

# SARAH DENNIS-BAUER

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## EDUCATION

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<b>Postdoctoral Researcher</b>	Current	<i>University of Washington</i>
<b>Ph.D. Civil Engineering</b>	Dec. 2024	<i>University of California, Davis</i>
<b>M.S. Epidemiology</b>	Sep. 2024	<i>University of California, Davis</i>
<b>M.S. Civil Engineering</b>	May 2019	<i>University of Nevada, Las Vegas</i>
<b>B.S. Public Health</b>	Dec. 2016	<i>University of Nevada, Las Vegas</i>

**Dissertation Title.** *Integrating human exposure into freight transportation modeling for a sustainable and equitable future*

**Civil Engineering Thesis Title.** *Perceptions and attitudes towards the deployment of autonomous and connected vehicles: Insights from Las Vegas, Nevada*

## INTERESTS AND SPECIALTIES

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**Efficient freight practices, technology, and land use.** Feasibility of zero and near-zero emission fuel technologies, operational, or systematic options to improve freight efficiency, including e-commerce.

**Disruption response and resilience.** Evaluating the impacts and behaviors under disruptions or disasters to identify key impacts and inform planning takeaways.

**Planning and policy.** Identifying feasible and effective policy, planning, and financial or incentive structures to address externalities from transportation.

**Environmental epidemiology.** Estimating health impacts from (transportation-attributable) emissions.

**Community health and human exposure modeling.** Developing and implementing efficient, accessible, and accurate computational models to quantify health impacts from various pollutants.

**Statistical modeling.** Employing and integrating various statistical methods and models for geospatial, inferential, predictive, econometric, choice modeling, and machine learning analyses.

## AWARDS AND HONORS

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- 2024 National Center for Sustainable Transportation Outstanding Student of the Year
- 2021 Best Teaching Assistant Award for the Department of Civil and Environmental Engineering
- 2018 First-place prize in the technical paper competition at the ITS Fall Transportation Conference

## RESEARCH EXPERIENCE

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**Postdoctoral Researcher in the Urban Freight Lab.** (September 2024 – Current)

Managing the traffic-related air pollution effects of urban warehousing near historically marginalized communities: A scenario analysis of technology and land use based strategies

- Reviewing literature and existing or proposed policies covering the relationships between warehouse and distribution, freight land use, e-commerce, air quality, and community health topics.
- Guiding study design to quantify the air quality and community health impacts of freight land use under current trends and with different projected technology, planning, and policy interventions.
- Designing, conducting, and analyzing interviews with various sector stakeholders, including developers, planners, and community-based organizations.
- Leading emissions, air quality, and health impact modeling and analysis.
- Implementing mixed-methods research, collecting and analyzing quantitative and qualitative data.
- Collaborating and supporting team efforts to ensure all funding agency requirements are met.

### Evacuation decisions and health impacts of the 2025 LA fires on transit users

- Co-wrote the successful grant application for funding from the National Hazards Center.
- Collaborated to design and conduct an online survey within one month of the 2025 LA fires.
- Lead health-related survey question design and analysis, health-related questions for follow-up interviews, and the air quality data integration with survey responses and analysis.
- Conducted interviews with fire-impacted community members.
- Hosted a stakeholder roundtable to share preliminary findings and engage with local planners and decision makers.

### **Graduate Student Researcher.** (May 2017 – December 2024)

#### Developing a reduced complexity air quality model for transportation-source air pollution

- Joined and analyzed large geospatial datasets and various models to estimate pollutant concentrations and associated public health impacts.
- Built a statistical model to optimize predictive power and reduce bias in epidemiological effect estimates.
- Structured model to allow estimation of transportation-source contributions to ambient air pollution to quantify sustainability and public health impacts from transportation planning decisions and policy proposals.

#### Explicit consideration of human exposure to minimize freight routing

- Co-wrote the successful grant application for project funding from the Center for Transportation, Environment, and Community Health.
- Employed a high-resolution reduced complexity air quality model to perform user equilibrium multimodal traffic assignment with the objectives of minimizing the health impacts of trucks (can be incentivized through policy initiatives) and travel time of passenger cars.
- Updated an eco-routing traffic assignment algorithm cost function to consider arc-level health impacts from PM<sub>2.5</sub> as arc costs, as opposed to emissions quantities or more traditional arc costs of travel time or distance.
- Assessed community-level outcomes under each assignment scenario, including minimized health costs (with additional geofenced scenarios), emissions, travel time, and distance.

#### How people access essential goods in a crisis: Grocery shopping during COVID-19

- Analyzed e-commerce and mobility trends in the early and most turbulent stage of COVID-19, to ensure that during future health crises, proper preparations are made by those in freight and disaster response to provide communities access to essential goods.
- Tested various modeling types and specifications to correctly model various data sources and scopes, with varied measurements and limitations.
- Estimated multiple indicator solution discrete choice models to model consumer demand for grocery shopping channels, and therefore their mode for obtaining essential goods.

#### Truck transportation in California: Disaggregating public health costs from criteria pollutants

- Created an algorithm to match exposure costs to vehicles according to several variables, using a reduced complexity air quality model, California Air Resources Board Emissions Factor model, and California Vehicle Inventory and Use Survey.
- Performed stratified analysis, multiple linear regression for cost estimates, and k-means clustering of trucks.
- Proposed policy and planning initiatives to mitigate health externalities of freight, considering vehicle and operational characteristics.

#### Estimating last-mile deliveries and shopping travel emissions by 2050

- Co-wrote the successful grant application for project funding from the US Department of Transportation National Center for Sustainable Transportation (Pacific Southwest Region University Transportation Center).
- Performed data cleaning, restructuring, and joining multiple spatiotemporal datasets including population characteristics and population projection estimates.

- Estimated future population data using scenario population projections to estimate e-commerce demand in coming decades using behavioral modeling.

#### I-5 Freight zero emissions route operations (ZERO) pilot study

- Outlined current and future freight transportation issues reported from various government reports and planning documents, as well as projected conditions and issues.
- Comprehensively assessed and recommended technological solutions to each of the six primary regional freight problems.
- Assisted in designing and conducting a small-scale data collection pilot study to evaluate (near) zero-emission heavy duty trucks and operations on the I-5 corridor in the San Joaquin Valley, ultimately identifying substantial barriers to the operation of such vehicles on this route.
- Used existing literature and the Argonne National Laboratory Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) to estimate total costs of ownership, considering funding and incentive programs available in the region.
- Created a framework for a future pilot study which contains a comprehensive list of potential solutions to local issues, advantages and disadvantages, cost estimates and who pays, and which of the issues are addressed.
- Collaborated with the San Joaquin Regional Planning Agencies, Kern Council of Governments, and original equipment manufacturers to target and update the study design and outcomes of interest.

#### Perceptions and attitudes towards the deployment of autonomous and connected vehicles

- Co-wrote a successful grant application for project funding from the City of Las Vegas.
- Designed two stated preferences surveys for two different target populations (exposed and unexposed to an autonomous shuttle) to analyze opinions and perceptions of automated and connected vehicles, using an autonomous shuttle operating in Las Vegas, Nevada.
- Implemented the unexposed survey to Qualtrics online platform and generated various social media and flyer templates to advertise the survey.
- Conducted over 400 cross-sectional surveys across in-person and online platforms.
- Identified and visited six carefully selected community centers to represent the Las Vegas community.
- Visited, rode, and surveyed riders of the autonomous shuttle for no less than 15 hours.
- Recruited and coordinated volunteer schedules, in addition to serving as the on-site project coordinator for approximately 15 rounds of in-person data collection.
- Collaborated with stakeholders, including AAA and the City of Las Vegas to collect data that were informative to their respective interests.
- Performed descriptive and appropriate statistical analysis on sparse and small sample size data.

## **PUBLICATIONS**

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### **Peer-Reviewed Publications.**

**Dennis-Bauer, S.**, Pahwa, A., and Jaller, M. Explicit consideration of human exposure to minimize freight routing impacts. (*Under review*)

Qin, Z., Goodchild, A., Fried, T., **Dennis-Bauer, S.**, and Yuan, Q. The state of modeling for evaluating health equity impacts of freight emissions. (*Under review*)

Fried, T., Tejada, C., **Dennis-Bauer, S.**, Bolbaatar, O., Goodchild, A., Marshall, J.D., Olmedo, O., Garcia, L. The logistics of zoning, zoning for logistics: Toward healthy and equitable development for urban freight. *Journal of the American Planning Association*. <https://doi.org/10.1080/01944363.2025.2515134>

**Dennis-Bauer, S.**, Jaller, M., Amador, S., and Forscher, E. (2024). Assessing grocery shopping behaviors during a health crisis. *Transportation Research Interdisciplinary Perspectives*. <https://doi.org/10.1016/j.trip.2024.101124>

Jaller, M., Xiao, R., **Dennis-Bauer, S.**, Rivera-Royero, D., and Pahwa, A. (2023). Estimating last-mile deliveries and shopping travel emissions by 2050. *Journal of Transportation Research Part D: Transport and Environment*. <https://doi.org/10.1016/j.trd.2023.103913>

**Dennis-Bauer, S.** and Jaller, M. (2023). Truck transportation in California: Disaggregating public health costs from criteria pollutants. *Journal of Transportation Research Part D: Transport and Environment*. <https://doi.org/10.1016/j.trd.2023.103850>

**Dennis, S.**, Paz, A., and Yigitcanlar, T. (2021). Perceptions and attitudes towards the deployment of autonomous and connected vehicles: Insights from Las Vegas, Nevada. *Journal of Urban Technology*. <https://doi.org/10.1080/10630732.2021.1879606>

#### **Book Chapter.**

Jaller, M. and **Dennis, S.** (2023). E-commerce and mobility trends during COVID-19. In: Loukaitou-Sideris, A., Bayern, A.M., Circella, G., Jayakrishnan R. (eds) *Pandemic in the Metropolis*. Springer Tracts on Transportation, Traffic, Vol. 20, Springer, Cham. [https://doi.org/10.1007/978-3-031-00148-2\\_6](https://doi.org/10.1007/978-3-031-00148-2_6)

#### **Reports.**

**Dennis-Bauer, S.**, Pahwa, A., Jaller, M., and Zhang, M. (2023). Cargo routing, health impacts, and disadvantaged communities. Center for Transportation, Environment, and Community Health (CTECH). US Department of Transportation.

Jaller, M., Xiao, R., **Dennis, S.**, Rivera-Royero, D., and Pahwa, A. (2022). National impacts of e-commerce growth: Development of a spatial demand-based tool. National Center for Sustainable Transportation. University of California, Davis.

Jaller, M., **Dennis, S.**, Rivera-Royero, D., and Pourrahmani, E. (2022). I-5 freight zero emissions route operations (ZERO) pilot study. San Joaquin Valley Regional Planning Agencies.

#### **Blog.**

**Dennis, S.** and Rivera-Royero, D. (2021). What transportation studies look like at UC Davis. StreetLight blog. <https://www.streetlightdata.com/transportation-studies-uc-davis/>

#### **Conference Presentations.**

Health Effects Institute (HEI) Annual Conference (2025). The logistics of zoning, zoning for logistics: Toward healthy and equitable development for urban freight. *Presenter: Fried, T.*

International Urban Freight (I-NUF) Conference (2025). Developing a transportation-specific reduced complexity model. *Presenter: Dennis-Bauer, S.*

I-NUF Conference (2025). The logistics of zoning, zoning for logistics: Toward healthy and equitable development for urban freight. *Presenter: Fried, T.*

Transportation Research Board (TRB) Annual Meeting Lectern Presentation (2024). Cargo routing, health impacts, and disadvantaged communities. Lectern: Health and Equity at the Heart of Transportation Planning, Policy, and Practice. *Presenter: Dennis-Bauer, S.*

TRB Annual Meeting Poster Presentation (2023). Truck transportation in California: Disaggregating public health costs from criteria pollutants. *Presenter: Jaller, M.*

International Urban Freight (I-NUF) Conference (2022). Changes in grocery shopping-related travel during COVID-19. *Presenter: Dennis-Bauer, S.*

TRB Annual Meeting Poster Presentation (2020). Perceptions and attitudes towards the deployment of autonomous and connected vehicles: Insights from Las Vegas, Nevada. *Presenter: Paz, A.*

Intelligent Transportation Society of Nevada. Fall Transportation Conference, Las Vegas, NV (October 2018). Preliminary analysis of perceptions and attitudes towards the deployment of an autonomous shuttle in Las Vegas, Nevada. *Presenter: Dennis-Bauer, S.*

## TEACHING EXPERIENCE

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### **Guest Lectures.** (April 2025 – Current)

- Course: Environmental Analysis and Assessment in Transportation (Graduate level), University of Washington
- Course: Travel Demand Forecasting (Graduate level), University of Washington
- Course: Land Use and Transportation Policy (Graduate level), Kyiv School of Economics

### **Civil Infrastructure and Society.** (September – December, 2019 – 2021)

- Introduced each field of civil engineering by combining technical lectures, seminars, and lab sessions with experiments or studies related to the field.
- Conducted weekly 3-hour lab sessions for a group of over 20 students.
- Adapted labs and teaching style to benefit student learning outcomes in an online platform during COVID-19.
- Provided students with the necessary information to perform lab assignments correctly, safely, and effectively, including targeted lectures, tutorials, and demonstrations.
- Created a transportation engineering lab assignment for all lab groups (over 160 students) to introduce students to basic concepts and tools used in the field.
- Ensured six other teaching assistants were prepared for the newly designed transportation engineering lab, which entailed a lecture, data collection, and data analysis.

### **Senior Design – Transportation Engineering Group.** (January – July, 2020 – 2021)

- A senior-level course in which groups of students develop transportation engineering proposals for Caltrans projects, including proposed solutions, comprehensive analysis of solutions, and recommendations.
- Served as a direct advisor to four groups of students, 4-5 students each.
- Met with groups weekly to discuss progress, questions, concerns, and technical and theoretical course content.
- Supported students in developing their technical writing, presentation, and communication skills.
- Guided students toward appropriate transportation engineering, environmental analysis, and statistical methods and resources.
- Adapted mentorship and instructional tactics to ensure student collaboration and learning outcomes were maintained during COVID-19.

### **Statics.** (January – May 2019)

- Aided students in applying physics and engineering concepts to evaluate the impacts of forces on the equilibrium of structures or systems.
- Graded weekly assignments for approximately 40 first and second-year students.
- Provided students with written feedback and guidance for additional topic resources.

### **Transportation Engineering.** (August – December 2018)

- A junior-level course covering the fundamental topics of transportation engineering.
- Conducted 8 out of 20 lectures for a class of approximately 30 students.
- Hosted weekly office hours to support student learning outcomes and strengthen their application of weekly content to assignments, exams, and term projects.
- Created all assignments and exams intending to improve critical thinking skills.

- Provided support and feedback to students on assignments, specific topics related to their class projects, and presentations.

## PROFESSIONAL EXPERIENCE

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### **Women's Transportation Seminar UC Davis Chapter Treasurer** (September 2021 – October 2024)

- Manage organization finances, including incoming donations and funds, expenses, reimbursements, and budgeting.
- Participate in leadership board activities, such as event planning, advertisement, outreach, adapting to student needs and interests, and developing and maintaining professional connections.

### **Caviola-Anson Group Transportation Engineering Intern.** (October 2017 – May 2019)

- Learned common industry practices and procedures for traffic and safety engineering, construction, design, and project management.
- Provided quality control assistance to PhD-level transportation engineers.
- Employed widely used transportation-related manuals and resources to assist in project-based tasks.

### **Girls on the Run, Las Vegas, Program Coordinator** (October 2016 – May 2017)

[A not-for-profit, after-school, physical and emotional health-promotion program for 3rd-8th grade girls]

- Facilitated efficient and effective communications within the organization.
- Assisted in the writing of grant funding applications.
- Collaborated with the executive director and program manager to facilitate a seamless delivery of the impactful program.
- Communicated clearly and concisely with approximately 150 volunteers.
- Marketed the program to potential participants, parents, sites, coaches, and other volunteers or philanthropic partners.

## SERVICE AND OUTREACH

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### **Dean's Graduate Student Advisory Committee Representative.** (December 2019 – February 2023)

- Served as the Civil and Environmental Engineering graduate student representative to the Dean of the College of Engineering.
- Met monthly with graduate student representatives from other College of Engineering departments, and the dean of the College of Engineering.
- Discussed graduate student concerns including mental health, space and supplies, COVID-19 concerns, and suitable remedies from the College.

### **Graduate Student Recruitment and Admissions Ambassador.** (January – March 2019)

- Developed online recruitment and informational materials for prospective students.
- Assisted in developing schedules that allow students to see the campus, interact with students, staff and faculty in their area of interest, and learn about the school and department.
- Answered prospective student questions as part of a student panel and one-on-one.

### **Girls on the Run, Las Vegas, Volunteer Head Coach.** (January 2017 – April 2017)

- Facilitated educational conversations and activities with up to 11 girls.
- Created a safe, comfortable environment for low-income children to express their insights, problems, and feelings.
- Followed a carefully established curriculum while also tailoring the material to the needs of the team.
- Appropriately reacted and acted in unexpected and difficult situations or experiences that girls shared.

## **AFFILIATIONS**

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UC Davis Society of Women Engineers (2023-2024)

Institute of Transportation Engineers (2023-2024)

UC Davis Women's Transportation Seminar Student Chapter (2021-2024)

International Women's Transportation Seminar (2021-Current)

UNLV Public Health Student Association (2014 - 2016)

## **SKILLS**

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- R (base R, R-Markdown, R-Quarto)
- Stata
- ArcGIS
- TransCAD
- Python
- SAS