Natalie Coleman

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Research Statement

I aspire to integrate civil engineering, data science tools, and an equity perspective into the management and restoration of critical infrastructure and lifestyle behaviors impacted by natural hazards. I aim to use a data-driven approach and address community needs of ongoing societal problems. My work includes the hardship experienced from infrastructure disruptions, equitable accessibility to essential and non-essential services, understanding of disproportionate flood impacts, and ethical use of big data and machine learning methods. I have 5 first-author publications, 6 co-author publications, and numerous conference presentations including Natural Hazards Workshop, ASCE Lifelines, and PRIMR-Disaster.

Teaching and Mentoring Statement

My teaching philosophy is to break down and explain complex, interdisciplinary topics to teach students foundational knowledge and to motivate them to contribute their unique perspectives to their respective fields. I have mentored +30 undergraduate and graduate students, including 4 interdisciplinary Aggie-Challenge research teams and 8 civil engineering students. I have training from CIMER Graduate Mentoring Academy and CIRTL Academy for Future Faculty.

Education

Aug. 2020 – Exp. Aug. 2024	PhD in Civil Engineering, Construction Management; Texas A&M University (GPR: 4.00) • Graduate Certificate in Environmental Hazard Management • Dissertation: Assessing Inequities in the Recovery of Infrastructure Systems and Lifestyle Behavior Changes during Climate Hazard Events
Aug. 2016 – Aug. 2020	B.S. Civil Engineering; Texas A&M University (GPR: 3.87, Magna Cum Laude) • Minor in Hispanic Studies, Certificate in International Engineering • Outstanding Undergraduate Thesis, Undergraduate Leadership Scholar

Research Employment

Aug. 2020 - Present Graduate Research Assistant - Urban Resilience.AI, Dr. Ali Mostafavi

➔ NSF Graduate Research Fellowship Program, CAREER: Household Network Modeling and Empathic Learning for Integrating Social Equity into Infrastructure Resilience
- Created a high-low matrix of user-level lifestyle recovery by leveraging granular scale location-intelligence data
- Systematic literature review of +3000 articles to examine the intersection of equity, infrastructure, and natural hazards and promote a vision of future research
- Established a critical milestone of recovery by clustering patterns of lifestyle to essential and non-essential services after Hurricane Havey
- Examined the social and spatial inequalities of power outages during Winter Storm Uri and Hurricane Ida using telemetry-based and reported service data

➔ Analytics for Equity Initiative, Partnership with Environmental Protection Agency
- Explored open-data to understand inequities in environmental hazard exposure in Harris County and Louisiana Cancer Valley

➔ RAPID: Urban Resilience to Health Emergencies: Revealing Latent Epidemic Spread Risk from Population Activity Fluctuations and Collective Sense-Making
- Calculated three exposure risk indicators to COVID-19 among vulnerable demographic groups based on traffic and human mobility data

May 2022 – Jul. 2022 Graduate Research Assistant, Dr. Yoonjeong Lee

➔ PIRE Coastal Flood Risk Reduction
- Calculated the feasibility of floodproofing measures given building conditions, flood parameters, and cost in collaboration with TU-Delft, Netherlands

Mar. 2018 – Aug. 2020 Undergraduate Research Assistant - Urban Resilience. AI, Dr. Ali Mostafavi

➔ CAREER: Household Network Modeling and Empathic Learning for Integrating Social Equity into Infrastructure Resilience, National Academies' Gulf Research Program
- Detected spatial hotspots to water and communication outages in Hurricane Harvey

- Developed a Disruption-Tolerance Index to service outages based on social features using principal component analysis

➔ Undergraduate Summer Research Grant: Determining Which Universal and Situational Factors Contribute to Risk Inequalities during Infrastructure Service Disruptions
- Established an anatomy of susceptibility for +2000 households
- Studied the correlation between social vulnerability and hardship, zone of tolerance, and disruption to infrastructure outages caused by 3 hurricanes

Jun. 2018 – Aug. 2018   Undergraduate Research Assistant – PUC Chile, Dr. Cristian Escauriaza
- Comprehensive literature review of bilingual technical reports for the research team investigating tidal energy potential in the Strait of Magellan

Teaching and Mentoring Experiences
Sep. 2023	Guest Lecture on Risk Assessment (CVEN 668)
Jan. 2023 – Present	Graduate Mentoring Academy Facilitator
Aug. 2020 – Present	PhD Mentor for 5 AggiE-Challenge Interdisciplinary Teams (ENGR 291, ENGR 491)
Aug. 2020 – Present	PhD Mentor for High-Impact Experiences for 8 Civil Engineers (CVEN 399)
Aug. 2019 – May. 2020	Peer Mentor for Hullabaloo First Year Experience (UGST 181)
Aug. 2017 – May 2018	Writing Consultant for University Writing Center
Aug. 2017 – May 2020	Executive Officer for the ASPIRE Living Learning Community for +100 mentoring relationships

Teaching and Mentoring Certifications
Aug. 2023	CIRTL- Introduction to evidence-based teaching for undergraduates
May 2023	CIRTL- Academy of Future Faculty
Jul. 2022	CIMER- Graduate Mentoring Academy
May 2019	CRLA- Advanced Mentor Learning Certification Level III
May 2018	CRLA- International Tutoring Level I

Professional Organizations
Feb. 2021 – Present	Women in Science and Engineering (WISE), President, Scholarship Chair
Sep. 2021 – Present	Bill Anderson Fund (BAF)- Disaster Researchers, Fellow, Lightning Talks, Secretary
Apr. 2023 – Present	Civil and Environmental Engineering Graduate Student Association (CEEGSA), Officer
Jan. 2023 – Present	Natural Hazards Engineering Research Infrastructure (NHERI), Treasurer

Service and Outreach
Aug. 2022 – Present	Peer Reviewer for journal articles (e.g. POLS One, Scientific Reports, Human Ecology, Cities, Sustainable Cities and Society)
Mar. 2021 – Present	Zoom-A-WISE Woman Panelist and WISE Outreach Volunteer
May 2019 – Present	Academy of Undergraduate Researchers Across Texas (AURA)
Spring 2022/ 2023	Project VICTORY Science Mentor
May 2020 – Feb. 2021	Graduate student representative of 2021 PRIMR Disaster Conference
May 2019 – May 2020	Undergraduate Research Ambassador

Data Analysis
- Proficient in Python, R-Studio, ArcMap, GeoDa
- Extensive experience with quantitative open-data (demographics, land, environmental, power outage) and location-intelligence data (Streetlight, SafeGraph, Spectus, and Mapbox)
- Deployed Qualtrics survey and analyzed qualitative reports

Significant Proposal Writing Experience
2022	"Quantifying and Modeling Deprivation Costs of Service Disruptions to Promote Equitable Outcomes in Infrastructure Resilience Processes," NSF Strengthening American Infrastructure Proposal,
2022	"SPPIM: Socio-Physical Probabilistic Integrated Modeling of Climate Hazard Induced Power and Water Disruption," NHERI Summer Institute Mock Proposal
2021	"Using Data to Develop Equitable Outcomes or Solutions to Climate Hazards and Other Disasters," Gulf Research Program Proposal

Community Workshop

Jul. 2023	Bill Anderson Fund (BAF) and Margaret A. Cargill Philanthropies (MACP) Joint Workshop
Apr. 2023	Bridging Diverse Knowledge Systems to Address Flood Risk in Northeast Houston
Mar. 2023	Catalyzing Advocacy in Science and Engineering Workshop on Science Policy

Grants, Fellowships, and Awards

Sep. 2023 – May 2024	P.E.O. Betty Cook Karrh Memorial Scholar, Distinction from P.E.O. International ($20,000)
Sep. 2023	Phi Kappa Phi Love of Learning Award ($1,000)
Jun. 2023	NSF Travel Grant to NHERI Summer Institute ($2,000)
Jun. 2023	Mock Proposal Winner at the NHERI Summer Institute
Mar. 2023	League of Legends LBJ High School Alumni Award from UISD
May 2022 – Jul. 2022	NSF PIRE Participant (Fully-Funded Research Trip)
Oct. 2022 – Present	Bill Anderson Fund Fellow (Funding for Professional Development and Conferences)
Aug. 2020 – Aug. 2023	NSF Graduate Research Fellowship Program (Full Tuition/ Fees, $102,000)
Apr. 2020 – Deferred	Aviles- Johnson Graduate Fellowship- TAMU (Full Tuition/ Fees, $112,000)
May 2019 – Jul. 2019	Undergraduate Summer Research Grant ($5,000)
Mar. 2019	Sigma Xi Interdisciplinary Award for Student Research Week ($1,000)
Aug. 2016 – Aug. 2020	Terry Foundation Traditional Scholar (Full Tuition/Fees and Living Expenses)

Accepted and Published Papers

2023	**N. Coleman,** C. Liu, Y. Zhao, A. Mostafavi, "Lifestyle Pattern Analysis Unveils Recovery Trajectories of Communities Impacted by Disasters," *Humanities and Social Sciences Communication*, Accepted
2023	**N. Coleman,** A. Esmalian, C. Lee, E. Gonzales, P. Koirala, A. Mostafavi, "Energy Inequality in Climate Hazards: Empirical Evidence of Social and Spatial Disparities in Managed and Hazard-Induced Power Outages," *Sustainable Cities and Society*, Published
2022	A. Esmalian, **N. Coleman,** F. Yuan, X. Xiao, A. Mostafavi, "Equitable Access to Grocery Stores During Disasters Using Location-based Data," *Scientific Reports,* Published
2022	F. Yuan, C. Fan, H. Farahmand, **N. Coleman,** A. Esmalian, C. Lee, F. Patrascu, C. Zhang, S. Dong, A. Mostafavi, "Smart Flood Resilience: Harnessing Community-Scale Big Data for Predictive Flood Risk Monitoring, Rapid Impact Assessment, and Situational Awareness," *Environmental Research: Infrastructure and Sustainability*, Published
2022	**N. Coleman,** X. Gao, J. DeLeon, "Human Activity and Mobility Data Reveal Disparities in Exposure Risk Reduction Indicators among Socially Vulnerable Populations during COVID-19 ," *Scientific Reports*, Published
2021	A. Esmalian, **N. Coleman,** S. Yu, M. Koceich, M. Esparza, A. Mostafavi, "Disruption Tolerance Index: An Integrated Index for Determining the Susceptibility to Infrastructure Service Disruptions," *International Journal of Disaster Risk Reduction,* Published
2021	A. Esmalian, S. Dong, **N. Coleman**, A. Mostafavi, "Determinants of Risk Disparity due to Infrastructure Service Losses in Disasters: A Household Service Gap Model," *Risk Analysis*, Published
2021	C. Podesta, **N. Coleman,** A. Esmalian, F. Yuan, A. Mostafavi, "Quantifying Community Resilience Based on Fluctuations in Visits to Point-of-Interest from Digital Trace Data," *Royal Society Interface,* Published
2021	L. Qingchun, Z. Tang, **N. Coleman,** A. Mostafavi, "Detecting Early-warning signals in Time Series of Visits to Points of Interest to Examine Population Response to COVID-19 Pandemic," *IEEE Access,* Published
2020	**N. Coleman,** A. Esmalian, A. Mostafavi, "Anatomy of Susceptibility for Shelter-in-Place Households Facing Infrastructure Service Disruptions Caused by Natural Hazards," *International Journal of Disaster Risk Reduction*, Published
2020	**N. Coleman**, A. Esmalian, A. Mostafavi, "Equitable Resilience in Infrastructure Systems: Empirical Assessment of Disparities in Hardship Experiences of Vulnerable Populations during Service Disruptions," *Undergraduate Thesis*, Archived*; Natural Hazards Review,* Published

Submitted Papers

2023	**N. Coleman,** X. Li, T. Comes, A. Mostafavi, "Weaving Equity into Infrastructure Resilience Research and Practice: A Decadal Review and Future Directions," Submitted to *Sustainable Cities and Society*

Conference and Professional Papers

2023	Pedersen, R.M., De La Cruz, I., Poor, S.V., **Coleman, N.,** Moyer, H., Nachon, M. (2023). "Zoom a WISE Woman: Becoming a STEM Expert!", Frontiers in Education Conference, Published
2023	**N. Coleman,** "Integrating Big Data for Equitable Infrastructure Management and Restoration," Bill Anderson Fund Legacy Magazine, Accepted
2022	**N. Coleman,** A. Esmalian, A. Mostafavi "Assessment of Protective Actions and Adjustments Taken by Shelter-in-Place Households Facing Disruptions in Critical Lifeline Services." Conference Report. *Lifelines 2022,* Published
2022	A. Mostafavi, J. Padgett, L. Duenas-Osorio, S. Leonardo, N. Elaina, T. Norton, H. Lester, H. Wang, S. Dong, M. Sichani, H. Farahmand, E. Jimenez, A. Esmalian, **N. Coleman,** J. Dargin, X. Zhou, C. Lee "Hurricane Harvey Infrastructure Resilience Investigation." Technical Report. DesignSafe-CI, Published
2020	**N. Coleman** and M. Esparza "Integrating the Human Dimension in Infrastructure Resilience: A Case Study of Service Disruptions Caused by Hurricane Harvey." Technical Report. *Explorations: Texas A&M Undergraduate Journal Vol. 12,* Published

Significant Research Presentations

Nov. 2023	**N. Coleman,** A. Mostafavi, "Detecting Social and Spatial Inequalities in Power System Critical Failures," ASCE Inspire 2023
Jul. 2023	**N. Coleman**, "Integrating Equity Standards in Infrastructure Management and Restoration," Bill Anderson Fund Lightning Talks, Natural Hazards Workshop in University of Colorado Boulder
May. 2023	**N. Coleman,** A Mostafavi, "Analyzing the Heterogeneity of Recovery Trends and Variations for Disrupted Lifestyles in Natural Hazard Events," Virtual Presentation at NHERI Conference
Apr. 2022	**N. Coleman,** X. Gao, J. DeLeon, A. Mostafavi, "Human Activity and Mobility Data Reveal Disparities in Exposure Risk Reduction Indicators of Socially Vulnerable Populations," Poster presentation at the Civil Engineering External Advisory Council at TAMU
Feb. 2022	**N. Coleman,** A. Esmalian, A. Mostafavi, "Capturing Population Activity Data to Quantify Community Resilience to Disasters ", Virtual Presentation at LifeLines Conference
Nov. 2021	**N. Coleman,** A. Esmalian, A. Mostafavi, "Anatomy of Susceptibility for Shelter-in-Place Households Facing Infrastructure Service Disruptions Caused by Natural Hazards", Construction Engineering Management Symposium at TAMU
Feb. 2021	**N. Coleman,** A. Esmalian, A. Mostafavi, "Assessment of Protective Actions and Adjustments Taken by Shelter-in-Place Households Facing Disruptions in Critical Lifeline Services", Virtual Presentation at Disaster PRIMR Conference at TAMU
Nov. 2020	J. Dargin, **N. Coleman,** A. Esmalian, A. Mostafavi, "Achieving Social Impact Through Visual Smart Planning", Virtual Presentation at Joint International Resilience Conference 2020
Sep. 2019	**N. Coleman**, A. Esmalian, A. Mostafavi, "Societal Impacts of Hurricane Harvey Measured through Risk Inequalities from Infrastructure Service Disruptions," Poster Presentation, Resilience Rising: Research and Practice on Hurricane Harvey and Hazards of the Future at TAMU

Educational and Professional Development Panels

Feb. 2022 - 2024	**N. Coleman,** Conference Organizer and Panel Moderator for Annual Susan M. Arseven '75 Conference for Women in Science and Engineering (32nd, 31st , 30th)
Feb. 2023	**N. Coleman,** Session Moderator for Undergraduate Research Symposium-TAMU
Oct. 2019 - 2022	**N. Coleman,** Panelist for Undergraduate Research Symposium- TAMU, "Mentoring Undergraduate Students," Virtual and In-Person
Nov. 2021	**N. Coleman,** Panelist for Conference for the Advancement of Science Teaching, "Zoom-a-WISE-Woman Virtual Workshop," Virtual
Jun. 2021	**N. Coleman,** Panelist for National Network of State Teachers of the Year Conference, "Zoom-a-WISE-Woman Virtual Workshop," Virtual
Feb. 2021	**N. Coleman,** Panel Moderator for 2021 Disaster PRIMR 2021 Conference "Next Generation of Resilience and Sustainability," Virtual