

Kelvin Fong

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STATEMENT OF PURPOSE

Our surroundings and environmental exposures have considerable impacts on our health. Through environmental health and epidemiologic research, I study their health effects and investigate strategies to minimize detriments, especially among vulnerable populations.

EDUCATION

Doctor of Science, Harvard TH Chan School of Public Health, May 2018

Environmental Epidemiology, Department of Environmental Health
Committee: *Joel Schwartz (Chair), Francine Laden, Brent Coull, Petros Koutrakis*

Master of Science, ETH Zurich (Swiss Federal Institute of Technology), December 2012

Environmental Sciences: Human Health, Nutrition, and Environment

Honours Bachelor of Science, University of Toronto, June 2010

High distinction in Physiology and Music

CURRENT POSITION

Department of Earth and Environmental Sciences, Dalhousie University, Halifax, NS

Assistant Professor, January 2022 – present

Elizabeth May Chair in Sustainability and Environmental Health, January 2022 – present

Laboratory for Environmental Assessment in Public Health

- Launching independent research group to address the interactions between the environment (natural and anthropogenic) and human population health
- Measuring health-relevant environmental exposures in Halifax and Atlantic Canada
- Quantifying environmental health disparities across population strata, with a focus on vulnerable groups
- Designing and performing epidemiologic studies to estimate mortality and morbidity effects from exposure to air pollution, extreme temperatures, and other environmental stressors
- Estimating the causal effects of potential climate and environmental policies

PEER-REVIEWED JOURNAL ARTICLES

26. Dong S, Abu-Awad Y, Kosheleva A, **Fong KC**, Koutrakis P, Schwartz JD. Maternal Exposure to Black Carbon and Nitrogen Dioxide during Pregnancy and Birth Weight: Using Machine-Learning Methods to Achieve Balance in Inverse-Probability Weights. *Environmental Research* 2022, 211: 112978.
25. Kim H, Lee J-T, Peng RD, **Fong KC**, Bell ML. Implications of Mortality Displacement for Effect Modification and Selection Bias. *arXiv preprint arXiv:220313982*.
24. Bell ML, **Fong KC**. Gender Differences in First/Corresponding Authorship in Public Health Research Submissions during the COVID-19 Pandemic. *American Journal of Public Health* 2021, 111(1): 159-163. [press article]
23. **Fong KC**, Bell ML. Do Fine Particulate Air Pollution (PM_{2.5}) Exposure and its Attributable Premature Mortality Differ for Immigrants Compared to those Born in the United States? *Environmental Research* 2021, 196: 110387.
22. Hood RB, James P, **Fong KC**, Minguez-Alaron L, Coull BA, Schwartz JD, Kloog I, Laden F, Gaskins AJ. The influence of fine particulate matter on the association between residential greenness and ovarian reserve. *Environmental Research* 2021, 197: 111162.
21. Kim H, Lee JT, **Fong KC**, Bell ML. Alternative adjustment for seasonality and long-term time-trend in time-series analysis for long-term environmental exposures and disease counts. *BMC Medical Research Methodology* 2021, 21(2).
20. Lee W, Kim H, Choi HM, Heo S, **Fong KC**, Yang J, Park C, Kim H, Bell ML. Urban Environments and COVID-19 in three Eastern States of the United States. *Science of the Total Environment* 2021, 779: 146334.
19. Son JY, Choi HM, Fong KC, Heo S, Lim CC, Bell ML. The Roles of Residential Greenness in the Association between Air Pollution and Health: a Systematic Review. *Environmental Research Letters* 2021, 16(9): 093001.
18. **Fong KC**, Mehta NK, Bell ML. Disparities in Exposure to Surrounding Greenness Related to Proportion of the Population that were Immigrants to the United States. *International Journal of Hygiene and Environmental Health* 2020, 224: 113434.
17. **Fong KC**, Yitshak-Sade M, Lane KJ, Fabian MP, Kloog I, Schwartz JD, Coull BA, Koutrakis P, Hart JE, Laden F, Zanobetti A. Racial Disparities in Associations between Neighborhood Demographic Polarization and Birth Weight. *Int. J. Environ. Res. Public Health* 2020, 17(9): 3076.

16. Nori-Sarma A, Thimmulappa RK, Venkataramana GV, Fauzie AK, Dey SK, Venkareddy LK, Berman JD, Lane KJ, **Fong KC**, Warren JL, Bell ML. Low-Cost NO₂ Monitoring and Predictions of Urban Exposure Using Universal Kriging and Land-Use Regression Modelling in Mysore, India. *Atmospheric Environment* 2020, 226: 117395.
15. Qiu X, **Fong KC**, Shi L, Papatheodorou S, Di Q, Just A, Kosheleva A, Messerlian C, Schwartz JD. Prenatal Exposure to Particulate Air Pollution and Gestational Age at Delivery in Massachusetts Neonates 2001-2015 – a Perspective of Causal Modeling and Health Disparities. *Environmental Epidemiology* 2020, 4(5): e113.
14. Son JY, **Fong KC**, Heo S, Kim H, Lim CC, Bell ML. Reductions in Mortality Resulting from Reduced Air Pollution Levels due to COVID-19 Mitigation Measures. *Science of the Total Environment* 2020, 744: 141012.
13. Yitshak-Sade M, Fabian MP, Lane KJ, Hart JE, Schwartz JD, Laden F, James P, **Fong KC**, Kloog I, Zanobetti A. Estimating the Combined Effects of Natural and Built Environmental Exposures on Birthweight Among Urban Residents in Massachusetts. *Int. J. Environ. Res. Public Health* 2020, 17: 8805.
12. Yitshak-Sade M, Lane KJ, Fabian MP, Kloog I, Hart JE, Davis B, **Fong KC**, Schwartz JD, Laden F, Zanobetti A. Race or Racial Segregation? Modification of the PM_{2.5} and Cardiovascular Mortality Association. *PLOS One* 2020, 15(7): e0236479.
11. **Fong KC**, Kosheleva A, Kloog I, Coull BA, Koutrakis P, Laden F, Schwartz JD. Fine Particulate Air Pollution and Birthweight: Differences in Associations along the Birthweight Distribution. *Epidemiology* 2019, 30(5): 617-623.
10. **Fong KC**, Di Q, Kosheleva A, Coull BA, Koutrakis P, Laden F, Schwartz JD. Relative Toxicities of Major Particulate Matter Constituents on Birthweight in Massachusetts. *Environmental Epidemiology* 2019, 3(3): e047.
9. Gaskins AJ, Minguiez-Alarcon L, **Fong KC**, Abu Awad Y, Di Q, Chavarro JE, Ford JB, Coull BA, Schwartz JD, Kloog I, Attaman J, Hauser R, Laden F. Exposure to Fine Particulate Matter and Ovarian Reserve among Women from a Fertility Clinic. *Epidemiology* 2019, 30(4): 486-491.
8. Gaskins AJ, Minguiez-Alarcon L, **Fong KC**, Abu Awad Y, Di Q, Chavarro JE, Ford JB, Coull BA, Schwartz JD, Kloog I, Attaman J, Hauser R, Laden F. Supplemental Folate Intake Modifies the Relation Between Traffic-Related Air Pollution and Live Birth Among Women Undergoing Assisted Reproduction. *American Journal of Epidemiology* 2019, 188(9): 1595-1604.

7. Gaskins AJ, **Fong KC**, Abu Awad Y, Di Q, Minguez-Alarcon L, Chavarro JE, Ford JB, Coull BA, Schwartz JD, Kloog I, Souter I, Hauser R, Laden F. Time-varying Exposure to Air Pollution and Outcomes of In Vitro Fertilization Among Couples from a Fertility Clinic. *Environmental Health Perspectives* 2019, 127(7).
6. Heo, S, **Fong KC**, Bell ML. Risk of particulate matter on birth outcomes in relation to maternal socio-economic factors: a systematic review. *Environmental Research Letters* 2019, 14: 123004.
5. Kim ES, **Fong KC**, Lee L, Spiro A, Schwartz JD, Whitsel E, Horvath S, Wang CC, Hou L, Baccarelli AA, Li Y, Stewart J, Manson JE, Grodstein F, DeMeo DL, Kubzansky LD. Optimism is Not Associated with Two Indicators of DNA Methylation Aging. *Aging* 2019, 11(14): 4970-4989.
4. Yitshak-Sade M, James P, Kloog I, Hart JE, Schwartz JD, Laden F, Lane KJ, Fabian MP, **Fong KC**, Zanobetti A. Neighborhood Greenness Attenuates the Adverse Effect of PM2.5 on Cardiovascular Mortality in Neighborhoods of Lower Socioeconomic Status. *Int. J. Environ. Res. Public Health* 2019, 16(5): 814.
3. **Fong KC**, Kloog I, Coull BA, Koutrakis P, Laden F, Schwartz JD, James P. Residential Greenness and Birthweight in the State of Massachusetts, USA. *Int. J. Environ. Res. Public Health*, 2018, 15(6): 1248.
2. **Fong KC**, Hart JE, James P. A Review of Epidemiologic Studies on Greenness and Health: Updated Literature Through 2017. *Curr Environ Health Rep*, 2018, 5(1): 77-87.
1. Schwartz JD, **Fong KC**, Zanobetti A. A National Multi-City Analysis of the Causal Effect of Local Pollution, NO2, and PM2.5 on Mortality. *Environmental Health Perspectives* 2018, 126(8).

OTHER PUBLICATIONS

3. **Fong KC**, on behalf of the International Society for Environmental Epidemiology, North American Chapter. Re: Review of the Ozone National Ambient Air Quality Standards. *Washington, DC, Regulations.gov*. 2020. (Public Comment)
2. WHO Regional Office for Europe (**Fong KC** part of WHO Secretariat that coordinated and developed the publication). Review of evidence on health aspects of air pollution – REVIHAAP Project: Technical Report. *Copenhagen, World Health Organization Regional Office for Europe*. 2013.
1. **Fong KC**, Nussbaumer T. Health Effects of Aerosols from Wood Combustion. *Zurich & Bern, Swiss Federal Office for the Environment*. 2012. (Peer-Reviewed Report)

RESEARCH EXPERIENCE**School of the Environment, Yale University**

Postdoctoral Associate, Michelle Bell Research Group, July 2018 – December 2021

Environmental Health Disparities in an Aging Population

- Assessed environmental exposures (*e.g.*, air pollution, temperature, green space) with large spatiotemporal data repositories for epidemiologic research
- Developed methods to reproducibly and efficiently perform spatial data linkage and analysis on computing clusters
- Estimated the air pollution and related mortality differences between native-born and foreign-born in the United States
- Wrote grants to fund research at the intersection of environmental and immigrant health

Department of Environmental Health, Harvard TH Chan School of Public Health

Graduate Research Assistant, September 2013 – May 2018

Environmental Exposures during Pregnancy and Birth Weight (Dissertation Focus)

- Conceptualized, designed, and performed data linkage (> 1 mil. records) of mothers' geographic information to air pollution predictions and environmental variables
- Applied quantile regression and showed that lighter newborns were more severely affected by particulate air pollution (PM_{2.5}) than average-weight or heavier newborns
- Assessed nonlinearity using splines and effect modification by socioeconomic status in the relationship between residential greenness exposure and birth outcomes
- Evaluated the relative toxicity of different constituents of PM_{2.5} on birth weight

Optimism and Healthy Aging (Collaboration with Social and Behavioral Sciences Department)

- Processed large sets of epigenetic data to compute methylation age
- Performed mixed effects models to understand how optimism affects the aging process

Neighborhood Social Stressors (Collaboration with Boston University)

- Investigated how neighborhood income and racial polarization affects birth weight outcomes directly and indirectly through environmental exposures

World Health Organization, European Center for Environment and Health

Intern, February 2013 – May 2013

- Compiled, edited, and formatted review of air pollution and health effects
- Authored conference paper on the health and economic impacts of environmental noise

Verenum Engineering Bureau (Zurich, Switzerland)

Pratikan, April 2011 – February 2012

- Wrote report on the health effects of wood combustion aerosols for the Swiss government

Division of Critical Care Medicine, St. Michael's Hospital (Toronto, Canada)

Summer Student, Summers 2007, 2008

- Assessed novel mechanical ventilation strategies' effects on diaphragm force generation

TEACHING EXPERIENCE**School of the Environment, Yale University***Postdoctoral Associate, July 2018 – present*

- Developing and teaching short courses on modern tools for environmental exposure assessment
 - *Scaling up Spatial Analyses: Using Google Earth Engine for Satellite Imagery Retrieval, Processing, and Analysis* [[link to webinar](#)]
 - *Data Analysis Workshop on Health and Demographic Surveillance Systems in Africa (forthcoming in 2022)*
- Mentoring PhD and MSc students
 - *On research projects: e.g., Childhood Air Pollution Exposure and Expected Adult Income, Modeling Air Pollution Exposure in India for Epidemiologic Studies*
 - *On career development: e.g., searching for a postdoctoral position*
- Participating in teaching, mentoring, and diversity workshops
 - *Difficult Conversations in the Classroom (Race, Ethnicity, and Culture)*
 - *Writing Across the Disciplines*
 - *Mentoring Training Course for Postdoctoral Fellows / Associates*
 - *Unconscious Bias*

Harvard College and Harvard TH Chan School of Public Health*Teaching Fellow / Assistant, February 2016 – May 2017*

- Led tutorials, labs, and graded student work in graduate and undergraduate classes
 - *Analysis of Case-Control and Cohort Studies*
 - *Analytical Methods and Exposure Assessment*
 - *Advanced Regression for Environmental Epidemiology*
 - *Energy and Climate: Vision for the Future*
 - *Environmental and Occupational Epidemiology*
- Revamped advanced regression course to use modern R packages and RMarkdown
- Developed teaching content on reproducible research and data science online course
 - *Principles, Statistical and Computational Tools for Reproducible Science*
- Completed training by the Bok Center for Teaching and Learning
 - *Active Approaches to Problem-Based Teaching*
 - *Teaching in General Education*

ETH Zurich (Swiss Federal Institute of Technology)*Teaching Assistant, February 2011 – May 2011*

- Edited course materials and graded student assignments and exams
 - *Environmental Impacts, Threshold Levels and Health Effects*

SELECTED PRESENTATIONS*Invited Seminars*

Fong KC. *Investigating Disparities in Environmental Exposures and Health Effects.* Department of Population Medicine, Harvard Medical School, 2021.

Fong KC. *Immigrant Health: Do Environmental Exposures Play a Role?* US EPA Air, Climate and Energy (ACE) Centers Meeting, 2020.

Fong KC. *Environmental Health Disparities: Do Our Surroundings Affect Us in Different Ways?* Mel and Enid Zuckerman College of Public Health, University of Arizona, 2020.

Fong KC. *Accelerating Exposure Assessment in Environmental Epidemiology.* Earth Engine Group @ Yale Seminar Series, 2019.

Fong KC. *Surrounding Residential Greenness and Birthweight.* Chinese University of Hong Kong, 2018.

Conference Presentations

Fong KC, Osgood C, Miranda ML, Bell ML. *Immigrant Disparities in Estimated Effects of Fine Particulate Matter on Birth Weight.* International Society for Environmental Epidemiology Conference, 2021.

Fong KC, Bell ML. *Disparities in Premature Deaths Attributable to Fine Particulate Matter (PM_{2.5}) Exposure between Immigrants to and those born in the United States.* International Society for Environmental Epidemiology Conference, 2020.

Fong KC, Lane KJ, Yitshak-Sade M, Kloog I, Hart JE, Fabian MP, Zanobetti A, Schwartz JD, Laden F. *Effect Modification of the PM_{2.5} Association with Birthweight by Local Residential Racial and Economic Segregation.* International Society of Exposure Science and International Society for Environmental Epidemiology Joint Conference, Ottawa, Canada, 2018.

Fong KC, James P, Kosheleva A, Schwartz JD. *Maternal Exposure to Greenness during Pregnancy and Birth Weight.* International Society for Environmental Epidemiology, Sydney, Australia, 2017.

Fong KC, Di Q, Kosheleva A, Kloog I, Schwartz JD. *Contributions to Low Birth Weight by the Constituents of Air Pollution.* International Society for Environmental Epidemiology, Rome, Italy, 2016.

AWARDS AND HONORS

Travel Award, International Journal of Environmental Research and Public Health, 2021

Reviewer Recognition (Top 15% Overall), Environmental Health Perspectives, 2020.

Travel Award, International Society for Environmental Epidemiology, 2017, 2019.

Harvard Graduate Consortium on Energy & Environment, Harvard University Center for the Environment, 2015-2017.

Benjamin Greeley Ferris, Jr Fellowship in Environmental Epidemiology, Harvard TH Chan School of Public Health, 2015.

Glickenhau Fund, Harvard TH Chan School of Public Health, 2014.

Doctoral Grant, Harvard TH Chan School of Public Health, 2013.

National Laureate, Excellence Awards, Canadian Merit Scholarship Foundation, 2008-2010.

Dean's List, University of Toronto, 2007-2010.

Dean's List, University of Washington, 2009.

Killam Fellowship, Fulbright Canada, 2009.

Finalist, St. Michael's Hospital Poster Competition, 2008.

Al Mercury Award, University of Toronto, 2008.

Walter and Mary Tuohy Award in Arts and Science, University of Toronto, 2008.

C.L. Burton Open Scholarship, University of Toronto, 2007

SKILLS

Computer	Statistical Modeling in R, Python, and SAS Geographic Analysis in R, Google Earth Engine, ArcGIS Linux, SLURM, Git
Languages	English & Cantonese (fluent) German (advanced) French & Mandarin (basic)

SERVICE

Grant Review	NASA Health and Air Quality Research Opportunities in Space and Earth Sciences (HAQAST ROSES)
Peer Review	<i>American Journal of Epidemiology,</i> <i>Atmosphere,</i> <i>Environmental Epidemiology,</i> <i>Environment International,</i> <i>Environmental Health,</i> <i>Environmental Health Perspectives,</i> <i>Environmental Research,</i> <i>Environmental Research Letters,</i> <i>Environmental Science & Technology,</i> <i>Epidemiology,</i> <i>Journal of Exposure Science and Environmental Epidemiology,</i> <i>Journal of Racial and Ethnic Health Disparities,</i> <i>International Journal of Hygiene and Environmental Health,</i> <i>International Journal of Environmental Research and Public Health,</i> <i>Science of the Total Environment,</i> <i>Social Science Research,</i> <i>Urban Forestry & Urban Greening</i>
Review Editorial Board	<i>Atmosphere,</i> <i>Frontiers in Epidemiology</i>
Leadership	International Society for Environmental Epidemiology (ISEE) - Student and New Researcher Network (2018 – 2020), Capacity Building and Education Committee (2019 – present), North America Chapter Associate Member (2019 – present)

References available upon request