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

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Report Term:	Semi-Annual
Signature of Submitting Official:	Haylee Yung

OVERVIEW

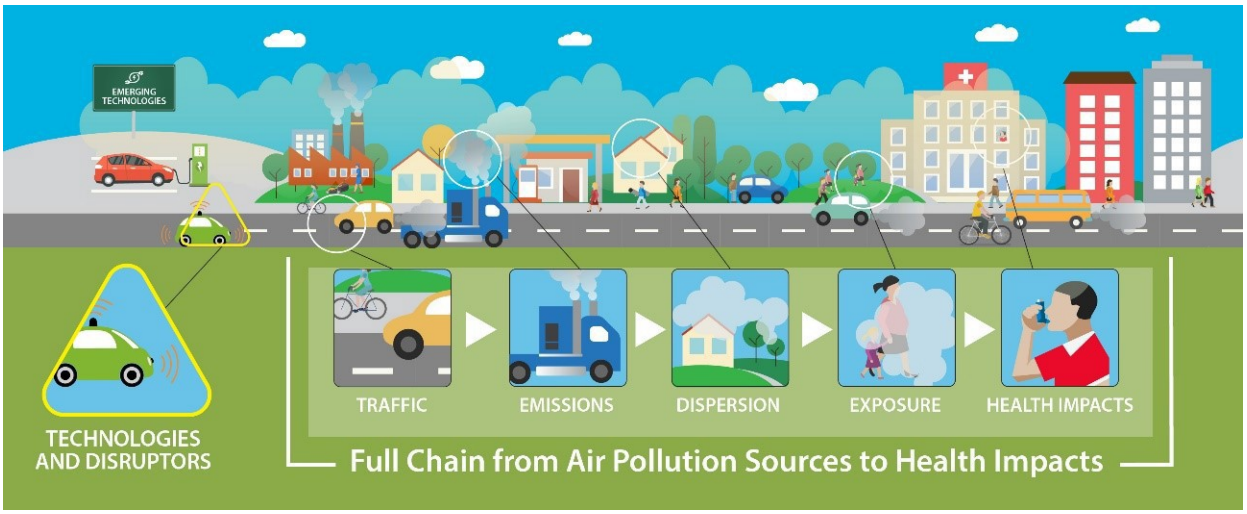
The Center for Advancing Research in Transportation Emissions, Energy, and Health (CARTEEH) has been highly productive during this reporting period as we continue to build on our successes of the last four and a half years. We have made good progress despite the disruptions we faced amid a pandemic. In this reporting period, we closed out several projects, and kicked off the most recent round of competitive awards and strategic initiatives.We are pleased with the impact of our work, 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's research focus areas were defined to cover this spectrum and are as follows:

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

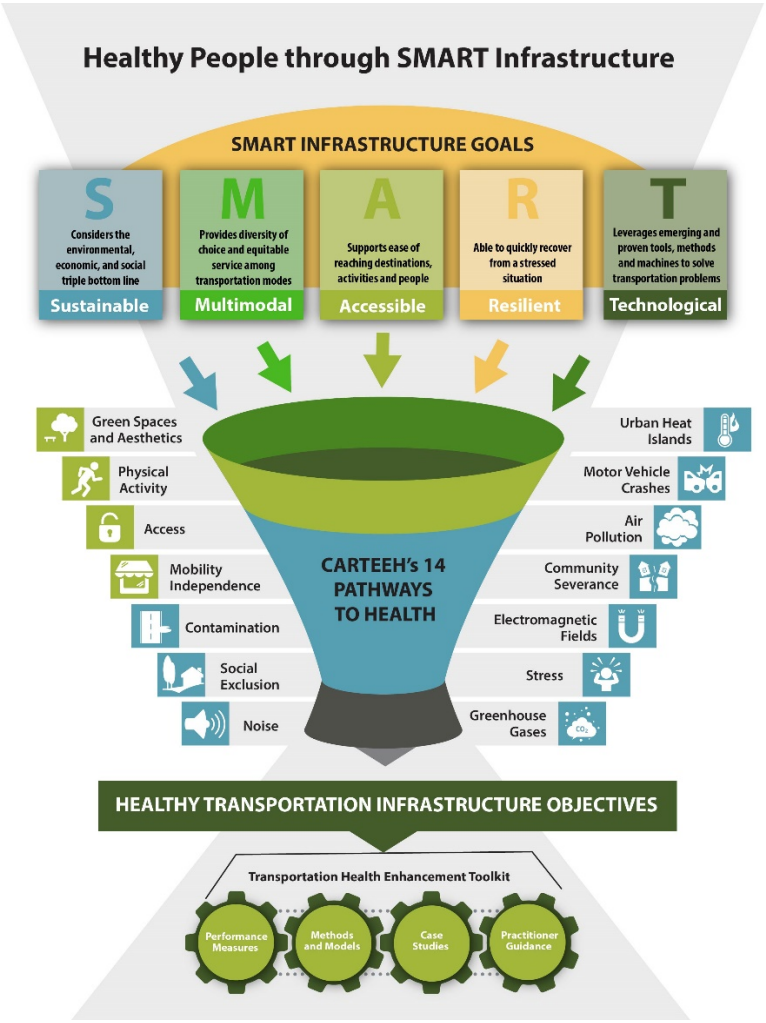
Progress in each CARTEEH goal area is detailed in the following sections:

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.

Most of the research activities this reporting period were focused on supporting CARTEEH's ambitious "SMART Infrastructure" initiative, that aims to link health to transportation infrastructure decisions. Fourteen new competitive projects were awarded as a result of the request for proposals (RFP) issued in the Fall of 2020 and kicked off during this reporting period. Further, all CARTEEH consortium members initiated collaborative projects aligned with the SMART framework.

Figure 2: SMART Infrastructure



The majority of the competitive research projects awarded in CARTEEH's third and fourth year have also been completed, and CARTEEH staff members are working with researchers to finalize their reports, upload their data to the CARTEEH Data Hub, and disseminate results.

Table 1: CARTEEH Project Portfolio

Project	Lead Institution	Principal Investigator	Project Number
Developing a Transportation Emissions and Health Data Hub	TTI	Andrew Birt	01-TTI
Reconciles differences in characteristics of transportation and health data; develops a platform to house datasets			
Truck Emissions Exposure Study in Ports	GaTech	Michael Rodgers	02-GT
Assesses pollutant emissions at selected major ports; evaluates the potential reduction of exposure using multiple methodologies			
Border Crossing Emissions Impact Study	TTI	Tara Ramani	03-TTI
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	Wen-Whai Li	04-UTEP
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	Peng Hao	05-UCR
Evaluates benefits of batter electric trucks and plug-in hybrid electric trucks over conventional diesel trucks			
Health Risk Characterization for Transportation Users	JHU	Mary Fox	06-JHU
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	Genee Smith	07-JHU
Delivers evidence-based characterization of emissions impacts of CBR within Baltimore City, Maryland			
PM Exposure for Paratransit Transport	GaTech	Alex Samoylov	01-08-GT
Characterizes exposure to PM faced by sensitive populations using paratransit transport			
Measuring Temporal and Spatial Exposure of Urban Cyclists to Air Pollutants Using an Instrumented Bicycle	GaTech	Kari Watkins	01-09-GT
Develops an understanding of local cyclists' exposure to PM2.5 air pollutants in an urban environment			
Traffic-Related Air Pollution and Childhood Asthma in the United States: A burden of Disease Assessment	TTI	Haneen Khreis	01-10-TTI
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	Phil Lewis	01-11-TTI
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	Suriya Vallamsundar	01-12-TTI
Examines usage pattens and emissions exposure of dockless mobility users			
Quantifying Bioavailable Metals and Potential Dust Emissions from Highway-Related and Desert Sediments at Lordsburg Playa, New Mexico	UTEP	Thomas Gill	01-13-UTEP
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	Georgios Karavalakis	01-14-UCR
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	Jill Luo	01-15-UCR
Develops a statistical model to quantify the contribution to the ambient air quality degradation due to traffic congestion			
Development of CARTEEH Curriculum for Transportation Emissions and Health: Phase 1	TTI	Haneen Khreis	01-16-TTI
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	Haneen Khreis	01-17-TTI
Development of a downloadable spreadsheet resource tabulating and categorizing literature on transportation emissions, energy, and health.			
Technology Landscape and Future Direction for Transportation Emissions, Energy, and Health	TTI	Yanzhi (Ann) Xu	03-18-TTI
Develops a technology roadmap for transportation emissions, energy, and health			
DataTEEH (Data for Transportation, Emissions, Energy, and Health) - Delivering value with CARTEEH's Data Hub.	TTI	Yanzhi (Ann) Xu	03-19-TTI
Use of CARTEEH's data hub infrastructure for data integration applications, including the development of a national emissions map			
Urban Policy Interventions to Reduce Traffic Emissions and Traffic-Related Air Pollution: A Systematic Evidence Map	TTI	Haneen Khreis	03-20-TTI
Identifies policy interventions to effectively reduce traffic emissions and traffic-related air pollution from on-road mobile sources			
Transportation and Health - Conceptualization and Quantification	TTI	Haneen Khreis	03-21-TTI
Addresses the transportation-health nexus beyond air quality and emissions; develops and applies a comprehensive conceptual "pathways" model			
Development of an Emission-based Selection Algorithm to Optimize Variable Message Signs Location	TTI	Farinoush Sharifi	03-23-TTI
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	Phil Lewis	03-24-TTI
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	Shankar Chellam	03-25-TTI
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	TTI	Johnathon Ehsani	03-26-JHU
Investigates the use of new mobility options as a public health intervention, through simulation of scenarios and validation with real-world data.			
Association of Traffic and Related Air Pollutants on Cardiorespiratory Risk Factors from Low-Income Populations in El Paso, TX.	UTEP	Jsoyoung Jeon	03-27-UTEP

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	Kent Johnson	03-28-UCR
Develops the capability for spatial and temporal visualization of emissions from the OSAR on-board emissions measurement system.			
Modeling Air Quality Impacts of Pollution Mitigation Scenarios at a Multimodal Inland Port.	GaTech	Franklin Gbologah	03-29-GT
Assessment of Nox and PM emissions and dispersion for various pollution control scenarios in an inland port.			
Improved Vehicle Emissions and Near-Road Dispersion Modeling Tool for Project Evaluation: Integrating MOVES-Matrix, the FEC, and AERMOD	GaTech	Haobing Liu	03-30-GT
Developing a tool to streamline and integrate transportation emissions modeling and dispersion modeling for a more straightforward assessment of air quality impacts.			
Course Curriculum Development (Phase II)	TTI	Haneen Khreis	03-31-TTI
Development of Full-Chain Transportation Emissions, Exposure, and Health Modeling Platform	TTI	Yanzhi (Ann) Xu	04-34-TTI
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	Josias Zietsman	04-35-TTI
Investigates the role of transportation vehicles and infrastructure in the spread of disease.			
Feasibility Analysis and Infrastructure Requirements of Affordable, Shared, and Electric Mobility*	TTI	Xiaodan Xu	05-37-TTI
Assesses the feasibility of providing electric shared EV service to middle- and low-income households that live in multi-unit communities in Texas.			
Economic Impacts of Electric Vehicle Infrastructure Expansion on Texas Metros*	TTI	Jacqueline Kuzio	05-38-TTI
Produce a tool that utilizes both benefit-cost and economic impact modelling to show the benefits that could arise with an increased investment in electric vehicle infrastructure.			
Effects of COVID-19 Lockdown on Air Quality and Mortality across Continental United States – A Data Driven Approach*	TTI	Rohit Jaikumar	05-39-TTI
Aims to integrate observational air quality, satellite data and epidemiological studies to quantify health benefits of the lockdown measures imposed in response to the COVID-19 pandemic.			
Developing a SMART Framework and Practitioner Toolkit to Enhance the Public Health Benefits of Transportation Infrastructure*	TTI	Ben Ettelman	05-40-TTI
Identify a range of qualitative and quantitative metrics for transportation-health pathways, which will be based on the 14 Pathways to Health (1) that have been developed by CARTEEH researchers.			
Instant COVID-19 Diagnostic Devices on the Go to Improve Transportation Safety*	UTEP	Xiujun Li	05-44-UTEP
Aims to develop an "on-the-Go" COVID-19 quantitative diagnostic microdevice integrated with reverse transcription–LAMP (RT-LAMP) for instant early detection of COVID-19 in public transportation vehicles to improve transportation safety.			
Understanding Modal Shift during the Pandemic and Quantifying its Public Health Impact*	JHU	Michelle Duren	05-45-JHU
Provide useful insights for policymakers in transportation and health departments on travel behavior changes during the pandemic.			
Locational Marginal Emission Evaluation for Electric Vehicle Charging Facility Planning*	UTEP	Yuanrui Sang	05-46-UTEP
Develop a framework for locational marginal emissions estimation and environmental impact mitigation for EVs.			

Impacts of COVID-19 Induced Active Transportation Demand on the Built Environment and Public Health*	TTI	Bahar Dadashova	05-47-TTI
Estimate the COVID-19-induced active transportation demand.			
Develop a performance metric to quantify the inhalation of traffic-related air pollutants at both mesoscale and macroscale*	UCR	Ji Luo	05-48-UCR
Develop a performance metric to quantify the inhalation of traffic-related air pollutants at both mesoscale (e.g., neighborhoods, cities) and macroscale (e.g., census tracts, metropolitan regions).			
Quantifying the Environmental and Health Impacts of Curbside Management for Emerging Multi-modal Mobility Services*	UCR	Guoyuan Wu	05-49-UCR
Aims to investigate how curbside management strategies may help address traffic bottlenecks on roads and sidewalks due to intensive pick-up/drop-off (PUDO) activities.			
Children's Exposure to Traffic Pollution in Texas School Districts: Analyzing Social Disparities and Adoption of Mitigation Strategies*	UTEP	Jayajit Chakraborty	05-51-UTEP
Seeks to analyze social disparities in exposure of school-aged children to vehicular air pollution and examine the adoption of mitigation strategies for reducing school exposure to vehicular pollution, across public school districts in Texas.			

* Indicates projects awarded/initiated during this reporting period.

Research Results Disseminated

CARTEEH researchers and students continued to disseminate their research results through various venues, including presentations at conferences, paper submittals to journals, and in meetings and outreach to stakeholders. Key research findings are also disseminated through the CARTEEH website. CARTEEH's success in disseminating research results was evidenced by a recent interview with the U.S. Department of Health and Human Services' (HHS) Office of Disease Prevention and Health Promotion (ODPHP) for their Healthy People 2030 Blog Series. The blog may be accessed here.

Plans for Next Reporting Period to Accomplish Research Goal

In the next reporting period, CARTEEH leadership will continue working with the principal investigators of newly initiated projects to ensure the success of their projects. We expect to leverage our research results for further education and technology transfer activities, with an emphasis on stakeholder engagement and in line with our SMART initiative.

CARTEEH Goal #2: Education and Workforce Development

CARTEEH closely engages with students on our ongoing research projects, and through opportunities for students to participate in events such as our upcoming Symposium. Key updates relating to education and workforce development are provided below.

CARTEEH Summer Internship Program

In conjunction with two other University Transportation Centers (UTCs), CARTEEH began accepting applications for the summer internship program in January of this year, to be held at the Texas A&M Transportation Institute. As done last year, the internship will be conducted virtually, with students working remotely, instead of on campus. In this reporting period, applications were received and evaluated. CARTEEH selected three summer interns, who will work remotely with mentors on research projects and deliver a final research paper and presentation. Students will also participate in other virtual events over the course of the internship, which runs from May 24 to July 31, 2021.

Education Results Disseminated

This reporting period, the dissemination of our education results focused on making more of CARTEEH's cross-disciplinary course on "Traffic- Related Air Pollution, Human Exposures, and Health" available online. There are currently 60 lectures available the CARTEEH website that cover a broad spectrum of topic areas related to transportation, air quality, and health. The course can form the basis of a graduate level course, used to supplement an existing university course, or for practitioner learning.

Plans for Next Reporting Period to Accomplish Education Goal

During the next reporting period, CARTEEH looks forward to engaging students in a successful summer internship program, making more of our curriculum available online, and pursue other opportunities for impact in the area of education and workforce development.

CARTEEH Goal #3: Technology Transfer

CARTEEH views technology transfer as a vital part of the research process, emphasizing stakeholder engagement, information dissemination and the creation of open-access tools and methods to make research results and knowledge available to the research community and beyond. Several technology transfer activities are underway and progressing, as outlined below.

Transportation, Air Quality, and Health Symposium

During this reporting period, work continued to plan the next CARTEEH Transportation, Air Quality, and Health Symposium. It was originally rescheduled from 2020 and planned

as an in-person event in California. However, due to uncertainties related to COVID-19, CARTEEH leadership decided to conduct it as virtual event instead, scheduled for May 18-20, 2021. TTI and UC Riverside are serving as event co-hosts, with other partners supporting the program development. The CARTEEH team finalized the virtual platform for the conference and worked on finalizing the program for the event, including selection of speakers from abstract submittals previously received, and recruitment of speakers for keynote and plenary sessions.

CARTEEH Webinar Series

CARTEEH continued its webinar series with a very successful webinar conducted on December 3, 2020 on the impacts that COVID-19 has had on transportation, air quality, and health. The webinar was conducted in panel format, featuring speakers from each CARTEEH consortium member. The webinar was very well attended with over 100 attendees. The webinar recording and slides, as well as materials from all previous CARTEEH webinars and seminars are available here: https://www.carteeh.org/carteeh-seminars-and-webinars/

CARTEEH has also lined up two upcoming webinars for the next reporting period. TTI will host a webinar on April 27, 2021 featuring Dr. Haneen Khreis speaking about the pathways linking health and transportation. Georgia Tech will also host a webinar on June 23, 2021 featuring Dr. Kari Watkins and her research on bicyclists' emissions exposure.

Technology Transfer Results Disseminated

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. As of the end of this period there are a total of 1,058 studies in the library. We continue to implement our tech transfer plan by engaging with stakeholders and disseminating research findings through our website. We maintain a robust mailing list, that we use for communication and dissemination of our work with monthly "CARTEEH Announcement "emails.

Plans for Next Reporting Period to Accomplish Technology Transfer Goal

Work will continue in preparation for the upcoming symposium, which will highlight our current research efforts and showcase emerging areas to the broader transportation community. We will continue to host webinars to help disseminate recently completed work by our competitive projects and engage with stakeholders to discuss our SMART initiative as well as health equity.

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 theTexas A&M Health Science Center, are also involved. 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 across 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 in the following tables 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-kindsupport
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 MetropolitanTransportation 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 toequipment
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

Despite the cancellation of several long-standing conferences and professional events, CARTEEH researchers continued to find opportunities to present and publish our work. Some key outputs this reporting period are listed below.

Presentations

Name: Wan Zhou, James Li
Event: Pittcon Conference
Title: Gold Nanoparticles Aggregation-Induced Quantitative Photothermal Biosensing Using a Thermometer

Name: Kenji Santacruz
Event: 2021 Texas Undergraduate Research Day at The Capitol
Title: Tracking Renewable Energy Consumption in an Electricity Market

Name: Xiaodan Xu
Event: Transportation Research Board Annual Meeting
Title: An Integrated Transportation Network and Power Grid Simulation Approach for Assessing Environmental Impact of Electric Vehicles

Name: Alexander Meitiv, Xiaodan Xu, Farinoush Sharifi, Jeff Shelton, Josias Zietsman, and Ann Xu
Event: AHPA 2020 Virtual Annual Meeting and Expo
Title: Full-chain transportation and health modeling platform: An interactive way to explore

Name: Chavez M, Vasquez A, Li W-W
Event: 79th Meeting of Joint Advisory Committee (JAC) for the improvement of air quality in the Ciudad Juarez, Chihuahua/El Paso, Texas/Dona Ana County, New Mexico air basin (online)
Title: Low-cost Air Sensor Study in the Paso del Norte

Name: Aguilera J, Jeon S, Chavez M, Ibarra G, Ferreira-Pinto J, Whigham L, Li W-W
Event: Transportation Research Board Annual Meeting
Title: Land Use Regression of Long-Term Transportation Data on Metabolic Syndrome Risk Factors in Low-income Communities

Name: Aguilera J, Jeon S, Chavez M, Ibarra G, Ferreira-Pinto J, Li W-W, Whigham L
Event: Obesity Week Interactive
Title: Associations of Traffic and Related Air Pollutants with Obesity and Glucose in Low-Income Populations in El Paso, TX

Name: Thomas Gill
Event: American Meteorological Society Annual Meeting
Title: Integrating NASA Satellite Data to Strengthen Environmental Health Applications: Approaches to Inform Health Decision-Making and Enhance Public Engagement

Peer Reviewed Publications

Aguilera J, Soyoung J, Chavez M, Ibarra G, Ferreira-Pinto J, Whigham L, Li WW (2021). Land Use Regression of Long-Term Transportation Data on Metabolic Syndrome Risk Factors in Low-income Communities. Transportation Research Record (Accepted for publication)

R. S. Van Pelt, John Tatarko, Thomas E. Gill, Chunping Chang, Junran Li, Iyasu Eibedingil, and Marcos Mendez, 2020. Dust Emission Source Characterization for Visibility Hazard Assessment on Lordsburg Playa in Southwestern New Mexico USA. Geoenvironmental Disasters 7: 34, doi:10.1186/s40677-020-00171-x

Uwak I, Vallamsundar S, Jaikumar R, Ramani T, Aguilera J, Li W-W. 2020. Personal Exposure to Polycyclic Aromatic Hydrocarbons in the Vicinity of the U.S.-Mexico Border Crossings, a pilot study of School Teachers in El Paso, Texas, submitted to Journal of Environmental Research and Public Health (IJERPH).

Patton, A.N., Levy-Zamora, M., Fox, M., Koehler, K. (2021) Benzene exposure and cancer risk from commercial gasoline station fueling events using a novel self-sampling protocol. International Journal of Environmental Research and Public Health 18(4):1872. doi: 10.3390/ijerph18041872.

Theses and Dissertations

Iyasu G. Eibedingil, Environmental Science and Engineering, University of Texas at El Paso, "Drought, Dust Storm and Particulate Matter Pollution and Their Interaction at the Cascade of Spatial Scales Across the Western United States," dissertation defended March 12, 2021, Thomas E. Gill, Committee Chair: Wen-Whai Li, Committee Member.

Media References

None to report currently.

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 project reports and outputs, as well as the Transportation Emissions and Health Data Hub, as well as the literature library and videos from CARTEEH seminars.

Technologies

None to report for this period

Inventions

None to report for this period

Other Products

None to report for this period

OUTCOMES

We have successfully met several of our outcome performance measures, such as the number of attendees at seminar and outreach events, and the number of visitors to the website, literature library, and Data Hub. For this six-month reporting period, we had over 300- attendees to our webinar and outreach events and 3,779 visits to our website and are on track to meet our yearly goals for these metrics.

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 stakeholders and are renewing our focus on this in light of the SMART initiative. Our outputs continue to impact the body of existing scientific knowledge, withpublications and conference presentations reaching a scientific audience, as well as the local media.

CHANGES/PROBLEMS

None

SPECIAL REPORTING REQUIREMENTS

No special reporting requirements.