ECAPH 2021

School of Public Health and Social Work

14-15 June 2021

2nd Ecosystem Change and Population Health Symposium (Virtual)

QUT

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Welcome

Professor Hilary Bambrick

Head of School of Public Health and Social Work,
Queensland University of Technology

A very warm welcome to everyone joining us at the second ECAPH conference here at QUT. This conference is bringing together global research leaders with early and mid-career researchers to share knowledge and ideas across a range of critical environmental health issues. Our participants and delegates come from around the globe, and we're here to discuss worldwide concerns.

The interconnectedness of people has never been clearer than in the last 18 months with the COVID-19 pandemic. Nor has the need for global cooperation to solve a global health problem been more apparent. While much of our attention may have been taken by the pandemic, environmental health crises continue to unfold. In the case of climate change, the need to address this has become even more urgent. Over 2020 we have seen cascading catastrophes; mega fires, major floods, landslides, record heat and record cold. The pandemic at the same time compounds complexity and risks associated with emergency and disaster response, and demonstrates that crises can be multiple and complex, that disasters don't line up neatly one after the other to wait their turn.

Forums like ECAPH bring diverse people and their ideas together, promote research networking and build collaborations. It's these types of conversations and collaborations that will help us understand and deal with the increasing complexity in environmental health in our interconnected world.

Professor Wenbiao Hu

Symposium Convenor
Director, Australia-China Centre for Public Health
School of Public Health and Social Work
Faculty of Health
Queensland University of Technology
Victoria Park Road Q4059

On behalf of the Symposium Organizing Committee, I warmly welcome you to the 2nd Ecosystem Change and Population Health (ECAPH) Symposium 2021.

Climate change is affecting our ecosystem and poses a great threat to the current and future health and well-being of humanity. This a major concern not just for scientists, public health officials and our governments but also the wider public sharing concerns for the possible health consequences of ecosystem change in the present and into the future. With the rise of international travel and trade, we are facing new challenges in dealing with population health at local, national and global levels. This is particularly relevant in the context of the ongoing COVID-19 pandemic which has caused significant global burden with widespread social and economic impacts, as a direct result of infections themselves and as a flow on effect from control strategies.

The objective of the symposium is to gather scientists working in the fields of environment health, epidemiology, infectious diseases and biostatistics and provide a platform for the exchange of information and ideas. Through the symposium our speakers will share exciting new research and ideas in the areas of environmental research and public health, aiming to better understand the complex ecology and the possible impacts of climate change on population health and to better develop early warning systems based on ecosystem change.

I am pleased to share with you that we have over 50 prestigious speakers representing 33 institutions from 8 countries in this two-day symposium. Our speakers will discuss leading issues including identifying and tackling the current major threat of COVID-19 and other population health issues posed by rapid ecosystem, social and technology changes in the modern world.

I hope that you will find the symposium both enjoyable and valuable, providing a great opportunity to network and share ideas on a global scale in an online format.

I look forward to your attendance and welcome to the ECAPH 2021!

Committee

Advisory Committee

Professor Hilary Bambrick
Head of School of Public Health and Social Work, Faculty of Health,
Queensland University of Technology

Emeritus Professor Gerald FitzGerald
School of Public Health and Social Work, Queensland University of Technology

Professor Guihua Zhuang
Dean of School of Public Health,
Xi'an Jiaotong University

Organization Committee

Convener

Professor Wenbiao Hu
School of Public Health and Social Work,
Queensland University of Technology

Organization Committee members

Ms. Hannah McClymont
School of Public Health and Social Work,
Queensland University of Technology

Mr. Callan Davis
School of Public Health and Social Work,
Queensland University of Technology

Dr. Xin Qi
School of Public Health,
Xi'an Jiaotong University

Ms. Semmi Brown
School of Public Health and Social Work,
Queensland University of Technology

About Zoom using guide

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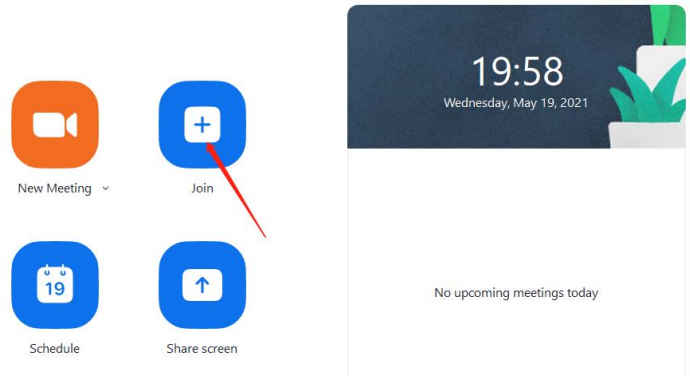

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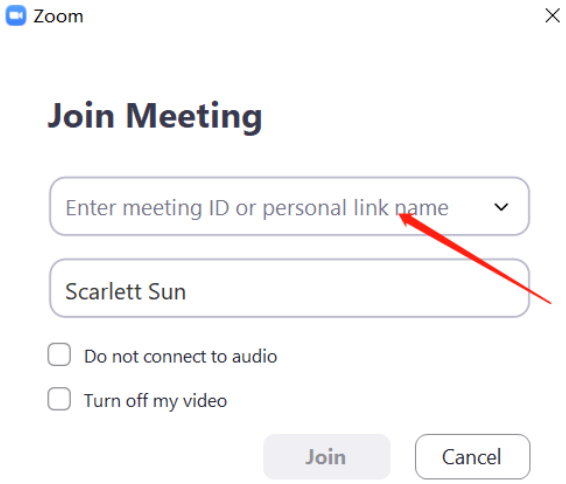

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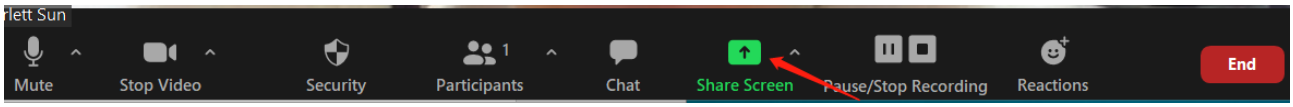

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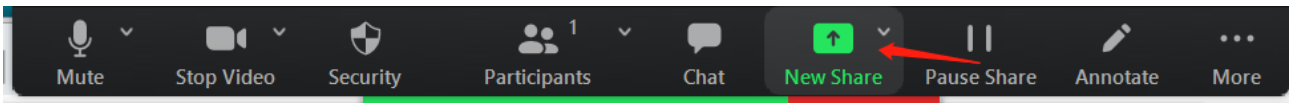

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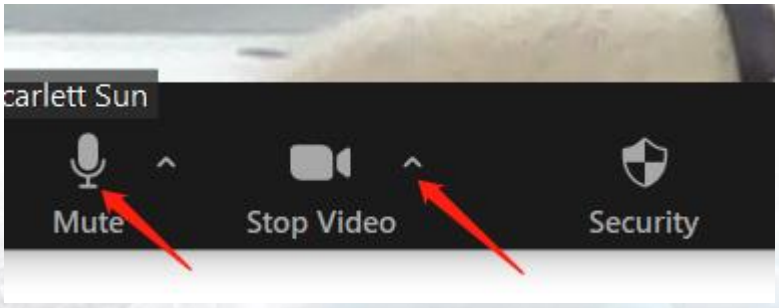


Agenda

Conference Calendar

Australian Eastern Standard Time (AEST)

Date	Time (AEST)	Session
14 June Monday	10:00-12:15	Opening ceremony and Plenary Session 1
	12:45-16:25	Session One
	12:45-16:25	Session Two
	12:45-16:25	Session Three
15 June Tuesday	10:20-12:30	Plenary Session 2
	13:00-16:40	Session Four
	13:00-16:40	Session Five
	13:00-16:40	Session Six
	16:45-17:20	Plenary Session 3 and Symposium Officially Concludes

Plenary Session

Day 1: Monday 14 June 2021, 10:00 - 12:15	
10:00	Official Greeting and Welcome **Prof. Mark Brough**, Head (acting), School of Public Health and Social Work, Queensland University of Technology, Australia
Plenary Session 1 - Chair: Emeritus Professor Gerry Fitzgerald –School of Public Health and Social Work, Queensland University of Technology, Australia	
10:15	**Prof. Kristie Ebi,** Department of Global Health, The University of Washington, United State of America. Topic: Adapting to the Health Risks of a Changing Climate. (20 min presentation + 10 min Q&A)
10:45	**Prof. Sotiris Vardoulakis,** National Centre for Epidemiology & Population Health, Australian National University. Topic: Environmental Change, COVID-19 and public health (20 min presentation + 10 min Q&A)
11:15	**Prof. Lidia Morawska,** School of Earth & Atmospheric Sciences, Queensland University of Technology, Australia. Topic: A paradigm shift to combat indoor respiratory infections: beyond COVID-19 . (20 min presentation + 10 min Q&A)
11:45	**Prof. Kerrie Mengersen,** School of Mathematical Science, Queensland University of Technology, Australia. Topic: AusEnHealth: An Australian Environmental Health Digital Twin. (20 min presentation + 10 min Q&A)
12:15	Break (30 min)

Day 2: Tuesday 15 June 2021, 10:20 – 12:30	
Plenary Session 2 Chair: Emeritus Prof. Gerry Fitzgerald – School of Public Health and Social Work, Queensland University of Technology, Australia	
10:30	**Prof. Peter Doherty,** Nobel Laureate – University of Melbourne, Australia. Topic: What have we learnt so far from COVID-19? (15 min presentation + 10 min Q&A)
11:00	**Prof. Archie Clements,** Pro Vice-Chancellor, Faculty of Health Sciences, Curtin University, Australia. Topic: Spatial and temporal data visualization in relation to COVID-19. (20 min presentation + 10 min Q&A)
11:30	**Prof. Weizhong Yang,** Chinese Academy of Medical Sciences/Peking Union Medical College, China. Topic: COVID-19 control and prevention in China. (20min presentation + 10 min Q&A)
12:00	**Prof. Xiaoming Yang,** China National Pharmaceutical Group Corp, China (TBC). Topic: Coronavirus variants, viral mutation and COVID-19 vaccines. (20min presentation + 10 min Q&A)
12:30	Break (30 min)

Day 2: Tuesday 15 June 2021, 16:45 – 17:20	
16:45	**Plenary Session 3. Prof. Michael Bonsall,** Mathematical Ecology Research Group, Oxford University, United Kingdom. Topic: Emerging pandemics: early warning approaches and disease mitigation strategies (20 min presentation + 10 min Q&A) **Chair: Prof. Wenbiao Hu,** School of Public Health and Social Work, QUT, Australia
17:15	**Symposium Officially Concludes, Prof. Wenbiao Hu,** School of Public Health and Social Work, Queensland University of Technology, Australia. 5 minutes.

Time Zone: Australian Eastern Standard Time

Concurrent Session
Session One

Day 1: Monday 14 June 2021, 12:45 - 16:25	
Session One (A): Environmental Exposure and Chronic Diseases Chair: Prof. Steven McPhail	
12:45	**Prof. Xiong Guo,** Xi'an Jiaotong University, China **Title:** Element Responsive Gene Set Enrichment Analysis of Human Complex Psychiatric Disorders
13:05	**Prof. Yana Bai,** Lanzhou University, China **Title:** Progress of Jinchang Cohort – the World's Largest Occupational Heavy Metal Exposure Cohort
13:25	**A/Prof. Ning Wang,** China CDC **Title**: Lung Cancer Mortality in China and Australia: An Age-Period-Cohort Analysis of Data from the Global Burden of Disease Study 2017
13:45	**A/Prof. Xin Qi,** Xi'an Jiaotong University, China **Title:** Air pollution and esophageal cancer in China
14:05	Break (1 hour)
Session One (B): Environmental Exposure and Chronic Diseases Chair: A/Prof. Xin Qi	
15:05	**Prof. Feng Zhang,** Xi'an Jiaotong University, China **Title:** Element Responsive Gene Set Enrichment Analysis of Human Complex Psychiatric Disorders
15:25	**A/Prof. Minzhen Wang,** Lanzhou University, China **Title:** Effects of atmospheric PM10 on the incidence of type 2 diabetes and its mechanism
15:45	**Prof. Peng Jia,** Wuhan University, China **Title:** Geospatial Epidemiological Analysis in Life Course Study
16:05	**Ms. Amy Savage,** Queensland University of Technology, Australia **Title:** Impacts of climate change on diet-related non-communicable diseases in Small Island Developing States: A qualitative case study in Vanuatu

Session Two

Day 1: Monday 14 June 2021, 12:45 - 16:25	
Session Two (A): Climate Change and Population Health Chair: Prof. Haidong Kan	
12:45	**A/Prof. Ying Zhang,** University of Sydney, Australia **Title**: The MJA-Lancet Countdown: Tracking progress on Health and Climate Change for Australia
13:05	**Dr. Yang Xie,** Beihang University, China **Title**: Health co-benefits of climate change mitigation policy in China
13:25	**Prof. Hancheng Dai,** Peking University, China **Title:** Integrated assessment on air quality and health co-benefits of climate mitigation
13:45	**Prof. Cunrui Huang,** Sun Yat-sen University, China **Title**: Detecting the net effect of flooding on infectious diarrheal disease in Anhui Province, China: a quasi-experimental study
14:05	Break (1 hour)
Session Two (B): Climate Change and Population Health Chair: Prof. Cunrui Huang	
15:05	**A/Prof. Donna Green,** University of New South Wales, Australia **Title:** Climate Change and Population Health
15:25	**A/Prof. Shan Zheng,** Lanzhou University, China **Title:** Temperature variability and cardiovascular diseases
15:45	**Prof. Peng Bi,** University of Adelaide, Australia **Title:** Environmental change and health in Australia: Working together with Stakeholders
16:05	**Dr. John Cauchi,** Queensland University of Technology, Australia **Title:** Climate Change, Food Security and Health – lessons from Kiribati

Time Zone: Australian Eastern Standard Time

Session Three

Day 1: Monday 14 June 2021, 12:45 - 16:25	
Session Three (A): The transmission, seasonality, and interventions of COVID-19 Chair: A/Prof. Stephen Lambert	
12:45	**Dr. David Warne,** Queensland University of Technology, Australia **Title:** Modelling the response of communities to COVID-19 outbreaks
13:05	**Dr. Wei Luo,** National University of Singapore, Singapore **Title**: The role of absolute humidity on transmission rates of the COVID-19 outbreak
13:25	**Dr. Chuchu Ye,** Pudong CDC, China **Title:** The effectiveness of active surveillance measures for COVID-19 cases in Pudong New Area, Shanghai, 2020
13:45	**Ms. Hannah McClymont,** Queensland University of Technology, Australia **Title:** Weather variability and COVID-19 Transmission
14:05	Break (1 hour)
Session Three (B): The transmission, seasonality, and interventions of COVID-19 Chair: Dr. Shengjie Lai	
15:05	**Prof. Bo Huang,** The Chinese University of Hong Kong, China **Title:** Integrated vaccination and physical distancing interventions to prevent future COVID-19 waves
15:25	**Dr. Shengjie Lai,** University of Southampton, United Kingdom **Title:** Human mobility and the global spread of SARS-CoV-2 and new variants
15:45	**Dr. Ruiyun Li,** University of Oslo, Norway **Title:** Strategic intervention of COVID-19 pandemic
16:05	**Mr. Francesco Sera,** London School of Hygiene and Tropical Medicine, United Kingdom **Title:** Potential drivers of COVID-19 seasonality in 409 cities across 26 countries

Session Four

Day 2: Tuesday 15 June 2021, 13:00 - 16:40	
Session Four (A): One Health Chair: A/Prof. Ricardo Magalhaes	
13:00	**A/Prof. Simon Reid,** University of Queensland, Australia **Title:** Making One Health more than a concept
13:20	**A/Prof. Lin Yang,** Hong Kong Polytechnic University, China **Title:** From SARS to COVID-19: the Hong Kong experience
13:40	**A/Prof. Huachen Zhu,** The University of Hong Kong, China **Title:** Genesis of Emerging Influenza viruses and Coronaviruses: an ecological perspective
14:00	**Prof. Cordia Chu,** Griffith University, Australia **Title:** What lessons must we learn from COVID-19 to prepare for the next pandemic?
14:20	Break (1 hour)
Session Four (B): One Health Chair: A/Prof. Lin Yang	
15:20	**Prof. Colleen Lau,** University of Queensland, Australia **Title:** Leptospirosis and Precision One Health
15:40	**Dr. Nicholas J Clark**, University of Queensland, Australia **Title:** Near-term forecasting of companion animal tick paralysis incidence: an iterative ensemble model
16:00	**A/Prof. R.J. Soares Magalhães,** University of Queensland, Australia **Title:** Public health impacts of animal and environmental exposures on human Q fever notifications: the case for integrated surveillance for source attribution
16:20	**Dr. Maximillian Stammnitz,** Centre for Genomic Regulation, Spain **Title:** Freshwater monitoring by nanopore metagenomics

Time Zone: Australian Eastern Standard Time

Session Five

Day 2: Tuesday 15 June 2021, 13:00 - 16:40	
Session Five (A): Vector-borne disease surveillance and control Chair: Dr. Amanda Murphy	
13:00	**Dr. Pandji Dhewantara,** National Institute of Health Research and Development, Indonesia **Title**: Climate change and vector-bone diseases in Indonesia: Trends, gaps and opportunities
13:20	**Dr. Aswi Aswi,** State University of Makassar, Indonesia **Title**: Modelling Hospitalization of dengue: A comparison of Bayesian spatial survival models
13:40	**Ms. Rokeya Akter,** Queensland University of Technology, Australia **Title:** Dengue in a crowded megacity: Lessons learnt from current outbreak (2019) in Dhaka, Bangladesh
14:00	**Dr. Zhiwei Xu,** University of Queensland, Australia **Title:** Using dengue epidemics and local weather in Bali, Indonesia to predict imported dengue in Australia
14:20	Break (1 hour)
Session Five (B): Vector-borne disease surveillance and control Chair: Dr. Zhiwei Xu	
15:20	**Dr. Amanda Murphy,** WHO **Title:** Climate variability and Aedes vector indices in the southern Philippines: an empirical analysis
15:40	**Prof. Jian Cheng,** Anhui Medical University, China **Title**: Short-term impacts of weather extremes on dengue outbreaks: evidence from Asia-Pacific region
16:00	**Dr. Tanya Russell,** James Cook University, Australia **Title:** Mosquito-borne disease surveillance and control in the Pacific region
16:20	**Dr. Ralph Trancoso da Silva,** University of Queensland, Australia **Title:** High-resolution climate change projections to support health adaptation

Session Six

Day 2: Tuesday 15 June 2021, 13:00 - 16:40	
Session Six (A): Air pollution, Extreme Weather Events and Health Chair: Prof. Yuming Guo	
13:00	**Prof. Haidong Kan,** Fudan University, China **Title**: Short term associations of ambient nitrogen dioxide with daily total, cardiovascular, and respiratory mortality: a global analysis in 398 cities
13:20	**Prof. Linwei Tian,** Hong Kong University, China **Title**: Physiological roles of gaseous pollutants
13:40	**Dr. Tiantian Li,** China CDC **Title:** Mortality risks of cold spell in China
14:00	**Prof. Guanghui Dong,** Sun Yat-sen University, China **Title:** Ambient Air Pollution and Health Impact in China
14:20	Break (1 hour)
Session Six (B): Air pollution, Extreme Weather Events and Health Chair: A/Prof. Donna Green	
15:20	**Prof. Yuming Guo,** Monash University, Australia **Title:** Global burden of mortality attributable to cold and hot temperatures
15:40	**Prof. Shaowei Wu,** Xi'an Jiaotong University, China **Title:** The modification of psychosocial stress on the cardiovascular effects of air pollution
16:00	**Dr. Tao Xue,** Peking University, China **Title**: Associations between Reduced PM2.5 and Improved Health during China's Clean Air Actions since 2013
16:20	**Dr. Dung Phung,** Griffith University, Australia **Title:** A Climate-based prediction tool in the dengue high-risk cluster of the Mekong Delta Region

Time Zone: Australian Eastern Standard Time (AEST)

Keynote Speakers

Peter C. Doherty

Laureate Professor, Doherty Institute – University of Melbourne

A graduate of the University of Queensland School of Veterinary Science, Peter Doherty shared the 1996 Nobel Medicine Prize for his immunology research and was the 1997 Australian of the Year. Since then, he has gone in to bat for evidence-based reality, relating to areas as diverse as childhood vaccination, global hunger and anthropogenic climate change. So far, he has published 6 "lay" books on science with the latest, "The Incidental Tourist".

Kristie L. Ebi,

Professor, Centre for Health and the Global Environment – University of Washington

Kristie L. Ebi, Ph.D., MPH has been conducting research and practice on the health risks of climate variability and change for nearly 25 years, focusing on understanding sources of vulnerability; estimating current and future health risks of climate change; designing adaptation policies and measures to reduce risks in multi-stressor environments; and estimating the health co-benefits of mitigation policies. She has supported multiple countries in Central America, Europe, Africa, Asia, and the Pacific in assessing their vulnerabilities and implementing adaptation policies and programs. She has been an author on multiple national and international climate change assessments, including the fourth U.S. National Climate Assessment and the IPCC Special Report on Global Warming of 1.5°C. She has edited fours books on aspects of climate change and has more than 200 publications.

Michael Bonsall,
Professor, Department of Zoology and Fellow of St Peters College – University of Oxford

Michael Bonsall is Professor of Mathematical Biology at the Department of Zoology and Fellow of St Peters College, University of Oxford. He is an Associate Head of Maths, Physical and Life Sciences Division. He completed his undergraduate, graduate and postdoctoral training at Imperial College London. He has wide ranging research interests focussing on ecology, evolution, and epidemiology. He has interests in vector-borne disease control and the applications of optimal control. Mike has held national and international research grants and has published over 150 peer-reviewed articles in international journals including Nature, Science, PNAS, Translational Psychiatry, Royal Society Journal Interface, Journal of Theoretical Biology.

Weizhong Yang
Professor, Executive Head, School of Population Medicine & Public Health – Chinese Academy of Medical Sciences/Peking Union Medical College

Prof. Weizhong Yang, Executive Head, School of Population Medicine & Public Health, Chinese Academy of Medical Sciences/Peking Union Medical College Vice President and Secretary General of Chinese Preventive Medicine Association, Former Deputy General Director of Chinese Center for Disease Control and Prevention.

Since 1982, he has been engaged in infectious disease surveillance, prevention and control, immunization planning management, and public health management in Sichuan Provincial Epidemic Prevention Station, Chinese Center for Disease Control and Prevention, and Chinese Preventive Medicine Association. In recent 10 years, as the first author or corresponding author, he has published more than 50 papers in international and journals such as The New England Journal of Medicine, Lancet, Vaccine, Public Health, PLoS ONE, Emerging Infectious Disease, BMJ, PLoS Medicine, Health Affairs, BMC Infectious Diseases etc. He edited the Early Warning for Infectious Disease Outbreak: Theory and Practice published by Elsevier He was the editor-in-chief of the Lancet Infectious Diseases Volume (Chinese Version), and the deputy editor of the Vaccine. (Chinese Version).

Xiaoming Yang,
Researcher, PhD supervisor.
Chairman of the Board – China National Biotec Group Company Limited (CNBG)

Prof. Xiaoming Yang has been serving as the Chairman of the Board at CNBG since Mar. 2015. He oversees the corporate strategy, governs the high-level operations and integrates the internal and external resources to promote the organic growth and expansion of the company. Before his current position, he held several senior positions in Sinopharm, including the Chief Engineer of Sinopharm, the President of the CNBG, and the General Manager of WIBP. He serves as member of leadership team in several leading organization and programs, including Chief Scientist of Vaccine Project in the National 863 program, General Director of the National Combo Vaccine Engineering Technology Center, Vice-Chairman of Vaccine Committee of Chinese Pharmacopoeia Commission (ChPC), Executive Director of the Chinese society of immunology, Member of the Joint Prevention and Control Mechanism of the State Council-Vaccine Research Committee, Chairman of Board of Biologicals at Chinese Preventive Medicine Association, Vice President of China Medicinal Biotechnology Association and a member of Vaccine committee.

Kerrie Mengersen,
Distinguished Professor, School of Mathematical Sciences – Queensland University of Technology

Distinguished Professor Kerrie Mengersen holds a Chair in Statistics at the Queensland University of Technology (QUT). She is the Deputy Director of the Australian Research Council Centre of Excellence in Mathematical and Statistical Frontiers, and Director of the QUT Centre for Data Science. Professor Mengersen's research interests include Bayesian methods; modelling and computation at the interface of statistics, machine learning and AI; and engagement in challenging real-world problems in health, environment and industry.

Lidia Morawska,
Distinguished Professor, School of Earth & Atmospheric Sciences – Queensland University of Technology

Lidia Morawska is Distinguished Professor at the Queensland University of Technology in Brisbane, Australia, and the Director of the International Laboratory for Air Quality and Health at QUT, which is a Collaborating Centre of the World Health Organization on Research and Training in the field of Air Quality and Health. Lidia also holds positions of Adjunct Professor, Institute for Environmental and Climate Research (ECI), Jinan University, Guangzhou, China, of Vice-Chancellor Fellow, Global Centre for Clean Air Research (GCARE), University of Surrey, UK, and is a co-director of the Australia-China Centre for Air Quality Science and Management She conducts fundamental and applied research in the interdisciplinary field of air quality and its impact on human health and the environment, with a specific focus on science of airborne particulate matter. She is a physicist and received her doctorate at the Jagiellonian University, Krakow, Poland for research on radon and its progeny. An author of over eight hundred journal papers, book chapters and refereed conference papers, Lidia has been involved at the executive level with a number of relevant national and international professional bodies, is a member of the Australian Academy of Science and a recipient of numerous scientific awards.

Prof. Sotiris Vardoulakis,
Global Environmental Health and Leader, Environment, Climate and Health Research Group – The Australian National University

Sotiris Vardoulakis is Professor of Global Environmental Health and Leader of the Environment, Climate and Health Research Group at the Australian National University. Previously, he was Director of Research at the Institute of Occupational Medicine in Edinburgh, Head of the Environmental Change Department at Public Health England, and held academic positions at the London School of Hygiene and Tropical Medicine and at the University of Birmingham (UK). His main research interests include climate change, air pollution and health, sustainable cities, exposure assessment, environmental epidemiology, health impact assessment, occupational hygiene, and public health communication and policy.

Professor Archie Clements,
Pro Vice Chancellor, Faculty of Health Sciences - Curtin University, Australia

Professor Clements is the Pro Vice Chancellor, Faculty of Health Sciences at Curtin University. Prior to his position at Curtin, Professor Clements was the Director of the Research School of Population Health and Professor of Infectious Disease Epidemiology at the Australian National University (ANU) in Canberra. The Research School of Population Health comprised of five academic units, including the flagship National Centre for Epidemiology and Population Health (NCEPH). He has worked previously at Imperial College London and University of Glasgow, and has a PhD from the University of London. His research background is in the epidemiology, control and elimination of infectious diseases, focussing mainly on the Asia-Pacific region during the last decade. He has particular expertise in spatial epidemiology, operational research and community-based intervention studies and has been an NHMRC Senior Research Fellow.

Chairs of Plenary Sessions

Professor Hilary Bambrick

Head of School of Public Health and Social Work, Faculty of Health, Queensland University of Technology

Professor Hilary Bambrick, Head of QUT's School of Public Health at Social Work, researches the health impacts of climate change. She led the health impacts assessment for Australia's national review (The Garnaut Review, 2008) and has contributed to adaptation strategies in Australia, including for Sydney, Queensland and Tasmania. She consults for DFAT, WHO and UNDP on climate impacts and adaptation strategies for health, including building national health systems resilience, and has worked on community-based adaptation in Asia, remote Pacific and the Ethiopian Rift Valley. She is a Councillor with Australia's Climate Council and contributes regularly to media and public debate.

Emeritus Professor Gerald FitzGerald

School of Public Health and Social Work, Queensland University of Technology

Emeritus Professor Gerald (Gerry) FitzGerald retired in July 2019 as Professor of Public Health at QUT and discipline Leader of Health Management and Disaster Management. He holds medical specialist qualifications in Emergency Medicine and Medical Administration and a Doctor of Medicine degree for a thesis entitled Emergency Department Triage. Professor FitzGerald was previously the Director of the Emergency Department at Ipswich Hospital, Medical Director and then Commissioner of the Qld Ambulance Service and Chief Health Officer. Since joining QUT Prof. FitzGerald has led the discipline of Health Management. His principal research focus is on emergency healthcare systems and how they perform under both routine and non-routine pressures. He has published over 150 peer reviewed articles, a text in Disaster Health Management, eight book chapters and more than 100 conference representations. He has supervised more than 30 PhD students to completion and obtained over $5m in research grants (including three ARC and three NHMRC grants).

Professor Wenbiao Hu

School of Public Health and Social Work, Queensland University of Technology

Prof. Wenbiao Hu is an Environmental Epidemiologist and former Australian Research Council Fellow at School of Public Health and Social Work, Queensland University of Technology (QUT), Australia. He is the director of Australia-China Centre for Public Health, QUT. Prof. Hu has been awarded over 8 national highly prestigious and competitive grants and has published more than 240 peer-reviewed articles in international and national journals. His research interests are on infectious disease ecology and epidemiology. He is a reviewer for prestigious journals including Science, New England Journal of Medicine, Lancet Infectious Diseases, Lancet Planetary Health, PloS Med, etc. Prof. Hu has served as a National Health and Medical Research Council (NHMRC) Ideas Grants panel member, an invited reviewer for the NHMRC Project Grants, ARC Discovery Grants and ARC Linkage Grant.

Official Greeting and Welcome

Date	Monday 14 June 2021
Session time	10:00 – 10:15 (Australian Eastern Standard Time)

Professor Mark Brough
Head of School (acting), School of Public Health and Social Work, Queensland University of Technology (QUT), Australia

Mark is a critical social scientist who specialises in health inequality. His work is informed by a concern for the socio-political structures which surround health. He applies this lens in a range of cross-cultural circumstances as well as a range of health problems. He has worked extensively with Aboriginal and Torres Strait Islander communities as well as communities with a refugee background. He has particular expertise in the social determinants of health and wellbeing and in the role of human service and health professionals in addressing those determinants.

Session Program Schedule

14 June 2021	
10:00	**Official Greeting and Welcome** **Prof. Mark Brough**, Head of School (acting), School of Public Health and Social Work, Queensland University of Technology, Australia

Plenary Session One

Chair	Emeritus Professor Gerry FitzGerald
Date	Monday 14 June 2021
Session time	10:15 – 12:15 (Australian Eastern Standard Time)

Chair: Emeritus Professor Gerry Fitzgerald

School of Public Health and Social Work - Queensland University of Technology, Australia

Emeritus Professor Gerald (Gerry) FitzGerald retired in July 2019 as Professor of Public Health at QUT and discipline Leader of Health Management and Disaster Management. He holds medical specialist qualifications in Emergency Medicine and Medical Administration and a Doctor of Medicine degree for a thesis entitled Emergency Department Triage. Professor FitzGerald was previously the Director of the Emergency Department at Ipswich Hospital, Medical Director and then Commissioner of the Qld Ambulance Service and Chief Health Officer. Since joining QUT Prof. FitzGerald has led the discipline of Health Management. His principal research focus is on emergency healthcare systems and how they perform under both routine and non-routine pressures. He has published over 150 peer reviewed articles, a text in Disaster Health Management, eight book chapters and more than 100 conference representations. He has supervised more than 30 PhD students to completion and obtained over $5m in research grants (including three ARC and three NHMRC grants).

Session Program Schedule

14 June 2021 Plenary Session One	
10:15	**Prof. Kristie Ebi,** University of Washington, United States of America **Topic:** Adapting to the Health Risks of a Changing Climate. (20 min presentation + 10 min Q&A)
10:45	**Prof. Sotiris Vardoulakis,** Australian National University, Australia **Topic:** Environmental Change, COVID-19 and public health (20 min presentation + 10 min Q&A)
11:15	**Prof. Lidia Morawska,** Queensland University of Technology, Australia **Topic:** A paradigm shift to combat indoor respiratory infections: beyond COVID-19 . (20 min presentation + 10 min Q&A)
11:45	**Prof. Kerrie Mengersen,** Queensland University of Technology, Australia **Topic: AusEnHealth:** An Australian Environmental Health Digital Twin. (20 min presentation + 10 min Q&A)
12:15	**Break**

Kristie L. Ebi, Professor

Centre for Health and the Global Environment – University of Washington, United States of America

Kristie L. Ebi, Ph.D., MPH has been conducting research and practice on the health risks of climate variability and change for nearly 25 years, focusing on understanding sources of vulnerability; estimating current and future health risks of climate change; designing adaptation policies and measures to reduce risks in multi-stressor environments; and estimating the health co-benefits of mitigation policies. She has supported multiple countries in Central America, Europe, Africa, Asia, and the Pacific in assessing their vulnerabilities and implementing adaptation policies and programs. She has been an author on multiple national and international climate change assessments, including the fourth U.S. National Climate Assessment and the IPCC Special Report on Global Warming of 1.5°C. She has edited fours books on aspects of climate change and has more than 200 publications.

Adapting to the Health Risks of a Changing Climate

The presentation will cover methods and tools to manage the health risks of climate variability and change. Conducting vulnerability and adaptation assessments and developing the health component of national adaptation plans are used to identify priority policies and measures to manage risks, taking into account the independent and joint effects of climate change and socioeconomic development.

Sotiris Vardoulakis, Professor

Professor of Global Environmental Health and Leader, Environment, Climate and Health Research Group – Australian National University, Australia

Sotiris Vardoulakis is Professor of Global Environmental Health and Leader of the Environment, Climate and Health Research Group at the Australian National University. Previously, he was Director of Research at the Institute of Occupational Medicine in Edinburgh, Head of the Environmental Change Department at Public Health England, and held academic positions at the London School of Hygiene and Tropical Medicine and at the University of Birmingham (UK). His main research interests include climate change, air pollution and health, sustainable cities, exposure assessment, environmental epidemiology, health impact assessment, occupational hygiene, and public health communication and policy.

Environmental Change, COVID-19 and public health

The COVID-19 lockdowns were an unprecedented natural experiment that gives us insight into the potential environmental impact of policies that change patterns of social mobility, energy generation, and production and consumption. In many cities and regions around the world, atmospheric emission patterns were altered during the lockdown periods, resulting in improved local air quality and reduced greenhouse gas emissions. However, these environmental gains were generally short-lived and therefore highlight the need for structural changes in environmental policies that will provide long-term benefits for public health. In this lecture, environmental management and related public health implications of the COVID-19 pandemic are discussed with examples from different countries.

Lidia Morawska, Distinguished Professor

School of Earth & Atmospheric Sciences – Queensland University of Technology, Australia

Lidia Morawska is Distinguished Professor at the Queensland University of Technology in Brisbane, Australia, and the Director of the International Laboratory for Air Quality and Health at QUT, which is a Collaborating Centre of the World Health Organization on Research and Training in the field of Air Quality and Health. Lidia also holds positions of Adjunct Professor, Institute for Environmental and Climate Research (ECI), Jinan University, Guangzhou, China, of Vice-Chancellor Fellow, Global Centre for Clean Air Research (GCARE), University of Surrey, UK, and is a co-director of the Australia-China Centre for Air Quality Science and Management She conducts fundamental and applied research in the interdisciplinary field of air quality and its impact on human health and the environment, with a specific focus on science of airborne particulate matter. She is a physicist and received her doctorate at the Jagiellonian University, Krakow, Poland for research on radon and its progeny. An author of over eight hundred journal papers, book chapters and refereed conference papers, Lidia has been involved at the executive level with a number of relevant national and international professional bodies, is a member of the Australian Academy of Science and a recipient of numerous scientific awards.

A paradigm shift to combat indoor respiratory infections: beyond COVID-19

Respiratory infections are considered an inescapable part of daily life, and very little has been done so far to control them. Every year acute respiratory illnesses, such as colds and influenza infections strike, sicken millions, kill thousands, and cause economic loses of billions of dollars. COVID-19 monthly costs are conservatively assessed at $1 trillion. But it doesn't have to be like this! Experts are calling for a "paradigm shift" in how buildings are designed, equipped, and operated to minimize all air risks, including airborne infection transmission. There must be a shift in the perception that we cannot afford better building systems: the economic costs of the impacts of indoor air pollution in general, and in particular infection transmission, by far exceed all other costs. For this to happen, as the first step, the World Health Organization should extend the WHO Indoor Air Quality Guidelines to include airborne pathogens and to recognize the need to control the hazard of airborne transmission of respiratory infections. This will lead to ventilation standards that will explicitly consider infection control in their statements of purpose and definitions. The presentation will explore how to turn this vision into a reality.

Kerrie Mengersen, Distinguished Professor

School of Mathematical Sciences – Queensland University of Technology, Australia

Distinguished Professor Kerrie Mengersen holds a Chair in Statistics at the Queensland University of Technology (QUT). She is the Deputy Director of the Australian Research Council Centre of Excellence in Mathematical and Statistical Frontiers, and Director of the QUT Centre for Data Science. Professor Mengersen's research interests include Bayesian methods; modelling and computation at the interface of statistics, machine learning and AI; and engagement in challenging real-world problems in health, environment and industry.

AusEnHealth: An Australian Environmental Health Digital Twin

Although many of the connections between environmental factors and human health are well known, the spatial and temporal nature of these relationships is less well known. In this presentation, I will discuss our efforts to better understand these relationships through the development of an Australian Environmental Health Digital Twin. The AusEnHealth online product has an initial focus on health vulnerabilities and outcomes associated with climate and air quality. In addition to describing the platform and some early insights, attention will be paid to the underlying spatio-temporal models and issues associated with analyses of aggregated data. The AusEnHealth Digital Twin is expected to enhance knowledge among researchers, increase understanding among the public and provide an evidence base for improved decision-making among health managers and policy makers.

Plenary Session Two

Chair	Professor Gerry Fitzgerlad
Date	Tuesday 15 June 2021
Session time	10:30 – 12:30 (Australian Eastern Standard Time)

Chair: Professor Gerry Fitzgerlad

School of Public Health and Social Work - Queensland University of Technology, Australia

Emeritus Professor Gerald (Gerry) FitzGerald retired in July 2019 as Professor of Public Health at QUT and discipline Leader of Health Management and Disaster Management. He holds medical specialist qualifications in Emergency Medicine and Medical Administration and a Doctor of Medicine degree for a thesis entitled Emergency Department Triage. Professor FitzGerald was previously the Director of the Emergency Department at Ipswich Hospital, Medical Director and then Commissioner of the Qld Ambulance Service and Chief Health Officer. Since joining QUT Prof. FitzGerald has led the discipline of Health Management. His principal research focus is on emergency healthcare systems and how they perform under both routine and non-routine pressures. He has published over 150 peer reviewed articles, a text in Disaster Health Management, eight book chapters and more than 100 conference representations. He has supervised more than 30 PhD students to completion and obtained over $5m in research grants (including three ARC and three NHMRC grants).

15 June 2021 Plenary Session TWO	
10:30	**Prof. Peter Doherty, Nobel Laureate –** University of Melbourne, Australia **Topic:** What have we learnt so far from COVID-19? (15 min presentation + 10 min Q&A)
11:00	**Prof. Archie Clements, Pro Vice-Chancellor,** Curtin University, Australia **Topic:** Spatial and temporal data visualisation in relation to COVID-19. (20 min presentation + 10 min Q&A)
11:30	**Prof. Weizhong Yang,** Chinese Academy of Medical Sciences/Peking Union Medical College, China **Topic:** COVID-19 control and prevention in China. (20min presentation + 10 min Q&A)
12:00	**Prof. Xiaoming Yang,** China National Pharmaceutical Group Corp (TBC), China **Topic:** Coronavirus variants, viral mutation and COVID-19 vaccines. (20min presentation + 10 min Q&A)
12:30	**Break**

Peter C. Doherty, Laureate Professor
Doherty Institute – University of Melbourne, Australia

A graduate of the University of Queensland School of Veterinary Science, Peter Doherty shared the 1996 Nobel Medicine Prize for his immunology research and was the 1997 Australian of the Year. Since then, he has gone in to bat for evidence-based reality, relating to areas as diverse as childhood vaccination, global hunger and anthropogenic climate change. So far, he has published 6 "lay" books on science with the latest, "*The Incidental Tourist*".

Archie Clements, Professor, Pro Vice Chancellor
Faculty of Health Sciences - Curtin University, Australia

Professor Clements is the Pro Vice Chancellor, Faculty of Health Sciences at Curtin University. Prior to his position at Curtin, Professor Clements was the Director of the Research School of Population Health and Professor of Infectious Disease Epidemiology at the Australian National University (ANU) in Canberra. The Research School of Population Health comprised of five academic units, including the flagship National Centre for Epidemiology and Population Health (NCEPH). He has worked previously at Imperial College London and University of Glasgow, and has a PhD from the University of London. His research background is in the epidemiology, control and elimination of infectious diseases, focussing mainly on the Asia-Pacific region during the last decade. He has particular expertise in spatial epidemiology, operational research and community-based intervention studies and has been an NHMRC Senior Research Fellow.

Spatial and temporal data visualisation for mass dissemination: advances in the era of COVID-19

The current COVID-19 pandemic is the first major human pandemic (causing over 1 million deaths) since computers and the internet became available to the majority of the world's population. In this new information age, health data have become more accessible to the general public than ever, and this is particularly true with respect to the COVID-19 pandemic. To present data in a way that is engaging and of value for public consumption, a plethora of individuals and organizations have created COVID-19 data visualization platforms, or data representations. Spatial and temporal patterns of disease are particularly important for the understanding and interpretation of disease risk. Here, the sources of data, approaches to spatial and temporal data representation and strengths and weaknesses of the approaches taken are evaluated and discussed.

Weizhong Yang, Professor, Executive Head

School of Population Medicine & Public Health– Chinese Academy of Medical Sciences/Peking Union Medical College, China

Prof. Weizhong Yang, Executive Head, School of Population Medicine & Public Health, Chinese Academy of Medical Sciences/Peking Union Medical College Vice President and Secretary General of Chinese Preventive Medicine Association, Former Deputy General Director of Chinese Center for Disease Control and Prevention.

Since 1982, he has been engaged in infectious disease surveillance, prevention and control, immunization planning management, and public health management in Sichuan Provincial Epidemic Prevention Station, Chinese Center for Disease Control and Prevention, and Chinese Preventive Medicine Association. In recent 10 years, as the first author or corresponding author, he has published more than 50 papers in international and journals such as The New England Journal of *Medicine*, *Lancet, Vaccine, Public Health, PLoS ONE*, *Emerging Infectious Disease, BMJ, PLoS Medicine, Health Affairs, BMC Infectious Diseases etc.* He edited the *Early Warning for Infectious Disease Outbreak: Theory and Practice* published by Elsevier He was the editor-in-chief of the *Lancet Infectious Diseases Volume* (Chinese Version), and the deputy editor of the *Vaccine*. (Chinese Version).

Control and prevention of COVID-19 outbreaks in China: Strengthening early warning and response

The development trends of the global COVID-19 pandemic is still facing a high degree of uncertainty, and the mutation of the SARS-CoV-2 has increased the uncertainty. From the discovery of the COVID-19 to the present, some countries still have insufficient understanding of the severity of the pandemic, and the control measures adopted varies greatly, which has led to ebbs and flows global epidemic. The lack of coordination in the distribution and vaccination strategies of the COVID-19 vaccine worldwide has exacerbated the inequities of global public health. The presentation will provide an overview of developing early warning system and response of COVID-19 outbreaks in china and discuss the main ongoing challenges in controlling COIVD-19 pandemic in the world.

Xiaoming Yang, Researcher, PhD supervisor.

Chairman of the Board, China National Biotec Group Company Limited (CNBG), China

Prof. Xiaoming Yang has been serving as the Chairman of the Board at CNBG since Mar. 2015. He oversees the corporate strategy, governs the high-level operations and integrates the internal and external resources to promote the organic growth and expansion of the company. Before his current position, he held several senior positions in Sinopharm, including the Chief Engineer of Sinopharm, the President of the CNBG, and the General Manager of WIBP. He serves as member of leadership team in several leading organization and programs, including Chief Scientist of Vaccine Project in the National 863 program, General Director of the National Combo Vaccine Engineering Technology Center, Vice-Chairman of Vaccine Committee of Chinese Pharmacopoeia Commission (ChPC), Executive Director of the Chinese society of immunology, Member of the Joint Prevention and Control Mechanism of the State Council-Vaccine Research Committee, Chairman of Board of Biologicals at Chinese Preventive Medicine Association, Vice President of China Medicinal Biotechnology Association and a member of Vaccine committee.

Plenary Session Three and End of Symposium

Chair	Professor Wenbiao Hu
Date	Tuesday 15 June 2021
Session time	16:45 – 17:20 (Australian Eastern Standard Time)

Chair: Prof. Wenbiao Hu
School of Public Health and Social Work - Queensland University of Technology, Australia

Prof. Wenbiao Hu is an Environmental Epidemiologist and former Australian Research Council Fellow at School of Public Health and Social Work, Queensland University of Technology (QUT), Australia. He is the director of Australia-China Centre for Public Health, QUT. Prof. Hu has been awarded over 8 national highly prestigious and competitive grants and has published more than 240 peer-reviewed articles in international and national journals including Lancet Infectious Disease, Lancet Global Health, Environmental Health Perspective, and Emerging Infectious Diseases etc. His research interests are on infectious disease ecology and epidemiology. He is a reviewer for prestigious journals including Science, New England Journal of Medicine, Lancet Infectious Diseases, Lancet Planetary Health, PloS Med, etc. Prof. Hu has served as a National Health and Medical Research Council (NHMRC) Ideas Grants panel member, an invited reviewer for the NHMRC Project Grants, ARC Discovery Grants, ARC Linkage Grant, UK Medical Research Council, Israel Science Foundation, and the Welcome Trust.

Session Program Schedule

15 June 2021 Plenary Session THREE and End of Symposium	
16:45	**Prof. Michael Bonsall,** Oxford University, United Kingdom **Topic:** Emerging pandemics: early warning approaches and disease mitigation strategies (20 min presentation + 10 min Q&A)
17:15	**Symposium Officially Concludes** **Prof. Hilary Bambrick,** Head of School, Public Health and Social Work, Queensland University of Technology, Australia, 5 minutes

Michael Bonsall, Professor

Department of Zoology and Fellow of St Peters College – University of Oxford, United Kingdom

Michael Bonsall is Professor of Mathematical Biology at the Department of Zoology and Fellow of St Peters College, University of Oxford. He is an Associate Head of Maths, Physical and Life Sciences Division. He completed his undergraduate, graduate and postdoctoral training at Imperial College London. He has wide ranging research interests focussing on ecology, evolution, and epidemiology. He has interests in vector-borne disease control and the applications of optimal control. Mike has held national and international research grants and has published over 150 peer-reviewed articles in international journals including Nature, Science, PNAS, Translational Psychiatry, Royal Society Journal Interface, Journal of Theoretical Biology.

Emerging pandemics: early warning approaches and disease mitigation strategies

In this talk, I will discuss our work on pandemic preparedness particularly around biosecurity planning, emphasising approaches associated with the current ongoing COVID pandemic. I will highlight our theoretical work on pandemic definitions, modelling early diagnostic testing and ways of mitigating disease spread. I will couple this with empirical work on diagnostic testing approaches, discussing the advantages and limitations of next generation sequencing approaches.

Chairs and speakers of sessions

Session One (A): Environmental Exposure and Chronic Diseases

Chair	Professor Steven McPhail
Date	Monday 14 June 2021
Session time	12:45 – 14:05 (Australian Eastern Standard Time)

Chair: Professor Steven McPhail

School of Public Health and Social Work - Queensland University of Technology, Australia.
Steve is a health services researcher, health economist and clinician who is passionate about ensuring promising research findings have appropriate influence on policy, practice and resource allocation decisions. He is the Academic Director of the Australian Centre for Health Services Innovation (AusHSI) and co-Director of the Centre for Healthcare Transformation at QUT. He has been supported by consecutive National Health and Medical Research Council administered fellowships since completing his PhD (UQ). Steve's major focus is on working in multidisciplinary partnerships to help design, implement and evaluate effective solutions to complex problems. While this can be challenging, he has had some success along the way having been awarded $100M+ in competitive research funding supporting his research that has resulted in practice changes in 100+ health services on 6 continents and cited in policy-related documents from the World Bank and World Health Organisation.

14 June 2021 Session One (A): Environmental Exposure and Chronic Diseases	
12:45	**Prof. Xiong Guo,** Xi'an Jiaotong University, China **Title:** Low selenium exposure and Kashin-Beck disease in China
13:05	**Prof. Yana Bai,** Lanzhou University, China **Title:** Progress of Jinchang Cohort – the World's Largest Occupational Heavy Metal Exposure Cohort
13:25	**A/Prof. Ning Wang,** China CDC **Title:** Lung Cancer Mortality in China and Australia: An Age-Period-Cohort Analysis of Data from the Global Burden of Disease Study 2017
13:45	**A/Prof. Xin Qi,** Xi'an Jiaotong University, China **Title:** Air pollution and esophageal cancer in China
14:05	**Break**

Prof. Xiong Guo
School of Public Health-Xi'an Jiaotong University, China

Xiong Guo, Professor, doctoral supervisor, Director, Key Laboratory of Trace Elements and Endemic Diseases, National Health Commission, Vice-Chairman of Endemic Disease Branch of Chinese Medical Association, Vice-Chairman of Endemic Disease Committee of National Health Standards Committee and Vice-Chairman of National Advisory Committee of Experts on Endemic Disease Prevention and Control of National Health Commission, participated in the examination and approval of National Health Endemic Disease Standards and endemic During the "Twelfth Five-Year Plan" and "Thirteenth Five-Year Plan", the formulation and discussion of prevention and control plan were conducted, and the key projects of international cooperation of the National Natural Science Foundation of China and the special projects of international cooperation of the Ministry of Science and Technology were presided over.

Progress on Selenium and Kashin-Beck disease in China

Kashin-Beck disease (KBD) is an endemic chronic osteochondral disease, which has a high prevalence and morbidity in the Eastern Siberia of Russia, and in the broad diagonal, northern-east to southern-west belt in China. However, relatively little is known new data on a cellular and molecular level related to low Se and supplement Se on the KBD chondrocytes has begun to accumulate, which hopefully will uncover the disease.

KBD was distributed mainly in low selenium (Se) areas, where the Se content of soil, grain and human hair were low and the patients were in a Se deficient condition in China by a food chain requested local cereal and drinking water. There was a significant negative correlation between hair and urine Se contents and the positive rate of metaphysis pathological changes in phalanx of hands on X-ray films in children with KBD. Since 1979, using Se-supplementation, Se deficiency in KBD children has been quickly improved into the normal Se nutritional status and decreased new incidence and obviously promoted the repair of metaphysis pathological changes (64.80% /2197), not been supplied Se (19.88%, $P<0.001$) of KBD children.

Agilent microarray analysis revealed 6/26 genes related to Se deficiency in KBD, such as POSTN, CLEC3B, BCL-2, and BAX. POSTN is involved in the recruitment of cells to the chondrocytes lineage, initiating the cartilage loss. A suitable concentration (0.25 mg/L–0.1 mg/L) of sodium selenite can improve the growth of KBD chondrocytes and reduce the apoptosis rate, but excessively high concentration (Se > 0.5 mg/L) can have a damaging effect. It confirmed that sodium selenite is effective in protecting chondrocyte damages from KBD patients by increasing the expression of genes CSGALNAC-1 and HAPLN-1. Nano Se-chondroitin sulfate, a novel nanoscale Se preparation with 30–200nm particles in distilled water, has less toxicity than sodium selenite and can effectively inhibit the apoptosis caused by T-2 toxin. Nano-Se may relief cell oxidative stress and regulating the redox homeostasis in chondrocyte through MnSOD, Hsp27 and Prdx1.

Summary of the above, Se deficiency is clearly an important environmental factor for KBD. A suitable concentration of Se supplementation has a good effect in the prevention of KBD on the cellular and molecular levels.

Prof. Yana Bai M.D., M.P.H.
School of Public Health - Lanzhou University, China

Prof. Yana Bai is a Professor at Institute of Epidemiology and Statistics, School of Public Health at Lanzhou University, and the Supervisor of doctoral program of College of Earth and Environmental Sciences at Lanzhou University. She is also a Visiting scholar of School of Public Health at Yale University. As the main leader, she established the world's only polymetallic exposure cohort (Jinchang Cohort) and followed up for more than 10 years based on 50,000 people. Her major interests include cohort study, environmental epidemiology and epidemiology of chronic diseases. She has been the PI for 1 NIH grant and 2 grants of Natural Science Foundation of China, and also participated in a number of national and international grants (including 2 National 'Twelfth five-year project' Scientific Research Programs of Health Care Reform in China, 2 National 'Twelfth five-year project' Scientific Research and Scientific Renovation Programs, National Technology Research and Development Program of Chronic Diseases Intervention and Prevention, National Key-Research program on 'Precision medicine' and 4 International collaboration grants).

Jinchang Cohort（JCC）- China Metal-Exposed Cohort

Aims: Environmental exposure to heavy metals has been linked to a wide range of human health hazards. Prospective cohort study in the occupational population with high exposure levels is an ideal study population to reveal the relationship between metals and diabetes.

Methods: Based on the biennial physical examination, epidemiological data and biological specimens of 48,001 participants in China, the Jinchang cohort (JCC) was established from June 2011 to December 2013. We detected the levels of 17 metals in urine and serum samples by inductively coupled plasma quadruple mass spectrometry.

Results: The JCC is an ongoing 20-year ambispective cohort with unique metal exposures of an occupational population, which is the only polymetallic exposure cohort in the world. Until to now, the JCC has completed three phases of follow-up. The first follow-up enrolled 46,713 participants from January 2014 to December 2015, the second enrolled 41,888 participants from January 2016 to December 2017, and the third enrolled 39,807 participants from January 2018 to June 2019. There are 6,259 participants living with diabetes. During the seven-year follow-up, 2,349 people developed diabetes. Diabetes ranks 7th in death rate, 8th in prevalence rate and 10th in incidence rate among all diseases in JCC. We have tested 1,000 urine samples and 1,644 serum samples from representative sub-samples to directly evaluate metal exposure levels, and found that blood copper, zinc, selenium, and mercury positively associated the risk of diabetes among men, but blood lead inversely associated with the risk of diabetes among women. Multiple urinary metals, particularly nickel and zinc, were associated with elevated blood glucose.

Conclusions: Metal exposure may play a critical role in diabetes development. Therefore, we will further address the effects of heavy metals on human health to provide suggestions for comprehensive prevention and treatment of environment metal exposures.

Keywords: Cohort, Diabetes, Metals

Dr. Ning Wang, Associate Professor

National Center for Chronic and Non-communicable Diseases Control and Prevention - Chinese Center for Diseases Control and Prevention, China

Dr. Ning Wang is currently an associate professor at the Chinese Center for Diseases Control and Prevention. She has more than ten years of experience in chronic diseases epidemiological research such as cancer and chronic obstructive pulmonary disease. She received her Ph.D. from QUT in March 2021. The topic of her Ph.D. project is PM2.5 and lung cancer mortality in China: spatial and temporal analyses. She has published over 20 articles in international peer-reviewed journals.

Lung Cancer Mortality in China and Australia: An Age-Period-Cohort Analysis of Data from the Global Burden of Disease Study 2017

Aims: Lung cancer (LC) is the leading cause of cancer death in China and Australia, the two largest countries in the Western Pacific Region. This study compared the age-period-cohort effect on LC mortality (LCM) and LCM attributable to risk factors in these two countries.

Methods: We collected LCM estimates between 1993 and 2017 from the Global Burden of Disease Study 2017 and applied age-period-cohort modelling to discern the effects of these individual factors.

Results: In 2017, LC age-standardized mortality rate (ASMR) of Chinese men (51.92 [95% uncertainty interval (UI): 48.90, 54.75] per 100,000 population) was almost twice of that of Australian men (28.68 [95% UI: 24.97, 32.75]), and LC ASMR of Chinese women (21.98 [95% UI: 20.76, 23.24]) was also significantly higher than Australian women (16.44 [95% UI: 14.10, 19.11]). Chinese ≥60 years and Australian women ≥70 years experienced an upward trend in LCM. The decreasing period and cohort effects on LCM attributable to smoking were more remarkable in Australia. The period and cohort effects on LCM attributable to particulate matter has constantly declined in Australia, in contrast to the rising trend in China. Period effect on LCM attributable to fasting glucose increased in Chinese men and barely changed in Australian and Chinese women.

Conclusions: High glucose levels is a challenge facing both countries. Vigorous tobacco and particulate matter control policies that brought a substantial decline in LCM in Australia could help reduce LCM in China. Chinese ≥60 years and Australian women ≥70 years are the priorities for LC early diagnosis and treatment.

Dr. Xin Qi, Associate Professor
School of Public Health - Xi'an Jiaotong University, China

Dr. Xin Qi is an Associate Professor in Dept. of Epidemiology and Biostatistics, School of Public Health, Xi'an Jiaotong University. He got the PhD degree in environmental epidemiology at Queensland University of Technology, Australia. Dr. Qi has got several national and other research grants and a track record of publication (e. g., Environmental Research, American Journal of Tropical Medicine and Hygiene, Cancer Prevention Research) and has supervised over 10 master students as principle supervisor. He is a member of the American Public Health Association and the International Society for Environmental Epidemiology. He is also the anonymous reviewer of several academic journals including The Innovation, AJTMH. His research areas include environmental epidemiology, climate change, air pollution and population health, and spatiotemporal epidemiology.

The lag effect of long-term exposure to PM2.5 on esophageal cancer in 388 Chinese counties

Long-term exposure to PM2.5 pollution is a significant health concern and increases risks for cancers in China. However, the studies regarding the association between PM2.5 and esophageal cancer incidence (ECI) are still scarce. In this study, we examined the sex- and area-specific association between long-term exposure to PM2.5 and ECI and explored the corresponding lag effects on ECI using a geographical weighted Poisson regression function. We found that each 1 ug/m3 PM2.5 caused ECI risk increases of 1.22% (95% CI: 1.09%, 1.36%) and 1.90% (95% CI: 1.66%, 2.14%) for males and females after covariates controlled, respectively, during the study period. We also found the higher risks of ECI for the females and rural areas, as well as the shorter lag period in urban than rural areas. Moreover, higher risks for both sexes appeared in north, northwestern, and east China. The findings indicated that long-term exposure to PM2.5 was significantly associated with increased risks for ECI, which reinforce a comprehensive understanding for ECI related to PM2.5.

Key words: PM2.5, Esophageal cancer incidence (ECI), lag effect, China

Session One (B): Environmental Exposure and Chronic Diseases

Chair	Associate Professor Xin Qi
Date	Monday 14 June 2021
Session time	15:05 – 16:25 (Australian Eastern Standard Time)

Chair: Dr. Xin Qi, Associate Professor
School of Public Health - Xi'an Jiaotong University, China

Dr. Xin Qi is an Associate Professor in Dept. of Epidemiology and Biostatistics, School of Public Health, Xi'an Jiaotong University. He got the PhD degree in environmental epidemiology at Queensland University of Technology, Australia. Dr. Qi has got several national and other research grants and a track record of publication (e. g., *Environmental Research*, *American Journal of Tropical Medicine and Hygiene*, *Cancer Prevention Research*) and has supervised over 10 master students as principal supervisor. He is a member of the American Public Health Association and the International Society for Environmental Epidemiology. He is also the anonymous reviewer of several academic journals including *The Innovation, AJTMH*. His research areas include environmental epidemiology, climate change, air pollution and population health, and spatiotemporal epidemiology.

14 June 2021 Session One (B): Environmental Exposure and Chronic Diseases	
15:05	**Prof. Feng Zhang,** Xi'an Jiaotong University, China **Title:** Element Responsive Gene Set Enrichment Analysis of Human Complex Psychiatric Disorders
15:25	**A/Prof. Minzhen Wang**, Lanzhou University, China **Title:** Effects of atmospheric PM10 on the incidence of type 2 diabetes and its mechanism
15:45	**Prof. Peng Jia** Wuhan University, China **Title:** Geospatial Epidemiological Analysis in Life Course Study
16:05	**Ms. Amy Savage,** Queensland University of Technology, Australia **Title:** Impacts of climate change on diet-related non-communicable diseases in Small Island Developing States: A qualitative case study in Vanuatu.
16:25	**End of Symposium Day 1**

Prof. Feng Zhang, Deputy Dean
School of Public Health - Xi'an Jiaotong University, China

Prof. Zhang is the Deputy Dean of School of Public Health, Xi'an Jiaotong University Health Science Center. His research areas mainly focus on the pathogenesis of chronic bone & joint diseases and biostatistics approaches. He has undertaken the Key project of international cooperation among governments in scientific and technological innovation, 5 projects of National Natural Science Foundation of China (including the Outstanding Youth Science Foundation). By now, he has published over 60 papers as the first /corresponding authors (cumulative IF = 210.95). His first /corresponding author papers have been cited by the papers of Science (2015, 2016), PNAS (2014), etc. In 2017, he won the second prize of "Award of science and technology of Shaanxi Province" (1th member), and the "Youth Science and Technology Award of Shaanxi Province". He published 3 academic monographs and textbooks, including one as associate editor. He was selected as the Vice Director of Youth Committee of the Endemic Diseases Branch of Chinese Medical Association, communication member of the editorial board of Chinese Journal of Endemiology, etc.

Element Responsive Gene Set Enrichment Analysis of Human Complex Psychiatric Disorders

Psychiatric disorders are a group of complex psychological syndromes whose etiology remains unknown. Previous study suggested that various chemicals contributed to the development of psychiatric diseases through affecting gene expression. This study aims to systematically explore the potential relationships between 5 major psychiatric disorders and more than 11 000 chemicals. The genome-wide association studies (GWAS) datasets of attention deficiency/hyperactive disorder (ADHD), autism spectrum disorder (ASD), bipolar disorder (BD), major depression disorder (MDD), and schizophrenia (SCZ) were driven from the Psychiatric GWAS Consortium and iPSYCH website. The chemicals related gene sets were obtained from the comparative toxicogenomics database (CTD). First, transcriptome-wide association studies (TWAS) were performed by FUSION to calculate the expression association testing statistics utilizing GWAS summary statistics of the 5 common psychiatric disorders. Chemical-related gene set enrichment analysis (GSEA) was then conducted to explore the relationships between chemicals and each of the psychiatric diseases. We observed several significant correlations between chemicals and each of the psychiatric disorders. We also detected common chemicals between every 4 of the 5 major psychiatric disorders, such as androgen antagonists for ADHD (P value = .0098), ASD (P value = .0330), BD (P value = .0238), and SCZ (P value = .0062), and imipramine for ADHD (P value = .0054), ASD (P value = .0386), MDD (P value = .0438), and SCZ (P value = .0008). Our study results provide new clues for revealing the roles of environmental chemicals in the development of psychiatric disorders.

Dr. Minzhen Wang, Associate Professor
School of Public Health - Lanzhou University, China

Dr. Minzhen Wang is an Associate Professor in Institute of Epidemiology and Health Statistics, School of Public Health at Lanzhou University. She holds a Ph.D. degree in environmental health from Lanzhou University. Her works are focused on the air pollution and human health and also interested on the epidemiology of chronic disease on the platform of Jinchang cohort in China.

Association between PM10 and incidence of Type 2 Diabetes in Northwest of China: a population-based cohort study

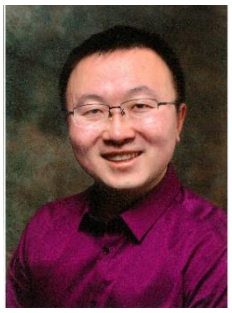
Objectives: To analyze the impact of PM10 on the prevalence and incidence of type 2 diabetes (T2D), and explore its possible biological mechanism.

Methods: 24285 subjects were selected on the platform of Jinchang Chort. According to the principle of nearest home address, ArcGIS10.3 software was used to match the nearest environmental monitoring station to assess individual PM10 exposure. Logistic regression and Cox regression model were conducted to analyze the impact of PM10 on the prevalence and incidence of T2D. Multiple linear regression model was selected to analyze the effects of PM10 on glucose and lipid indicators. In addition, 420 patients with T2D, prediabetes, and normal blood glucose were randomly selected from the baseline population. ELISA was used to detect IL-6, VCAM-1, 8-iso-PGF2α and INS. The multiple linear regression model was used to evaluate the effects of PM10 on biomarkers.

Results: (1) For an increase of 10μg/m3 in PM10 exposure, the OR and HR of T2D were 1.05 (95%CI: 1.01, 1.09) and 1.22 (95%CI: 1.12, 1.34). The effects of PM10 were larger among females, subjects younger than 60 years and with family history of diabetes. (2) For an increase of 10μg/m3 in PM10, FPG, TC, LDL-C, HDL-C and TG increased by 0.11% (95%CI: 0.06%, 0.16%), 0.11% (95%CI: 0.06%, 0.16%), 0.14% (95%CI: 0.06%, 0.22%), 0.14% (95%CI: 0.07%, 0.20%) and -0.40% (95%CI: -0.55%, -0.25%). (3) For every 10μg/m3 increase in PM10, IL-6 increased by 1.21% (95%CI: 0.22%, 2.20%) in prediabetes population. VCAM-1 increased by 10.85% (95%CI: 2.89%, 19.42%) and 2.22% (95%CI: 0.83%, 6.34%) in normal and prediabetes, respectively. 8-iso-PGF2α increased by 5.65% (95%CI: 2.19%, 9.23%) in T2D patients. In normal people, INS and HOMA-β decreased by 2.86% (95%CI: -5.30%, -0.35%) and 4.50% (95%CI: -7.44%, -1.45%).

Conclusions: PM10 can increase the prevalence and incidence of T2D. Females, young to middle-aged people and those with family history of diabetes were susceptible population. Abnormal glucose and lipid metabolism, inflammation, oxidative damage and impaired pancreatic islet function may be the underlying biological mechanisms of PM10 leading to T2D.

Key words: PM10, Diabetes, Cohort study, Mechanism



Dr. Peng Jia, Professor
International Institute of Spatial Lifecourse Epidemiology (ISLE); Wuhan University, China

Prof. Jia is the founding director of the International Institute of Spatial Lifecourse Epidemiology (ISLE), and a professor in Wuhan University, China. He received his M.S. in Geographic Information Systems (GIS) from Chinese Academy of Sciences, M.S. in Spatial Epidemiology from Emerging Pathogens Institute at the University of Florida, and Ph.D. in Health Geography from Louisiana State University. His research mainly focuses on the applications of GIS, statistics, remote sensing, big data, mobile devices, and artificial intelligence in environmental health areas, particularly in emerging infectious disease (e.g., COVID-19) and chronic disease research (e.g., obesity). His other interests include the association between climate and health, construction and optimization of national hierarchical healthcare systems, allocation and equality of healthcare resources, etc. He was the recipient for the Outstanding Article of the Year Award from the U.S. Agency for Healthcare Research and Quality, and the 2019 IJERPH Young Investigator Award. He has published more than 100 papers and commentaries in SCI journals, including Nature, Nature Medicine, Lancet, Lancet Global Health, Environmental Health Perspectives.

Geospatial Epidemiological Analysis in Life Course Study

Spatial lifecourse epidemiology takes advantage of advanced and emerging spatial, location-based, and artificial intelligence technologies (e.g., geoinformatics, earth observation, sensors, smartphone apps, internet of things, and machine learning) to investigate long-term effects and mechanisms of measurable environmental, behavioral, and psychosocial factors on human health at an unprecedented degree of accuracy. This presentation will identify future research priorities in this area, and introduce a reporting guideline for high-quality publications in this area.

Amy Savage, PhD Candidate
School of Public Health and Social Work – Queensland University of Technology, Australia

Amy Savage is a public health nutrition researcher and practitioner with a focus on the health impacts of climate change. She is currently completing her PhD exploring the impacts of climate change on food and nutrition security and diet-related non-communicable diseases in Vanuatu. She has a Master of Human Nutrition from the University of Queensland. Amy has worked on a variety of international development projects with the Australian Government and currently works with the World Health Organization Climate Change and Health Unit.

Impacts of climate change on diet-related non-communicable diseases in Small Island Developing States: A qualitative case study in Vanuatu

Aims: Climate change and diet-related non-communicable diseases (DR-NCDs) are two of the most significant global health challenges. Pacific Island Countries and Territories (PICTs) have some of the highest rates of NCDs globally and are also particularly vulnerable to the adverse effects of climate change. This paper explores the impacts of climate change on DR-NCDs using a case study of one PICT, Vanuatu.

Methods: The lived experiences of climate change and DR-NCDs of people in two villages in Vanuatu were explored using an ethnographic, qualitative research approach. Data collection included a range of methods, including observational techniques, informal storying, and group workshops. Community-level data is complemented with thirty-two semi-structured interviews of key informants at the national level. Reflexive thematic analysis was applied to both data types.

Results: The analysis showed high awareness of both climate change and DR-NCDs at the village and national levels; however, there was little understanding of the connections between them. Structural factors, such as climate change and social determinants, were the major drivers of DR-NCD risk and limited individual and collective agency to make food and health choices. DR-NCD prevention was seen as an individual responsibility at both the community and national levels despite the lack of control over the structural determinants.

Conclusions: A re-framing of the DR-NCD narrative in Vanuatu is needed to address the structural drivers of DR-NCD risk, including climate change. An enhanced understanding of the structural determinants promotes a DR-NCD prevention approach which can simultaneously address the dual challenges of climate change and DR-NCDs. It also facilitates greater individual and collective agency, allowing for optimal food and health choices and structural transformation.

Session Two (A): Climate Change and Population Health

Chair	Professor Haidong Kan
Date	Monday 14 June 2021
Session time	12:45 – 14:05 (Australian Eastern Standard Time)

Chair: Professor Haidong Kan
School of Public Health – Fudan University, China

Professor Haidong Kan, he obtained his Ph.D. degree in 2003 at Fudan University in China. In 2007, he completed his postdoc training at the National Institute of Environmental Health Science of the US. He is now associate editor of International Journal of Epidemiology and Environmental Health Perspectives. His research investigates how ambient air pollution and global climate change affect human health.

Session Program Schedule

14 June 2021 Session Two (A): Climate Change and Population Health	
12:45	**A/Prof. Ying Zhang,** University of Sydney, Australia **Title**: The MJA-Lancet Countdown: Tracking progress on Health and Climate Change for Australia
13:05	**Dr. Yang Xie,** Beihang University, China **Title**: Health co-benefits of climate change mitigation policy in China
13:25	**Prof. Hancheng Dai,** Peking University, China **Title:** Integrated assessment on air quality and health co-benefits of climate mitigation
13:45	**Prof. Cunrui Huang,** Sun Yat-sen University, China **Title:** Detecting the net effect of flooding on infectious diarrheal disease in Anhui Province, China: a quasi-experimental study
14:05	**Break**

Dr. Ying Zhang, Associate Professor, Student Life Academic Director (Central Precinct),

Sydney School of Public Health – University of Sydney, Australia

Bio: A/Prof Ying Zhang is a senior epidemiologist and a dedicated researcher on climate change and global health. She has led national and international projects with over 100 publications. She has been the co-chair of the MJA-Lancet Countdown on Health and Climate Change in Australia since 2017. She is the founder and convenor of the Sustainability, Climate and Health Collaboration group at University of Sydney, Elected Councilor and Treasurer of the Australasian Epidemiological Association. Prime Minister Endeavor Fellowship awardee.

The MJA-Lancet Countdown: Tracking progress on Health and Climate Change for Australia

Presentation: The MJA-Lancet Countdown develops and tracks indicators on national progress on health and climate change research in Australia. Three national countdown reports have been published since 2018. The 2021 full report is to be published later in the year. The presentation will summarise the key findings and more importantly, the implications on changes in policies and practices to address health and climate change issues in the country.

Associate Professor Yang Xie

School of Economics and Management, Beihang University, China

Yang Xie is an Associate Professor (Tenure Track) in the School of Economics and Management at Beihang University with an MD of Clinical Medicine from Health Science Center, Peking University and a PhD of Public Policy from Department of Industrial Engineering and Economics, Tokyo Institute of Technology. She is an Invited contributor of China Clean Air Policy Partnership (Synergy Pathway of Carbon Neutrality and Clean Air in China); Invited Lead of China Lancet Countdown Working Group v (Carbon Trade and Carbon Price); Collaborator, Global Burden Diseases. Yang Xie's research focuses on developing the state-of-the-art integrated assessment models to find out the relationship between health impacts and climate mitigation, air pollution control as well as economic development from local to global scale. Her work aims to estimate the cost and benefit of public policy combining epidemiology, econometrics and CGE model.

Health co-benefits of climate change mitigation policy in China

China's climate mitigation has tremendous contributions to the global carbon and air pollutants reductions. This study is trying to extract the co-benefit on air quality, public health and economic costs in China and worldwide from China's GHGs mitigation policy. We construct two scenarios, with moderate climate mitigation action worldwide, versus more stringent climate mitigation action in China. We use the GAINS model to predict the GHGs and air pollutants emissions in the two scenarios, and a state-of-the-art global chemical transport model to simulate the annual PM 2.5 concentrations. We then use IMED|HEL, which is a health assessment model, to estimate the health impacts and economic cost of PM 2.5 pollution in each country. Results show China's mitigation has significant impact on both air quality and health improvement in eastern China and eastern Asia, a little bit impact in the rest of Asia. The improved air quality could avoid 0.37 million premature deaths due to ambient PM 2.5 exposure by 2050s globally, with the majority happening in China. We use the willingness to pay method to estimate the economic benefits from the improved air quality, and find that the reduced ambient PM 2.5 concentration could avoid $406 billion and $1206 billion economic costs by 2030s and 2050s globally, with China the largest fraction of 98.5% (400billion) and 99.5 % (1200 billion), respectively. The reduced ambient PM 2.5 exposure can also avoid 11.3 million cases morbidity globally by 2050s, due to asthma attacks and hospital admissions. Our study shows most of the economic benefits from air quality improvement due to China's mitigation happens in China, followed by the eastern Asia (such as South Korea and Japan) and the rest of Asia. Health improvement is the main fraction of the potential benefits, such as saving health expenditure, increasing the work time.

Dr. Hancheng Dai, Assistant Professor

College of Environmental Sciences and Engineering-Peking University, China

Dr. Dai's research focuses on green & low-carbon transformation and human & planetary health at the local, national and global scales. By developing and applying the state-of-the-art IMED model, key questions are explored on the mitigation costs of achieving ambitious climate targets and their co-benefits on improvements in air pollution, human health and resource efficiency.

Dr. Dai serves as the Lead Author of the Global Environment Outlook Sixth Edition (GEO-6) for Cities, Contributing Author of the IPCC 6th Assessment Report, Global Burden of Disease (GBD) Collaborator, Standing Committee Member of Branch of Ecological and Environmental Systems Engineering, Systems Engineering Society of China, and Committee Member of City Air Integrated Management and Low Carbon Action Partnership of China.

Integrated assessment on air quality and health co-benefits of climate mitigation

Air pollution and climate change have caused serious health effects both globally, leading to economic impacts and social welfare losses. Tackling climate change and air pollution without compromising economic development needs to coordinate the requirements of "development" and "emission reduction", strengthen the coordinated governance of energy, environment, and economy, which could help to achieve a win-win situation for all stakeholders. This presentation aims to introduce the use of integrated assessment model to evaluate the co-benefits of clean air and climate mitigation policies in terms of air quality and human health improvement, and to evaluate their costs and benefits, which could provide scientific support to formulate climate and clean air policies.

Dr. Cunrui Huang, Professor

School of Public Health-Sun Yat-sen University, China

Dr. Cunrui Huang is a Professor in the School of Public Health at Sun Yat-sen University, China. He is the Chief Scientist of the National Key R&D Program funded by the Ministry of Science and Technology of China, Lead author of Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC), and China National Committee Member of Future Earth. Dr. Huang's research focuses on the health impacts of climate change and extreme events, especially on more vulnerable populations. He has been conducting research on heat-related mortality, years of life lost due to climate change, understanding sources of vulnerability, and adaptation planning to improve health outcomes. He has published over 60 articles in prestigious journals such as Nature Climate Change, JAMA, Environmental Health Perspectives, and his work has been featured in The Australian, Wired Magazine and many other media outlets. Dr. Huang is also committed to build and strengthen the Collaborative Network on Climate Change and Health Research under the Belt & Road Initiative.

Presentation title: Detecting the net effect of flooding on infectious diarrheal disease in Anhui Province, China: a quasi-experimental study

Though a number of studies have shown positive relationships between flooding events and infectious diarrhea, there is a paucity of rigorous evidence regarding the net effect of flooding on diarrhea incidence, controlling for existing pre-trends and meteorological confounders. The study treats the 2016 catastrophic flood event in Anhui Province, China as a natural experiment using a difference-in-differences design with propensity score matching to exclude background variations of diarrhea occurrence and meteorological effects, thus isolating the net effect of flooding on diarrhea. A triple-differences analysis was further deployed to identify the potential effect modifiers, including gender, age, occupation and community health resources. This study employs quasi-experimental design and provides a better understanding on both acute and sustained effects of flooding on diarrhea, which is important for accurate health impact assessments and developing targeted intervention strategies.

Session Two (B): Climate Change and Population Health

Chair	Professor Cunrui Huang
Date	Monday 14 June 2021
Session time	15:05 – 16:25 (Australian Eastern Standard Time)

Chair: Dr. Cunrui Huang, Professor
School of Public Health-Sun Yat-sen University, China

Dr. Cunrui Huang is a Professor in the School of Public Health at Sun Yat-sen University, China. He is the Chief Scientist of the National Key R&D Program funded by the Ministry of Science and Technology of China, Lead author of Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC), and China National Committee Member of Future Earth. Dr. Huang's research focuses on the health impacts of climate change and extreme events, especially on more vulnerable populations. He has been conducting research on heat-related mortality, years of life lost due to climate change, understanding sources of vulnerability, and adaptation planning to improve health outcomes. He has published over 60 articles in prestigious journals such as Nature Climate Change, JAMA, Environmental Health Perspectives, and his work has been featured in The Australian, Wired Magazine and many other media outlets. Dr. Huang is also committed to build and strengthen the Collaborative Network on Climate Change and Health Research under the Belt & Road Initiative.

Session Program Schedule

14 June 2021 Session Two (B): Climate Change and Population Health	
15:05	**A/Prof. Donna Green,** University of New South Wales, Australia **Title:** Climate Change and Population Health
15:25	**A/Prof. Shan Zheng**, Lanzhou University, China **Title:** Temperature variability and cardiovascular diseases
15:45	**Prof. Peng Bi,** University of Adelaide, Australia **Title:** Environmental change and health in Australia: Working together with Stakeholders
16:05	**Dr. John Cauchi,** Queensland University of Technology, Australia **Title:** Climate Change, Food Security and Health – lessons from Kiribati
16:25	**End of Symposium Day 1**

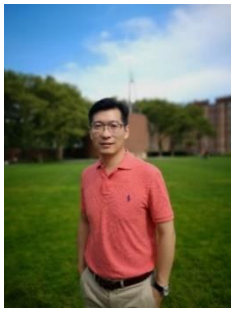
Associate Professor Donna Green

School of Biological, Earth and Environmental Sciences - University of New South Wales, Australia

Associate Professor Donna Green was a founding member of the Climate Change Research Centre, UNSW. She is an Associate Investigator of the ARC Centre of Excellence for Climate Extremes; and an affiliate of the NHMRC Centre for energy, air pollution and health Research. She leads a national researcher network, the Climate Health Network www.climatehealth.info. As an interdisciplinary environmental scientist, she conducts research on climate impacts, energy policy, public health and air pollution. Donna was a contributing author in the UN World Energy Assessment and for the IPCC's Fourth and Fifth Assessment Reports.

Climate change and population health 2.0

The awareness that climate change has already directly and indirectly affected our health is now well established. For Australians, the recent experience of multiple compound events – for example bushfires, droughts and heatwaves – have identified the need to develop more encompassing resilience strategies to protect our health. In this talk, I will argue for the need to add a dimension to these discussions about building resilience. That is, to identify some pressing issues regarding inequality in the distribution of these health impacts including inter- and intra-generational, inter- and intra-national concerns. I will argue that without recognising and actively developing robust responses to these equity dimensions, climate adaptation policies, especially health policies, are likely to be ineffective.



Dr. Shan Zheng, Associate Professor

Institute of Epidemiology and Statistics, School of Public Health - Lanzhou University, China

Shan Zheng, PhD, is an Associate Professor in School of Public Health at Lanzhou University of China. He received a Ph.D. in Applied Meteorology and a Master of Medicine in Epidemiology and Health Statistics from Lanzhou University in 2013 and 2010, respectively, and studied at Yale University School of Medicine in 2019. His research interest is climate change and human health, with special attention to the influence of outdoor environmental factors on cardiovascular disease. He has been the PI for the grants of National Natural Science Foundation of China and has published more than 20 articles in the field of environment and health.

Effect of temperature variability on admissions and deaths for CVDs in northwest China

Aims: To explore the effects of temperature variability (TV) on the admissions and deaths for cardiovascular diseases (CVDs) in northwest China.

Methods: The data on inpatient and outpatient and death for CVDs were collected in Jinchang City of northwest China during 2013 to 2017. The meteorological environment data in the same period came from the local meteorological environment monitoring departments. The daily temperature variability (DTV) and hourly temperature variability (HTV) were both used in this study. Then the distributed lag nonlinear model (DLNM) was used to analyze the TV effects. The attributable risk burden of TV was also conducted.

Results: There was a linear positive correlation between DTV and HTV and the outpatients and emergency admissions for CVDs, when DTV increased by 1℃, the outpatient and emergency admissions increased by 3.61% (95%CI: 1.19%~6.08%) to 4.31% (95%CI: 1.33%~7.37%). While when HTV increased by 1℃, the outpatient and emergency admissions increased by 2.64 % (95%CI: -0.35%~5.72%) to 4.23 % (95%CI: 0.37%~8.24%). However, there was no significant association between TV and hospitalizations and deaths for CVDs in this study. The results of attribution analysis showed that 23.54%~26.45% of outpatient admissions for CVDs were attributed to DTV exposure, and 12.12%~18.60% were attributed to HTV exposure.

Conclusions: Both DTV and HTV have statistically significant effects on the outpatient and emergency admissions for CVDs in Jinchang City, northwest China.

Keywords: temperature variability, CVDs, attributable risk, DLNM

Prof. Peng Bi
School of Public Health, University of Adelaide, Australia

Professor Peng Bi directs a team of 20 people in the School of Public Health at the University of Adelaide University undertaking research on the health risks and adaptation from extreme heat and climate change. His work has been recognized nationally and internationally. He has won 23 National Competitive grants with 18 as CIA, more than 250 publications, 40 plenary and keynote presentations in the past 15 years. He is the Recipient of the Inaugural President's Award for Research into the Public Health Effects of Climate Change of CAPHIA in 2020. He was National Coordinator of NCCARF Vulnerable Community Network.

Environmental change and health in Australia: Working together with Stakeholders

Climate change has and will continue to have negative impact on population health and challenge our already overloaded healthcare system. It is necessary to develop tailored adaptation measurements to reduce such risk. Working closely with different stakeholders is a key step to achieve such goal. This presentation will show how public health researchers work collaboratively with policy-makers from different government organisations, public health practitioners, non-government organisations, and community members in the co-development of heat and health early warning system in South Australia.

Dr. John Paul Cauchi, PhD Candidate
School of Public Health and Social Work, Faculty of Health, Queensland University of Technology, Australia

John comes from the Mediterranean island of Malta, from where he graduated with a medical degree (MD) from the University of Malta in November 2009. He subsequently went on to specialise in Public Health by completing a MSc Public Health degree at the London School of Hygiene and Tropical Medicine. He has recently completed his PhD at QUT, investigating Climate Change, Food Security and Health in Kiribati. His interests include the field of human ecology, with the overarching principle that a healthy environment leads to a healthy life, and that man needs to work in harmony with nature, not in competition with it. Other interests include climate adaptation studies focusing on building resilience.

Climate Change, Food Security and Health – lessons from Kiribati

This presentation will examine interactions between climate change, food security and health. Through key lessons from his PhD study, John Paul Cauchi looks at how building climate resilience in food systems is key to successful adaptation, while also ensuring improved health outcomes and greater cultural appreciation of the role of traditional food in society. Methods could include bolstering local domestic production, improving palatability of local food through innovation and improving infrastructure to ensure interventions can be sustained. This is especially relevant for island and remote communities far from main food distribution centers.

Session Three (A): The transmission, seasonality, and interventions of COVID-19

Chair	Associate Professor Stephen Lambert
Date	Monday 14 June 2021
Session time	12:45 – 14:05 (Australian Eastern Standard Time)

Chair: Associate Professor Stephen Lambert

Epidemiology and Research Unit, Communicable Diseases Branch, Queensland Health, Brisbane, Australia

Stephen Lambert is a public health physician with an interest in the public health surveillance and management of communicable diseases. Stephen's research interests include using publicly available data to assess vaccine program impact and quantify the effectiveness of new and existing vaccines.

Session Program Schedule

14 June 2021 Session Three (A): The transmission, seasonality, and interventions of COVID-19	
12:45	**Dr. David Warne,** Queensland University of Technology, Australia **Title:** Modelling the response of communities to COVID-19 outbreaks
13:05	**Dr. Wei Luo,** National University of Singapore, Singapore **Title:** The role of absolute humidity on transmission rates of the COVID-19 outbreak
13:25	**Dr. Chuchu Ye,** Pudong CDC, China **Title:** The effectiveness of active surveillance measures for COVID-19 cases in Pudong New Area, Shanghai, 2020
13:45	**Ms. Hannah McClymont,** Queensland University of Technology, Australia **Title:** Weather variability and COVID-19 Transmission
14:05	**Break**

Dr. David Warne, Postdoctoral Research Fellow
Centre for Data Science and the School of Mathematical Sciences, Faculty of Science - Queensland University of Technology, Australia

David Warne is a postdoctoral research fellow at the Centre for Data Science and the School of Mathematical Sciences within the Faculty of Science, Queensland University of Technology, Brisbane, Australia. He is a member of the ARC (Australian Research Council) Centre of Excellence in Mathematical and Statistical Frontiers. His research involves the development mathematical modelling and the application of advanced statistical and computational techniques to solve real word problems in diverse fields including biology, ecology, and health. His work regularly requires the development of new computational methods to resolved statistical inferences that would otherwise be intractable.

Modelling the response of communities to COVID-19 outbreaks

The global impact of COVID-19 and the country-specific responses to the pandemic provide an unparalleled opportunity to prepare for the future by learning about different patterns of the outbreak and interventions. Using Bayesian methods, we analyse the response to the COVID-19 outbreak for 158 countries for the period 22 January to 9 June 2020. This encompasses the period in which many countries imposed a variety of response measures and initial relaxation strategies. We adopt a stochastic epidemiological model including a feedback mechanism on virus transmission to capture complex nonlinear dynamics arising from continuous changes in community behaviour in response to rising case numbers. We find that countries with the largest cumulative case tallies are characterised by a delayed response and countries that recovered rapidly are characterised by high case identification rates. We conclude a multipronged approach is required to effectively manage future outbreaks.

Dr. Wei Luo, Assistant Professor
Geography Department - National University of Singapore, Singapore

He is an Assistant Professor in Geography Department at National University of Singapore. He used to be a Research Associate in Computational Health Informatics Program (CHIP) at Boston Children's Hospital and Harvard Medical School. He received Master degree from Geography department at University at Buffalo and PhD degree at Penn State University. His research focuses on geovisual analytics, epidemiology, and social network. He received Waldo-Tobler Young Researcher Awards from Austrian Academy of Sciences' Commission of GIScience 2019.

The role of absolute humidity on transmission rates of the COVID-19 outbreak

A novel coronavirus (COVID-19) was identified in Wuhan, Hubei Province, China, in December 2019 and has caused over 40,000 cases worldwide to date. Previous studies have supported an epidemiological hypothesis that cold and dry (low absolute humidity) environments facilitate the survival and spread of droplet-mediated viral diseases, and warm and humid (high absolute humidity) environments see attenuated viral transmission (i.e., influenza). However, the role of absolute humidity in transmission of COVID-19 has not yet been established. Here, we examine province-level variability of the basic reproductive numbers of COVID-19 across China and find that changes in weather alone (i.e., increase of temperature and humidity as spring and summer months arrive in the North Hemisphere) will not necessarily lead to declines in COVID-19 case counts without the implementation of extensive public health interventions.

Dr. Chuchu Ye, Deputy Director
Department of Infectious Disease Control and Prevention, Pudong New Area Center for Disease Control and Prevention, Shanghai, China

Chuchu Ye, Department of Infectious Disease Control and Prevention in Pudong New Area Center for Disease Control and Prevention, deputy director. In charge of acute infectious disease surveillance and outbreak disposal. PHD of Fudan University, focus on study of infectious surveillance and early warning technique, seasonality features of influenza virus and its association with meteorological factors, influenza disease burden and the vaccination promotion among elderly. Principle Investigator of 4 projects and first/corresponding author of nine SCI papers.

The effectiveness of active surveillance measures for COVID-19 cases in Pudong New Area, Shanghai, 2020

Shanghai, the largest city in eastern China, with a population of approximately 33 million, faced a significant risk of a COVID-19 outbreak due to the substantial population movement and huge amount of international travelers entering from PKG international airport located in Pudong New Area. Our efforts were mostly directed at preventing local transmission by timely identification of potential exposure populations (PEPs), such as those with a travel history to area with higher infection risk, and tracing of close contacts (CCs). Based on these measures, local transmission was successfully controlled and we would like to share these experiences in this symposium.

Ms. Hannah McClymont
School of Public Health and Social Work, Queensland University of Technology, Australia

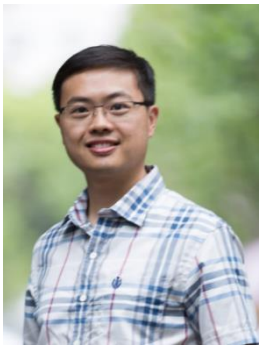
Hannah McClymont is a current Master of Public Health student at Queensland University of Technology. Her research interest lies in environmental epidemiology, infectious disease and public health. Hannah is currently employed as a research assistant at QUT, where she is working on COVID-19 transmission in Australia and the association with environmental factors, weather variability and big data.

Weather Variability and COVID-19 Transmission

The association between COVID-19 transmission and weather is a significant area of interest globally since COVID-19 first emerged, for the potential to understand or 'predict' future outbreaks and the seasonality of COVID-19 into the future. Seasonal weather patterns are associated with variations in transmission rates of infectious diseases such as colds and flus through mechanisms including changes in host innate immunity, human behaviours and changes in transmission due to altered virus survival when airborne and on surfaces. Exploring the association of weather variables and COVID-19 transmission can contribute to greater surveillance and, and early warning systems for future outbreaks and implementing timely and targeted preventative measures.

Session Three (B): The transmission, seasonality, and interventions of COVID-19

Chair	Dr. Shengjie Lai
Date	Monday 14 June 2021
Session time	15:05 – 16:25 (Australian Eastern Standard Time)



Chair: Dr Shengjie Lai, BMed, MMed, PhD, Senior Research Fellow
WorldPop, School of Geography and Environmental Science, University of Southampton, United Kingdom

Dr. Lai has been long engaged in interdisciplinary research focusing on human mobility, environmental changes, and infectious disease transmission dynamics and early warning, to provide an improved evidence-base for disease control decision-making. He has >120 papers published in scientific journals such as Nature, Science, Lancet Infectious Diseases, Nature Human Behaviour, and Nature Communications. During the COVID-19 pandemic, he has been leading a series of influential COVID studies for understanding the COVID-19 transmission dynamics and intervention effectiveness. The findings of these studies have been timely shared with the WHO, Africa CDC, Europe CDC, China CDC, among others for tailoring COVID-19 intervention strategies, and also featured in main media outlets across the world.

Session Program Schedule

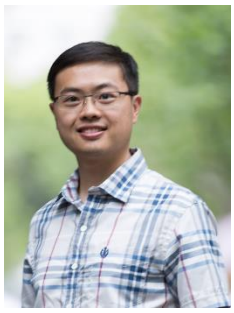
14 June 2021 Session Three (B): The transmission, seasonality, and interventions of COVID-19	
15:05	**Prof. Bo Huang,** The Chinese University of Hong Kong, China **Title:** Integrated vaccination and physical distancing interventions to prevent future COVID-19 waves
15:25	**Dr. Shengjie Lai,** University of Southampton, United Kingdom **Title:** Human mobility and the global spread of SARS-CoV-2 and new variants
15:45	**Dr. Ruiyun Li,** University of Oslo, Norway **Title:** Strategic intervention of COVID-19 pandemic
16:05	**Mr. Francesco Sera,** London School of Hygiene and Tropical Medicine, United Kingdom **Title:** Potential drivers of COVID-19 seasonality in 409 cities across 26 countries
16:25	**End of Symposium Day 1**

Dr. Bo Huang, Professor
Department of Geography and Resource Management - The Chinese University of Hong Kong, China

Dr. Bo Huang is a Professor in the Department of Geography and Resource Management, The Chinese University of Hong Kong. His research interests include the design and development of models and algorithms for spatial-temporal statistics, unified satellite image fusion and multiobjective spatial optimization with applications to environmental monitoring and sustainable land use and transportation planning. In recent years, he has been concentrating on the use of mobility networks and spatiotemporal big data analytics to bear on urban structure and public health problems.

Vaccination and physical distancing in tandem to prevent future waves of COVID-19

Using anonymized mobile geolocation data in China, we devise a social contact index that quantifies the combined effect of physical distancing and vaccination, to bridge the gaps between intervention measures and disease transmission. The results show that physical distancing can only be relaxed in ratio to the rate of vaccination in the city's population until herd immunity is achieved.



Dr. Shengjie Lai, BMed, MMed, PhD
Senior Research Fellow, WorldPop, School of Geography and Environmental Science, University of Southampton, United Kingdom

Dr Lai has been long engaged in interdisciplinary research focusing on human mobility, environmental changes, and infectious disease transmission dynamics and early warning, to provide an improved evidence-base for disease control decision-making. He has >120 papers published in scientific journals such as Nature, Science, Lancet Infectious Diseases, Nature Human Behaviour, and Nature Communications. During the COVID-19 pandemic, he has been leading a series of influential COVID studies for understanding the COVID-19 transmission dynamics and intervention effectiveness. The findings of these studies have been timely shared with the WHO, Africa CDC, Europe CDC, China CDC, among others for tailoring COVID-19 intervention strategies, and also featured in main media outlets across the world.

Measuring human mobility, COVID-19 transmission dynamics and intervention effectiveness

The global spread of SARS-CoV-2 through human movement shows how geographically disparate countries can be rapidly reached by an emerging pathogen, leading to a global crisis. Non-pharmaceutical interventions (NPIs) such as travel restrictions and social distancing have been implemented rapidly across countries to tackle the pandemic. As the rollout of SARS-CoV-2 vaccines will enable the lightening of NPI measures, the world will inevitably return to normality. Therefore, it is vital to understand the changing patterns of human mobility, the effectiveness of NPIs, and their impacts on COVID-19 transmission dynamics across countries and waves for tailoring and adjusting interventions.

Dr. Ruiyun Li, Researcher
Centre for Ecological and Evolutionary Synthesis – University of Oslo, Norway

I am a researcher at Univeristy of Oslo. My research interests cover health geographics, mathematical epidemiology and public health. I have engaged extensively with methodological innovation for the spread of multiple diseases, including avian influenza, dengue, malaria and coronavirus. I was trained at Beijing Normal University, Columbia University and University of Oslo, and worked as a research associate in Imperial College London.

Disease picture: How the pandemic will end?

Aims: A fundamental signature of COVID-19 is the age manifestation of the burden of infection. This stimulates us to advance our understanding of the evolving public health burden. **Methods:** To this end, we develop a realistic age-structured SIRS model to establish the scenarios of age-incidence and burden of mortality in the long-term circulation of the disease. **Results:** We show that the SARS-CoV-2 virus hardly hit children in the early stage of the epidemic. As time goes on, the picture would change completely. It is likely that the young would face higher risks in future circulation. **Conclusions:** The age-risk may shift over the long-term circulation of the disease.

Francesco Sera, Research Fellow
University of Florence; Honorary Research Fellow, London School of Hygiene and Tropical Medicine, United Kingdom

Francesco Sera is Research Fellow at University of Florence and Honorary Research Fellow at the London School of Hygiene and Tropical Medicine. Francesco is a statistician and epidemiologist and he has worked in several epidemiological projects with more than 150 publications. His current research interests focuses on short term health effects of environmental exposures as temperature and air pollution, and related methodological aspects, as time series models, and pooling results from multi-centre studies. Working with colleagues of the Multi-Country Multi-City MCC Collaborative Research Network contributed increasing the evidence on environmental exposures health-impact with papers published in high-impact journals.

Potential drivers of COVID-19 seasonality in 409 cities across 26 countries

Aims: More than a year since its emergence, there is conflicting evidence on the potential influence of weather conditions on COVID-19 transmission dynamics. As SARS-CoV-2 is a new virus to humans, it is difficult to ascertain if seasonal climate variations might have enhanced or reduced transmission in the first pandemic wave given the high proportion of susceptible people and the presence of several confounding factors.

Methods: Within the Multi-country Multi-city (MCC) Collaborative Research Network, we used a two-stage ecological modelling approach to estimate weather-dependent signatures in COVID-19 transmission in the early phase of the pandemic, using a dataset of 3 million COVID-19 cases reported until 31 May 2020, spanning 409 locations in 26 countries. We calculated the effective reproduction number (Re) over a city-specific early-phase time-window of 10-20 days, for which local transmission had been established but before non-pharmaceutical interventions had intensified, as measured by the OxCGRT Government Response Index. We calculated mean levels of meteorological factors, including temperature and humidity observed in the same time window used to calculate Re. Using a multilevel meta-regression approach, we modelled nonlinear effects of meteorological factors, while accounting for government interventions and socio-demographic factors.

Results: A weak non-monotonic association between temperature and Re was identified, with a decrease of 0.087 (95% CI: 0.025; 0.148) for an increase in temperature between 10-20°C. Non pharmaceutical interventions had a greater effect on Re with a decrease of 0.285 (95% CI 0.223; 0.347) for a 5th - 95th percentile increase in the government response index. The variation in the effective reproduction number explained by early government interventions was 6 times greater than for mean temperature.

Conclusions: We find little evidence of meteorological conditions having influenced the early stages of local epidemics and conclude that population behaviour and governmental intervention are more important drivers of transmission.

Session Four (A): One Health

Chair	Associate Professor Ricardo J. Soares Magalhães
Date	Tuesday 15 June 2021
Session time	13:00 – 14:20 (Australian Eastern Standard Time)

Chair: Associate Professor Ricardo J. Soares Magalhães
School of Veterinary Science- University of Queensland, Australia

Assoc. Prof. Soares Magalhães (LVM MSc PhD DiplECVPH) is a veterinarian and zoonotic disease epidemiologist with qualifications in both human and veterinary public health. He leads the UQ's Spatial Epidemiology Laboratory (www.spatialepilab.com) a One Health medical geography group within the University of Queensland, Australia. His primary research focuses on the development and application of spatial risk assessment methods to inform integrated surveillance of zoonotic infectious diseases. He has served as an international consultant to WHO and the Food and Agriculture Organisation of the United Nations to assist the development of national action plans for antimicrobial resistance and avian influenza. He is part of the editorial board of PLoS Neglected Tropical Diseases, BMC Infectious Diseases, BMC Veterinary Research, One Health journal and Tropical Medicine and Infectious Diseases.

Session Program Schedule

15 June 2021 Session Four (A): One Health	
13:00	**A/Prof. Simon Reid,** University of Queensland, Australia **Title:** Making One Health more than a concept
13:20	**A/Prof. Lin Yang,** The Hong Kong Polytechnic University, China **Title:** From SARS to COVID-19: the Hong Kong experience
13:40	**A/Prof. Huachen Zhu,** The University of Hong Kong, China **Title:** Genesis of Emerging Influenza viruses and Coronaviruses: an ecological perspective
14:00	**Prof. Cordia Chu –** Griffith University, Australia **Title:** What lessons must we learn from COVID-19 to prepare for the next pandemic?
14:20	**Break**

Dr. Simon Reid, Associate Professor

School of Public Health – University of Queensland, Australia

Simon Reid is an Associate Professor in the School of Public Health at the University of Queensland. He is a keen advocate of One Health and the application of systems thinking approaches to understand and improve interventions for wicked problems at the human-animal-ecosystem interface such as zoonoses. His research includes projects exploring the drivers of human-bat interactions, human brucellosis and improving global health security. He has an emerging interest in multisectoral governance as it applies to high level issues such as health security and antimicrobial resistance. He delivers postgraduate courses in communicable disease control and One Health at UQ.

Making One Health more than a concept

The WHO Director-General presented a call to action for One Health in his opening remarks at the 27th Tripartite Annual Executive Committee Meeting in February 2021. He stated that "One Health must become more than a concept. It must be translated into systems at the local level that keep people safer." In order to translate a concept into reality we need a methodological framework within which to work. We believe that Systems Thinking is one framework that provides a set of principles and tools to enable (w)holistic exploration of zoonotic disease. We will show how Systems Thinking enables a One Health "approach" using a systems dynamics model of brucellosis transmission in Jordan. The structure of the model identified the importance of livestock production and trading, and trust in veterinary services as critical subsystems driving brucellosis transmission in sheep, which are the reservoir for spill over to humans. Simulating potential single sector and multiple sector (One Health) interventions showed that single sector interventions have limited impact on disease incidence, or are unlikely to be acceptable to livestock producers. For example, the current government policy based on vaccination of sheep and behavioural interventions to reduce human exposure have limited impact on animal or human incidence. Indeed, the only single sector intervention that will significantly reduce transmission is the traditional animal disease eradication approach of test and slaughter that is expensive and unpopular. However, the most effective postulated intervention is a multisectoral strategy that is able to create synergistic effects to reduce the incidence of brucellosis. Whilst promising, the model outputs require validation in the real world. The strength of our approach is that "what if" scenarios can be rapidly simulated to explore different policy settings and allow policy makers to "see" how One Health works in practice, or at least in silico.

Dr. Lin Yang, Associate Professor

School of Nursing- The Hong Kong Polytechnic University, China

Dr. Lin Yang is Associate Professor in School of Nursing, the Hong Kong Polytechnic University (PolyU). She joined PolyU in 2014 after obtaining her Ph.D. in epidemiology from the School of Public Health, the University of Hong Kong. Her research interests include infectious disease epidemiology, infection control and vaccination. She has published more than 40 research articles in international peer-review journals, and her research widely covers epidemiological characteristics, clinical management and transmission modeling of COVID-19. She is now the Vice Chairperson of the Infection Control Subcommittee of the Guangdong Provincial Association of Hospitals and the expert committee member of the China Medical Education Association.

From SARS to COVID-19: the Hong Kong experience

Hong Kong has been attacked by the SARS outbreak and the ongoing COVID-19 pandemic. Have the Hong Kong people learned from the previous SARS outbreak and were better prepared for the COVID-19 pandemic? In this talk, I will review a variety of control measures that have been implemented by the Hong Kong government and their effectiveness.

Dr. Huachen Zhu

Associate Professor, School of Public Health - The University of Hong Kong (HKU), Hong Kong, China; Adjunct Professor, Shantou University, China

Dr Huachen Zhu is a tenured Associate Professor at The University of Hong Kong (HKU) and an Adjunct Professor at the Shantou University (STU). She serves as Associate Director of the Joint Institute of Virology (STU/HKU) and Co-director of Joint Laboratory for International Collaboration in Virology and Emerging Infectious Diseases.

Dr Zhu's research field is focused on mechanisms that lead to the virus emergence at the human and animal interface. In the past few years, she has identified the zoonotic sources, transmission routes, evolutionary pathways and molecular basis leading to the genesis of multiple severe viral threats to human health.

Genesis of Emerging Influenza viruses and Coronaviruses: an ecological perspective

Influenza viruses and coronaviruses pose a continuous threat to public health and agriculture. In the past decades, various strains from both viral families have been repeatedly introduced into humans and domestic animals, causing outbreaks or even pandemics across the world. How could these viruses emerge and transmit to the human population remained a question, even though surveillance at the human and animal interface has indicated the zoonotic sources for most cases. Here we will review the origin and genesis of several emerging influenza viruses and coronaviruses which have had the pandemic potentials or properties, with a focus on the ecological factors.

Prof Cordia Chu AM, BSSc. MA., PhD

Director, Centre for Environment and Population Health; Coordinator, the Hub for Global Health Security; School of Medicine and Dentistry - Griffith University, Australia

Professor Cordia Chu AM, Director, Centre for Environment and Population Health, Griffith University, has a background in medical anthropology and sociology with expertise in ecological public health, reproductive health, risk communication and community participation, health-promotion and integrated health planning. An international consultant actively facilitating the development of healthy cities, hospitals and workplaces in many Asia-Pacific countries, her recent focus has been on building a research consortium for global health security, One Health, disaster risk reduction, climate change adaptation and sustainable development. She has graduated 48 PHDs, published over 220 articles and book chapters, and presented over 80 conference keynote addresses.

What lessons must we learn from COVID-19 to prepare for the next pandemic?

COVID-19 has brought us enormous negative health and socio-economic impacts, as well as painful but valuable lessons. While the race was on to discover vaccines and medical treatments, rapidly escalating outbreaks had to be controlled, and prolonged outbreaks that over-stretch health systems prevented. This has been done through proven public health control measures like hygiene practices, testing, contract tracing, and social restrictions and distancing. The effectiveness of these measures depends on citizens adhering to these requirements, and on the relevant stakeholders promptly collaborating, particularly around helping communities to adapt to changing social restrictions to prevent community transmissions. However, this pandemic has brought the world an unprecedented 'infodemic' and fake news, with conflicting and politicalised messages compounding public confusion, distrust and panic. Many countries are further challenged by poor leadership with inconsistent outbreak control policies that increase social divisions and reduce pandemic response effectiveness. This has brought to light the centrality of effective leadership and risk communication to positive pandemic outcomes.

This presentation will analyse the COVID-19 response around the world and discuss what we can learn from these experiences in preparing for the next pandemic. It will first briefly review the unfolding of COVID-19 on the world stage, including the good, the bad and the shocking realities associated with the pandemic. It will then examine the lessons we can learn from COVID-19's global spread, highlighting two key factors that have had a major impact on pandemic control outcomes: leadership and risk communication. This is followed by an analysis of the major challenges ahead from emerging zoonotic diseases and eco-system changes. The presentation will conclude by urging that to prepare for future pandemics, the collaborative One Health approach be adopted, taking on board lessons learned from COVID-19.

Session Four (B): One Health

Chair	Dr. Lin Yang, Associate Professor
Date	Tuesday 15 June 2021
Session time	15:20 – 16:40 (Australian Eastern Standard Time)

Chair: Dr. Lin Yang, Associate Professor
School of Nursing-The Hong Kong Polytechnic University, Australia

Dr. Lin Yang is Associate Professor in School of Nursing, the Hong Kong Polytechnic University (PolyU). She joined PolyU in 2014 after obtaining her Ph.D. in epidemiology from the School of Public Health, the University of Hong Kong. Her research interests include infectious disease epidemiology, infection control and vaccination. She has published more than 40 research articles in international peer-review journals, and her research widely covers epidemiological characteristics, clinical management and transmission modelling of COVID-19. She is now the Vice Chairperson of the Infection Control Subcommittee of the Guangdong Provincial Association of Hospitals and the expert committee member of the China Medical Education Association.

Session Program Schedule

15 June 2021 Session Four (B): One Health	
15:20	**Prof. Colleen Lau,** University of Queensland, Australia **Title:** Leptospirosis and Precision One Health
15:40	**Dr Nicholas J Clark,** University of Queensland, Australia **Title:** Near-term forecasting of companion animal tick paralysis incidence: an iterative ensemble model
16:00	**A/Prof. R.J. Soares Magalhães,** University of Queensland, Australia **Title:** Public health impacts of animal and environmental exposures on human Q fever notifications: the case for integrated surveillance for source attribution
16:20	**Dr. Maximillian Stammnitz,** Centre for Genomic Regulation, Spain **Title:** Freshwater monitoring by nanopore metagenomics
16:40	**End of Session**

Professor Colleen Lau
Professorial Research Fellow, NHMRC Fellow, School of Public Health- University of Queensland, Australia

Prof Colleen Lau (MBBS (UWA), MPHTM (JCU), PhD (UQ), FRACGP, FACTM, FISTM) is a Professorial Research Fellow, NHMRC Fellow, and infectious disease epidemiologist at the School of Public Health, University of Queensland. She has a significant portfolio of independent research and is internationally recognised for her expertise in emerging infectious diseases, neglected tropical diseases and travel medicine. Her work includes operational research on lymphatic filariasis (LF) elimination and surveillance to improve strategies for the WHO's Global Programme to Eliminate LF, one of the largest public health programs in the world. Other areas of research expertise include leptospirosis, eco-epidemiology, spatial epidemiology and disease mapping.

Leptospirosis and Precision One Health

Leptospirosis is an emerging infectious disease with strong environmental drivers of transmission. A key challenge with developing prevention and control strategies is that the risk factors and drivers of transmission vary significantly between places and subpopulations. To maximise impact, interventions should be specifically targeted for each location and subpopulation. Following the principles of 'Precision Public Health', we should explore innovative approaches to using data and technology to help understand the complex transmission dynamics, and use this knowledge to optimise who, when, how, and where to target prevention and control. It's time to develop the science for 'Precision One Health'.

Dr Nicholas J Clark, Lecturer, ARC DECRA Fellow
School of Veterinary Science, University of Queensland, Australia

Dr Nicholas Clark is a Lecturer in Molecular Epidemiology and an ARC DECRA Fellow at the University of Queensland's Spatial Epidemiology Laboratory. His research interests focus on the developing iterative multivariate forecast algorithms for the early warning detection and management of vector-borne disease. He has consulted with the WHO for development of disease surveillance methodology and is currently building a national near-term forecast pipeline to predict spatiotemporal variation in tick paralysis admissions in Australian domestic dogs.

Near-term forecasting of companion animal tick paralysis incidence: an iterative ensemble model

Tick paralysis is a leading cause of emergency veterinary admissions for Australian pets, often resulting in death if untreated. Information on periods of increased risk can help reduce exposures to ticks and guide recommendations for preventative treatment. Improved awareness of clinicians and pet owners about changes in tick paralysis risk can be assisted by integrating environmental information into time series models. Using an 11-year time series of tick paralysis cases from veterinary clinics in one of Australia's tick paralysis hotspots, we built a near-term forecasting algorithm. We fit a series of statistical and generative models using a suite of environmental variables as predictors and combined forecast distributions into a weighted ensemble to minimise prediction interval error. Our model forecasted cases with exceptional accuracy while preserving interpretability, outperforming a field-leading benchmark. Variables related to temperature anomalies, vegetation moisture and the Southern Oscillation Index were useful for predicting admissions. Using online particle filtering to adjust forecast distributions when new data became available, our model adapted to changing conditions and further reduced errors. We expect our pipeline to act as a platform for developing early warning systems to notify clinicians and pet owners about risks of environmentally driven vector-borne conditions.

A/Prof. Ricardo J. Soares Magalhães, Assoc Professor
School of Veterinary Science- University of Queensland, Australia

Assoc. Prof. Soares Magalhães (LVM MSc PhD DiplECVPH) is a veterinarian and zoonotic disease epidemiologist with qualifications in both human and veterinary public health. He leads the UQ's Spatial Epidemiology Laboratory (www.spatialepilab.com) a One Health medical geography group within the University of Queensland, Australia. His primary research focuses on the development and application of spatial risk assessment methods to inform integrated surveillance of zoonotic infectious diseases. He has served as an international consultant to WHO and the Food and Agriculture Organisation of the United Nations to assist the development of national action plans for antimicrobial resistance and avian influenza. He is part of the editorial board of PLoS Neglected Tropical Diseases, BMC Infectious Diseases, BMC Veterinary Research, One Health journal and Tropical Medicine and Infectious Diseases.

Public health impacts of animal and environmental exposures on human Q fever notifications: the case for integrated surveillance for source attribution

Dr. Maximilian Stammnitz
Postdoctoral fellow, Centre for Genomic Regulation, Spain

Maximilian Stammnitz is a postdoctoral fellow at the Centre for Genomic Regulation, Spain. He recently graduated from the University of Cambridge with a PhD in cancer genomics and bioinformatics. During his studies in Prof. Elizabeth Murchison's laboratory at the Cambridge Veterinary School, he explored the somatic histories, mutational landscapes and therapeutic vulnerabilities of two transmissible cancer cell lineages in the Tasmanian devil. Since 2017, he has been leading PuntSeq (www.puntseq.co.uk), an interdisciplinary effort that uses portable DNA sequencing technology for biodiversity monitoring. His works have been recognised by Gates Cambridge Trust and FEBS fellowships, among other awards.

Freshwater monitoring by nanopore metagenomics

With the launch of Oxford Nanopore Technology's MinION device in 2015, 'portable' DNA sequencing has opened a promising route for remote environmental surveillance. My team has recently explored uses of MinION-guided DNA analysis within a One Health context, by resolving the spatiotemporal microbial biodiversity, pathogen abundance and sewage contamination patterns in a local river setting in Cambridge, UK (Urban & Holzer et al., 2021, eLife 10:e61504). My presentation will provide insight into new developments in metagenomic tracing of bacteria and viruses, with a particular emphasis on real-time, low-cost monitoring via nanopore sequencing.

Session Five (A): Vector-borne disease surveillance and control

Chair	Dr. Amanda Murphy
Date	Tuesday 15 June 2021
Session time	13:00 – 14:20 (Australian Eastern Standard Time)

Chair: Dr. Amanda Murphy
Division of Pacific Technical Support - World Health Organization

Amanda holds a PhD in vector-borne disease epidemiology, and has more than 15 years' experience working in infectious disease research and project coordination roles in the Asia Pacific region – previously working with the Asia Pacific Malaria Elimination Network (APMEN), and the Australian Initiative for the Control and Elimination of Malaria (AICEM) in Vanuatu and the Solomon Islands. Amanda has recently joined the WHO Division of Pacific Technical Support based in Suva, Fiji, where she acts as a regional focal point to support the vector surveillance and control needs of Pacific Island countries.

Session Program Schedule

Session Five (A): Vector-borne disease surveillance and control	
13:00	**Dr. Pandji Dhewantara,** National Institute of Health Research and Development, Indonesia **Title:** Climate change and vector-bone diseases in Indonesia: Trends, gaps and opportunities
13:20	**Dr. Aswi Aswi,** State University of Makassar, Indonesia **Title:** Modelling Hospitalization of dengue: A comparison of Bayesian spatial survival models
13:40	**Ms. Rokeya Akter,** Queensland University of Technology, Australia **Title:** Dengue in a crowded megacity: Lessons learnt from current outbreak (2019) in Dhaka, Bangladesh
14:00	**Dr. Zhiwei Xu,** University of Queensland, Australia **Title:** Using dengue epidemics and local weather in Bali, Indonesia to predict imported dengue in Australia
14:20	**Break**

Dr. Pandji W. Dhewantara, Researcher
National Institute of Health Research and Development - Ministry of Health, Indonesia

Dr. Pandji W. Dhewantara is a researcher in the National Institute of Health Research and Development of the Ministry of Health of Indonesia. He completed his PhD at the University of Queensland in 2020. Dr. Dhewantara's research focuses on the epidemiology of vector-borne and zoonotic diseases (VBZDs) including dengue, malaria, chikungunya, lymphatic filariasis and leptospirosis. His current research focuses on the impacts of climate change on VBDs in Indonesia.

Climate change and vector-borne diseases in Indonesia: trends, gaps and opportunities

Aims: Climate change is expected to increase vector-borne diseases (VBDs) outbreaks including dengue, malaria and chikungunya in subtropical and tropical countries, including in Indonesia. Yet, the effects of climate change on the morbidity of VBDs in the country are poorly documented. We reviewed and critically appraised methods of the recent available evidence on the association between climate and vector-borne diseases (VBDs) to identify gaps and opportunities to formulate climate change adaptation (CCA) strategies and VBDs control in Indonesia.

Methods: A systematic literature search was performed by using Pubmed and GoogleScholar. Total of 82 eligible literatures published until December 2020 were reviewed and critically appraised. Data for location, morbidity, explanatory variables, data source and resolution, methods and findings from eligible literature were extracted and summarized.

Results: Studies investigated the relationship between climate and VBDs showed an increasing trend. The relationship between climate and the incidence of dengue (n= 62, 76%) and malaria (n=18, 22%) at subnational and local scale was inconsistent across locations. Limited studies have investigated the role of regional climate variability (i.e., ENSO and/or IOD) on dengue (n=1, 0.01%) and chikungunya (n=1, 0.01%). None has projected the long-term climatic effects on the spatial and temporal distribution on the VBDs. Most studies utilized passive surveillance data. Small number of studies applied longitudinal surveys to look at the relationship between entomological variables, outbreaks and climate at micro level (n=2, 0.02%). Traditional correlation and regression approaches were mostly used in examining the climate effects of diseases (n=79, 96%).

Conclusions: The impact of climate change on the morbidity of VBDs may vary between localities across the country, suggesting the needs for the development of localised early-warning system and adaptation strategies. Standardized, long-term, and high-quality epidemiological data as well as more advanced modelling approaches are essential in future research to better inform national, sub-national and local level policy.

Aswi Aswi
Assistant Professor, Faculty of Mathematics and Natural Science-Universitas Negeri Makassar (UNM), Indonesia

Aswi is an Assistant Professor at the Faculty of Mathematics and Natural Science, Universitas Negeri Makassar (UNM). Aswi is fascinated by exploring Bayesian Spatio-temporal trends in disease for regions with a small number of areas, with a focus on understanding dengue fever in Makassar, Indonesia as well as other diseases. Aswi achieved recognition as a professional lecturer in August 2011 in Indonesia and as an Associate Fellow of The Higher Education Academy (AFHEA), UK in August 2019. Aswi was officially sworn into the member of the senate at the Faculty of Mathematics and Natural Science, UNM on September 9, 2020.

Modelling Hospitalisation of dengue: A comparison of Bayesian spatial survival models

Hospitalisation of dengue fever is costly, yet few studies have examined hospitalisation for dengue. This study aims to compare different Bayesian spatial survival models and examine factors that significantly affect the length of stay with a focus on dengue patients in Makassar, Indonesia. Bayesian spatial Weibull and Cox Semiparametric models with different spatial priors were used to model the hospitalisation for dengue. Data on admitted dengue cases were acquired from patient medical records from a selected public hospital in Makassar from 1 January 2013 to 31 July 2018. A range of demographic and key clinical factors to capture the severity of dengue fever were included. The results of this study will be useful for hospital management and planning.

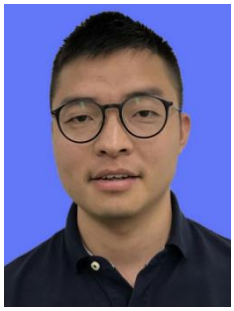
Keywords: Dengue, hospitalisation, Bayesian spatial models, survival models

Rokeya Akter
Spatial Analyst in Water Technology Pty Ltd, Brisbane, Australia

I am Rokeya Akter, spatial analyst in Water Technology and former lecturer in Zoology in Bangladesh. I have achieved Doctorate degree in science from the Queensland University of Technology, Australia. My research primarily focuses on climate variability and socio-demographic attributes and how they impact on dengue. I have published several articles in prominent scientific journals including Environmental Research, Plos one, Plos NTDS and Tropical Medicine and International Health. As a spatial analyst in Water Technology, I am involved in spatial data management, spatial analysis of water resources, flooding and environmental projects. I have also worked with multiple stakeholders, including policy makers and local communities, to communicate environmental objectives and assess sustainability needs.

Dengue in a crowded megacity: Lessons learnt from current outbreak (2019) in Dhaka, Bangladesh

This is a collaborative work between Biomedical Research Foundation, Bangladesh and Environmental Health group, Queensland University of Technology. Dengue is a mosquito-borne viral disease commonly reported in the tropical regions of the world. The presence of two mosquito vectors (Aedes aegypti is highly urban, while A. albopictus is less urban) throughout the year makes dengue fever an endemic disease in several countries. Most of the Asian countries including Bangladesh is the mostly affected dengue endemic countries. Dengue fever was initially concentrated in Dhaka, the capital city of Bangladesh. However, distribution of dengue expanded to other parts of the country in 2019. This work tried to investigate the triggering forces that contributed the dispersion of dengue across the country.



Dr. Zhiwei Xu, Postdoctoral Research Fellow
School of Public Health - University of Queensland, Australia

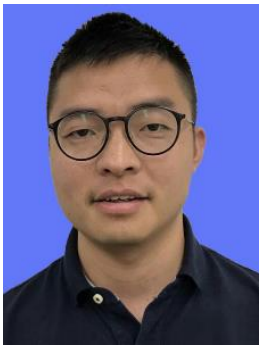
Dr. Xu has published more than 40 papers as first/corresponding author, and has a career Google-Scholar H-index of 25 and has been cited >2,000 times. His research interests are: (1) extreme weather events and health; (2) early life environmental exposure and children's health; and (3) environmental hazards and women's reproductive health.

Using dengue epidemics and local weather in Bali, Indonesia to predict imported dengue in Australia

Description: Although the association between dengue in Bali, Indonesia, and imported dengue in Australia has been widely asserted, no study has quantified this association so far. In this study, we collected monthly data on dengue and climatic factors in Bali and Jakarta as well as monthly data on imported dengue in Australia, and conducted a three-stage analysis. We found that above a monthly incidence of 1.05 cases per 100,000, dengue in Bali was almost linearly associated with imported dengue in Australia at a lag of one month. Mean temperature and rainfall in Bali were significantly associated with imported dengue in Australia at a lag of four months.

Session Five (B): Vector-borne disease surveillance and control

Chair	Dr. Zhiwei Xu, Postdoctoral Research Fellow
Date	Tuesday 15 June 2021
Session time	15:20 – 16:40 (Australian Eastern Standard Time)



Chair: Dr. Zhiwei Xu, Postdoctoral Research Fellow
School of Public Health - University of Queensland, Australia

Dr. Xu has published more than 40 papers as first/corresponding author, and has a career Google-Scholar H-index of 25 and has been cited >2,000 times. His research interests are: (1) extreme weather events and health; (2) early life environmental exposure and children's health; and (3) environmental hazards and women's reproductive health.

Session Program Schedule

15 June 2021 Session Five (B): Vector-borne disease surveillance and control	
15:20	**Dr. Amanda Murphy,** WHO **Title:** Climate variability and Aedes vector indices in the southern Philippines: an empirical analysis
15:40	**Prof. Jian Cheng,** Anhui Medical University, China **Title:** Short-term impacts of weather extremes on dengue outbreaks: evidence from Asia-Pacific region
16:00	**Dr. Tanya Russell,** James Cook University, Australia **Title:** Mosquito-borne disease surveillance and control in the Pacific region
16:20	**Dr. Ralph Trancoso da Silva,** University of Queensland, Australia **Title:** High-resolution climate change projections to support health adaptation
16:40	**End of Session**

Dr. Amanda Murphy

Division of Pacific Technical Support - World Health Organization

Amanda holds a PhD in vector-borne disease epidemiology, and has more than 15 years' experience working in infectious disease research and project coordination roles in the Asia Pacific region – previously working with the Asia Pacific Malaria Elimination Network (APMEN), and the Australian Initiative for the Control and Elimination of Malaria (AICEM) in Vanuatu and the Solomon Islands. Amanda has recently joined the WHO Division of Pacific Technical Support based in Suva, Fiji, where she acts as a regional focal point to support the vector surveillance and control needs of Pacific Island countries.

Climate variability and Aedes vector indices in the southern Philippines: an empirical analysis

Vector surveillance is an essential public health tool to aid the prediction and prevention of mosquito borne diseases. This study aimed to compare spatial and temporal trends of vector surveillance indices for Aedes vectors in the southern Philippines, and to assess potential links between vector indices and climate factors. We analysed routinely collected larval surveillance data from residential areas of 14 cities and 51 municipalities during 2013-2018 (House, Container, Breteau and Pupal Productivity Indices), and used linear regression to explore potential relationships between vector indices and climate variables (minimum temperature, maximum temperature, precipitation). We found substantial spatial and temporal variation in monthly vector indices between cities during the study period, and no seasonal trend apparent. The House (HI), Container (CI) and Breteau (BI) Indices were consistently high across each city surveyed, while the Pupal Productivity Index (PPI) was comparatively low except for two peak periods in 2014 and 2015. The PPI also had a more localised spatial pattern than the other indices. Each of the vector indices were weakly correlated with one or more climate variables when matched to data from the same month or the previous 1 or 2 months. Significant associations were identified between minimum temperature and HI, CI and BI in the same month ($R2 = 0.038$, $p=0.007$; $R2 = 0.029$, $p=0.018$; and $R2 = 0.034$, $p=0.011$, respectively), maximum temperature and PPI with a 2-month lag ($R2=0.031$, $p=0.032$), and precipitation and HI in the same month ($R2=0.023$, $p=0.04$). We suggest further studies to ascertain the most effective use of entomological indices in guiding vector control responses, and recommend that additional drivers of Aedes abundance in residential environments be investigated.

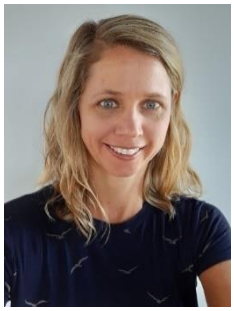
Jian Cheng, Professor

School of Public Health & Anhui Province Key Laboratory of Major Autoimmune Disease - Anhui Medical University, China

Education: Ph.D., Queensland University of Technology, 2020. Professional Appointments: Professor, PhD supervisor. Teaching: Epidemiology & Medical Statistics. Affiliation: Department of Epidemiology and Biostatistics, School of Public Health & Anhui Province Key Laboratory of Major Autoimmune Disease, Anhui Medical University, China. Research Interest: Nine years of working and research experience on the impact of climate change and air pollution on human health, including exposure risk and disease burden assessment. Publication: More than 50 peer reviewed publications. Collaborations: Queensland University of Technology, The University of Queensland, Hong Kong University, etc. Reviewer for journals: BMJ, Lancet Planetary Health, Environmental Health Perspectives, International Journal of Epidemiology, etc.

Short-term impacts of weather extremes on dengue outbreaks: evidence from Asia-Pacific region

Dengue fever affects about half of the world's population, especially those living in the Asia-Pacific region. Dengue transmission is particularly climate-sensitive, and increasing studies have demonstrated associations between weather conditions and dengue transmission. As climate change progresses, extreme weather events such as heatwaves and unusually high rainfall are predicted more intense and frequent. However, the evidence is scarce regarding the impacts of extreme weather events on dengue outbreaks. To address this knowledge gap, we recently conducted studies in the Asia-Pacific region. In contrast to the common sense that long-lasting high-temperature weather prevents the transmission of dengue fever, extreme weather events such as heatwaves could delay the timing and increase the magnitude of dengue outbreaks.



Dr Tanya Russell

Senior Research Fellow, Australian Institute of Tropical Health and Medicine - James Cook University, Australia

Dr Tanya Russell is an Australian medical entomologist and ecologist co-leading the Mosquito-Borne Diseases Group at James Cook University. The aim of her research is to stop the transmission of mosquito-borne diseases globally, but with a particular focus on the Asia-Pacific. She has pioneered numerous large-scale field experiments across the Pacific, Asia and Africa demonstrating how the ecology of the mosquito vectors plays a significant role in disease transmission. Dr Russell has 60+ publications, reviews for various international journals, acts as an Associate Editor for Parasites & Vectors and supervises higher degree research students.

Mosquito-borne disease surveillance and control in the Pacific region

Mosquitoes are the world's deadliest animal. Each year nearly 700 million people contract mosquito-borne illnesses, causing more than one million deaths. To support evidence-based vector control, ongoing surveillance data is required to ensure that programs remain effective and respond to any threats as they arise. In the Solomon Islands, for example, the phenomenon of "behavioural resistance" by mosquitoes was documented. Here, mosquitoes have adapted their behaviours to avoid long-term insecticidal pressure from mosquito nets by biting earlier and outdoors. This behavioural resistance is feared to be a threat to the effectiveness of long-lasting insecticidal nets (LLINs).

However, LLINs appear to be maintaining effective control. This conundrum of effective control of an outdoor early biting vector by an intervention (LLINs) that acts on indoor late-night biting was investigated by careful quantitative measurements of key vector parameters. Effective malaria control by LLINs in the Solomon Islands is explained by the following 4 facts. There is limited resistance to pyrethroids due to modest selective pressure, since mosquitoes avoid contract with insecticides. Anopheles farauti consists of single populations of mosquitoes who mostly feed outdoors and early within a single feeding cycle. During each feeding cycle, some individual An. farauti bite indoors late at night, exposing a small proportion of the largely susceptible vector population to the insecticides in LLINs. Finally the short 2-day feeding cycle of An. farauti means that sporozoite-infected An. farauti will have to take 5-6 blood meals; hence, there will be a cumulative impact on the age structure of the vector population with most mosquitoes having a high probability of having entered a house late at night before they survive the length of the extrinsic incubation period. Nonetheless, elimination will likely require vector control tools that target other bionomic vulnerabilities to suppress transmission outdoors.

Dr Ralph Trancoso da Silva, Research Fellow

School of Biological Sciences - University of Queensland, Australia

Ralph is an earth system scientist with over 20 years' experience in academia, government and industry. His projects have been targeting the impacts of climate change and deforestation on earth surface processes and how these impacts affect society around the world exploring both observations and modelling. Ralph's areas of expertise span climate change, spatial sciences, ecohydrology, remote sensing and data analysis. His science has strong focus on policy outcomes in addition to purely scientific contributions.

High-resolution climate change projections to support health adaptation policies in Queensland

The talk will introduce the Queensland Future Climate, a research program that developed high-resolution climate simulations for Queensland exploring state-of-the-art climate models and analytical approaches to inform adaptation and mitigation policies. It will cover the science, the datasets, the resources and the use in impact assessments, such as the State heatwave risk assessment. The talk will show how and where to get future climate data for users with different data needs.

Session Six (A): Air pollution, Extreme Weather Events and Health

Chair	Prof. Yuming Guo
Date	Tuesday 15 June 2021
Session time	13:00 – 14:20 (Australian Eastern Standard Time)

Chair: Prof. Yuming Guo

Global Environmental Health and Biostatistics & Head of the Monash Climate, Air Quality Research (CARE) Unit, Monash University, Australia

Dr Guo is Professor of Global Environmental Health and Biostatistics & Head of Climate, Air Quality Research Unit at Monash University. He has developed many multidisciplinary national/international collaborative programs, which have delivered new approaches and tools to improve exposure assessment, statistical modelling, and has demonstrated that climate change, extreme weather and air pollution have great health impacts. Since 2010, he has published > 330 peer reviewed articles in prestigious journals including NEJM, The Lancet, BMJ, and PLOS Medicine. He is Associate/Academic Editor for PLOS Medicine, EHP, Environment International, and Environmental Research. He has been awarded the Tony McMichael Award by ISEE (2020), Young Tall Poppy of The Year (2020), Rising Star of Australian Researchers (2019), NHMRC Research Excellence Award (2018), and Best Environmental Epidemiology Paper by ISEE 2016.

Session Program Schedule

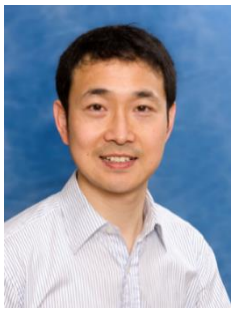
Session Six (A): Air pollution, Extreme Weather Events and Health	
13:00	**Prof. Haidong Kan,** Fudan University, China **Title:** Short term associations of ambient nitrogen dioxide with daily total, cardiovascular, and respiratory mortality: a global analysis in 398 cities
13:20	**Prof. Linwei Tian,** University of Hong Kong, China **Title:** Physiological roles of gaseous pollutants
13:40	**Dr. Tiantian Li,** China CDC **Title:** Mortality risks of cold spell in China
14:00	**Prof. Guanghui Dong,** Sun Yat-sen University, China **Title:** Ambient Air Pollution and Health Impact in China
14:20	**Break**

Prof. Haidong Kan
School of Public Health-Fudan University, China

Prof. Haidong Kan, he obtained his Ph.D. degree in 2003 at Fudan University in China. In 2007, he completed his postdoc training at the National Institute of Environmental Health Science of the US. He is now associate editor of International Journal of Epidemiology and Environmental Health Perspectives. His research investigates how ambient air pollution and global climate change affect human health.

How heat wave and cold spell affect population mortality? - A case study in 272 Chinese cities

In this study, we evaluated the associations and effect patterns of heat wave and cold spell with mortality risk in 272 major Chinese cities. The relative risk of cold spell (1.39 [95% CI: 1.15, 1.69]) was higher than that of heat wave (1.07 [95%CI: 1.03, 1.10]) for total mortality. Meanwhile, the maximal lag effect of cold spell (28 days) was longer than heat wave (3 - 5 days). The elderly, females, and less-educated people were more vulnerable, and the effect varied in regions. It might be necessary to establish region-specific forecasting and alarming system for heat wave and cold spell.



Dr. Linwei Tian
School of Public Health, LKS Faculty of Medicine - The University of Hong Kong, China

Dr Linwei Tian is an environmental epidemiologist with a focus on air pollution and health. Compared with static data, time series data contain more information at our disposal for the inference of causality. He has been trying to examine the earlier ambiguity and enhance causal inference of the environment-health associations by contrasting the traditional time series regression models with the recent methods of causal discovery from big data.

Physiological roles of gaseous pollutants

Nitric oxide (NO), carbon monoxide (CO), and sulfur dioxide (SO2) played a variety of roles in the origin of life in the environment of the early Earth, and they are recently recognized as gasotransmitters endogenously produced in human body. Is it possible that some of the physiological effects of these endogenous gases are mimicked by their exogenous counterparts in the ambient air? Applying Empirical Dynamic Modeling to the time series data of air pollution and hospitalizations in Hong Kong, we have some preliminary findings on the relationships of: 1) SO2 and ischemic stroke; 2) CO and sepsis ('blood poisoning').

Dr. Tiantian Li

Director of the Department of Environmental Health Risk Assessment, National Institute of Environmental Health (NIEH), Chinese Center for Disease Control and Prevention

Tiantian Li, PhD, is the director of the Department of Environmental Health Risk Assessment, National Institute of Environmental Health (NIEH), Chinese Center for Disease Control and Prevention. She completed a postdoctoral appointment at the Department of Environmental Health Sciences, Mailman School of Public Health, Columbia University and a PhD from the Department of Environmental Sciences, College of Environmental Sciences, Peking University. Her major research interests include air pollution, climate change and health. She has been the PI or Co-I for many national research grants (including grants from the National Natural Science Foundation of China, the Ministry of Science and Technology, and the Ministry of Health) and international research grants (including grants from the WHO, GEF, and NIH), She has published more than 150 academic papers.

Health Risks of Extreme Weather in China

This talk will introduce the basic concept and trends of extreme event under changing climate. Studies of the health risks of extreme weather, such as heat wave, cold spell, flooding and typhoon in China will be presented. The future perspectives of studies of extreme weather and health will also be proposed.

Dr. Guanghui Dong

Professor, School of Public Health - Sun Yet-san University, China

Dr. Dong is a Professor of environmental epidemiology and environmental toxicology. He has years of experience working as an environmental epidemiologist in China and his research areas of focus include adults and child health, environmental health, exposure assessment, indoor and outdoor air pollution. Also, His research area focused on the toxicological evaluation of some components in PM10 and PM2.5, such as some persistent organic pollutant (PFOS, PBDEs) in ambient air particles. So far, Dr. Dong has published more than 120 papers in the international journals including Lancet Planetary Health, JAMA Network Open, EHP, etc. journals as first and corresponding author.

Ambient Air Pollution and Health Impact in China

Based on the large population investigations, this report systematically summarizes the effects of ambient air pollution exposure on human health in China, including the following four sections: 1) Ambient air pollution and mortality in Chinese based on the China Four Citied Study; 2) Ambient air pollution and morbidity in Chinese based on the 33 Communities Chinese Health Study; 3) Ambient air pollution and morbidity in Chinese children based on the Seven Northeast Cities (SNEC) Study; and 4) Toxicological Evaluation of Components in PM. Finally, I would like to introduce the ongoing works and hope to develop collaboration with interesting scholars in future.

Session Six (B): Air pollution, Extreme Weather Events and Health

Chair	Associate Professor Donna Green
Date	Tuesday 15 June 2021
Session time	15:20 – 16:40 (Australian Eastern Standard Time)

Chair: Associate Professor Donna Green
School of Biological, Earth and Environmental Sciences - University of New South Wales, Australia

Associate Professor Donna Green was a founding member of the Climate Change Research Centre, UNSW. She is an Associate Investigator of the ARC Centre of Excellence for Climate Extremes; and an affiliate of the NHMRC Centre for energy, air pollution and health Research. She leads a national researcher network, the Climate Health Network www.climatehealth.info. As an interdisciplinary environmental scientist, she conducts research on climate impacts, energy policy, public health and air pollution. Donna was a contributing author in the UN World Energy Assessment and for the IPCC's Fourth and Fifth Assessment Reports.

Session Program Schedule

15 June 2021 Session Six (B): Air pollution, Extreme Weather Events and Health	
15:20	**Prof. Yuming Guo,** Monash University, Australia **Title:** Global burden of mortality attributable to cold and hot temperatures
15:40	**Prof. Shaowei Wu,** Xi'an Jiaotong University, China **Title:** The modification of psychosocial stress on the cardiovascular effects of air pollution
16:00	**Dr. Tao Xue,** Peking University, China **Title:** Associations between Reduced PM2.5 and Improved Health during China's Clean Air Actions since 2013
16:20	**Dr. Dung Phung,** Griffith University, Australia **Title:** A Climate-based prediction tool in the dengue high-risk cluster of the Mekong Delta Region
16:40	**End of Session**

Prof. Yuming Guo

Global Environmental Health and Biostatistics & Head of the Monash Climate, Air Quality Research (CARE) Unit, Monash University, Australia

Dr Guo is Professor of Global Environmental Health and Biostatistics & Head of Climate, Air Quality Research Unit at Monash University. He has developed many multidisciplinary national/international collaborative programs, which have delivered new approaches and tools to improve exposure assessment, statistical modelling, and has demonstrated that climate change, extreme weather and air pollution have great health impacts. Since 2010, he has published > 330 peer reviewed articles in prestigious journals including NEJM, The Lancet, BMJ, and PLOS Medicine. He is Associate/Academic Editor for PLOS Medicine, EHP, Environment International, and Environmental Research. He has been awarded the Tony McMichael Award by ISEE (2020), Young Tall Poppy of The Year (2020), Rising Star of Australian Researchers (2019), NHMRC Research Excellence Award (2018), and Best Environmental Epidemiology Paper by ISEE 2016.

Global burden of mortality attributable to cold and hot temperatures

Background: Exposure to cold or hot temperatures is associated with premature deaths. However, the global, regional, and national mortality burden associated with non-optimal ambient temperatures has not been adequately evaluated.

Methods: We collected time-series data on mortality and ambient temperatures from 750 locations in 43 countries and meta-predictors at grid (0·5°×0·5°) level across the globe. Three-stage analysis strategy was used. Firstly, the temperature-mortality association was fitted for each location using time-series regression. Secondly, a multivariate meta-regression model was built between location-specific estimates and meta-predictors. Thirdly, the cell-specific association was predicted with the cell-specific meta-predictors. Temperature-related excess deaths, ratio accounting for all deaths, and death rate per 100,000 residents were then calculated for each cell across the globe.

Findings Globally, 5,083,172 [95% empirical CI: 4,087,967, 5,965,520] deaths were associated with non-optimal temperatures per year, accounting for 9·43% of all deaths (8·52% cold-related and 0·91% heat-related deaths). The mortality burden varied geographically: 51·5% of cases occurred in Asia. East Europe and Sub-Saharan Africa had the highest heat- and cold-related excess death rates, respectively. Between 2000–2019, the global cold-related death ratio decreased by -0·51% and heat-related death ratio increased by 0·21%, leading to a net reduction in overall ratio. The largest decline occurred in South-east Asia, while there was temporal increase in South Asia and Europe.

Interpretation Non-optimal temperatures are associated with substantial mortality burden, which varied spatio-temporally. Findings benefit the international, national, and local communities in developing preparedness/prevention strategies to reduce weather-related impacts immediately and under climate change scenarios.

Prof. Shaowei Wu
School of Public Health - Xi'an Jiaotong University, China

Dr. Wu has served as the Principal Investigator for a number of scientific research projects funded by National Key Research & Development Programs, National Natural Science Foundation of China, and Beijing Natural Science Foundation. In recent years, Dr. Wu's research has focused on the health effects of environmental factors such as air pollution, ultraviolet radiation, heavy metals on human health and related mechanisms. He has published more than 80 peer-reviewed articles in international authoritative journals including American Journal of Psychiatry, Journal of Clinical Oncology, Journal of the National Cancer Institute, and Environmental Health Perspectives, with a total of nearly 3000 citations. In 2018, he won the first Excellent Young Scientist Award of Chinese Society for Environmental Sciences, and won the second prize of Beijing Science and Technology Award and the second prize of Environmental Protection Science and Technology Award of Chinese Society for Environmental Sciences (both as the third completer). He is currently a councilor of the International Society for Environmental Epidemiology (ISEE) Asia Western Pacific Chapter. He is also a member of the Biomarkers Professional Committee and the Exposure Omics and Exposure Science Professional Committee of Chinese Environmental Mutagen Society, and a member of Respiratory Toxicology Committee and Neurotoxicology Committee of Chinese Society of Toxicology. He also serves as an editorial board member for Journal of Environmental & Occupational Medicine and Journal of Environment and Health.

The modification of psychosocial stress on the cardiovascular effects of air pollution

Aims: Ambient air pollution is found to have adverse health effects on the cardiovascular system. Psychosocial stress could be a potential effect modifier for adverse health effects of air pollution, but research evidence is scare. We investigated the potential modifying effects of psychosocial stress on the association between short-term exposure to air pollution and cardiorespiratory health variables. **Methods:** We conducted a cross-sectional study in 373 elderly subjects and a panel study in 90 participants with 3-6 repeated measurements. We collected psychosocial stress information on perceived stress, anxiety, depression and social support, obtained daily environmental data or personal exposure data, conducted cardiovascular health measurements, and analyzed the associations of air pollutants with cardiovascular health indicators and the modification by psychosocial stress using appropriate regression models. A psychosocial stress index was established using weighted quantile sum regression method. Results: Results from the cross-sectional study showed that the associations of fine particulate matter with total triglyceride (TG), and ozone with systolic blood pressure, TG and high-density lipoprotein cholesterol were stronger in participants with high psychosocial stress than in participants with low psychosocial stress. **Results:** from the panel study showed that psychosocial stress significantly modified the associations of short-term exposure to black carbon (BC) with blood pressure and heart rate variability variables. For example, as the personal BC exposure level increased, the decreases in total power, very low-frequency power, high-frequency power (HF), standard deviation of normal-to-normal heart beat intervals and root-mean-square successive difference were greater in the high psychosocial stress group than in the low psychosocial group, while the increases in low-frequency power/HF ratio and heart rate were greater in the high psychosocial stress group than in the low psychosocial stress group. **Conclusion:** Our results suggest that psychosocial stress may increase the susceptibility of the elderly individuals to the adverse cardiovascular effects of air pollution exposure.

Dr. Tao Xue, Assistant Professor
School of Public Health - Peking University Health Science Center, China

Dr. Xue is an Assistant Professor from School of Public Health, Peking University Health Science Center. He holds a Bachelor degree in Environmental Science from Peking University, and a PhD degree in Public Health from University of Pittsburgh. His works are focused on the environmental risk factors including air pollution and climate change, and their exposure and health impact assessments. The relevant works have published in highly impactful journals such as Nature Communications, PLoS Medicine, and Lancet Planetary Health. Dr. Xue has published more than 40 peer-reviewed papers in recent 5 years.

Associations between reduced PM2.5 and improved health during China's clean air actions since 2013

BACKGROUND: China has conducted the Clean Air Actions, which have reduced the PM2.5 concentrations rapidly. Here I present a series of studies, which examined whether the improved air quality was associated with improvements in multiple dimensions of public health.

METHODS: We applied quasi-experimental studies to examine how the health statues changed before and after the conduction of the China's Clean Air Actions, since 2013, among the nation- or region-representative adult samples. We examined the associations between the reduced concentrations of PM2.5 and indicators of lung function, metabolic disorders, mental health, and medical expenditure.

RESULTS: We found the PM2.5 reductions were significantly associated to (1) an improved peak exhale flow, (2) a decreased level of blood pressure, (3) an improved lipid profiles, (4) a decreased score of depressive risk, and (5) a saved money in medical cost in China. Some of the relevant results have been published in PLoS Medicine, the Lancet Regional Health, Environment International and etc.

CONCLUSIONS: China's clean air actions have protected the public health by reducing the levels of particulate pollution.

Dr. Dung Phung
Research Fellow, Centre for Environment and Population Health - Griffith University, Australia

Dr. Dung Phung has background in both medicine and public health. He received Master of Public Health in Occupational and Environmental Medicine from University of Washington, and PhD in Environment and Population Health from Griffith University, Australia. His recent research focus is on climate change and health in developing countries. The lower Mekong Delta Region (MDR), a developing and tropical area, is considered one of the areas in South-East Asia most vulnerable to extreme hydro-meteorological events associated with climate change. Phung has conducted a series of studies on the health effects of high ambient temperatures, unusual and intensive flooding events, and sea level rises in the MDR. He has expressed a special interest on translating from complex scientific evidence into policy and practices to support climate change adaptation and mitigation strategies in this region.

A climate-based prediction model in the high-risk clusters of the Mekong Delta Region, Vietnam: towards improving dengue prevention and control

Aims: This study developed a prediction score scheme useful for prevention practitioners and authorities to implement dengue preparedness and controls in the Mekong Delta Region (MDR).

Methods: In the first study, we identified the best statistical model for predicting the dengue fever in the central area of the Mekong Delta Region (MDR). In the second study, we applied a spatial scan statistic to identify high-risk dengue clusters in the MDR and used generalized linear distributed lag models to examine climate-dengue associations using dengue case records and meteorological data from 2003 to 2013. The significant predictors were collapsed into categorical scales, and the β-coefficients of predictors were converted to prediction scores. The score scheme was validated for predicting dengue outbreaks using ROC analysis.

Results: The north-eastern MDR was identified as the high-risk cluster. For 1oC increase in temperature at lag 1-4 and 5-8, the dengue rose 11% (95%CI, 9-13) and 7% (95%CI, 6-8) respectively. For 1% increase in humidity at lag 1-4 and 5-8, dengue rose 0.9% (95%CI, 0.2-1.4) and 0.8% (95%CI, 0.2-1.4) respectively. For 1mm increase in rainfall at lag 1-4 and 5-8, dengue rose in 0.1 % (95%CI, 0.05-0.16) and 0.11% (95%CI, 0.07-0.16) respectively. The predicted scores performed with high accuracy in diagnosing the dengue outbreaks (96.3%).
Conclusions: This study demonstrates the potential usefulness of a dengue prediction score scheme derived from complex statistical models for identified high-risk dengue clusters. We recommend a further study to examine the possibility of incorporating such a score scheme into the dengue early warning system in similar climate settings.

Abstracts of E-poster presentation

1 The relationships of ambient air pollution and hospitalizations for gout in a humid subtropical region of China

Hai-Feng Pan [1], Yi-Sheng He [1], Gui-Hong Wang [2], Qian Wu [1], Zheng-Dong Wu [1], Yue Chen [3], Jin-Hui Tao [4], Xin-Yu Fang [1], Zhiwei Xu [5]

1. Department of Epidemiology and Biostatistics, School of Public Health, Anhui Medical University, 81 Meishan Road, Hefei, Anhui, China;

2. Department of Rheumatology, Anqing Hospital Affiliated to Anhui Medical University, Anqing, Anhui, China;

3. Department of Epidemiology and Biostatistics, School of Public Health, Anhui Medical University, 81 Meishan Road, Hefei, Anhui, China;

4. Department of Rheumatology and Immunology, the First Affiliated Hospital of USTC, Division of Life Sciences and Medicine, University of Science and Technology of China, Hefei, China.;

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Keywords: Gout; Air pollutants; Carbon monoxide; Nitrogen dioxide; Ozone

Abstract

Objective: Gout is a chronic disease caused by the deposition of sodium urate (MSU) crystals. Available data on the association between environmental hazards and gout are scarce. The present study aimed to investigate the relationship between short-term exposure to air pollution and hospitalizations for gout from 2016 to 2020 in Anqing City, China.

Methods: Generalized linear regression was used to examine the association between air pollution (NO_2, O_3, and CO) and gout, and stratified analyses by gender, age and season were conducted.

Results: There were 8,675 hospitalizations for gout in Anqing City during the study period. We observed an obvious association between NO_2 and hospitalizations for gout (lag 0, RR:1.022, 95%CI:1.004-1.041, per 10μg/m3 increase in NO_2 concentration). For every 1 mg/m3 increase in CO concentration, hospitalizations for gout increased by 3.9% (RR=1.039, 95%CI:1.004-1.076, lag 11 days). Intriguingly, there was a negative relationship between O_3 and hospitalizations for gout (lag0, RR=0.986, 95%CI: 0.976-0.996, for every 10 μg/m3 increase in O_3 concentration). Stratified analyses showed that exposure to high levels of NO_2 and CO during cold season was dramatically associated with increased risk of hospitalizations for gout.

Conclusions: Our findings suggest that patients with gout need to take preemptive actions during high air pollution days to avoid hospitalizations.

2. Associations of air pollution and meteorological factors with COVID-19: A systematic review and meta-analysis

Hai-Feng Pan[1], Yi-Sheng He[1], Zhiwei Xu[2], Kun Xiang[1], Yu-Qian Hu[1], Yi-Lin Dan[1], Qian Wu[1]

1 Department of Epidemiology and Biostatistics, School of Public Health, Anhui Medical University, 81 Meishan Road, Hefei, Anhui, China.

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Email: panhaifeng1982@sina.com

Keywords: Air pollution; meteorological factors; COVID-19

Abstract

Background: COVID-19 is mainly transmitted from person to person through droplets and direct contact. The roles of air pollutants and meteorological factors in the occurrence of COVID-19 remain controversial so far.

Objectives: The purpose of the study was to conduct a meta-analysis of recent findings to assess the associations of air pollution and meteorological factors with risk of COVID-19.

Methods: We systematically searched three electronic literature databases (PubMed, EMBASE, and Web of Science) to identify studies published up to July 2020 which reported the associations of air pollution, meteorological factors with COVID-19. We assessed the risk of bias in all studies and meta-analyzed the associations of air pollutants and meteorological factors with COVID-19 using random-effects models, and conducted various sensitivity analyses.

Results: We identified 724 records in the initial search, and included 10 studies in the final analysis. Except for O3 and $PM_{2.5}$, the other air pollutants and meteorological factors were all associated with the occurrence of COVID-19. NO_2 and relative humidity (%) were positively associated with the occurrence of COVID-19 [relative risk (RR) and 95% confidence interval (CI) were 1.045 (95% CI: 1.009, 1.082) and 1.013 (95% CI: 1.000, 1.026), respectively]. In contrast, temperature (°F) was negatively associated with the occurrence of COVID-19 [RR: 0.998 (95% CI: 0.996, 1.000)].

Conclusions: High NO_2 concentration, high relative humidity, and low temperature may facilitate the transmission of COVID-19.

3. Dengue transmission risk in a changing climate: Bangladesh could experience a longer dengue fever season in the future

Kishor Kumar Paul[1], Ian Macadam[2,3], Donna L Green[2,3], David G Regan [1], Richard T Gray [1]

1 Kirby Institute, UNSW Sydney

2 ARC Centre of Excellence for Climate Extremes, UNSW Sydney

3 Climate Change Research Centre, UNSW Sydney

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Keywords: vectorial capacity, global climate model, outbreak risk, mosquito-borne disease

Abstract

Our changing climate is already affecting the transmission of vector borne diseases such as dengue fever. This issue presents a significant public health concern for some nations, such as Bangladesh, which already experience regular seasonal outbreaks of dengue fever under present day conditions. To provide guidance for proactive public health planning to potentially mitigate future infections, we explore the impact of climate change on dengue infections by calculating the change in vectorial capacity of Aedes aegypti mosquito at a seasonal level for all regions in Bangladesh under two atmospheric greenhouse gas concentrations for the period 1950-2099. For each of the four climate models used, and for both scenarios, our analysis reveals that the annual vectorial capacity remains at a level that would enable potential dengue epidemic transmission in all regions during the time period examined. We found a slight decline in vectorial capacity in half of the regions examined during the last two decades of 21st Century for the lower-concentration scenario, with a pronounced decline in vectorial capacity in all geographic regions beginning in 2060 for the higher-concentration scenario. The likely reason is that in many regions greenhouse warming is leading to temperatures beyond the optimum for mosquito breeding. However, seasonal differences in vectorial capacity dissipate as the climate warms, to the point that there is almost no observable seasonality for the higher-concentration scenario during the last two decades of the century. This suggests the potential for the dengue season to extend all year, with outbreaks occurring at any time. These findings suggest that disease surveillance and control activities would need to be geographically and temporally adapted to mitigate dengue epidemic risk.

4. An outbreak of Coxsackievirus A6 infection in adults of a collective unit, China, 2019

Yumeng Gao [1], Guangyuan Ma [1], Yong Xiao [1], Qun Cai [2], Ping Shi [1], Yujun Chen [1], Yuan Shen [1], Chao Shi [1]

1 Wuxi Center for Disease Control and Prevention

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Email: wxcdcshp@126.com

Keywords: Coxsackievirus A6 infection, adults, outbreak

Abstract

Background: Outbreaks/epidemic caused by Coxsackievirus A6 have been reported continuously since 2008. However, outbreaks caused by Coxsackievirus A6 infection in adults of a collective unit have not been reported. **Methods**: The nasopharyngeal swab specimens were collected to extract the total nucleic acid (DNA/RNA). The pathogen was determined using nucleic acid detection kits for 22 respiratory pathogens. The VP1 gene of this pathogen was amplified and sequenced. Sequence alignment and analysis were performed using Bioedit. The gene phylogenetic tree was constructed with MEGA software.

Results: The factory emerged patients in succession from the February 14 and reached the peak on the 18th. The main symptoms were rash, ocular conjunctival hemorrhage, fever and sore throat. A total of 19 workers had symptoms in this factory up to March 31, 2019, giving an attack rate of 8.26%. The laboratory results showed that Coxsackievirus A6 was the main pathogen causing this outbreak. The risk of taking a bath in the bathroom was 7.37 times higher than that of not taking a bath (95% CI: 1.67-32.79).

Conclusions: This manuscript further enriched the infection-related information of CVA6, which was helpful to better identify and deal with the epidemic in the future.

5. Epidemiologic features and influencing factors of Norovirus outbreaks in the city of Wuxi, China from 2014 to 2018

Chao Shi[1], Yuan Shen[1], Qian Geng[1]

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Keywords: epidemiologic features, influencing factors, Norovirus outbreaks

Abstract

We investigated the genotypic changes and epidemiologic features of norovirus outbreaks, as well as factors influencing the attack rate and outbreak duration in Wuxi from 2014 to 2018. A total of 74 norovirus outbreaks were reported in Wuxi from 2014 to 2018. The predominant norovirus genotypes in outbreaks have changed from GII.17 (20.3%) in 2014-2015 to GII.P16/GII.2 (40.5%) in 2017-2018. GII.P16/GII.2 in 2017-2018 season were more prevalent than GII.17 in 2014-2015 season (χ^2 =4.741, P=0.029). 56.7% of outbreaks occurred in primary school. The reinfection rate of norovirus outbreaks was 16.2%. 66.7% of reinfection outbreaks were infected by variants different to previous infections. Outbreaks occurred in non-primary school settings(P=0.02) and that with setting suspension (P=0.025) experienced a higher attack rate. The outbreaks in primary schools(P=0.024), reinfection outbreaks (P=0.035) and longer report timing (P=0.001) declared a significantly longer duration. It is of great importance that the monitoring of norovirus outbreaks for the emergence of novel strains, along with responsive preventive and control interventions, should be strengthened in adults and school-age population, especially in primary students and preschool children.

6. Combined Effects of Chronic PM2.5 Exposure and Habitual Exercise on Renal Function and Chronic Kidney Disease: A Longitudinal Cohort Study

Yiqian Zeng [1], Cui Guo [1], Xiangqian Lao [1], Yacong Bo [1], Ly-yun Chang [2], Alexis K.H Lau [3], Tony Tam [1], Changqing Lin [3], Zengli Yu [4]

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Keywords: Ambient $PM_{2.5}$; Habitual Exercise; Renal Function; Chronic Kidney Disease; Longitudinal Cohort; Taiwan

Abstract

Aims: We investigated the combined effects of chronic $PM_{2.5}$ exposure and habitual exercise on the decline of renal function and the incidence of chronic kidney disease (CKD) in Taiwan.

Methods: A total of 108,615 participants (≥ 18 years old) were recruited between 2001 and 2016. All participants underwent at least two medical examinations. Estimated glomerular filtration rate (eGFR) was calculated using the Modification of Diet in Renal Disease (MDRD) equation. The incident of eGFR decline ≥30% was defined as a decline of eGFR ≥30% during the study period, while the incident of CKD was defined as an eGFR <60 mL/min/1.73 m² or a newly self-reported physician-diagnosed CKD in the subsequent visits. The satellite-based spatiotemporal model was used to estimate $PM_{2.5}$ exposure at each participant's address. Information on habitual exercise was collected using a standard self-administered questionnaire. The Cox regression model with time-dependent covariates was used for data analyses.

Results: Higher habitual exercise was associated with lower risks of renal function decline and CKD development, whereas higher $PM_{2.5}$ exposure was associated with higher risks of renal function decline and CKD development. We found no significant interaction effect between $PM_{2.5}$ and habitual exercise, with an HR (95% CI) of 1.02 (0.97, 1.07) for incident eGFR decline ≥30% and 1.00 (0.95, 1.05) for CKD development. Compared to participants with inactive-exercise and high-$PM_{2.5}$, participants with high-exercise and low-$PM_{2.5}$ had 74% and 61% lower risks of renal function decline and CKD development, respectively.

Conclusions: Increased habitual exercise and reduced $PM_{2.5}$ exposures are associated with lower risks of renal function decline and CKD development. Habitual exercise reduces risks of renal function decline and CKD development regardless of the levels of chronic $PM_{2.5}$ exposure. Our study suggests that habitual exercise is a safe approach for kidney health improvement even for people residing in relatively polluted areas.

7. Short-term effect of temperature on Hand, Foot, and Mouth Disease morbidity stratified by Urban-Rural Status in Wuxi, China

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Keywords: HFMD, Meteorological factors, Susceptible populations

Abstract

Aims Hand, foot, and mouth disease (HFMD) has brought millions of attacks and a substantial burden in the Asia-Pacific region. Previous studies assessed disease risks around the world, which demonstrated great heterogeneity, and few determined the modification effect of social factors on temperature–disease relationship.

Methods We conducted a time-series study based on 107,906 HFMD cases in Wuxi (a city in the Yangtze River Delta, China) reported from the National Center for Public Health Surveillance and Information Services (from 2011 to 2017) to evaluate the temperature-associated HFMD morbidity risk and to identify potential modifiers relating to urban–rural status and aggregation mode of children. Controlling for time-varying factors and other meteorological factors, a distributed lag nonlinear model (DLNM) was used.

Results We found that the relationship between daily mean temperature and the cumulative risk of HFMD was an approximately M-shaped curve. With the reference of −6°C, the cumulative relative risk (RR) values of high temperature (95 percentile) and low temperature (5 percentile) were 3.74 (95% CI: 2.50–5.61) and 1.72 (95% CI: 1.24–2.37) at lag 4–7, respectively. The effects of higher temperature appeared to be greater and more persistent than those of lower temperature. Temperature-associated HFMD morbidity risks were more pronounced among rural children and those attending kindergartens or schools at specific lags and temperatures, whereas no gender difference was observed.

Conclusions Our results suggested that urban–rural status, and aggregation mode of the population modify the short-term effects of temperature on HFMD. These findings enhance the knowledge of the disease dynamics caused by changing environments, provide information for temperature-based early warning, and facilitate policy-making and resource allocation.

8. Interaction of daily mobility and environmental factors on the risk of acute respiratory illness: a GPS-based cohort study in community-dwelling older people

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Keywords: environmental impact, Mobility, Daily activity, Acute respiratory illness

Abstract

Background: It remains unclear whether both environmental factors and daily mobility would modify the risk of acute respiratory illness (ARI). The study aimed to investigate the effect modification of daily mobility pattern on the risk of ARI associated with environmental factors, including temperature, relative humidity (RH), absolute humidity (AH) among community-dwelling older people.

Methods: From Dec 2016 to May 2017, 285 community-dwelling older adults in Hong Kong were recruited and followed up till May 2019. The household indoor temperature and RH of individual participant were continuously monitored by data loggers and their acute respiratory symptoms by monthly telephone surveys. Outdoor environmental data were retrieved from the Hong Kong Observatory. Participants' daily mobility patterns were measured by GPS devices for seven consecutive days in the summer and winter of 2018. Participants were classified into the large and small life space groups using the cut-off of median daily travel distance from home in summer and winter, respectively. A time-stratified case-crossover design with conditional logistical regression was used to estimate the 7-day cumulative excess risk (ER) and 95% confidence interval (CI) of ARI associated with per unit increase of both indoor and outdoor environmental factors. The interaction of daily mobility and environmental factors were measured by stratification analysis of two mobility groups.

Results: A total of 186 participants had complete GPS data collection at least in one season, including 154 in summer and 168 in winter. The median daily travel distance from home were 1.4 and 2.3 kilometres in summer and winter, respectively. There were 81 participants who reported a total of 99 ARI episodes during the study period. A negative association was found between outdoor AH and ARI incidence, which was amplified higher in the small life space group than in the large life space group (cumulative ER -13.8% vs -4.8%). No significant difference between two life-space groups was observed for indoor or outdoor temperature and RH and indoor AH.

Conclusions: Small life space might have comprised the hazards of by of ARI associated with lower outdoor AH, but no such evidence was found for other environmental factors.

9. An evolving Australian glossary to support intersectoral climate change and health collaboration

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Keywords: climate change, glossary, shared language, terminology, interdisciplinarity, intersectoral collaboration, climate change and health, health, Aboriginal and Torres Strait Islander health, wellbeing

Abstract

Aims: Leading international organisations have developed glossaries relevant to climate change and health, yet many terms require refinement for the Australian context. Our study aimed to develop Australia's first glossary on health and climate change to support intersectoral research, practice, and policy in the Australian context. The target audience includes researchers collaborating to conduct multi-disciplinary research on health and climate change and end-users needing to understand and use that research to drive change.

Methods: The glossary development process included systematic review of existing glossaries and a word frequency analysis of the field's key reports. Multiple rounds of stakeholder engagement were conducted to identify and choose the most appropriate terms and definitions and inform amendments to several definitions to better suit the Australian context.

Results: We developed a publicly available mega-glossary database of terms following our systematic review; 932 terms and definitions from 44 glossaries. After stakeholder engagement, our project's final output is a publicly available Australian-specific climate change and health glossary, with 55 terms and definitions.

Conclusions: Our project contributes an Australian-unique climate change and health glossary, addressing needs for shared terminology in this exponentially growing field. Several definitions integrate Aboriginal and Torres Strait Islander perspectives, and the term 'Indigenous knowledges' is included for its importance in sustaining and caring for Country. Numerous definitions have been amended to include considerations of other sentient beings and ecosystems, recognising that human and environmental health are inextricably linked. We intend to keep our glossary and mega-database live and current by inviting users to suggest amendments to terms and definitions as they evolve. Policymakers, researchers, and stakeholders from different sectors can refer to our glossary to facilitate discussions and help translate research into policies and practices. By doing so, we can build a shared language to underpin a just transition to a sustainable future for our country.

10. Associations between exposure to road traffic noise and particulate matter and the prevalence of depression in Taichung

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Keywords: Cross-sectional study; Depression; Particulate matter; Prevalence; Road traffic noise

Abstract

Background: The World Health Organization has reported that the prevalence of mental illness is 4% of the global population. Some studies have been associated depression symptoms with exposure to road traffic noise and particulate matter (PM), but results are inconsistent.

Objective: This cross-sectional study investigated the associations between exposure to road traffic noise and particulate matter with the prevalent depression and the potential synergistic effect.

Methods: This study included 3,200 residents living in the Taichung area participated in the Taiwan Biobank as the study subjects. Their residential addresses were replaced with 29 administrative offices in the district due to individual confidential concern. We used land-use regression model to evaluate the annual average levels of road traffic noise and particulate matter. The logistic regression analysis was conducted to estimate the odds ratio (OR) of prevalent depression after adjustments of possible confounding factors.

Results: The annual average levels of 24-hour noise, night-time noise, $PM_{2.5}$ and PM_{10} were 68.1±3.7dBA, 62.4±2.1dBA, 32.4±5.4μg/m^3 and 70.4±12.8μg/m^3, respectively. The prevalence of depression was 3.2%. After adjusting for confounding factors, per 1-dBA increase in 24-hr noise was associated with the increased risk of 1.11 (95%CI=1.01-1.21), and per 1-μg/m^3 increase in $PM_{2.5}$ and PM_{10} was associated with the elevated risk of 1.02 (95% CI =0.97-1.07) and 1.01 (95%CI=0.99-1.04), respectively. Traffic noise is still significantly associated with the depression even after adjusting for $PM_{2.5}$ (OR=1.109; 95%CI=1.007-1.221). Exposre to ≥ 69.3 dBA in 24-hr noise and ≥ 32.9 μg/m^3 in $PM_{2.5}$ has found a significantly higher risk of depression (OR=2.151; 95%CI=1.244-3.721).

Conclusion: Our study found that exposure to road traffic noise was related to the increased risk of depression prevalence. The synergistic effect was identified with $PM_{2.5}$ exposure.

11. The impacts of long-term exposure to PM2.5 on cancer hospitalizations in Brazil

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Keywords: Cancer; particulate matter; hospitalization; cancer burden

Abstract

Background: Long-term exposure to $PM_{2.5}$ has been linked to cancer incidence and mortality. However, it was unknown whether there was an association with cancer hospitalizations.

Methods: Data on cancer hospitalizations and annual $PM_{2.5}$ concentrations were collected from 1,814 Brazilian cities during 2002–2015. A difference-in-difference approach with quasi-Poisson regression was applied to examine State-specific associations. The State-specific associations were pooled at a national level using random-effect meta-analyses. $PM_{2.5}$ attributable burden were estimated for cancer hospitalization admissions, inpatient days and costs.

Results: We included 5,102,358 cancer hospitalizations (53.8% female). The mean annual concentration of $PM_{2.5}$ was 7.0 μg/m^3 (standard deviation: 4.0μg/m^3). With each 1 μg/m^3 increase in two-year-average (current year and previous one year) concentrations of $PM_{2.5}$, the relative risks (RR) of hospitalization were 1.04 (95% confidence interval [CI]: 1.02 to 1.07) for all-site cancers from 2002 to 2015 without sex and age differences. We estimated that 33.82% (95%CI: 14.97% to 47.84%) of total cancer hospitalizations could be attributed to $PM_{2.5}$ exposure in Brazil during the study time. For every 100,000 population, 1,190 (95%CI: 527 to 1,836) cancer hospitalizations, 8,191 (95%CI: 3,627 to 11,587) inpatient days and US$788,775 (95%CI: $349,272 to $1,115,825) cost were attributable to $PM_{2.5}$ exposure.

Conclusions: Long-term exposure to ambient $PM_{2.5}$ was positively associated with hospitalization for many cancer types in Brazil. Inpatient days and cost would be saved if the annual $PM_{2.5}$ exposure was reduced.

12. Vulnerability and Burden of All-Cause Mortality Associated with Particulate Air Pollution during COVID-19 Pandemic: A Nationwide Observed Study in Italy

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Keywords: Particulate Matter, all-cause mortality, COVID-19, Italy

Abstract

Background: Limited evidence is available on the health effects of particulate matter (PM including $PM_{2.5}$ with an aerodynamic diameter ≤ 2.5 μm; PM_{10}, ≤ 10 μm; $PM_{2.5–10}$, 2.5–10 μm) during the pandemic of COVID-19 in Italy. The aims of the study were to examine the associations between all-cause mortality and PM in the pandemic period and compare them to the normal periods (2015–2019).

Methods: We collected daily data regarding all-cause mortality (stratified by age and gender), and PM concentrations for 107 Italian provinces from 1 January 2015 to 31 May 2020. A time-stratified case-cross design with the distributed lag non-linear model was used to examine the association between PM and all-cause mortality. We also compared the counts and fractions of death attributable to PM in two periods.

Results: Italy saw an increase in daily death counts while slight decreases in PM concentrations in pandemic period. Each 10 $\mu g/m^3$ increase in PM was associated with much higher increase in daily all-cause mortality during the pandemic period compared to the same months during 2015–2019 (increased mortality rate: 7.24% (95%CI: 4.84%, 9.70%) versus 1.69% (95%CI: 1.12%, 2.25%) for $PM_{2.5}$; 3.45% (95%CI: 2.58%, 4.34%) versus 1.11% (95%CI: 0.79%, 1.42%) for PM_{10}; 4.25% (95%CI: 2.99%, 5.52%) versus 1.76% (95%CI: 1.14%, 2.38%) for $PM_{2.5–10}$). The counts and fractions of deaths attributable to PM were higher in 2020 for $PM_{2.5}$ (attributable death counts: 20,062 versus 3927 per year in 2015–2019; attributable fractions: 10.2% versus 2.4%), PM_{10} (15,112 versus 3999; 7.7% versus 2.5%), and $PM_{2.5–10}$ (7193 versus 2303; 3.7% versus 1.4%).

Conclusion: COVID-19 pandemic increased the vulnerability and excess cases of all-cause mortality associated with short-term exposure to $PM_{2.5}$, $PM_{2.5–10}$, and PM_{10} in Italy, despite a decline in air pollution level.

13. Temperature-mortality association during and before the COVID-19 pandemic in Italy: A nationwide time-stratified case-crossover study

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Keywords: non-COVID-19 deaths, all-cause mortality, temperature, pandemic, Italy

Abstract

Background: Human lives and the health system have been substantially reshaped by the COVID-19 pandemic. However, the impacts of temperature on non-COVID and all-cause mortality in the pandemic remains unknown.

Objectives: We aimed to identify the associations of temperature with non-COVID and all-cause deaths in the pandemic 2020 in comparison with the non-COVID-19 period in Italy.

Methods: The daily data on 3,958,989 all-cause deaths (including 3,885,308 non-COVID deaths) and meteorological conditions in 107 Italian provinces between 2015 and 2020 was collected. We employed a time-stratified case-crossover study design combined with the DLNM model to investigate the relationships of temperature with all-cause and non-COVID deaths in 2020 and 2015-2019.

Results: Cold temperature contributed higher risks for both all-cause and non-COVID deaths in the pandemic year 2020 than in 2015-2019. However, no different change was found for the impacts of hot temperature. The relative risk (RR) of non-COVID deaths and all-cause mortality at extremely cold temperature (2 ˚C) in comparison with the estimated minimum mortality temperature (19 ˚C) in 2020 were 1.63 (95% CI: 1.55-1.72) and 1.45 (95%CI: 1.31-1.61) respectively, which were higher than all-cause mortality risk in 2015-2019 with RR of 1.19 (95%CI: 1.17-1.21). A total of 72,914 (95%CI: 66,063-80,658) all-cause deaths and 50,408 (95%CI: 42,088-58,371) non-COVID deaths were attributable to cold temperatures in 2020 pandemic period. Males (RR of 1.74 (95%CI: 1.63-1.86)) suffered greater risk of dying due to extremely cold temperature than females (RR of 1.54 (95%CI: 1.44-1.64)) in the pandemic, but no significant change in temperature-mortality association was found for people above 85 years old between the periods of 2015-2019 and 2020.

Discussion: Cold temperature showed stronger impacts than hot temperature on all-cause and non-COVID mortality in the pandemic year 2020 compared to pre-pandemic periods in Italy. Thus, taking actions to avoid the cold-related excess mortality is critical in the pandemic.

14. Humidity-Dependent Survival of Airborne Respiratory Viruses

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Keywords: Airborne Transmission, Influenza, Rhinovirus, Hospital infection

Abstract

Aims: There is a lack of consistent explanation regarding the mechanisms by which the airborne virus-laden aerosol composition interacts with RH and influences the viability of embedded viruses. We hypothesized that an Efflorescence/Deliquescence-Divergent-Infectivity model can predict the RH-dependent survival of airborne human-rhinovirus-16 (HRV-16) and influenza A H3N2 virus (IAV H3N2) as the suitable representatives of nonenveloped and enveloped viruses, respectively.

Methods: We used a state-of-the-art technique and measured the efflorescence RH (ERH) and deliquescence RH (DRH) of carrier aerosols nebulized from a protein-enriched saline carrier-fluid simulating human respiratory fluid in term of the major components. RH was then classified into three subclasses based on the hygroscopic behaviours of the carrier aerosols as sub-efflorescence (RH<ERH), hysteresis (ERH<RH<DRH) and super-deliquescence (RH>DRH) zones. We tested the validity of the EDDI model for HRV-16 and IAV H3N2 through two different scenarios. To test the model for nonenveloped HRV-16, the carrier fluid containing the virus was nebulized into the RH<ERH zone or RH>DRH zone air, to set the aerosols to the effloresced/solid or non-effloresced/liquid state before transitioning the RH into ERH<RH<DRH zone. Following the RH adjustment to the hysteresis zone, the surviving fractions (SFs) of the virus were measured at 15-, 25- and 55-minutes post-nebulization. In the second scenario, aerosols were introduced directly into the RH<ERH, ERH<RH<DRH and RH>DRH zones without transition and then SFs were measured at 5-, 15- and 45-minutes post-nebulization. We used the same scenarios to test the model for IAV H3N2.

Results: We found SFs for transitioned HRV-16 aerosol in the hysteresis zone after 15 min pos-aerosolization were higher for effloresced (17±2%) than non-effloresced (0.5±0.5%), while these figures for transitioned IAV H3N2 were (9.5±0.8%) and (0.40±0.05%), respectively. SFs for non-transitioned HRV-16 aerosols in the RH<ERH, ERH<RH<DRH and RH>DRH zones were 18±6%, 5±0.2% and 20±5%, while corresponding SFs for IAV H3N2 aerosols were 12±2%, 2±0.1% and 3±0.4%, respectively.

Discussion: The results revealed that while the SFs of HRV-16 were higher in all investigated RH zones compared to IAV H3N2, both viruses follow a V-shaped SF/RH dependence.

15. The Comparable Differences between the Taiwanese Approach and the Australian Approach to Covid 19

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Keywords: Covid 19； pandemic； federal system； complacency

Abstract

While Taiwan and Australia have approximately similar populations there is a marked difference with their respective responses to the Covid 19 virus. We will compare some of the methods that both countries have employed and contrast the variations that have been utilized by each nation.

We need to note that the Australian federal system constitutes separation of power and therefore each Australian state has its own separate health, hospital and nursing service and other government systems that are state owned and operated, such as education, police and others. Consequently, there are multiple differences in regulations and rules that apply to the many different government departments in comparison to each state within Australia. In contrast Taiwan health, hospital and nursing service is controlled and regulated by one central government department but with several different divisions.

As we gain more insight into the Covid 19 pandemic and how it can be spread, both national health authorities are trying to effectively to reduce any rise in Covid 19 cases and stem any serious threats that have affected both nations.

In Taiwan authorities acted quickly and thoroughly in overseeing the reduction of possible consequences of citizens and residents catching and passing the virus onto others, however, no civilian preventative system has been found to be absolute and until recently Taiwan was seen as a model of preventative action and was considered a representation for positive Covid responsive action. Recently however, Taiwan went into a heightened alert over a dramatic rise in Covid cases and some suggest this was a case a sense of complacency within the government and within the population.

Australia took more gradual approach but the Australian authorities eventually acted quickly and decisively and with a bipartisan approach to the other states and declaring that unity was essential to the emergency response. As the world grapples with this most serious pandemic let us hope that ultimately it will cease to be as active as it has been and that the world returns to some normalcy.

In conclusion both countries have to stay alert and consistent with their health and screening of the population and encourage their citizens to be active in social distancing and with all and any specific requirements that their respective governments have advised as a precaution to safeguard their wellbeing.

16. Temperature variability and asthma hospitalisation in Brazil, 2000-2015: A nationwide case-crossover study

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Keywords: Temperature variability, asthma

Abstract

Background: Both cold and hot temperature have been associated with the onset of asthma, but it remains largely unknown about the risk of asthma hospitalization associated with short-term temperature fluctuation or temperature variability (TV).

Objective: To explore the association between short-term exposure to TV and asthma hospitalization in Brazil.

Methods: Data for asthma hospitalization and weather conditions were collected from 1,816 Brazilian cities between 2000 and 2015. TV was calculated as the standard deviation of all daily minimum and maximum temperatures within 0-7 days prior to current day. A time-stratified case-crossover design was performed to quantify the association between TV and hospitalization for asthma.

Results: A total of 2,818,911 hospitalizations for asthma were identified during the study period. Each 1 ˚C increase in 0–7 days' TV exposure was related to a 1.0% [95% confidence interval (CI): 0.7–1.4%] increase in asthma hospitalizations. The elderly were more vulnerable to TV than other age groups, while region and season appeared to significantly modify the associations. There were 159,305 (95% CI: 55,293–258,054) hospitalizations, $48.41 million (95% CI: $16.92–$78.30 million) inpatient costs at 2015 price and 450.44 thousand days (95% CI: 156.08–729.91 thousand days) associated with TV during the study period. The fraction of asthma hospitalizations attributable to TV increased from 5.32% in 2000 to 5.88% in 2015.

Conclusion: TV was significantly associated with asthma hospitalization and the corresponding substantial health costs in Brazil. Our findings suggest that preventive measures of asthma should take TV into account.

17. Associations between fuel prices and air pollution in Vietnam

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Keywords: PM2.5, Fuel price, Air Pollution

Abstract

Background: Controlling and reducing $PM_{2.5}$ level is essential but there has been few studies focusing on assessing effective policies reducing air pollution through fuel prices. This study aims to investigate whether the higher fuel price was associated with the lower $PM_{2.5}$ concentration in Ha Noi and Ho Chi Minh City, Vietnam.

Methods: Daily data of $PM_{2.5}$ in the two largest cities in Vietnam (Hanoi and Ho Chi Minh City) and prices of different fuels were collected for 2 years (2016-2017). A linear regression model was performed to evaluate the association of $PM_{2.5}$ and fuel prices including the lag effect up to ten days. The long-term and seasonal effects on $PM_{2.5}$ were controlled using a natural cubic spline function of time with three degrees of freedom per year.

Results: For every A$0.055 (2021 price) increase in price of diesel oil and kerosene leads to a decrease of 6.8% (95% CI: -13.1, -0.6) and 8.2% (95% CI: -15.4, -0.9) $PM_{2.5}$ concentrations in Ho Chi Minh City. Meanwhile, for every A$0.055 increase in price of diesel oil, mazut 3.5S, mazut 3.0S and kerosene led to a decrease of 13.4% (95% CI: -22.3, -4.5), 26% (95% CI -40.0, -11.8), 27.4% (95% CI: -42.2, -12.3) and 15.3% (95% CI: -25.6, -4.8), respectively in $PM_{2.5}$ concentrations at Hanoi.

Conclusion: $PM_{2.5}$ was statistically negatively associated with the prices of diesel and kerosene in both Hanoi and Ho Chi Minh City. While $PM_{2.5}$ in Ho Chi Minh City was not statistically associated with mazut 3.5S, mazut 3.0S, $PM_{2.5}$ in Hanoi was statistically negatively associated with both mazut 3.5S and mazut 3.0S. These findings provided evidence that fuel price could have significant impact on the level of $PM_{2.5}$ in the large cities of Vietnam. Our study offers valuable perspectives for policymakers establish environmental policies in fossil fuel energy consumption.