Education	Collaboration	USA
Dr. Mark Nieuwenhuijsen	Barcelona Institute for Global Health	Collaboration	Spain
Dr. Martina Klose	Barcelona Supercomputing Center, Barcelona, Spain	Contact/ data sharing	Spain
Dr. Michael Jerett	University of California, Los Angeles	Collaboration	USA
Dr. Nicholas Webb	USDA Agricultural Research Service, Las Cruces, NM	Collaboration	USA
Dr. Nick Duffield	Texas A&M Institute of Data Science	Collaboration	USA
Dr. Qi Ying	TAMU – Civil Engineering	Collaboration	USA
Dr. R. Scott Van Pelt	USDA Agricultural Research Service, El Paso, TX	Collaboration	USA
Dr. Rashid Shaikh	Health Effects Institute	Collaboration	USA
Dr. Rob Scott McConnell	The University of Southern California, Keck School of Medicine	Collaboration	USA
Dr. Robin Autenreith	TAMU – Civil Engineering	Collaboration	USA
Dr. Roya Bahreini	UCR, Environmental Sciences	In-kind contributions	USA
Dr. Shams Tanvir	University of California, Riverside	Personnel	USA

Dr. Susan Anenberg	Environmental and Occupational Health, George Washington University	Collaboration	USA
Dr. Susan Chrysler	TTI – SAFE-D UTC Assistant Director	Collaboration	USA
Dr. Tom Durbin	University of California, Riverside	Data	USA
Dr. Wei Li	TAMU – Landscape Architecture and Urban Planning	Collaboration	USA
Dr. Yunlong Zhang	TAMU – Civil Engineering	Collaboration	USA
Mr. Brandon Feenstra	South Coast Air Quality Management District	Data, In-kind support	USA
Mr. David Ederer	Centers for Disease Control and Prevention	Collaboration	USA
Mr. Douglass Mann	Maryland Institute College of Art	Data collection access	USA
Mr. Hugh Pocock	Maryland Institute College of Art	Data collection access	USA
Mr. Iyasu Eibedingil	The University of Texas at El Paso	Collaboration, Data, Equipment, Student	USA
Mr. John Smart	Advanced Vehicles - Idaho National Lab	Collaboration	USA
Mr. Juan Aguilera	Institute for Healthy Living at the University of Texas at El Paso	Collaboration, Data, Equipment, Student	USA
Mr. Marcos Mendez	The University of Texas at El Paso	Collaboration, Data, Equipment, Student	USA
Mr. Mathew Bechle	University of Washington	Data	USA
Mr. Michael Garber	Emory University	Collaboration	USA
Mr. Zhiming Gao	Oak Ridge National Laboratory	In-kind support	USA
Ms. Niina Kuittinen	Tampere University of Technology	Collaboration	Finland
Ms. Victoria DeGuzman	University of Southern California/ METRANS UTC	Collaboration	USA
Mr. Trent Botkin	New Mexico Department of Transportation	Collaboration	USA
Mr. William Hutchinson	New Mexico Department of Transportation	Collaboration	USA
Mr. Michael Baca	New Mexico Environment Department	Collaboration	USA
Dr. Sarah Hayes	U.S. Geological Survey	Facilities, Equipment, Data	USA
Dr. Robert Wunderlich	Center for Transportation Safety, TTI	Data	USA
Dr. Jothikumar Narayanan	Centers for Disease Control and Prevention	Next-generation sequencing	USA
Stephen Paciotti	Texas Commission on Environmental Quality	Collaboration	USA

OUTPUTS

In CARTEEH's 2018 Technology Transfer Plan, several output performance measures were identified for the Center. We have successfully met several of our output target metrics, such as the number of conference presentations and papers based on CARTEEH research, as well as the number of public, industry, and nonprofit organizations engaged by CARTEEH researchers. Our target metric for conference presentations and papers based on CARTEEH research is seven per year and we have exceeded this number for the year. We plan to continue producing tangible outputs that demonstrate the benefits of CARTEEH research to stakeholders.

Presentations

Name: Gill, T
Event: Southern New Mexico Dust Conference (Sponsored by: New Mexico Department of Environment) April 2020
Title: Dust Storms: Latest Findings

Name: Sharifi, F.
Event: National Travel Monitoring Exposition and Conference (NaTMEC), June 1-4, 2020
Title: The Estimation of Crash Risk and Associated Emission Implications in a Network: Analyzing Data from El Paso, Texas

Name: Tanvir, S., Un-Noor, F., Boriboonsomsin, K., and Gao, Z.
Event: Accepted for publication in *Transportation Research Record*
Title: Feasibility of Operating Heavy-Duty Battery Electric Truck Fleet in Drayage Application

Name: Wei, Z., Esaid, D., Hao, P., Boriboonsomsin, K., and Barth, M.
Event: Submitted for presentation at 100th Annual Meeting of the Transportation Research Board
Title: Connected eco-approach and departure system for electric trucks

Name: Sharifi, F
Event: National Travel Monitoring Exposition and Conference (NaTMEC) (June 1-4, 2020
Title: The Estimation of Crash Risk and Associated Emission Implications in a Network: Analyzing Data from El Paso, Texas

Name: Jeon, S
Event: Joint Advisory Committee (JAC) for the Improvement of Air Quality in the Ciudad Juárez, Chihuahua / El Paso, Texas / Doña Ana County, New México Air Basin (July, 2020)
Title: Land Use Regression Modeling to Assess Effects of Long-Term Transportation Data on Metabolic Syndrome Risk Factors of Low-Income Communities in El Paso, TX

Name: Aguilera, J
Event: Joint Advisory Committee (JAC) for the Improvement of Air Quality in the Ciudad Juárez, Chihuahua / El Paso, Texas / Doña Ana County, New México Air Basin (July 2020)
Title: Short Term Effects of Traffic Related Air Pollution on Cardiorespiratory Outcomes among Low Income Residents from El Paso, TX

Conference Abstracts, Conference Papers, and Journal Articles

Meitiv. A., Xu. X., Sharifi. F., Shelton. J., Zietsman. J., Xu. Y. (Submitted). Full-chain transportation and health modeling platform: An interactive way to explore. American Public Health Association's 2020 Annual Meeting and Expo. San Francisco, CA. October 24-28, 2020.

Sharifi, F., X. Xu, A. Meitiv, J. Shelton, Y. Xu (Submitted). Regional Emission and Health Impact Assessment of Implementation of Micromobility: An El Paso, TX Case Study. 2020 Conference on Sustainability and Emerging Transportation Technology (SETT). Irvine, CA. August 31 – September 2, 2020.

Media References

None to report for this period.

Website

The CARTEEH website continues to be the face of our Center and is regularly updated with the latest center activities. It also provides access to the Transportation Emissions and Health Data Hub, the literature library, and videos from CARTEEH seminars. From April 1, 2020, through September 30, 2020, the CARTEEH website had a total of 5,671 page views and a total of 2,040 unique visitors.

Technologies

None to report for this period

Inventions

None to report for this period

Other Products

None to report for this period

OUTCOMES

We are on track to meet several of our outcome performance measures, such as the number of attendees at seminar and outreach events, the number of visitors to the website, literature library, and Data Hub. Despite setbacks faced due to COVID-19, we anticipate meeting our goals for the year. Further detailed metrics will be included in the report for the next reporting period.

IMPACT

We are continuing to see the impacts of our work, ranging from the successes of our students

and interns to the dissemination of our research results and technology transfer activities. We continue to engage several transportation agencies and work with them collaboratively on solutions that can maintain and enhance the functioning of the transportation system while also promoting health. Our outputs continue to impact the body of existing scientific knowledge, with publications and conference presentations reaching a scientific audience, as well as the local media. We hope to continue outreach to stakeholders with a view of increasing our impact in the coming reporting period.

CHANGES/PROBLEMS

None

SPECIAL REPORTING REQUIREMENTS

No special reporting requirements.