EMERGING SCIENCE FOR ENVIRONMENTAL HEALTH DECISIONS

AGENDA

Pivotal Interfaces of Environmental Health and Infectious Disease Research to Inform Responses to Outbreaks, Epidemics, and Pandemics

JUNE 8–9, 2021

FOR REGISTRATION AND MORE INFORMATION, PLEASE VISIT THE WORKSHOP WEBSITE:
http://nationalacademies.org/envirohealth-infectious-diseases

ALL TIMES LISTED ARE IN EASTERN TIME

AN EMERGING BODY OF RESEARCH details intersections between environment and infectious disease exposure and transmission. This workshop will take a population-level look and collaborative approach to this complex relationship to inform public health decision making during outbreaks, epidemics, and pandemics.

Specifically, workshop participants will investigate how emerging environmental exposure assessment tools could help identify and monitor critical pathways for exposure to infectious agents, and how recent advances in climate and environmental health modeling techniques could be applied to predict transmission dynamics and provide early warning of emerging infectious disease outbreaks.

Participants will also explore how data integration and emerging analytical tools can enable collaborations. A series of case studies on past infectious disease outbreaks, some mediated by environmental exposures, will be used to illustrate and expand on the workshop themes. This workshop builds on the Standing Committee's 2019 workshop, which focused on the interplay between environmental stressors, infectious disease, and human health at the individual level.

TUESDAY JUNE 8, 2021 10:00 AM – 3:15 PM ET

10:00 Pre-Recorded Workshop Primer Video—**Robert Newman**, The Aspen Institute, and **Melissa Perry**[*†], The George Washington University

10:10 Welcome and Opening Remarks—**Melissa Perry**[*†], The George Washington University

10:15 **AGENCY PERSPECTIVES AND OPPORTUNITIES**

Perspectives from the National Institute of Allergy and Infectious Diseases—**Cristina Cassetti**, National Institute of Allergy and Infectious Diseases, Division of Microbiology and Infectious Diseases

Moderator: **Vincent Munster**[†], National Institute of Allergy and Infectious Diseases, Laboratory of Virology

Perspectives from the National Institute of Environmental Health Sciences—**Gwen Collman**, National Institute of Environmental Health Sciences

Moderator: **Jade Mitchell**[†], Michigan State University

10:40 A Fireside Chat: Current Evidence Base and Gaps—**Cristina Cassetti,** National Institute of Allergy and Infectious Diseases, Division of Microbiology and Infectious Diseases; and **Gwen Collman**, National Institute of Environmental Health Sciences

Moderators: **Vincent Munster**[†], National Institute of Allergy and Infectious Diseases, Laboratory of Virology
Jade Mitchell[†], Michigan State University

11:00 **SESSION 1: PRINCIPLES OF EXPOSURE SCIENCE IN INFECTIOUS DISEASE RESEARCH**
The presentations and discussions in this session will focus on taking an environmental sciences perspective to pathogen transmission.

Moderator: **Kristen Malecki**[*†], University of Wisconsin, Madison

Exposure Science and Infectious Diseases—**Donald Milton,** University of Maryland, College Park

What Drives the Association Between Rainfall and Diarrhea Interrogating Evidence in Support of the Concentration Dilution Hypothesis—**Joseph Eisenberg,** University of Michigan

11:30 **SESSION 2: THE INTERSECTION OF ENVIRONMENTAL SCIENCE AND INFECTIOUS DISEASES IN SURVEILLANCE AND MONITORING**
This session's speakers will discuss translating technical tools from environmental surveillance to monitoring for infectious disease outbreaks (animal, environment, human).

Moderator: **Christine K. Johnson**[†], University of California, Davis

Leveraging Wastewater Surveillance to Improve Health Security—**David Larsen**, Syracuse University

Global Change and the Ecology of Vector-Borne Disease—**Erin Mordecai**, Stanford University

12:00 Scientific and Policy Panel Discussion: Session 1 and 2
During the Scientific and Policy Panel Discussions, invited speakers and policymakers from diverse agencies and organizations will discuss the needs and contributions of research and innovation to inform policy/decision-making. The discussants will address gaps and challenges that may have, or could, weaken early detection and prevention of infectious disease outbreaks, while highlighting areas of potential collaboration and cross-disciplinary interventions.

—**M. Christian Bautista**, Department of Defense, Armed Forces Health Surveillance
—**Wayne Cascio,** Environmental Protection Agency, Office of Research and Development
—**Joseph Eisenberg,** University of Michigan
—**David Larsen**, Syracuse University
—**Bill Lindsley,** Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health
—**Donald Milton,** University of Maryland, College Park
—**Erin Mordecai**, Stanford University

1:00 Break

1:30 **SESSION 3: ENABLING COLLABORATIONS WITH COMBINING COMPLEX DATA SETS**
In this session, participants will focus on moving past data collection, toward data utilization.

Moderator: **David Blazes**[†], Bill and Melinda Gates Foundation, Vaccine Development & Surveillance – Modelling and Pathogen Genomic Sequencing

Combining Data Streams for Malaria Intervention Impact Modeling—**Amelia Bertozzi-Villa,** Bill & Melinda Gates Foundation, Institute for Disease Modeling

Enabling Collaborations with Combining Complex Datasets—**William Pan,** Duke University

2:00 Scientific and Policy Panel Discussion: Session 3

—**Charles Ben Beard,** Centers for Disease Control and Prevention, Division of Vector-Borne Diseases
—**Amelia Bertozzi-Villa,** Bill & Melinda Gates Foundation, Institute for Disease Modeling
—**Abdisalan Noor,** World Health Organization, Global Malaria Programme
—**William Pan,** Duke University
—**Juli Trtanj,** National Oceanic and Atmospheric Administration

3:00 Wrap Up and Reflection on Day 1—**Vincent Munster**†, National Institute of Allergy and Infectious Diseases, Laboratory of Virology

3:15 Adjourn Day 1

WEDNESDAY JUNE 9, 2021 10:00 AM – 2:15 PM ET

10:00 Welcome and Opening Remarks; Reflections on Day 1; Overview of Day 2—**Jade Mitchell**†, Michigan State University, and **Christine K. Johnson**†, University of California, Davis

10:15 **SESSION 4: USING BIG DATA AND AI TO DRIVE NEW QUESTIONS**
This session will focus on current uses of big data and AI in modeling and prediction of epidemiology, and on potential future applications.

Moderator: **Svitlana Volkova**†**,** Pacific Northwest National Laboratory

Using Novel Data Streams to Track Outbreaks—**Ayesha Mahmud**, University of California, Berkeley

How Can AI Prevent the Next Pandemic?—**Pascale Fung,** Hong Kong University of Science and Technology

10:45 Scientific and Policy Panel Discussion: Session 4

—**Steven Foley**, Food and Drug Administration, National Center for Toxicological Research
—**Pascale Fung,** Hong Kong University of Science and Technology
—**Ayesha Mahmud**, University of California, Berkeley
—**Charles Schmitt,** National Institute of Environmental Health Sciences, Office of Data Science

11:45 Break

12:00 **BREAKOUT ACTIVITY**

During this activity, invited participants will brainstorm research and policy interventions, responses, and solutions to various infectious disease or environmental exposure scenarios. Members of the public will only view the discussions in Breakout Room 1: Airborne Exposure and Detection Scenario, which will be recorded and posted online after the workshop. The other breakout rooms will be attended by invitation from the workshop organizing committee. A summary of all the breakout room discussions will be provided during the breakout room report outs.

Overview of the Breakout Activity—**Gary Ginsberg**[*†], New York State Department of Public Health

Room 1: Airborne Exposure and Detection Scenario

It is 2022 and there is a new infectious disease outbreak from an unknown pathogen of unknown risk but that is highly likely an airborne pathogen. There are some reported clusters of cases associated with common indoor spaces in buildings. Since COVID-19, there are now air filters or monitors (unspecified) installed indoors as standard. ***This is the breakout room that members of the public will observe.***

—**Wayne Cascio,** Environmental Protection Agency, Office of Research and Development
—**Paul Dabisch,** National Biodefense Analysis and Countermeasures Center, Department of Homeland Security
—**Michael Johansson,** Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases
—**Bill Lindsley,** Centers for Disease Control and Prevention
—**Donald Milton,** University of Maryland, College Park
—**Vincent Munster**[†], National Institute of Allergy and Infectious Diseases
—**Melissa Perry**[*†], The George Washington University

Room 2: Wastewater Surveillance and Potential Waterborne Exposure

It is 2022 and there is routine wastewater surveillance that some municipalities have implemented for parasites, bacterial, and viral pathogens. An unknown pathogen is detected. Humans are not getting sick at first but there are few clusters of animal cases that center around common wastewater sources. A pattern, direction, and routes of transmission of this unknown waterborne pathogen are difficult to identify. In fact, infectious disease experts have not yet made the link between the pathogen detected and the animal cases.

—**Michael Focazio,** United States Geological Survey, Environmental Health Programs
—**Gary Ginsberg**[*†], New York State Department of Public Health
—**Jasen Kunz,** Centers for Disease Control and Prevention, National Center for Environmental Health

—**Christine K. Johnson**[†], University of California, Davis
—**David Larsen,** Syracuse University
—**Mia Mattioli,** Centers for Disease Control and Prevention, Environmental Microbiology Lab

Room 3: Antimicrobial Resistance Emergence Scenario

It is 2026 and there is a brand new antibiotic (i.e., new class and mechanism) that has just come to market this year. Surprisingly, a few hospitals in a specific region in the U.S. are already reporting resistance profiles in some E. coli strains. We know that there have been recent cases of exposure to heavy metal through soil contamination in this specific farming region as well, but the link between the two situations is unclear. Interestingly, similar farming regions in the same state do not report similar cases yet.

—**David Blazes**[†], Bill and Melinda Gates Foundation, Vaccine Development & Surveillance – Modelling and Pathogen Genomic Sequencing
—**Steven Foley,** Food and Drug Administration, National Center for Toxicological Research
—**Pascale Fung,** Hong Kong University of Science and Technology
—**Kristen Malecki**[*†], University of Wisconsin, Madison
—**Kimberly Thigpen Tart,** National Institute of Environmental Health Sciences

Room 4: Environmental Change Scenario

It is 2026 and forecasts suggest heavy rainfall with unpredictable downpours impacting the entire Eastern seaboard. Seasonal forecasts are now available at short term downscaled levels and heavy rain suggest extreme flooding in urban as well as rural areas across multiple states on the East coast. Among these areas are regions where industry is highly prevalent. In rural areas on the Eastern seaboard, large proportions of private well water supplies will be compromised and contaminated with groundwater. Basements of private properties are flooded potentially exposing homeowners to infections agents and contaminants.

—**John Balbus,** National Institute of Environmental Health Sciences
—**Charles Ben Beard,** Centers for Disease Control and Prevention, Division of Vector-Borne Diseases
—**Adriana Costero-Saint Denis**, National Institute of Allergy and Infectious Diseases, Parasitology and International Programs Branch
—**Katharina Dittmar,** National Science Foundation, Division of Environmental Biology
—**Jade Mitchell**[†], Michigan State University
—**William Pan,** Duke University
—**Juli Trtanj,** National Oceanic and Atmospheric Administration
—**Rish Vaidyanathan,** Centers for Disease Control and Prevention, National Center for Environmental Health
—**Svitlana Volkova**[†]**,** Pacific Northwest National Laboratory[†]

1:15 Break

1:30 Breakout Room Report Outs: Research and Policy Interventions

2:00 Closing Remarks—**Melissa Perry**[*†], The George Washington University

2:15 Adjourn Workshop[‡]

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[*] Member of the Standing Committee on the Use of Emerging Science for Environmental Health Decisions

[†] Member of the workshop organizing committee

[‡] The Standing Committee on the Use of Emerging Science for Environmental Health Decisions business meeting will follow the workshop at 3:30 pm

Workshop Organizing Committee

This workshop was organized by the following experts: **David Blazes,** Bill and Melinda Gates Foundation; **Gary Ginsberg**[*], New York State Department of Health; **Christine K. Johnson,** University of California, Davis; **Kristen Malecki**[*], University of Wisconsin, Madison; **Jade Mitchell,** Michigan State University; **Vincent J. Munster,** National Institute of Allergy and Infectious Diseases; **Melissa J. Perry**[*], The George Washington University; **Svitlana Volkova,** Pacific Northwest National Laboratory.

About the Standing Committee on the Use of Emerging Science for Environmental Health Decisions

The National Academies' Standing Committee on the Use of Emerging Science for Environmental Health Decisions (ESEHD) examines and discusses issues on the use of new science, tools, and research methodologies for environmental health decisions. The ESEHD committee is organized under the auspices of the Board on Life Sciences and the Board on Environmental Studies and Toxicology of the National Academies of Sciences, Engineering, and Medicine, and sponsored by the National Institute of Environmental Health Sciences.