

# Water, Climate & Health Program Newsletter

Summer 2022



## *A Note from the Director*

Hello from Omaha!

It's been a busy start to 2022. I'm so proud of our team and what they have accomplished. These last couple years have not been easy, but I'm impressed with everyone's resilience and ability to persevere. I never anticipated starting the Water, Climate and Health Program in the middle of a global pandemic and it hasn't been easy. However, success is only possible if you have a good team and I'm fortunate to have a great team. I'm confident that our success will continue, and I look forward to the future.

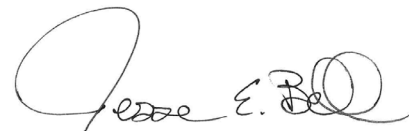
Since our last newsletter, we have accomplished a lot and seen a few changes in the Water, Climate and Health Program. I decided to work at an academic center because I wanted the opportunity to interact and work with students. It is incredibly rewarding to help students find their passion and interest. Some of our students have graduated and are moving on to new things. Although I don't like seeing them go, I am excited to see them start their careers. Jagadeesh Puvvula is my first student to defend his dissertation and graduate with his PhD. He has taken full advantage of his time at UNMC, and the University of Pennsylvania is fortunate to have him. Balkissa Ouattara also finished her PhD and is moving on as an AAAS Science Policy Fellow in Washington DC.

On a slightly different note, we have new additions to the Water, Climate and Health Program. I'm incredibly excited to announce that Dr. Kristina Kintziger has started her position at UNMC as the Claire M. Hubbard Professor of Health and Environment. She is a great addition to UNMC and Nebraska. Her knowledge and expertise will help Nebraska address the environmental challenges that impact our health.

In addition, we are still making progress on understanding the links between environmental issues and human health. We had at least seven scientific publications since our last newsletter and many more research manuscripts in the review process. We also received a NASA grant to understand the impacts of drought on human health and funding from NOAA to conduct an urban heat island study in Omaha. Our group has given 19 presentations this year to professionals and the public on topics related to water quality, environmental change, and climate change. I could not be prouder of this work, because solid scientific research and science communication are the core for our continued success in addressing environmental issues that negatively impact our health.

Thank you so much for your interest in our program! Partnerships with individuals like you allow us to continue to address environmental health concerns in Nebraska and around the world. Please don't hesitate to reach out if you are interested in learning more about our program or the issues we are addressing.

Sincerely,



Jesse E. Bell, PhD

# UNMC and community scientists map the hottest parts of Omaha

- Article by Meghan Langel

Heat kills more Americans annually than any other weather-related event, but not everyone's risk is the same. Mapping geographic heat inequities was the goal of the [Omaha Urban Heat Watch Project](#), a community-led campaign conducted by the University of Nebraska Medical Center (UNMC) College of Public Health and Water, Climate and Health Program on August 6<sup>th</sup>. The project was sponsored by the National Oceanic and Atmospheric Administration (NOAA), the interagency [National Integrated Heat Health Information System](#) (NIHHIS) and [CAPA Strategies LLC](#). Omaha is one of 14 U.S. cities participating in the 2022 Heat Mapping Campaign.

The project is part of a larger effort by NOAA and NIHHIS to raise awareness about extreme heat

and urban heat islands. *"In urban environments, you see an increase in heat as you move more into the metro area, there's more concrete, less green space, and that causes more extreme heat"* said Jesse Bell in a recent interview with [WOWT News 6](#). The hottest spots of cities are typically in underserved communities. A key focus of the project is to compare heat distribution in areas of Omaha that were redlined in the 1900s to areas that were not historically segregated to determine where heat inequities exist. *"This is interesting because this is not only public health, we are talking about all the social determinants [of health]"* says UNMC Ph.D. student Aziz Abdoulaye in a recent interview with [WOWT News 6](#).

Using heat sensors mounted on their own cars, volunteers navigated their neighborhoods in the morning, afternoon and evening on the hot August day. The sensors recorded temperature, humidity, time, and geographic coordinates every second.

Bell and Abdoulaye hope the results can be used to develop heat action plans, add cooling stations to bus shelters, educate residents and policymakers and inform new research.

The Omaha Urban Heat Watch Project was led by Dr. Jesse Bell and PhD student, Abdoulaziz Abdoulaye. Partner organizations included NOAA, NIHHIS, the National Weather Service UNMC's [YES! Youth Enjoy Science program](#), and [The Simple Foundation](#).

For more media on the project, visit our [News & Events page](#).

Questions? Contact Aziz Abdoulaye at [abdoulaye.abdoulaziz@unmc.edu](mailto:abdoulaye.abdoulaziz@unmc.edu).



## *New faculty spotlight: Meet Kristina Kintziger*



**Kristina Kintziger,  
MPH, PhD**

In July we welcomed Kristina Kintziger, MPH, PhD to the Water, Climate and Health team. We interviewed Kristina about her expertise and hopes for her new role.

**Q: Where are you from?**

A: I am from Wauchula, FL, which is not what you usually picture when you think of Florida. Wauchula is a rural town in the middle of the southern part of the state, whose primary industries are phosphate mining and agriculture (citrus and both dairy and beef cattle).

**Q: What are your research interests?**

A: I'm interested in the impacts of weather and climate change, and the interaction of these impacts with human or system-level vulnerabilities, on morbidity, mortality, and other public health outcomes.

**Q: What draws you to climate and health research?**

A: I started off my training with a focus on purely infectious disease epidemiology. I was fascinated by the intelligence of some infectious agents (e.g., HIV). But, because I grew up on a farm in a rural community, I have always understood how important the environment is to human health and our livelihoods. So, when I got the chance to combine the two areas in my post-doctoral training, I jumped at the opportunity. Working with the Florida Department of Health in the Division of Environmental Health, I was able to work on a variety of infectious diseases that occur because of human-environment interactions. But I was also able to expand my experiences into more traditional environmental public health areas, and eventually began working with the Environmental Public Health Tracking and Building Resilience Against Climate Effects programs.

**Q: What excites you about this opportunity?**

A: There are several reasons that I am excited to join the Water, Climate and Health Program and UNMC...the opportunity to collaborate with others in my field on research and community engagement projects, being part of a College of Public Health, the chance to mentor students interested in climate and health or other environmental epidemiology topics, and getting to be closer to family!

**Q: What do you like to do in your spare time?**

A: My family likes to spend time outdoors. We mostly hike right now, but we are looking forward to getting back into kayaking and camping as the kids get a little older.



## *DWFI, UNMC to study health and economic impact of nitrate contamination in Nebraska*

- Article by Rachel Williss,  
Daugherty Water for Food Global Institute

The Daugherty Water for Food Global Institute (DWFI) has begun working on a new project in collaboration with the Water, Climate and Health Program (WCHP) that seeks to further understand the impacts of nitrate contamination of Nebraska's groundwater by considering economic and health perspectives. The WCHP and DWFI began work on the project in May 2022, evaluating nitrate-attributable disease with adverse birth outcomes and associated healthcare costs. They are also exploring the cost of water treatment solutions and other nitrate contamination mitigation strategies.

With about 85% of Nebraskans using

groundwater as their source for drinking water, broader impacts of widespread nitrate contamination are a shared interest between the public health perspective of the WCHP and the economics perspective of the collaborating researchers at DWFI. The team is spending the summer interacting with water quality experts throughout the state to understand interdisciplinary perspectives and collect background information on the nitrate issue. Data analysis will follow, beginning in the fall.

**Questions?** Contact Renata Rimsaite at [rrimsaite@unl.edu](mailto:rrimsaite@unl.edu)

## *Team will use NASA data to explore connections between drought and public health*

- Article by Meghan Langel

According to NASA, *"the best place to study Earth is from space."* Though the agency is synonymous with space exploration, they are also using advanced technology to look toward Earth --at our oceans, atmosphere, and land surfaces -- in incredible detail. NASA's Earth Observation (NEO) program provides a repository of continually updated satellite and ground observation data allowing scientists to examine changes in Earth's environment, climate, and natural resources. In an upcoming study, a team of scientists, led by Dr. Jesse Bell of the University of Nebraska Medical Center (UNMC) and Dr. Jesse Berman of the University of Minnesota, will utilize a variety of NEO's products to make connections between drought and public health.

The team, which also includes collaborators from University of Nebraska Lincoln (UNL), George Mason University, and Morgan State University, will utilize NASA's air quality and drought monitoring products to analyze changes



in air quality during droughts. Additionally, the team will examine health risks and vulnerabilities associated with these changes. The team will engage end users, such as local public health departments, in the development of tools and resources to help stakeholders prepare for and respond to drought.

In addition to Dr. Bell, the University of Nebraska team includes Rachel Lookadoo, Yeongjin Gwon, Meghan Langel, Siddhi Munde, and Azar Abadi of the UNMC College of Public Health and Brian Wardlow of UNL's School of Natural Resources. This project has been funded by NASA.

## Researchers provide update on AltEn to Mead community

- Article and photos by Daugherty Water for Food Global Institute

A team led by the University of Nebraska Medical Center (UNMC) and [Daugherty Water for Food Global Institute](#) (DWFI) researchers [have been studying](#) possible effects from the AltEn ethanol plant in Mead, Nebraska, since it shut down last year, after leaked contaminated wastewater was found. They presented to a group of about 50 community members at a Mead Town Hall session. The team includes Jesse Bell and Eleanor Rogan, Water, Climate and Health Program Executive Director and Associate Director, respectively, as well as Water Sciences Lab Director Dan Snow, and other University of Nebraska Lincoln faculty including Shannon Bartelt-Hunt and Liz VanWormer. Bell and Rogan, along with colleagues Ali Khan and Judy Wu-Smart, were present.

The team is particularly concerned with neurotoxins from the neonicotinoids produced by the plant, which is being sued by the state of Nebraska. *"[It] raises the level of concern, particularly for infants and children, that they might experience some neurological problem with this. That would be my big concern,"* said Rogan.



Community members also voiced their concerns about the surrounding streams and wildlife, which are now considered *"biologically dead"*. In addition to homes, the research team is also sampling the water, soil, air and small animals.

A survey on perceived health impacts has been sent to 1,000 people in the surrounding community, and so far about 400 responses have been received. Anyone who has lived or worked near the contamination from the AltEn plant or its solid or liquid waste is encouraged to fill out the survey. The team also hopes to begin a medical registry that will follow willing participants for at least ten years, starting in January.

This work is part of UNMC's partnership with DWFI to assess water quality impacts on health, and the start of the project was funded by the Claire M. Hubbard Foundation. The update was covered by several local media outlets.

For more media on the project, visit our [News & Events page](#).

Questions? Contact Eleanor Rogan at [egrogan@unmc.edu](mailto:egrogan@unmc.edu).



## *UNMC-led workshops mobilize national community of practice around drought and health issues*

- Article by Meghan Langel

In April, Water, Climate and Health team members facilitated the Upper Missouri River Basin Drought and Health Workshop in Bozeman, Montana. The workshop, which was hosted by the University of Nebraska Medical Center (UNMC) College of Public Health and led by Jesse Bell, PhD and Rachel Lookadoo, JD, Executive Director and Director of Public Health Policy of the WCHP, respectively, in collaboration with the National Oceanic and Atmospheric Administration's (NOAA) National Integrated Drought Information System (NIDIS), the Montana Institute on Ecosystems and Montana Health Professionals for a Healthy Climate. The purpose of the two-day workshop was knowledge sharing, cross-sector collaboration, and discussion of opportunities for addressing the health impacts of drought in the region. The workshop was part of Bell and Lookadoo's ongoing work for NIDIS to develop a national drought and health strategy for the United States. This was the fourth regional drought meeting hosted by the team, with similar workshops hosted for the Midwest, Southwest, and Carolina's regions. A fifth workshop will be held in October 2022 in the Pacific Northwest. The results of the workshops' facilitated discussion sessions will inform NIDIS's national drought and health strategy document for the United States of America.

We asked Lookadoo to share more details about the workshops and their findings:

### **Q: Are any themes emerging in terms of what folks are expressing concern about at these workshops?**

A: Across every regional workshop, we've heard attendees mention the need for a robust drought and health community of practice. By convening these workshops, we're helping

***“It’s not a future issue, it’s happening as we speak, which adds an important level of urgency to this work.”***

- Rachel Lookadoo, JD

bring that community to fruition by connecting stakeholders who may not normally collaborate.

### **Q: Why is this work important?**

A: At each of these workshops, we've talked to individuals who are dealing with drought and its corresponding health issues right now. It's not a future issue, it's happening as we speak, which adds an important level of urgency to this work. We need to continue to provide education on drought and health, while empowering public health practitioners and other key stakeholders with practical solutions to address drought and health in their communities.

### **Q: Where would you like to take this project in the future?**

A: After seeing so many similarities in concerns and issues across regions, we'd like to continue this work by conducting focused research and developing a more comprehensive, national community of practice for individuals engaged in drought and health work. Drought and the health issues that connect to it are only increasing in frequency and intensity, so now is the time to bolster awareness, preparedness, and mitigation efforts at the national and local level.



## Featured Publications

### *“Geospatial distribution of age-adjusted incidence of the three major types of pediatric cancers and waterborne agrichemicals in Nebraska”*

- Article by Siddhi Munde

Nebraska is predominantly an agricultural state. Almost 92% of the state's total area is used for farming and ranching. Agrichemicals Atrazine and Nitrate are widely applied for crop production in Nebraska, contributing to contamination of surface and groundwater sources. The rate of pediatric cancers in Nebraska is currently among the five highest in the United States. This study examines the relationship between pediatric cancers and Atrazine and Nitrate concentrations in water—particularly for brain and other Central Nervous System (CNS) tumors, leukemia, and lymphoma. Mean atrazine and nitrate concentrations and the age-adjusted pediatric cancer incidences in each county in Nebraska from 1987 to 2016 were used in the study. The results found that the age-adjusted incidence of pediatric brain and other CNS tumors was higher than the national average in 63% of the Nebraska counties. Moreover, counties with elevated atrazine or nitrate levels reported more childhood cancers than counties with lower levels. Although not a causality, the study suggests that atrazine and nitrate may pose a risk relative to pediatric brain and CNS cancers, leukemia, and lymphoma.

Quattara, B. S., Puvvula, J., Abadi, A., Munde, S., Kolok, A. S., Bartelt-Hunt, S., Bell, J.E., Wichman, C.S., Rogan, E. (2022). *Geospatial distribution of age-adjusted incidence of the three major types of pediatric cancers and waterborne agrichemicals in Nebraska*. *GeoHealth*, 6, e2021GH000419. <https://doi.org/10.1029/2021GH000419>

**Questions?** Contact Eleanor Rogan at [egrogan@unmc.edu](mailto:egrogan@unmc.edu).

### *“Drought and all-cause mortality in Nebraska from 1980 to 2014: Time-series analyses by age, sex, race, urbanicity and drought severity”*

- Article by Azar Abadi

Drought is one of the costliest and deadliest natural disasters globally. NOAA's Billion Dollar Disasters report lists drought as the costliest extreme event in Nebraska. The economic impact of drought in Nebraska is well known, though our understating of drought-related health outcomes are still nascent and limited. In this study, we aimed to first identify the association between various types of drought and all-cause mortality and further to find populations most at risk to eventually inform public health authorities to implement more effective strategies to mitigate negative impacts. This study is a collaborative effort by researchers from UNMC, University of Alabama-Birmingham, University of Minnesota, and National Oceanic and Atmospheric Administration. The main finding of this study is that pathways to drought-related health outcomes are region and demographic group specific. We specifically showed that white population aged 25–34 and 45–64 were the most at risk. The results also indicate that longer-term droughts are associated with more heightened mortality rates among sub-populations in both metro and non-metro counties.

Abadi, A. M., Gwon, Y., Gribble, M. O., Berman, J. D., Bilotta, R., Hobbins, M., & Bell, J. E. (2022). *Drought and all-cause mortality in Nebraska from 1980 to 2014: Time-series analyses by age, sex, race, urbanicity and drought severity*. *Science of The Total Environment*, 840, 156660. DOI [10.1016/j.scitotenv.2022.156660](https://doi.org/10.1016/j.scitotenv.2022.156660)

**Questions?** Contact Azar Abadi at [azar.abadi@unmc.edu](mailto:azar.abadi@unmc.edu).



## *We are proud of our graduates!*

Our talented graduate assistants, Laura Nagengast and Kylie Johnson, graduated in May 2022. We are thankful for their hard work for the program and know they will do great things!



**Laura Nagengast**



**Kylie Johnson**

Laura Nagengast has started a full-time position as a Source Water Protection Extension Educator for the University of Nebraska-Lincoln (UNL). In this role, she is continuing to work towards improving Nebraska's water quality through collaboration, education, and advocacy efforts. This new position, funded jointly by the UNL Institute of Agriculture and Natural Resources and the Nebraska Department of Environment and Energy, will supply continued opportunity for collaboration between UNMC and these entities around water and health issues.

The Water, Climate and Health Program team is excited to continue to work with Laura in this new capacity. *"I feel working for the WCHP has given me the footing to move into my career more confidently after graduation,"* said Nagengast.

Kylie Johnson is working for the National Park Service as a Safety and Occupational Health Specialist at Valley Forge National Historic Park in Pennsylvania. She is enjoying the opportunity to take care of a special part of our nation's history.

Johnson said of her experience with the program, *"I appreciated the opportunity to work with an excellent team of researchers and to foster such strong mentorship with those around me. I learned an incredible amount that I hope to take forward with me into future roles."*



## Student Corner

### *UNMC medical students studying climate and health as part of advanced training program*

Three first year medical students, Anna Barent, Bailey Newsome, and Morgan Penry, have been accepted to the inaugural “*Climate and Health*” Enhanced Medical Education Track (EMET), one of several competitive training tracks offered by the University of Nebraska Medical Center’s (UNMC) College of Medicine (COM) to provide specialized training in an interdisciplinary field of medicine. The climate and health EMET, new in 2021, is co-directed by Dr. Jesse Bell and Dr. Ellen Kerns, faculty in the UNMC COM. These three students will work under Bell and Kerns’ guidance to execute the projects described below.

**Anna’s project:** My research aims to calculate CO<sub>2</sub> emissions saved from 2019-2022 at Nebraska Medicine through telehealth. Healthcare appointments accessible from one’s home through audio-only or audio-visual technology eliminate CO<sub>2</sub> emissions from transport to and from in-person healthcare appointments. Additionally, the project aims to understand how telehealth and emissions changed throughout the COVID-19 pandemic. Telehealth provides a feasible opportunity for the healthcare sector to reduce its contribution to climate change. This project will explore the magnitude of emission reduction through the lens of the pandemic.

**Bailey’s project:** My research project for the Climate and Health EMET will seek to understand the relationship between increasing ambient temperature and congenital defect development. Specifically, we will retrospectively analyze extreme heat exposures of pregnant Nebraska residents and the potential risk of their child developing a congenital heart defect. Congenital heart defects are the most prevalent birth defect category and are associated with the highest risk of mortality during the infantile period. We hope to contribute to this understudied area of research and seek further understanding of how climate change will impact public health.

**Morgan’s project:** For my summer research project, I am investigating the relationship between drought and heat-related illness. We are using heat-related ICD-10 mortality codes to see the difference in heat-related deaths during drought and non-drought times. Heat and drought have an intricate relationship, and because heat has been well-established with causing heat related mortality, we want to investigate whether drought does as well.



**Anna Barent**



**Bailey Newsome**



**Morgan Penry**

## *Welcome to our new student workers!*



Jessenia Hincapie

Jessenia Hincapie is a first year Master of Public Health student with a concentration in Epidemiology. She is originally from Brooklyn, New York, but was raised in Nebraska City, Nebraska. She received her Bachelor's Degree in Biology from Peru State College. Previously, she conducted research in rural communities of Costa Rica. Her research focused on developing a technology-enabled control tool against Dengue Fever. This study sparked her interest to further pursue her career in Public Health.



Ruth Mencia

Ruth Mencia of Grand Island, NE is a recent graduate of Chadron State College where she acquired a Bachelor's degree in Social Work, minoring in Human Biology and General Business and Administration. Although her passion of service began early on, her interest in public health catalyzed in the midst of a global crisis. During the pandemic, Ruth worked as a bilingual COVID-19 contact tracer assisting in bridging the gap of communication to further promote the health and safety of Nebraska residents, igniting a passion of international public health along the way. This upcoming fall, Ruth will begin her path in pursuing a Master of Public Health with a concentration in Health Promotion in aim of expanding her skillset globally.

## *New Educational Tools*

**Nitrate and Health 5-minute video:** [Nitrate and Human Health - Nebraska WAVES - YouTube](#)

**Climate Change e-module:** <https://www.unmc.edu/elearning/egallery/introduction-to-climate-change/>

**Climate and Health e-module:** <https://www.unmc.edu/elearning/egallery/climate-and-health/>

**Water and Health e-module:** <https://www.unmc.edu/elearning/egallery/water-and-health/>

## Publications

**Azar M. Abadi, Yeongjin Gwon, Matthew O. Gribble, Jesse D. Berman, Rocky Bilotta, Mike Hobbins, Jesse E. Bell,** Drought and all-cause mortality in Nebraska from 1980 to 2014: Time-series analyses by age, sex, race, urbanicity and drought severity, *Science of The Total Environment*, Volume 840, 2022, 156660, ISSN 0048-9697, <https://doi.org/10.1016/j.scitotenv.2022.156660>.

**Jagadeesh Puvvula, Lorena Baccaglini, Anthony Johnson Jr, Yi Du, Jesse E Bell & Risto H Rautiainen** (2022) Prevalence and risk factors for pulmonary conditions among farmers and ranchers in the central United States, *Journal of Agromedicine*, DOI: [10.1080/1059924X.2021.2025180](https://doi.org/10.1080/1059924X.2021.2025180)

**Ouattara, B. S., Puvvula, J., Abadi, A., Munde, S., Kolok, A. S., Bartelt-Hunt, S., Bell, J.E., Wichman, C.S., Rogan, E.** (2022). Geospatial distribution of age-adjusted incidence of the three major types of pediatric cancers and waterborne agrichemicals in Nebraska. *GeoHealth*, 6, e2021GH000419. <https://doi.org/10.1029/2021GH000419>

**Jalalzadeh Fard, B.; Puvvula, J.; Bell, J.E.** Evaluating Changes in Health Risk from Drought over the Contiguous United States. *Int. J. Environ. Res. Public Health* **2022**, *19*, 4628. <https://doi.org/10.3390/ijerph19084628>

**Puvvula, J., Abadi, A., Conlon, K., Rennie, J., Herring, S., Thie, L., Rudolph, M., Owen, R., Bell, J.E.** (2022). Estimating the burden of heat-related illness morbidity attributable to anthropogenic climate change in North Carolina. *Earth and Space Science Open Archive*. <https://doi.org/10.1002/essoar.10511080.1>

Joseph, N., Libunao, T., Herrmann, E., Bartelt-Hunt, S., Propper, C. R., **Bell, J.**, & Kolok, A. S. (2022). Chemical Toxicants in Water: A GeoHealth perspective in the context of Climate Change. *GeoHealth*, 6, e2022GH000675. <https://doi.org/10.1029/2022GH000675>

Ju-Hyeong Park, Eungul Lee, Ethan D. Fechter-Leggett, Ellie Williams, Shobha Yadav, Arundhati Bakshi, Stefanie Ebel, **Jesse E. Bell**, Heather Strosnider, and Ginger L. Chew. 2022. Associations of Emergency Department Visits for Asthma with Precipitation and Temperature on Thunderstorm Days: A Time-Series Analysis of Data from Louisiana, USA, 2010–2012. *Environmental Health Perspectives* 130:8 CID: 087003 <https://doi.org/10.1289/EHP10440>



## Presentations

- **Jesse Bell** was invited to present on the topic of water quality at the EPA Region 7 meeting in Lincoln, NE (July).
- **Jesse Bell** and **Eleanor Rogan** presented at a town hall meeting in Mead, NE on their research investigating contamination from the town's AltEn ethanol plant (June).
- **Jesse Bell** was invited to present on "*Extreme Weather Hazards*" at Columbia University's Climate Change and Health Bootcamp (June).
- **Jesse Bell** was invited to participate on a panel presentation at a community event hosted by Humanities Nebraska entitled "*Weathering Uncertainty: Conversations About Climate in Nebraska*" (June).
- **Jesse Bell** was invited to present on "*water, climate and health*" at the American Geophysical Union, "*GeoHealth*" quarterly meeting (June).
- **Yeongjin Gwon** was invited to present on "*Recent development in regression model for aggregate ordinal outcomes with imprecise categories*" at the Western North American Region Conference (WNAR), CA (June).
- **Yeongjin Gwon** was invited to present on "*How to identify the distribution of my data*" at Chonnam University's research seminar, Korea (June).
- **Jesse Bell** was invited to present on "*Heat, Health and Drought in the U.S. eastern region*" at NOAA's Eastern Region Climate Series (May).
- **Jesse Bell** was invited to present on "*water, climate and health*" at the University of Iowa's Climate/Atmospheric Science and Engineering (CASE) Colloquium (May).
- **Jesse Bell** presented on "*water, climate and health*" to the Nebraska Water Leaders Academy (May).
- **Jesse Bell** was invited to participate in a panel presentation on "*climate change and health*" hosted by Nebraska Cures (April).
- **Jesse Bell** and **Eleanor Rogan** were invited to participate in a panel presentation on their AltEn/Mead research project at the Nebraska Public Health Conference (April).
- **Jesse Bell** was invited to present on "*climate-driven disasters*" to the World Federation of Public Health Associations, an international professional society out of Rome (April).
- **Meghan Langel** was invited to present on "*Recognizing and Responding to Climate Change in Nebraska*" by Osher Lifelong Learning Institute (April).

- **Jesse Bell** presented on “*drought and health*” at the Water in the West conference in Bozeman, Montana (May).
- **Yeongjin Gwon** was invited to present on “*Recent development in regression model for aggregate ordinal outcomes with imprecise categories*” at 35<sup>th</sup> New England Statistical Symposium (NESS), CT (May).
- **Rachel Lookadoo** was invited to present on “*Drought and Health: Engaging Public Health and Other Stakeholders*” at the Water in the West conference in Bozeman, Montana (May).
- **Jesse Bell** was invited to present on “*water quality and health*” at an event hosted by City Sprouts in Omaha, NE (April).
- **Jesse Bell** was invited to present on “*water quality and health*” to Central Platte Natural Resource District Board in Grand Island, NE (March).
- **Jesse Bell** was invited to present on “*water quality and health*” at a legislative breakfast hosted by the Wellhead Protection Network and NDEE in Lincoln, NE (March).
- **Meghan Langel** was invited to present on “*water quality and health in Nebraska*” at the Nitrogen and Water Management Workshop hosted by UNL and the Lower Platte North NRD in Schuyler, NE (February).
- **Jesse Bell** was invited to present on “*Health impacts of Extreme Weather Events in a changing climate*” for the Global Consortium on Climate and Health Education at Columbia University (February).