



Water, Climate & Health Program

Newsletter

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Note From the Director

Welcome to the second installment of the *Water, Climate and Health Program Newsletter!* A lot has happened since the last issue and we are excited to share these updates.

As I reflect on the last six months, I am impressed with the amount of work that our team has accomplished. We are addressing some of the most pressing environmental health issues facing Nebraska and building the name of our program across the state and nation. We are leading multiple research studies that address the health impacts of climate change, water quality, and other environmental issues. We have expanded education efforts and opportunities for student engagement on environmental issues. We are also informing and educating the general public on environmental threats in Nebraska. None of this would be possible without the excellent team that makes up the Water, Climate and Health (WCH) Program.

Our team has published over 10 scientific articles and reports over the last six months. We have contributed to a United

Note from the Director, cont.

Nations report that deals with drought impacts on health and a national policy document published by Lancet that focuses on the impacts of climate change on human health. We have also published research articles showing an increased risk in pediatric cancer in areas of Nebraska with more atrazine in the water and contributed to the first research article that shows an increase in reported stress in farmers during drought conditions. In collaboration with colleagues from CDC and NOAA, we had a number of research articles published on factors that contribute to respiratory health issues. This is only the beginning. Our team is working on many new and exciting projects, so keep an eye out for our upcoming publications on water quality, extreme heat, drought and mental health.

Our research efforts are increasing our visibility at the national and international level, but our outreach and engagement is improving our impact in Nebraska. We have given at least 25 public presentations on topics dealing with public health, climate change, and water quality. We have given presentations to citizens of Nebraska, high school students, college students, medical faculty and staff, professional organizations, and many others. Our goal is to inform and educate anyone that is interested in the topics our program addresses.

I am proud of our hard work, but I am probably most impressed with our accomplishments at the University of Nebraska Medical Center (UNMC). I serve as the faculty liaison for HEAL. HEAL is a student organization at UNMC that focuses on climate change, environmental issues, and sustainability. These young professionals are

leaders in our community, and they continue to forge ahead. They have pushed for including climate change in UNMC's medical school curriculum, the development of a climate and health Enhanced Medical Education Track, and for sustainability efforts on campus and in the community. Because of their work, we have more opportunities for future professionals coming through UNMC to understand and address the public health and healthcare challenges that we will continue to face as our environment continues to change.

Thank you so much for your interest in our program! Partnerships with individuals like you allow us to continue to address the 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

Jesse E. Bell, PhD



UNMC is Emerging Leader in Climate and Health Education for Medical Students

By Conor O'Neill and Meghan Langel

Climate change increases the risk of negative health outcomes such as heat-related illness, infections, asthma, mental health disorders, and poor birth outcomes. More frequent and intense extreme events can impair healthcare delivery due to damage to essential infrastructure, access to care, and compromised power supply . Because climate change will likely have impacts on healthcare, graduating medical students should be aware of these issues. Education efforts should help these students anticipate and manage the ways that climate change and extreme events will impact patients and delivery of care. The WCH Program and UNMC College of Medicine (COM) have decided to make this a priority. In the short time since the inception of the WCH Program, UNMC has emerged as a leader in the integration of climate and health content into medical school curriculum.

In Summer 2021, the UNMC COM approved a new Climate Change and Health Enhanced Medical Education Track (EMET). EMETs offer medical students an opportunity to perform an in-depth study of an interdisciplinary field of medicine that enhances the student's required curriculum without extending the time needed to graduate. To our knowledge, this is the only climate change and health EMET in the country. The first cohort of students has been selected and will begin their research projects in Summer 2022 under the guidance of Dr. Ellen Kerns, Assistant Professor in the COM Department of Pediatrics, and Dr. Jesse Bell.

In addition, the COM Curriculum Committee has approved a broader educational reform proposal to integrate principles of climate change into the curriculum for medical students. The curriculum reform proposal was approved in Fall 2021 and is currently being implemented. These important efforts would not have happened without the support of UNMC leadership, the Healthy Earth Alliance (HEAL), Chris Dethlefs (Medical Student), Tazah Weinmaster (Medical Student), DJ Maar (Medical Student), Conor O'Neill (WCH Program Graduate Assistant), Dr. Ellen Kerns, Dr. Anne Hubbard, Dr. Jesse Bell and the countless national experts who have helped to guide this process.

As for UNMC students interested in being involved in Climate and Health activities, please consider joining the UNMC student organization HEAL that is focused on climate change and sustainability. For more information about HEAL, visit their [Engage Page](#).



WCH Program Hosts Oil Pipeline Emergency Preparedness Workshop

By Laura Nagengast and Kylie Johnson

On November 2, 2021 the Water, Climate and Health Program held an Oil Pipeline Emergency Preparedness workshop in Norfolk, NE. Participants included emergency managers, public health officials, fire marshals, emergency responders, and tribal representatives from across Nebraska/the U.S. The goal of the workshop was to explore opportunities for preparedness improvement in relation to a pipeline breach in Nebraska.

The workshop began with two presentations – one from Durk Dunham, regarding his role leading the response to the 2010 Enbridge oil spill in Michigan, and one from Rachel Lookadoo, who covered the legal concerns surrounding pipeline event preparedness and response in Nebraska. Following the two presentations, stakeholders participated in a focused conversation and guided consensus process to arrive at preparedness strategies tailored to their roles in an oil pipeline breach response. Participants identified current response challenges which they organized into six general categories. From those challenges, they identified 24 potential solutions, and selected three that would be most easily implementable solutions through a guided consensus process. The results of the workshop are being formally written up for review and journal publication.



WCH Program is Key Contributor to the Water for Food Global Forum

By Frances Hayes and Meghan Langel

Daugherty Water for Food Global Institute (DWFI) virtually convened leading international experts, growers and organizations throughout the month of October 2021 to tackle issues related to achieving global water and food security. The Forum featured 22 virtual sessions with more than 80 speakers sharing their expertise. The Water, Climate and Health Program was among DWFI's key collaborators in planning the event, with other partners including those from the World Bank, the World Wildlife Fund, U.S. Farmers and Ranchers in Action, the International Water Management Institute, the International Food Policy Research Institute, the International Finance Corporation, CGIAR, USAID, FAO, the World Food Programme, the U.S. Department of Agriculture, the Natural Resources Districts and other universities and state agencies.

The Forum was a new initiative for the institute and nearly 900 people registered, representing 87 countries and 40 U.S. states. Strategically situated between the United Nations Food Systems Summit and the United Nations Climate Change Conference (COP26), the Forum focused on integrating knowledge and practice in four topic areas: climate change and extreme events; water and nutrient management; food systems and nutrition; and innovations and entrepreneurship in agriculture and water management. The WCH Program, which brings together experts from UNMC, the Institute of Agriculture and Natural Resources and DWFI, convened nationally and internationally-recognized speakers for several sessions under the topic areas of climate change and extreme events and water and nutrient management.

Recorded sessions may be viewed on [DWFI's YouTube page](#).

United Nations Report

By Jesse Bell

Jesse Bell was a contributing author on the Food and Agriculture Organization of the United Nations and United Nations Convention to Combat Desertification report titled *Thinking Ahead: Drought Resilience and COVID-19*. The goal of this report was to identify the ways that destabilization of ecosystems during drought has impacts on human health, leading to new challenges during response to the COVID-19 pandemic. For more on this report, please visit the [FAO webpage](#).



Lancet Report on Health and Climate Change

By Jesse Bell

Jesse Bell and Rachel Lookadoo contributed to the Lancet Countdown on Health and Climate Change: Policy Brief for the United States of America. This annual report identifies climate change as a health crisis and highlights opportunities for action. If you are interested in learning more about this report, please visit the [Lancet Countdown webpage](#).

National Academy of Medicine Workshop on Climate and Health

By Jesse Bell

Jesse Bell was invited to participate in a series of workshops by the National Academy of Medicine and Burroughs Wellcome Fund on the role of climate change on human health. These workshops were invitation-only events that were designed to bring together a diverse group of experts to advance the research and innovation on critical challenges at the intersection of human health and climate change.

National Climate Assessment

By Jesse Bell

UNMC College of Public Health Dean Ali Khan and Jesse Bell are among a diverse group of nationally recognized experts to serve as authors on the congressionally mandated Fifth National Climate Assessment. The purpose of this report is to summarize the current and future impacts of climate change on the United States. This report will be released by the White House in 2023. For more information, visit the [UNMC Newsroom webpage](#).



Featured Publications

“Mapping Heat Vulnerability Index Based on Different Urbanization Levels in Nebraska, USA”

By Babak Jalalzadeh Fard

Jalalzadeh Fard, B., Mahmood, R., Hayes, M., Rowe, C., Abadi, A. M., Shulski, M., Medcalf, S., Lookadoo, R., & Bell, J. E. (2021). Mapping heat vulnerability index based on different urbanization levels in Nebraska, USA. *GeoHealth*, 5(10). <https://doi.org/10.1029/2021gh000478>

Heat waves are known as periods of abnormally high temperatures that have the potential to cause health problems, even death. Heat waves and extreme heat likely kill more people every year than any other climate or weather-related events. Scientific studies have shown that climate change will cause more frequent, more extreme, and longer-lasting heat waves in the future. Additionally, urban areas are known to experience higher temperatures compared to their surrounding non-urban areas due to what is referred to as the Urban Heat Island (UHI) effect. The UHI is a result of concrete, asphalt, steel, and similar materials absorbing energy and returning it as heat. As our populations continue to grow and heat events become more common, it is important to understand the susceptibility of different communities to extreme heat to prepare and reduce potential impacts.

In a study, published in *Geohealth*, a group of scientists from UNMC and UNL separated the state of Nebraska into four levels of urbanizations (medium metropolitan, small metropolitan, micropolitan, and rural) and found that the socioeconomic variables combined differently in vulnerability indices for different urbanization classifications. The results of this study also indicate that different landcover types vary by urbanization levels and should be considered when calculating Heat Vulnerability Indices. This work shows the importance of accounting for urbanization differences when trying to prepare for heat health issues.

“Association between aqueous Atrazine and pediatric cancer in Nebraska”

By Jagadeesh Puvvula

Puvvula, J., Bartelt-Hunt, S.L., Ouattara, B.S., Kolok, A.S., Bell, J.E., Rogan, E.G., Association between aqueous Atrazine and pediatric cancer in Nebraska, (2021) *Water (Switzerland)*, 13 (19), art. no. 272, DOI:10.3390/w13192727

This study is a collaborative effort by the researchers from the UNMC, UNL, and the University of Idaho. The associations between Atrazine (ground and surface water) and pediatric cancer were evaluated over 30 years among Nebraska watersheds. This study observed higher atrazine concentrations among the southeastern Nebraska watersheds. Cancer diagnoses such as central nervous system (CNS), lymphoma, and leukemia were predominant during the study period. The results of this study observed positive associations between atrazine concentrations in surface water and groundwater with pediatric cancer. These findings indicate that children living in watersheds with atrazine concentrations higher than negligible had a 1.6 to 4.6 times increased likelihood of developing pediatric cancer.

Student Spotlight



Kylie Johnson

Kylie Johnson is a second year Master of Public Health student studying Emergency Preparedness. She is from Omaha, Nebraska and received her Bachelor of Science in Business Administration with minors in Public Health and Health Care Management from the University of Nebraska at Kearney. Currently, she is working on several projects under the supervision of Dr. Jesse Bell including health assessment in Mead, Nebraska, a review of current pipeline emergency preparedness efforts in Nebraska, and her capstone project which is an assessment of personal preparedness in the Douglas County volunteer first responder population. She is a Presidential Management Fellow finalist and is in the process of applying for her federal appointment. After her anticipated May 2022 graduation, she will transition into her role with a federal agency and begin her two-year fellowship. Upon completion of her fellowship, she hopes to continue her career with the federal government as an emergency preparedness specialist.

Our Team Continues to Grow!



Laura Nagengast

Laura Nagengast is the most recent addition to the Water Climate and Health program. She is currently a second year Masters of Public Health student at UNMC's College of Public Health. Laura is originally from Bloomfield, Nebraska and received her Bachelor's Degree in Anthropology from the University of Michigan- Ann Arbor. She is an advocate for health equity, with a particular interest in rural health advocacy and policy. Her future goals include improving health access and resources to those living in rural areas. Laura works on multiple projects throughout the WCH Program, but her research is focused on nitrate drinking water contamination. Her capstone project consists of conducting a needs assessment of nitrate water contamination educational materials throughout the state. She hopes to build upon the initial needs assessment following the completion of her Master's of Public Health degree.



Rachel Lookadoo

The Water, Climate and Health (WCH) has appointed a Director of Public Health Policy! Rachel Lookadoo is the Director of Legal and Public Health Preparedness for the Center for Preparedness Education at the University of Nebraska Medical Center, and an instructor in the Epidemiology department of the College of Public Health at the University of Nebraska Medical Center. Ms. Lookadoo's background is as an attorney, and she focuses on the various legal and regulatory issues that can arise in emergency preparedness. She specializes in quarantine law, public health effects of climate change, crisis standards of care, infectious disease response, and general legal preparedness. Ms. Lookadoo also conducts emergency preparedness trainings and assessments for public health departments and healthcare facilities nationally. She is working on various projects in collaboration with the WCH Program, including development of a drought and public health strategy document for the National Integrated Drought Information System (NIDIS).

Career Opportunities

We are accepting applications for two full-time positions! Please share with those who may be interested.

Assistant Extension Educator - Source Water Protection: The candidate will develop a robust program to assist Nebraska communities in developing strategies to protect the ground water source of their drinking water supply. The position involves facilitating communication and activities between the University of Nebraska Medicine Center's Water, Climate and Public Health program, University of Nebraska Extension, and the Nebraska Department of Environment and Energy's source water protection and nonpoint source management programs.

[University of Nebraska-Lincoln | Assistant Extension Educator - Source Water Protection \(unl.edu\)](https://unl.edu)

Tenure-leading endowed faculty position in the Department of Environmental, Agricultural & Occupational Health at UNMC: The incumbent's research will focus on environmental health, with emphasis on addressing issues associated with climate change and/or water quality. The incumbent will be a contributor to the research agenda of the WCH Program.

[University of Nebraska Medical Center | Academic Rank/Depends on Qualifications \(peopleadmin.com\)](https://peopleadmin.com)

Publications

Puvvula, J., Baccaglini, L., Johnson Jr, A., Du, Y., Bell, J. E., & Rautiainen, R. H. (2022). [Prevalence and risk factors for pulmonary conditions among farmers and ranchers in the central United States](#). *Journal of Agromedicine*.PB

Watanabe-Galloway, S., Chasek, C., Yoder, A. M., & Bell, J. E. (2022). [Substance use disorders in the farming population: Scoping review](#). *The Journal of Rural Health*, 38(1), 129-150.

Berman, J. D., Ramirez, M. R., Bell, J. E., Bilotta, R., Gerr, F., & Fethke, N. B. (2021). [The association between drought conditions and increased occupational psychosocial stress among US farmers: An occupational cohort study](#). *Science of The Total Environment*, 149245.

Gribble, M. O., Kaufman, J. A., Abadi, A. M., Bilotta, R., Bell, J. E., & Scovronick, N. C. (2021). [Differential susceptibility to aridity for mortality outcomes in South Africa: Application of mixed-effect regression tree analysis to a case-only design](#). ISEE Conference Abstracts, 2021(1). <https://doi.org/10.1289/isee.2021.o-lt-030>

Jalalzadeh Fard, B., Mahmood, R., Hayes, M., Rowe, C., Abadi, A. M., Shulski, M., ... & Bell, J. E. (2021). [Mapping heat vulnerability index based on different urbanization levels in Nebraska, USA](#). *GeoHealth*, 5(10), e2021GH000478.

Leeper, R. D., Matthews, J. L., Cesarini, M. S., & Bell, J. E. (2021). [Evaluation of air and soil temperatures for determining the onset of growing season](#). *Journal of Geophysical Research: Biogeosciences*, e2020JG006171.

Manangan, A., Brown, C., Saha, S., Bell, J., Hess, J., Uejio, C., ... & Schramm, P. (2021). [Long-term pollen trends and associations between pollen phenology and seasonal climate in Atlanta, Georgia \(1992-2018\)](#). *Annals of Allergy, Asthma & Immunology*.

McDermid, S. S., Mahmood, R., Hayes, M. J., Bell, J. E., & Lieberman, Z. (2021). [Minimizing trade-offs for sustainable irrigation](#). *Nature Geoscience*, 14(10), 706-709.

New-Aaron M, Abimbola O, Mohammadi R, Famojuro O, Naveed Z, Abadi A, Bell JE, Bartelt-Hunt S, Rogan EG. [Low-Level Groundwater Atrazine in High Atrazine Usage Nebraska Counties: Likely Effects of Excessive Groundwater Abstraction](#). *International Journal of Environmental Research and Public Health*. 2021; 18(24):13241. <https://doi.org/10.3390/ijerph182413241>

Publications cont.

Puvvula, J., Bartelt-Hunt, S.L., Ouattara, B.S., Kolok, A.S., Bell, J.E., Rogan, E.G., Association between aqueous Atrazine and pediatric cancer in Nebraska, (2021) *Water (Switzerland)*, 13 (19), art. no. 272, DOI:10.3390/w13192727

Book Chapters

Landon, C. M., Lyles, R. H., Scovronick, N. C., Abadi, A. M., Bilotta, R., Hauer, M. E., Bell, J. E., & Gribble, M. O. (2021). Mixed-effects negative binomial regression with interval censoring: A simulation study and application to aridity and all-cause mortality among black South Africans over 1997–2013. *Emerging Topics in Statistics and Biostatistics*, 381–413. https://doi.org/10.1007/978-3-030-72437-5_17

Technical Reports

The Lancet Countdown on Health and Climate Change: Policy Brief for the United States of America, both Rachel Lookadoo and Dr. Jesse Bell were editors.

Food and Agriculture Organization of the United Nations and United Nations Convention to Combat Desertification report titled Thinking Ahead: Drought Resilience and COVID-19, Jesse Bell was a contributing author

Presentations

- On December 15th, 2021 Dr. Jesse Bell was a Convener for a session at the American Geophysical Union Fall Meeting entitled “Accelerating Human Agility, Communication, and Equity in Shifting Disease Landscapes.”
- On December 14th, 2021 Dr. Jesse Bell was the presenting author for a poster at the American Geophysical Union Fall Meeting onentitled “A Comparative Review of Drought Metrics for Public Health Research Applications.” Other COPH authors included Siddhi Munde, Dr. Azar Abadi, Dr. Yeongjin Gwon and Rachel Lookadoo.
- On November 19th, 2021 Dr. Jesse Bell gave a presentation for the Children’s Health Research Institute Seminar Series on the topic of water quality and health in Nebraska.
- On November 5th, 2021 Dr. Jesse Bell gave a presentation at the Children’s Hospital Ground Rounds on the topic of water quality and health in Nebraska
- On November 3rd, 2021 Dr. Jesse Bell, Meghan Langel, Dr. Eleanor Rogan, Rachel Lookadoo, Keith Hansen, and Dr. Sharon Medcalf hosted a emergency preparedness workshop in Norfolk, entitled, “Emergency Planning for Oil Pipeline Breach Response.”
- On October 28th, 2021 Dr. Jesse Bell gave a presentation at the Water for Food Global Forum session titled “Impact of extreme events on water, food systems and human health.”
- On September 17th, 2021 Jesse Bell and Meghan Langel presented at the Nebraska Social Workers Annual Conference on the topic of “Environmental Issues Impacting Underserved Populations in Nebraska.”
- On September 27th, 2021 Jesse Bell gave a presentation at the Natural Resource District Fall Conference on the Science of Water and Health.
- On September 21st, 2021 Jesse Bell was a panelist at the NOAA NIDIS 2021 Southwest Drought Virtual Forum for a session titled Sector and Community-based Perspectives on Cascading Drought Impacts and Needed Changes.”
- On August 24th, 2021 Jesse Bell gave a presentation at the Indo-U.S. Bilateral Virtual Workshop on the “Water and Air Research Initiative for Societal Health.”

Presentations cont.

- On August 25th, 2021 Jesse Bell presented at the 33rd Annual Conference of the International Society for Environmental Epidemiology. The panel discussion was titled, “Building the Evidence Base to Advance Climate And Health Practice: Lessons Learned from Ongoing Translational Research Projects at the Centers for Disease Control and Prevention (CDC) and its partners.”
- On June 24th, 2021 Qianqian Li, Lorena Baccaglini, Jesse E Bell, Yi Du and Risto H Rautiainen, presented, “Chronic health conditions as risk factors for agricultural injuries in the Central United States” at the 2021 ISASH Virtual Conference
- On July 15, 2021 Rachel Lookadoo gave a presentation entitled, “Effective Long-Term Strategies to Prepare for, Prevent, and Mitigate Health Impacts of Drought” at the National Environmental Health Association Annual Education Conference
- On September 22, 2021 Rachel Lookadoo gave a presentation entitled “Drought and Health: Engaging Public Health and Policymakers” at the Network for Public Health Law Annual Conference
- On November 3, 2021 Rachel Lookadoo gave a presentation entitled, “Pipeline Emergencies in Nebraska” at the Pipeline Preparedness Workshop in Norfolk, NE.
- On June 28, 2021 Dr. Azar Abadi was the Speaker at “Mental Health & Our Changing Climate” by Conservation Nebraska
- On September 27, 2021 Dr. Azar Abadi participated in ASK UNMC! Why is air quality affected by wildfires from other parts of the country?
- On December 20, 2021 Dr. Azar Abadi participated in ASK UNMC! I have been really anxious about the recent climate changes. What can I do?
- On November 8, 2021 Dr. Azar Abadi participated in ASK UNMC! How does climate change impact human health?
- On November 30, 2021 Dr. Azar Abadi gave a Science Café talk
- On December 14, 2021 Dr. Azar Abadi gave an oral presentation entitled, “Investigating the Impacts of Drought on All-cause Mortality in Nebraska in a Bayesian Framework” (American Geophysical Union)
- On November 12, 2021 at the 1st ANNUAL College of Public Health INNOVATION EXPO Dr. Azar Abadi gave a presentation entitled, “Assessment of the Effects of Different Types of Drought on Suicide in Nebraska from 2000 to 2018”
- On November 11, 2021 at the Midwest Rural Agricultural Safety and Health Conference Dr. Azar Abadi gave a presentation entitled, “Assessment of the Effects of Different Timescales of Drought on Suicide in the U.S. Department of Health and Human Services (HHS) Region 7 from 2000 to 2018.”
- On November 14-16, 2021 Dr. Yeongjin Gwon presented “Bayesian Network Meta-Regression for Aggregate Ordinal Outcomes with Missing Categories” at the Eastern Asia Chapter of International Society for Bayesian Analysis (EAC-ISBA)
- On June 25-27, 2021 Dr. Yeongjin Gwon presented “Network Meta-Regression for Ordinal Outcomes with Incomplete Categories” at the International Conference on Econometrics and Statistics (EcoSta)
- On August 7-12, 2021 Dr. Yeongjin Gwon presented “Risk Modeling and Regression Technique” at the Joint Statistical Meetings (JSM)

