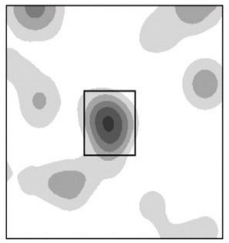
Health & the Environment

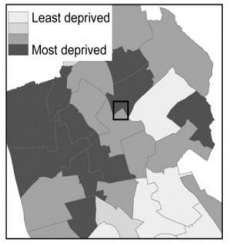
Dr. Trevor Dummer

CanPath National Scientific Co-Director
Professor & Canadian Cancer Society Chair in Cancer Primary Prevention
School of Population and Public Health
University of British Columbia

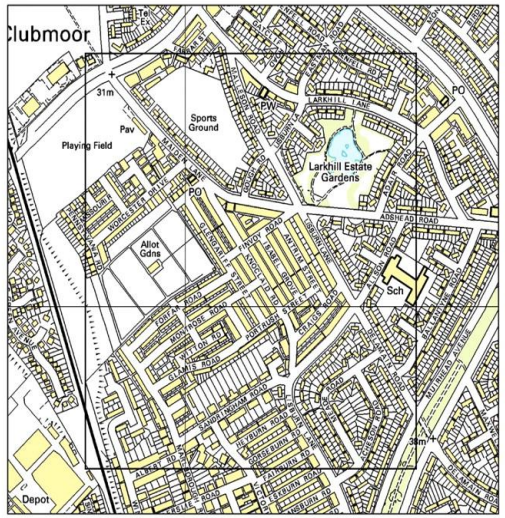
CanPath
Canadian Partnership for Tomorrow's Health
Partenariat canadien pour la santé de demain



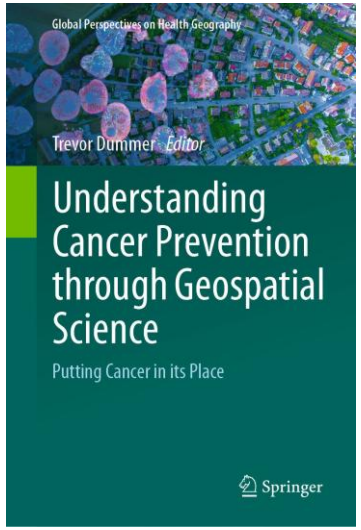
Map A: Area of 'good' eating habits



Map B: Census ward deprivation



Map C: Local built environment



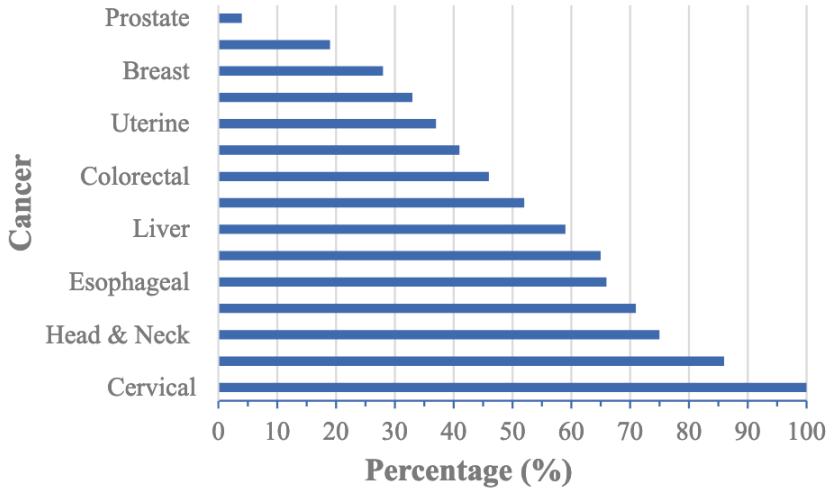


Fig. 2 Estimated percentage preventability of major cancers in Canada. (Data source: Canadian Population Attributable Risk of Cancer (ComPARe) Study 2019)

Cancer prevention is better than cure

where we live, work and play significantly impacts our health

CanPath helping us understand how our environment impacts our health

CanPath

Measuring environmental exposures in CanPath

CanPath - helping us understand how where we live, work and play affects our health

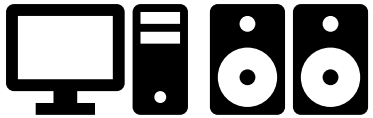
1. Questionnaire information

CanPath participants

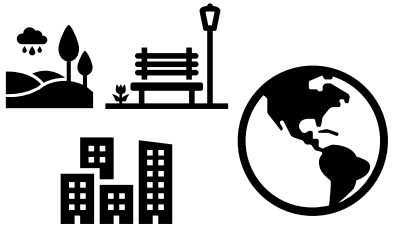
- Baseline
- Follow-up
- Occupational History
- Covid-19 survey

- **Exposures** – such as sun exposure, second-hand tobacco smoke, occupational exposures
- **Individual behaviours** - such as diet, physical activity and other information

2. Link to other databases



Postal code



Occupation

Work-based exposures

Ensuring your PRIVACY is central

Focus of this section of the presentation

CanPath

CANUE

The Canadian Urban Environmental Health Research Consortium

advancing research on urban living and human health

Air pollution

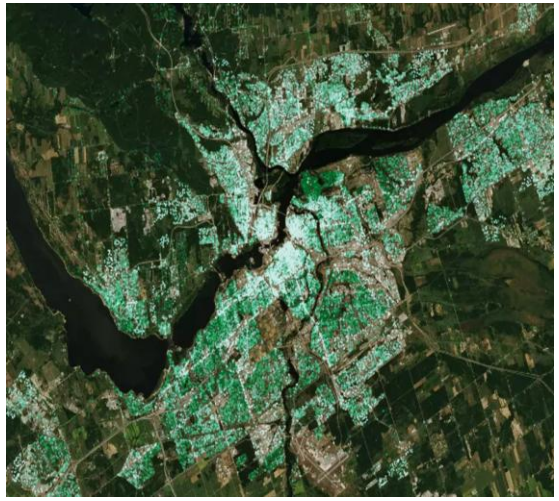
Fine Particulates

- PM2.5

Green spaces

Greenspace

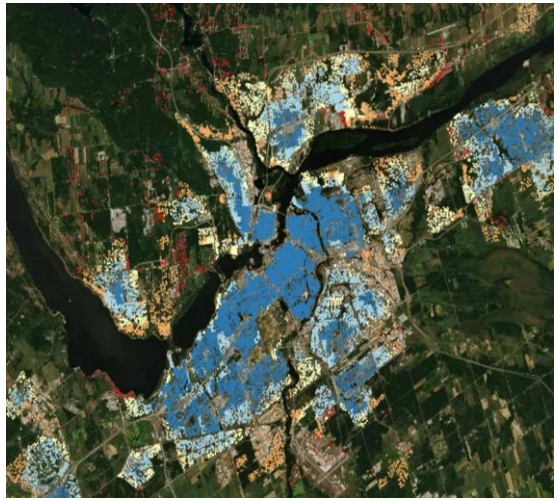
- NDVI (vegetation index)



Neighbourhood factors

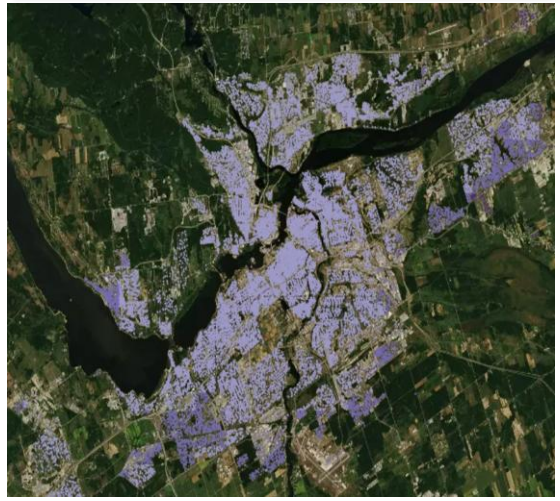
Walkability

- Active living index



Night time light

- Satellite imagery



And many other datasets related to the built and natural environment and pollution…..

CanPath

How are my data being used?

Lung cancer in non-smokers and air pollution – **Cartagene** contributed data to this landmark paper

CanPath supports training the next generation of scientists

Atul Aravindakshan BDS, MPH
PhD Candidate

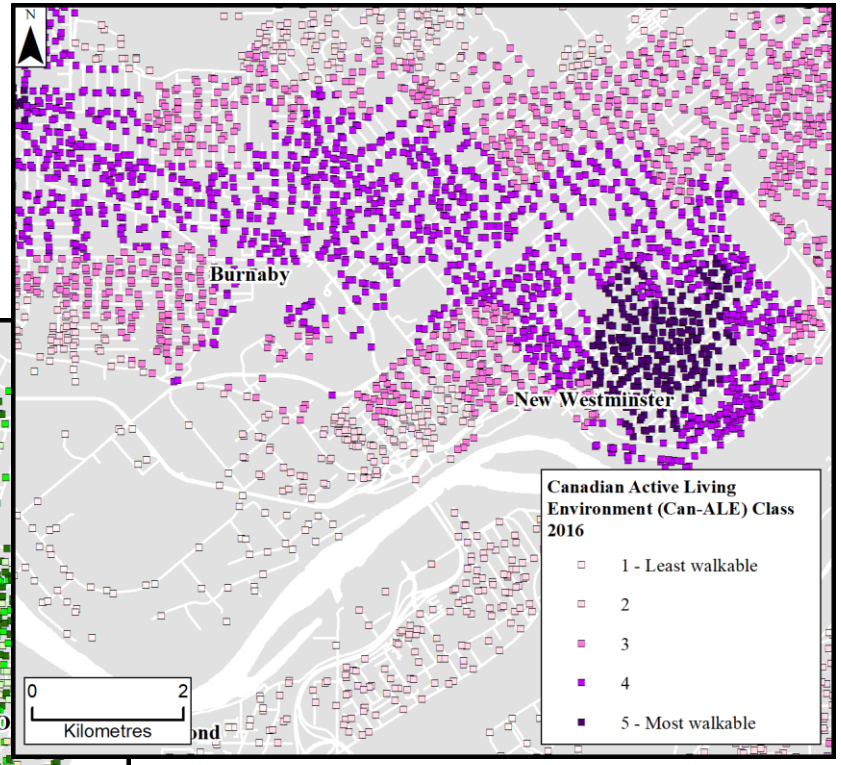
Ezra Yu MSc
PhD Candidate

Cancer risk, obesity, physical activity and the built environment – **BC Generations**

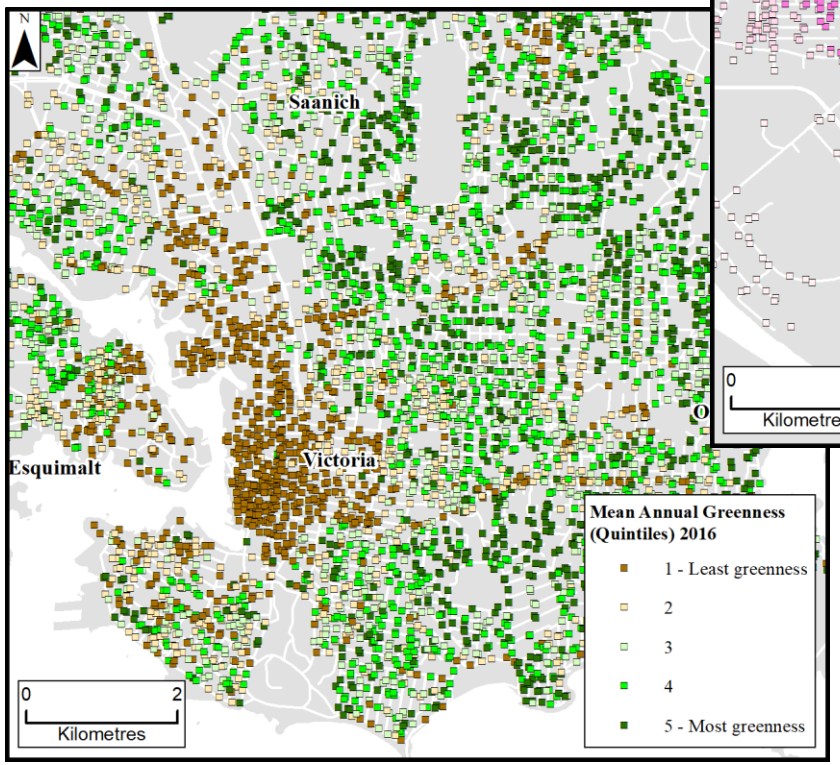
THE UNIVERSITY OF BRITISH COLUMBIA
Cancer Prevention
Research Excellence Cluster

CanPath

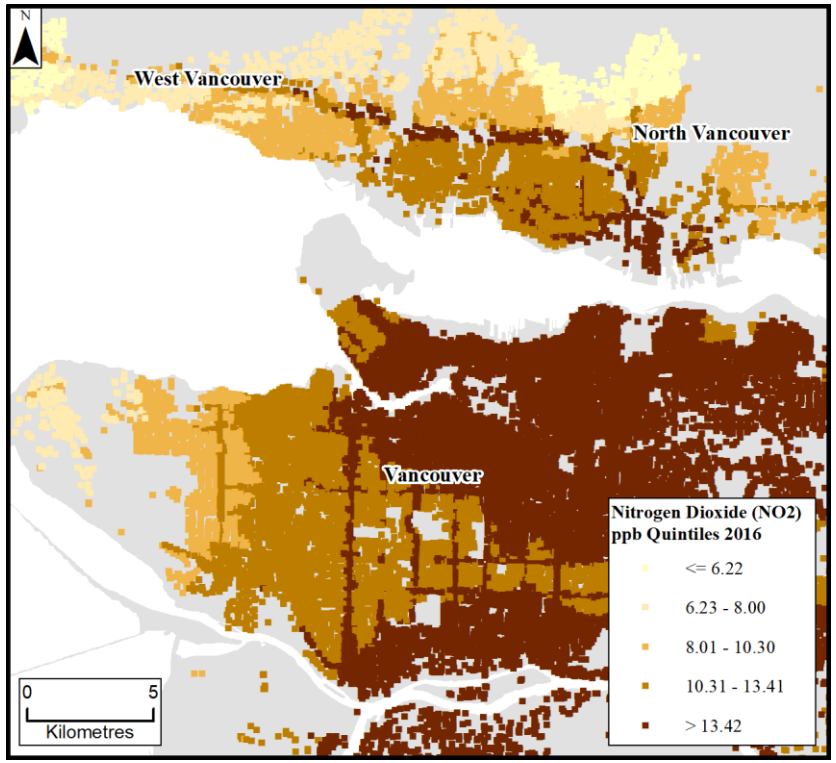
Walkability



Greenspace



Air Pollution



CanPath

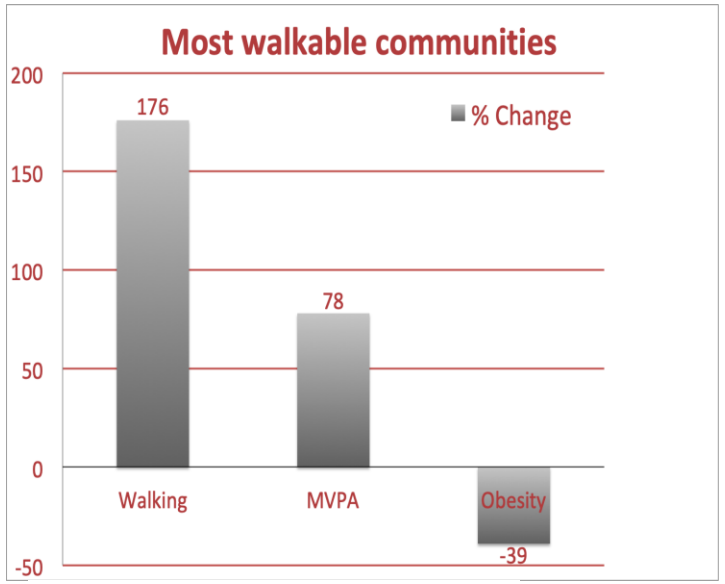
- Greenspace
- Walkability
- Air Pollution

→

- Obesity
- Physical activity
- Walkability

- Cancer risk

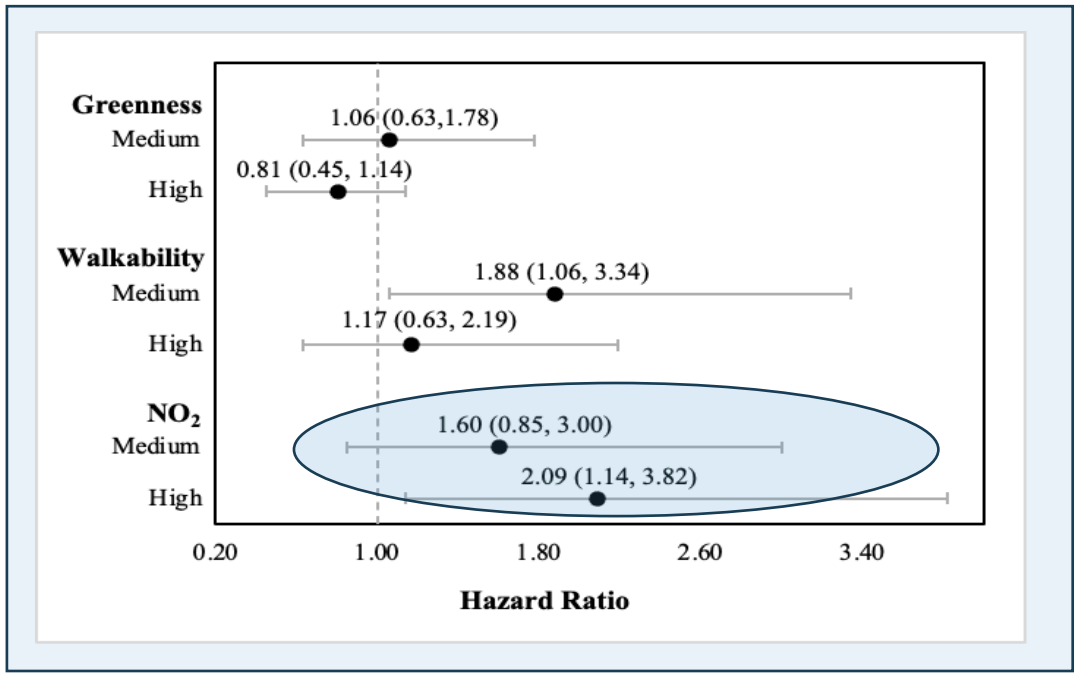
BC Generations Project
Your time today builds a healthier tomorrow.



Environment International
Volume 158, January 2022, 106959

Chronic disease and where you live: Built and natural environment relationships with physical activity, obesity, and diabetes

Lawrence D. Frank [a, b, *], Binay Adhikari [b], Katherine R. White [b], Trevor Dummer [b, e], Jat Sandhu [b, c], Ellen Demlow [c], Yumian Hu [c], Andy Hong [b, d], Matilda Van den Bosch [b]



Bladder cancer risk

CanPath

What did we find ?

Bladder cancer

Greenness – no association

Walkability – no consistent association, suggestion of a protective effect for high walkability areas after adjustment for other environmental exposures but this was non-significant

NO_2 – significant increase in highest category of NO_2 exposure

Physical activity, obesity

Walkability – strongly associated with increased physical activity, including walking and vigorous exercise and decreased overweight and obesity

Atlantic PATH toenail collection

Your toenail clippings provide researchers with a window to observe exposure to environmental contaminants, such as arsenic, over the previous 8-12 months

AND provided Atlantic PATH with a Guinness World Record!

Atlantic PATH earns Guinness World Record for world's largest toenail collection

(Originally Published at Dalhousie University)

The record may seem silly, but the science behind it is incredibly important to understanding why Atlantic Canada has such high rates of cancer.

The Atlantic Partnership for Tomorrow's Health, or "PATH," is part of the Canadian Partnership for Tomorrow Project, the largest study of its kind ever undertaken in Canada. Led by a group of Dal researchers, Atlantic PATH is investigating the various factors that contribute to the development of cancer and chronic diseases: everything from the environment, to genetics, to lifestyle and behaviour. It's recruiting tens of thousands men and women, ages 35-69, from across the four Atlantic provinces to take part.

Left to right: Drs. Trevor Dummer, Louise Parker and David Thompson, and a whole lot of toenail clippings. (Danny Abriel photo)

ELSEVIER

Environment International

Volume 66, May 2014, Pages 115-123

What is the role of obesity in the aetiology of arsenic-related disease?

Zhijie M. Yu [a], Bryan Fung [b], John D. Murimboh [b], Louise Parker [a], Trevor J.B. Dummer [a]

Journal of Exposure Science and Environmental Epidemiology (2014) 24, 135–144

www.nature.com/jes

ORIGINAL ARTICLE

Relationship between drinking water and toenail arsenic concentrations among a cohort of Nova Scotians

Zhijie M. Yu[1], Trevor J.B. Dummer[1], Aimee Adams[2], John D. Murimboh[2] and Louise Parker[1]

Consumption of arsenic-contaminated drinking water is associated with increased cancer risk. The relationship between arsenic body burden, such as concentrations in human toenails, and arsenic in drinking water is not fully understood. We evaluated the relationship between arsenic concentrations in drinking water and toenail clippings among a cohort of Nova Scotians. A total of 960 men and women aged 35 to 69 years provided home drinking water and toenail clipping samples. Information on water source and treatment use and covariables was collected through questionnaires. Arsenic concentrations in drinking water and toenail clippings and anthropometric indices were measured. Private drilled water wells had higher arsenic concentrations compared with other dug wells and municipal drinking water sources ($P<0.001$). Among participants with drinking water arsenic levels ≥ 1 μg/l, there was a significant relationship between drinking water and toenail arsenic concentrations ($r = 0.46$, $P<0.0001$). Given similar levels of arsenic exposure from drinking water, obese individuals had significantly lower concentrations of arsenic in toenails compared with those with a normal weight. Private drilled water wells were an important source of arsenic exposure in the study population. Body weight modifies the relationship between drinking water arsenic exposure and toenail arsenic concentrations.

Journal of Exposure Science and Environmental Epidemiology (2014) **24,** 135–144; doi:10.1038/jes.2013.88; published online 25 December 2013

ELSEVIER

Science of The Total Environment

Volume 505, 1 February 2015, Pages 1248-1258

Geostatistical modelling of arsenic in drinking water wells and related toenail arsenic concentrations across Nova Scotia, Canada

T.J.B. Dummer [a], Z.M. Yu [a], L. Nauta [a], J.D. Murimboh [b], L. Parker [a]

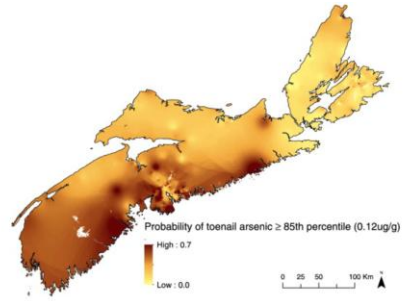


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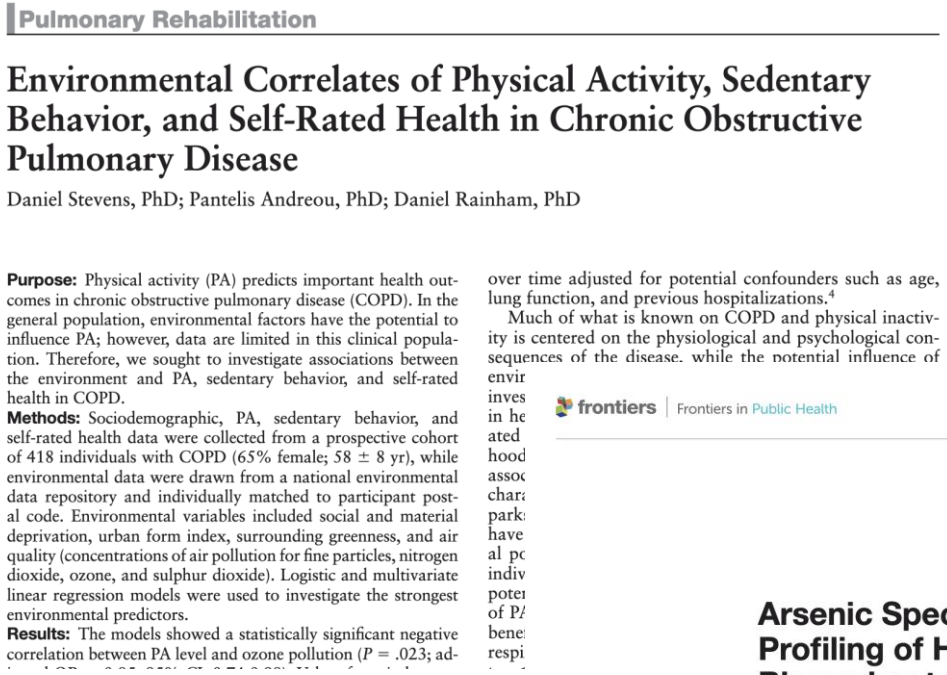
Fig. 4. Predicted probability of arsenic concentrations ≥ 85th percentile (0.12 μg g^{-1}) in toenail clippings.

CanPath

CanPath information in action



Pulmonary Rehabilitation

Environmental Correlates of Physical Activity, Sedentary Behavior, and Self-Rated Health in Chronic Obstructive Pulmonary Disease

Daniel Stevens, PhD; Pantelis Andreou, PhD; Daniel Rainham, PhD

Purpose: Physical activity (PA) predicts important health outcomes in chronic obstructive pulmonary disease (COPD). In the general population, environmental factors have the potential to influence PA; however, data are limited in this clinical population. Therefore, we sought to investigate associations between the environment and PA, sedentary behavior, and self-rated health in COPD.

Methods: Sociodemographic, PA, sedentary behavior, and self-rated health data were collected from a prospective cohort of 418 individuals with COPD (65% female; 58 ± 8 yr), while environmental data were drawn from a national environmental data repository and individually matched to participant postal code. Environmental variables included social and material deprivation, urban form index, surrounding greenness, and air quality (concentrations of air pollution for fine particles, nitrogen dioxide, ozone, and sulphur dioxide). Logistic and multivariate linear regression models were used to investigate the strongest environmental predictors.

Results: The models showed a statistically significant negative correlation between PA level and ozone pollution ($P = .023$; ad-

over time adjusted for potential confounders such as age, lung function, and previous hospitalizations.[4]

Much of what is known on COPD and physical inactivity is centered on the physiological and psychological consequences of the disease, while the potential influence of

frontiers | Frontiers in Public Health

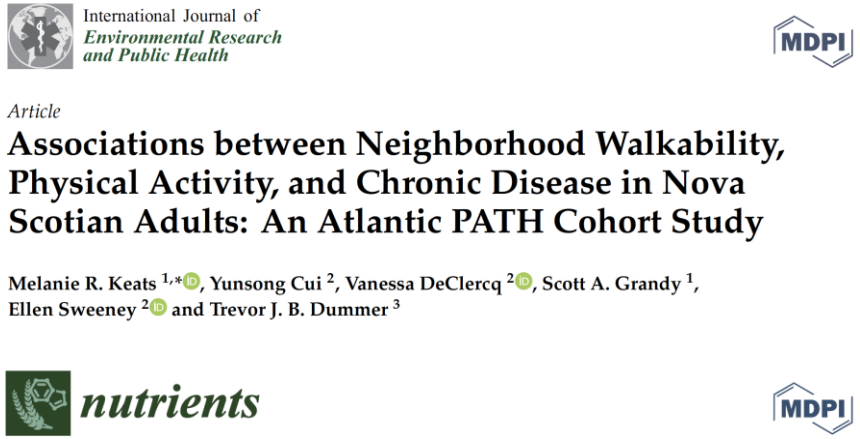
ORIGINAL RESEARCH
published: 07 July 2022
doi: 10.3389/fpubh.2022.818069

Arsenic Speciation and Metallomics Profiling of Human Toenails as a Biomarker to Assess Prostate Cancer Cases: Atlantic PATH Cohort Study

*Erin Keltie[1,2], Kalli M. Hood[1,2], Yunsong Cui[3], Ellen Sweeney[3], Gabriela Ilie[1], Anil Adisesh[4,5], Trevor Dummer[6], Veni Bharti[1,2] and Jong Sung Kim[1,2]**

[1] Department of Community Health and Epidemiology, Faculty of Medicine, Dalhousie University, Halifax, NS, Canada, [2] Health and Environments Research Centre (HERC) Laboratory, Faculty of Medicine, Dalhousie University, Halifax, NS, Canada, [3] Atlantic Partnership for Tomorrow's Health (PATH), Dalhousie University, Halifax, NS, Canada, [4] Division of Occupational Medicine, Department of Medicine, University of Toronto, Toronto, ON, Canada, [5] Department of Medicine, Dalhousie Medicine New Brunswick, Saint John, NB, Canada, [6] School of Population and Public Health, University of British Columbia, Vancouver, BC, Canada

OPEN ACCESS



International Journal of *Environmental Research and Public Health*

MDPI

Article

Associations between Neighborhood Walkability, Physical Activity, and Chronic Disease in Nova Scotian Adults: An Atlantic PATH Cohort Study

Melanie R. Keats [1,*], Yunsong Cui [2], Vanessa DeClercq [2], Scott A. Grandy [1], Ellen Sweeney [2] and Trevor J. B. Dummer [3]

nutrients

MDPI

Article

Diet Quality and Neighborhood Environment in the Atlantic Partnership for Tomorrow's Health Project

Kaitlyn Gilham [1,†], Qianqian Gu [1,†,‡], Trevor J. B. Dummer [1], John J. Spinelli [1] and Rachel A. Murphy [1,2,*]

Zhao *et al. Environmental Health* (2020) 19:86
https://doi.org/10.1186/s12940-020-00637-3

Environmental Health

RESEARCH Open Access

Long-term exposure to a mixture of industrial SO_2, NO_2, and $PM_{2.5}$ and anti-citrullinated protein antibody positivity

Naizhuo Zhao[1], Audrey Smargiassi[2,3,4], Marianne Hatzopoulou[5], Ines Colmegna[6,7], Marie Hudson[6,8], Marvin J. Fritzler[9], Philip Awadalla[10,11] and Sasha Bernatsky[1,6,7,12*]

CanPath

Your health and the environment – More toenail research!

Atlantic PATH

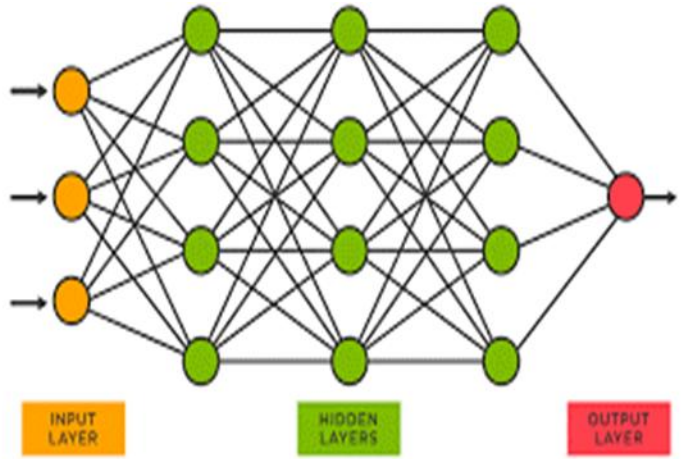
Toenail analysis for heavy metals

Prostate Cancer Canada supported a study led by a team at Dalhousie including Dr Anil Adisesh, Dr Jong Sung Kim and others. This study has expanded to all cancers

Statistical analysis using machine learning

Potential for cancer prevention

We are using **machine learning** – a field within the area **of artificial intelligence** – to analyze toenail clipping information on heavy metals, to develop data-driven cancer risk prediction models



Machine Learning Image.
Photo Credit: Dr. Sayed Sibte Abidi

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CanPath.ca

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Canadian Partnership for Tomorrow's Health

Partenariat canadien pour la santé de demain