2022
EH Scan

National Collaborating Centre for Environmental Health
Centre de collaboration nationale en santé environnementale

ENVIRONMENTAL HEALTH RESEARCH SCAN

WITH COVID-19 SECTIONS

VOL 5 (3) MARCH 2022

CONTENTS

Environmental Health (EH) Research Scan: Aims and Scope

NCCEH's EH Research Scan aims to expand awareness of topics in environmental health, in line with NCCEH's vision to be the indispensable online resource for environmental health practitioners and policy-makers across Canada. This research scan is not peer reviewed; it does not cover all research, news, and information, and NCCEH is not responsible for the accuracy of the content from media or databases. Not all links are open access; some are abstract links where paid journal subscription is required.

COVID-19 Publications are listed in the sections above and there are also COVID-19 Additional Topics.

National Collaborating Centre for Environmental Health
Centre de collaboration nationale en santé environnementale

EDITOR PICKS

The Omicron variant - Updating our knowledge as the surge subsides [blog]

Juliette O'Keeffe (right), Environmental Health Knowledge Translation Scientist, NCCEH; Angela Eykelbosh; and Anne-Marie Nicol

"This blog provides an update on what we know about the Omicron variant, which may be important to continuing to manage the current wave and prepare for future variants."

"Out of the box" food safety considerations for meal kits [blog]

Kelsey James, Environmental Health Knowledge Translation Scientist, NCCEH

"This blog discusses the food safety implications of meal kits and provides information that can be communicated to manufacturers and consumers of meal kits by environmental health practitioners."

Mobilizing extreme cold response plans for people experiencing homelessness [blog]

Leah Rosenkrantz, Environmental Health Knowledge Translation Scientist, NCCEH

"This blog explores factors that exacerbate the health risks of extreme cold events for people experiencing homelessness such as frostbite and hypothermia, discusses the evidence on mobilizing extreme cold response plans to reduce such risks, and examines additional environmental health risks that may arise during an extreme cold event."

Canadian green spaces during COVID-19: public health benefits and planning for resilience [evidence review]

Angela Eykelbosh (right), Environmental Health Knowledge Translation Scientist, NCCEH and Anna Chow

"One of the key messages in this paper is that parks, and green spaces more broadly, should be viewed as public health assets, increasing resilience during the current pandemic and during future climate-related disruptions. Accordingly, environmental public health should take opportunities to participate in park planning and design to ensure best health outcomes."

Human health risk assessments addressing artificial turf and crumb rubber [guidance document]

Angela Eykelbosh, Environmental Health Knowledge Translation Scientist, NCCEH
[*Image:* CC BY-SA 3.0 File:Urbeach-high-park-splashpad.jpg]

EDITOR's PICKS, *continued*

Climate change in the Arctic and radon gas: a rising threat from the ground up [blog]

Art Nash and Anne-Marie Nicol (right), Environmental Health Knowledge Translation Scientist, NCCEH

"As global attention focuses more on climate action, there is little time to spare for the already melting permafrost. Current estimates suggest that over 3 million northern residents will be impacted by permafrost degradation and loss by 2050."... more

Analysis of community deaths during the catastrophic 2021 heat dome: Early evidence to inform the public health response during subsequent events in greater Vancouver, Canada [journal article]

Sarah B Henderson, Scientific Director, Environmental Health Services, BCCDC, and co-authors

"Risk of death during the heat dome was associated with deprivation, lower neighborhood greenness, older age, and sex. Public health response should focus on…"

Time to think 15-minute cities for health and equity [blog]

Anna Chow, Environmental Health Knowledge Translation Scientist, NCCEH

"The 15-minute city concept can work to provide benefits that can improve quality of life, reduce carbon footprint, and to help promote health and health equity. Connections with local residents in underserved populations in planning efforts can address equity concerns. In also recognizing that spaces can be flexible and adapt to multiple uses, the 15-minute city can provide a more liveable and accessible community for all."

Lead in drinking water: homes and schools [topic page]

National Collaborating Centre for Environmental Health

The resources listed here are intended to assist environmental and public health professionals to:

- *Understand the key issues around lead in drinking water including exposure, health effects, and current guidelines*
- *Provide practical advice on sampling, testing, and mitigating lead exposure in schools and childcare settings*
- *Understand the issues associated with identification and replacement of lead service lines (LSL)*

ENVIRONMENTAL HEALTH RESEARCH SCAN

SELECTED NCCEH RESOURCES

1. Chow A. **Time to think 15-minute cities for health and equity [blog]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 Feb 14. Available from: https://ncceh.ca/content/blog/time-think-15-minute-cities-health-and-equity.
2. Crooks V, Rosenkrantz L. **Spatially exploring COVID-19 risks in BC neighbourhoods [webinar]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 Jan 25. Available from: https://ncceh.ca/content/webinar-recording-spatially-exploring-covid-19-risks-bcs-neighbourhoods.
3. Eykelbosh A. **Human health risk assessments addressing artificial turf and crumb rubber [guidance document]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 Mar 1. Available from: https://ncceh.ca/documents/guide/human-health-risk-assessments-addressing-artificial-turf-and-crumb-rubber-0.
4. Eykelbosh A, Chow A. **Canadian green spaces during COVID-19: public health benefits and planning for resilience [evidence review]**. 2022 Mar 9. Available from: https://ncceh.ca/documents/canadian-green-spaces-during-covid-19-public-health-benefits-and-planning-resilience.
5. James K. **"Out of the box" food safety considerations for meal kits [blog]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 Mar 11. Available from:https://ncceh.ca/content/blog/out-box-food-safety-considerations-meal-kits.
6. Lalonde C. **Backyard swimming pool rentals: Making a splash with some environmental public health risks [blog]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 Mar 2. Available from: https://ncceh.ca/content/blog/backyard-swimming-pool-rentals-making-splash-some-environmental-public-health-risks.
7. Nash A, Nicol A-M. **Climate change in the Arctic and radon gas: a rising threat from the ground up [blog]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 Mar 11. Available from: https://ncceh.ca/content/blog/climate-change-arctic-and-radon-gas-rising-threat-ground.
8. National Collaborating Centre for Environmental Health. **Quebec's health alert system for cold weather events [webinar]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 Feb 17. Available from: https://ncceh.ca/content/webinar-recording-quebecs-health-alert-system-cold-weather-events.
9. National Collaborating Centre for Environmental Health. **NCCEH eNews (Feb 2021) : (Raw) food for thought: antimicrobial resistance and BARF pet diets. more...** Vancouver, BC: NCCEH; 2022 Feb 17. Available from: https://tinyurl.com/2p97hv8p.
10. National Collaborating Centre for Environmental Health. **Lead in drinking water: homes and schools [topic page]**. Vancouver, BC: NCCEH; 2022 03 10 Mar 10. Available from: https://ncceh.ca/environmental-health-in-canada/health-agency-projects/lead-drinking-water-homes-and-schools.
11. O'Keeffe J, Eykelbosh A, Nicol A-M. **The Omicron variant - Updating our knowledge as the surge subsides [blog]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 Feb 14. Available from: https://ncceh.ca/content/blog/omicron-variant-updating-our-knowledge-surge-subsides.

12. Rosenkrantz L. **Mobilizing extreme cold response plans for people experiencing homelessness [blog]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 Mar 9. Available from: https://ncceh.ca/content/blog/mobilizing-extreme-cold-response-plans-people-experiencing-homelessness.

British Columbia Centre for Disease Control

1. Henderson SB, McLean KE, Lee MJ, Kosatsky T. **Analysis of community deaths during the catastrophic 2021 heat dome: Early evidence to inform the public health response during subsequent events in greater Vancouver, Canada**. Environ Epidemiol. 2022;6(1):e189. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35169667.
2. Wagstaff M, Henderson SB, McLean KE, Brauer M. **Development of methods for citizen scientist mapping of residential woodsmoke in small communities**. J Environ Manage. 2022;311:114788. Available from: https://www.sciencedirect.com/science/article/pii/S0301479722003619.

INDIGENOUS ENVIRONMENTAL HEALTH

1. Assembly of First Nations. **National Climate Gathering Report - Driving Change, Leading Solutions**. Ottawa, ON: Assembly of First Nations (AFN); 2020 Oct 7. Available from: https://www.afn.ca/wp-content/uploads/2021/04/Climate_Gathering_Report_ENG.pdf.
2. Blanchet R, Willows N, Johnson S, Initiatives ONSR, Batal M. **Enhancing cultural food security among the Syilx Okanagan adults with the reintroduction of Okanagan sockeye salmon**. Appl Physiol Nutr Metab. 2022;47(2):124-33. Available from: https://cdnsciencepub.com/doi/abs/10.1139/apnm-2021-0321.
3. Cozzetto K, Marks-Marino D, Status of Tribes and Climate Change Working Group (STACC). **Executive Summary. In Status of Tribes and Climate Change Report The Status of Tribes and Climate Change Report (STACC)**. In: Marks-Marino D, editor. Flagstaff, AZ: Institute for Tribal Environmental Professionals (ITEP) Tribes and Climate Change Program; 2021. Available from: https://sites.google.com/view/stacc2021-itep/home?authuser=0.
4. Donovan M. **In Canada, Indigenous communities and scientists collaborate on marine research**. Mongabay. 2022 Feb 15. Available from: https://news.mongabay.com/2022/02/in-canada-indigenous-communities-and-scientists-collaborate-on-marine-research/?utm_source=ActiveCampaign&utm_medium=email&utm_content=Top+news%3A++ATF_LEAD_STORY_TITLE&utm_campaign=ATF+Daily+-+Outlook.
5. Duignan S, Moffat T, Martin-Hill D. **Be like the running water: Assessing gendered and age-based water insecurity experiences with Six Nations First Nation**. Soc Sci Med. 2022;298:114864. Available from: https://www.sciencedirect.com/science/article/pii/S0277953622001708.
6. Greenwood M, Adams E. **Visioning the Future: First Nations, Inuit, & Métis Population and Public Health**. Prince George, BC: National Collaborating Centre for Indigenous Health; 2021 Dec. Available from: https://www.nccih.ca/495/Visioning_the_Future__First_Nations,_Inuit,__M%C3%A9tis_Population_and_Public_Health_.nccih?id=10351.
7. Inuit Tapiriit Kanatami. **National Inuit Climate Change Strategy**. Ottawa, ON: Inuit Tapiriit Kanatami (ITK); 2019. Available from: https://www.itk.ca/wp-content/uploads/2019/06/ITK_Climate-Change-Strategy_English_lowres.pdf.

8. Prairie Climate Centre. **Climate atlas of Canada - Indigenous knowledges [First Nations, Inuit, Metis]**. Winnipeg, MB: University of Winnipeg, Prairie Climate Centre; 2022. Available from: https://climateatlas.ca/.
9. Prairie Climate Centre. **Climate atlas of Canada - Indigenous climate change maps**. Winnipeg, MB: University of Winnipeg, Prairie Climate Centre; 2022. Available from: https://climateatlas.ca/indigenous/first-nations.
10. Tanner B, Plain S, George T, George J, Mushquash CJ, Bernards S, et al. **Understanding Social Determinants of First Nations Health Using a Four-Domain Model of Health and Wellness Based on the Medicine Wheel: Findings from a Community Survey in One First Nation**. Int J Environ Res Public Health. 2022;19(5):2836. Available from: https://www.mdpi.com/1660-4601/19/5/2836.

AGRICULTURAL OPERATIONS

BIOLOGICAL AGENTS

BUILT ENVIRONMENT, ACTIVE TRANSPORTATION

1. Aguilar-Carrasco MJ, Gielen E, Vallés-Planells M, Galiana F, Almenar-Muñoz M, Konijnendijk C. **Promoting Inclusive Outdoor Recreation in National Park Governance: A Comparative Perspective from Canada and Spain**. Int J Environ Res Public Health. 2022;19(5):2566. Available from: https://www.mdpi.com/1660-4601/19/5/2566.
2. Amiour Y, Waygood EOD, van den Berg PEW. **Objective and Perceived Traffic Safety for Children: A Systematic Literature Review of Traffic and Built Environment Characteristics Related to Safe Travel.** Int J Environ Res Public Health. 2022;19(5):2641. Available from: https://www.mdpi.com/1660-4601/19/5/2641.
3. Baceviciene M, Jankauskiene R. **The Mediating Effect of Nature Restorativeness, Stress Level, and Nature Connectedness in the Association between Nature Exposure and Quality of Life**. Int J Environ Res Public Health. 2022;19(4):2098. Available from: https://www.mdpi.com/1660-4601/19/4/2098.
4. Barnett TA, Ghenadenik AE, Van Hulst A, Contreras G, Kestens Y, Chaix B, et al. **Neighborhood built environment typologies and adiposity in children and adolescents**. Int J Obes. 2022;46(3):588-96. Available from: https://doi.org/10.1038/s41366-021-01010-1.
5. University of Cambridge. **Integrated Transport and Health Impact Modelling Tool (ITHIM)**. Cambridge, UK: University of Cambridge; 2022 [updated Feb; cited 2022 Feb 22]; Available from: https://www.mrc-epid.cam.ac.uk/research/research-areas/public-health-modelling/ithim/?_gl=1*11q01pj*_ga*MjEwMjM2NjgwMS4xNjQ1NTM3NzQx*_ga_P8Q1QT5W4K*MTY0NTUzNzc0MS4xLjEuMTY0NTUzNzc0OC4w.
6. Chow A. **Time to think 15-minute cities for health and equity [blog]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 20220214 Feb 14. Available from: https://ncceh.ca/content/blog/time-think-15-minute-cities-health-and-equity.
7. Doubleday A, Knott CJ, Hazlehurst MF, Bertoni AG, Kaufman JD, Hajat A. Correction to: Neighborhood greenspace and risk of type 2 diabetes in a prospective cohort: the Multi-Ethnic

Study of Atherosclerosis. Environ Health. 2022;21(1):28. Available from: https://doi.org/10.1186/s12940-022-00845-z.

8. Eykelbosh A, Chow A. **Canadian green spaces during COVID-19: public health benefits and planning for resilience [evidence review].** 2022 Mar 9. Available from: https://ncceh.ca/documents/canadian-green-spaces-during-covid-19-public-health-benefits-and-planning-resilience.
9. Filigrana P, Levy JI, Gauthier J, Batterman S, Adar SD. **Health benefits from cleaner vehicles and increased active transportation in Seattle, Washington**. J Expo Sci Environ Epidemiol. 2022. Available from: https://doi.org/10.1038/s41370-022-00423-y.
10. Frank LD, Bigazzi A, Hong A, Minaker L, Fisher P, Raine KD. **Built environment influences on healthy eating and active living: The NEWPATH study**. Obesity. 2022;30(2):424-34. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1002/oby.23352.
11. Garget J. **Planning for action. Free online tools built by Cambridge researchers are helping planners design exercise into our towns and cities**. Cambridge, UK: University of Cambridge; 2022 Feb. Available from: https://www.cam.ac.uk/stories/activetravel.
12. Howell NA, Booth GL. **The Weight of Place: Built Environment Correlates of Obesity and Diabetes**. Endocr Rev. 2022. Available from: https://doi.org/10.1210/endrev/bnac005.
13. Intergovernmental Panel on Climate Change. **Chapter 7: Health, wellbeing and the changing structure of communities - IPCC Sixth Assessment Report - summary for policymakers**. Geneva: United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO); 2022 Feb 27. Available from: https://www.ipcc.ch/report/ar6/wg2/.
14. Khan NA, Habib MA. **Exploring the impacts of built environment on pedestrian injury severity involving distracted driving**. J Safety Res. 2022;80:97-108. Available from: https://doi.org/10.1016/j.jsr.2021.11.001.
15. Klicnik I, Cullen JD, Doiron D, Barakat C, Ardern CI, Rudoler D, et al. **Leisure sedentary time and physical activity are higher in neighbourhoods with denser greenness and better built environments: an analysis of the Canadian Longitudinal Study on Aging**. Appl Physiol Nutr Metab. 2022;47(3):278-86. Available from: https://cdnsciencepub.com/doi/abs/10.1139/apnm-2021-0438.
16. Lang JJ, Pinault L, Colley RC, Prince SA, Christidis T, Tjepkema M, et al. **Neighbourhood walkability and mortality: Findings from a 15-year follow-up of a nationally representative cohort of Canadian adults in urban areas.** Environ Int. 2022;161:107141. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35183941.
17. Larson LR, Hipp JA. **Nature-based Pathways to Health Promotion: The Value of Parks and Greenspace**. N C Med J. 2022;83(2):99-102. Available from: https://doi.org/10.18043/ncm.83.2.99.
18. Park S, Kim E, Kim G, Kim S, Choi Y, Paek D. **What Activities in Forests Are Beneficial for Human Health? A Systematic Review**. Int J Environ Res Public Health. 2022;19(5):2692. Available from: https://www.mdpi.com/1660-4601/19/5/2692.
19. Partnership Against Cancer. **Physical activity and cancer in Canada**. Toronto, ON: Partnership Against Cancer; 2022. Available from: https://www.partnershipagainstcancer.ca/topics/physical-activity-policies/.
20. Penbrooke TL. **Applying Systems Thinking Approaches to Address Preventive Health Factors through Public Parks and Recreation Agencies**. Journal of Park and Recreation Administration. 2022;40(1). Available from: https://js.sagamorepub.com/jpra/article/view/11007.

21. Poon L. **The Case for Preserving Spontaneous Nature in Cities**. 2022 [updated Mar 10]; Available from: https://www.bloomberg.com/news/articles/2022-03-10/what-spontaneous-urban-nature-reveals-about-cities?srnd=citylab&utm_source=ActiveCampaign&utm_medium=email&utm_content=Top+news%3A++ATF_LEAD_STORY_TITLE&utm_campaign=ATF+Daily+-+Outlook.
22. Riazi NA, Wunderlich K, Yun L, Paterson DC, Faulkner G. **Social-Ecological Correlates of Children's Independent Mobility: A Systematic Review**. Int J Environ Res Public Health. 2022;19(3):1604. Available from: https://www.mdpi.com/1660-4601/19/3/1604.
23. Rothman L, Schwartz N, Cloutier M-S, Winters M, Macarthur C, Hagel BE, et al. **Child pedestrian and cyclist injuries, and the built and social environment across Canadian cities: the Child Active Transportation Safety and the Environment Study (CHASE)**. Inj Prev. 2022:injuryprev-2021-044459. Available from: https://injuryprevention.bmj.com/content/injuryprev/early/2022/01/20/injuryprev-2021-044459.full.pdf.
24. Thornton LE, Schroers R-D, Lamb KE, Daniel M, Ball K, Chaix B, et al. **Operationalising the 20-minute neighbourhood**. Int J Behav Nutr Phys Act. 2022;19(1):15. Available from: https://doi.org/10.1186/s12966-021-01243-3.
25. Tsao T-M, Hwang J-S, Lin S-T, Wu C, Tsai M-J, Su T-C. **Forest Bathing Is Better than Walking in Urban Park: Comparison of Cardiac and Vascular Function between Urban and Forest Parks**. Int J Environ Res Public Health. 2022;19(6):3451. Available from: https://www.mdpi.com/1660-4601/19/6/3451.
26. Yuchi W, Brauer M, Czekajlo A, Davies HW, Davis Z, Guhn M, et al. **Neighborhood environmental exposures and incidence of attention deficit/hyperactivity disorder: A population-based cohort study**. Environ Int. 2022;161:107120. Available from: https://www.sciencedirect.com/science/article/pii/S0160412022000460.
27. Zhdanova IV, Kayasova DS, Kuznetsova AA. **Principles of the Inclusion Green Spaces in the Public Area of a Residential Building**. IOP Conference Series: Earth and Environmental Science. 2022;988(4):042023. Available from: http://dx.doi.org/10.1088/1755-1315/988/4/042023.

CHEMICAL AGENTS – METALS, GENERAL

General

1. Caporale N, Leemans M, Birgersson L, Germain P-L, Cheroni C, Borbély G, et al. **From cohorts to molecules: Adverse impacts of endocrine disrupting mixtures**. Science. 2022;375(6582):eabe8244. Available from: https://www.science.org/doi/abs/10.1126/science.abe8244.
2. Eykelbosh A, Chow A. **Human health risk assessments addressing artificial turf and crumb rubber [guidance document]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 Mar 1. Available from: https://ncceh.ca/documents/guide/human-health-risk-assessments-addressing-artificial-turf-and-crumb-rubber-0.
3. Gibson JM, MacDonald JM, Fisher M, Chen X, Pawlick A, Cook PJ. **Early life lead exposure from private well water increases juvenile delinquency risk among US teens**. Proceedings of the National Academy of Sciences. 2022;119(6):e2110694119. Available from: https://www.pnas.org/doi/abs/10.1073/pnas.2110694119.
4. Health Canada. **Sixth Report on Human Biomonitoring of Environmental Chemicals in Canada**. Ottawa, ON: Health Canada; 2021 Dec. Available from: https://www.canada.ca/en/health-

canada/services/environmental-workplace-health/reports-publications/environmental-contaminants/sixth-report-human-biomonitoring.html.

5. Kwak K, Kang D, Paek D. **Environmental exposure to asbestos and the risk of lung cancer: a systematic review and meta-analysis**. Occup Environ Med. 2022;79(3):207-14. Available from: https://oem.bmj.com/content/oemed/79/3/207.full.pdf.
6. Lemieux F, Thepsouvanh T. **Health Canada's new lead guideline and results of an Indigenous Services Canada, FNIHB drinking water sampling survey in children's facilities [webinar].** Vancouver, BC: National Collaborating Centre for Environmental Health, Environmental Health Seminar Series; 2022 Mar 24. Available from: https://ncceh.ca/content/ncceh-environmental-health-seminar-series.
7. Liew Z, Guo P. **Human health effects of chemical mixtures**. Science. 2022;375(6582):720-1. Available from: https://pubmed.ncbi.nlm.nih.gov/35175805/.
8. Moore S, Paalanen L, Melymuk L, Katsonouri A, Kolossa-Gehring M, Tolonen H. **The Association between ADHD and Environmental Chemicals-A Scoping Review**. Int J Environ Res Public Health. 2022;19(5):2849. Available from: https://www.mdpi.com/1660-4601/19/5/2849.
9. Tisler S, Christensen JH. **Non-target screening for the identification of migrating compounds from reusable plastic bottles into drinking water**. J Hazard Mater. 2022;429:128331. Available from: https://www.sciencedirect.com/science/article/pii/S0304389422001194.

Plastics, Microplastics

1. Organisation for Economic Co-Operation and Development. **Global Plastics Outlook**. Paris, France: OECD; 2022. Available from: https://www.oecd-ilibrary.org/content/publication/de747aef-en.

CHEMICAL AGENTS – PESTICIDES

CHEMICAL AGENTS – SHALE GAS

CHILDREN'S ENVIRONMENTAL HEALTH

1. Anabitarte A, Ibarluzea J, García-Baquero G, Santa Marina L, Fernández-Somoano A, Tardón A, et al. **Effects of residential greenness on attention in a longitudinal study at 8 and 11–13 years**. Environ Res. 2022;210:112994. Available from: https://www.sciencedirect.com/science/article/pii/S0013935122003218.
2. Beasley DE, Monsur M, Hu J, Dunn RR, Madden AA. **The bacterial community of childcare centers: potential implications for microbial dispersal and child exposure**. Environ Microbiome. 2022;17(1):8. Available from: https://doi.org/10.1186/s40793-022-00404-6.
3. Yuan X, Ryu Y. **Evaluation of Children's Thermal Environment in Nursery School: Through the Questionnaire and Measurement of Wearable Sensors Approach**. Int J Environ Res Public Health. 2022;19(5):2866. Available from: https://www.mdpi.com/1660-4601/19/5/2866.

CLIMATE CHANGE

1. Ágoston C, Csaba B, Nagy B, Kőváry Z, Dúll A, Rácz J, et al. **Identifying Types of Eco-Anxiety, Eco-Guilt, Eco-Grief, and Eco-Coping in a Climate-Sensitive Population: A Qualitative Study**. Int J

Environ Res Public Health. 2022;19(4):2461. Available from: https://www.mdpi.com/1660-4601/19/4/2461.

2. Assembly of First Nations. **National Climate Gathering Report - Driving Change, Leading Solutions**. Ottawa, ON: Assembly of First Nations (AFN); 2020 Oct 7. Available from: https://www.afn.ca/wp-content/uploads/2021/04/Climate_Gathering_Report_ENG.pdf.
3. Berry P, Schnitter R, editors. **Health of Canadians in a changing climate. Advancing our knowledge for action**. Ottawa, ON: Health Canada; 2022. Available from: https://ftp.maps.canada.ca/pub/nrcan_rncan/publications/STPublications_PublicationsST/329/329522/gid_329522.pdf.
4. Graham H, Harrison A, Lampard P. **Public Perceptions of Climate Change and Its Health Impacts: Taking Account of People's Exposure to Floods and Air Pollution**. Int J Environ Res Public Health. 2022;19(4):2246. Available from: https://www.mdpi.com/1660-4601/19/4/2246.
5. Health Canada. **Health of Canadians in a changing climate. Advancing our knowledge for action**. Ottawa, ON: Public Health Agency of Canada; 2022 Feb. Available from: https://ftp.maps.canada.ca/pub/nrcan_rncan/publications/STPublications_PublicationsST/329/329522/gid_329522.pdf.
6. Intergovernmental Panel on Climate Change. **Chapter 6: Cities, settlements and key infrastructure - IPCC Sixth Assessment Report - summary for policymakers**. Geneva: United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO); 2022 Feb 27. Available from: https://www.ipcc.ch/report/ar6/wg2/.
7. Intergovernmental Panel on Climate Change. **Climate Change 2022: Impacts, Adaptation and Vulnerability - IPCC Sixth Assessment Report - summary for policymakers**. Geneva: United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO); 2022 Feb 27. Available from: https://www.ipcc.ch/report/ar6/wg2/.
8. Intergovernmental Panel on Climate Change. **Climate Change 2022: Impacts, Adaptation and Vulnerability - IPCC Sixth Assessment Report [full report]**. Geneva: United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO); 2022 Feb 27. Available from: https://www.ipcc.ch/report/ar6/wg2/.
9. Intergovernmental Panel on Climate Change. **North America - IPCC Sixth Assessment Report - summary for policymakers**. Geneva: United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO); 2022 Feb 27. Available from: https://www.ipcc.ch/report/ar6/wg2/.
10. Inuit Tapiriit Kanatami. **National Inuit Climate Change Strategy**. Ottawa, ON: Inuit Tapiriit Kanatami (ITK); 2019. Available from: https://www.itk.ca/wp-content/uploads/2019/06/ITK_Climate-Change-Strategy_English_lowres.pdf.
11. Khomsi K, Chelhaoui Y, Alilou S, Souri R, Najmi H, Souhaili Z. **Concurrent Heat Waves and Extreme Ozone (O3) Episodes: Combined Atmospheric Patterns and Impact on Human Health**. Int J Environ Res Public Health. 2022;19(5):2770. Available from: https://www.mdpi.com/1660-4601/19/5/2770.
12. Leal Filho W, Ternova L, Parasnis SA, Kovaleva M, Nagy GJ. **Climate Change and Zoonoses: A Review of Concepts, Definitions, and Bibliometrics**. Int J Environ Res Public Health. 2022;19(2):893. Available from: https://www.mdpi.com/1660-4601/19/2/893.
13. Maguet S, McBride S, Friesen M, Takaro T. **Report: Climate, health and COVID-19 in British Columbia**. Burnaby, BC: SHIFT Collaborative, Simon Fraser University Planetary Health Research

Group and the Pacific Institute for Climate Solutions (PICS); 2022 Jan. Available from: https://shiftcollaborative.ca/2022/02/report-climate-health-and-covid-19-in-british-columbia/.

14. National Collaborating Centre for Environmental Health. **Quebec's health alert system for cold weather events [webinar]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 Feb 17. Available from: https://ncceh.ca/content/webinar-recording-quebecs-health-alert-system-cold-weather-events.
15. National Collaborating Centre for Indigenous Health. **Indigenous Peoples' perspectives on climate change and water safety and security [webinar]**. Prince George, BC: National Collaborating Centre for Indigenous Health; 2022 Mar 10. Available from: https://unbc.zoom.us/webinar/register/WN_fzWq13E8RWuAAcZgOatQww.
16. Nori-Sarma A, Sun S, Sun Y, Spangler KR, Oblath R, Galea S, et al. **Association Between Ambient Heat and Risk of Emergency Department Visits for Mental Health Among US Adults, 2010 to 2019**. JAMA Psychiatry. 2022. Available from: https://doi.org/10.1001/jamapsychiatry.2021.4369.
17. Osborne NE, Jacquemain MA. **What are the most serious health risks of climate change?** Yahoo News. 2022 Feb 18. Available from: https://ca.news.yahoo.com/most-serious-health-risks-climate-140049018.html.
18. Prairie Climate Centre. **Climate atlas of Canada - Indigenous knowledges [First Nations, Inuit, Metis]**. Winnipeg, MB: University of Winnipeg, Prairie Climate Centre; 2022. Available from: https://climateatlas.ca/.
19. Prairie Climate Centre. **Climate atlas of Canada - Indigenous climate change maps**. Winnipeg, MB: University of Winnipeg, Prairie Climate Centre; 2022. Available from: https://climateatlas.ca/indigenous/first-nations.
20. Prairie Climate Centre. **Climate atlas of Canada**. Winnipeg, MB: University of Winnipeg, Prairie Climate Centre; 2022. Available from: https://climateatlas.ca/.
21. Roston E, Kaufman L. **Global Warming Is Outrunning Efforts to Protect Human Life, Scientists Warn. A new UN report says countries must do more to safeguard billions from floods, droughts and other "compounding" hazards. Bloomberg News**. 2022 Feb 28. Available from: https://www.bloomberg.com/news/features/2022-02-28/ipcc-report-un-scientists-warn-of-closing-window-to-ready-for-hotter-world?utm_source=ActiveCampaign&utm_medium=email&utm_content=Top+news%3A++ATF_LEAD_STORY_TITLE&utm_campaign=ATF+Daily+-+Outlook.
22. Status of Tribes and Climate Change Working Group. **The Status of Tribes and Climate Change Report (STACC)**. Flagstaff, AZ: Institute for Tribal Environmental Professionals (ITEP) Tribes and Climate Change Program; 2021. Available from: https://sites.google.com/view/stacc2021-itep/home?authuser=0.
23. Syed S, O'Sullivan TL, Phillips KP. **Extreme Heat and Pregnancy Outcomes: A Scoping Review of the Epidemiological Evidence**. Int J Environ Res Public Health. 2022;19(4):2412. Available from: https://www.mdpi.com/1660-4601/19/4/2412.
24. United Nations Environment Programme. **Spreading like wildfire: The rising threat of extraordinary landscape fires**. New York, NY: UNEP; 2022 Feb 23. Available from: https://www.unep.org/resources/report/spreading-wildfire-rising-threat-extraordinary-landscape-fires.
25. US Environmental Protection Agency. **EnviroAtlas Use Cases**. Washington, DC: US EPA; 2022. Available from: https://www.epa.gov/enviroatlas/enviroatlas-use-cases.
26. Warren FJ, Lulham N, editors. **Health of Canadians in a changing climate. National issues report**. Ottawa, ON: Government of Canada; 2021. Available from:

https://ftp.maps.canada.ca/pub/nrcan_rncan/publications/STPublications_PublicationsST/328/328384/gid_328384.pdf.

27. Warren FJ, Lulham N, editors. **Health of Canadians in a changing climate. Regional perspectives report**. Ottawa, ON: Government of Canada; 2022. Available from: https://ftp.maps.canada.ca/pub/nrcan_rncan/publications/STPublications_PublicationsST/329/329330/gid_329330.pdf.

COMMUNICABLE AND INFECTIOUS DISEASES

See Covid 19 subsections in this issue and in the COVID-19 Additional Topics and Guidance section at the end of this issue (e.g., Occupational Guidance, Transit, Transmission)

DRINKING WATER

1. Lee D, Calendo G, Kopec K, Henry R, Coutts S, McCarthy D, et al. **The Impact of Pipe Material on the Diversity of Microbial Communities in Drinking Water Distribution Systems**. Frontiers in microbiology. 2021;12:779016-. Available from: https://pubmed.ncbi.nlm.nih.gov/34992587.
2. National Collaborating Centre for Environmental Health. **Lead in drinking water: homes and schools [topic page]**. Vancouver, BC: NCCEH; 2022 03 10 Mar 10. Available from: https://ncceh.ca/environmental-health-in-canada/health-agency-projects/lead-drinking-water-homes-and-schools.
3. Niculita-Hirzel H, Vanhove AS, Leclerc L, Girardot F, Pourchez J, Allegra S. **Risk Exposure to Legionella pneumophila during Showering: The Difference between a Classical and a Water Saving Shower System**. Int J Environ Res Public Health. 2022;19(6):3285. Available from: https://www.mdpi.com/1660-4601/19/6/3285.
4. US Environmental Protection Agency. **Water Sensors Toolbox**. Washington, DC: US EPA; 2022. Available from: https://www.epa.gov/water-research/water-sensors-toolbox.

EMERGENCY PREPAREDNESS

1. Alberta Health. **Horse River Wildfire Response Environmental Monitoring, Public Health Assessment and Ecological Screening. Technical Summary Document**. Edmonton, AB: Government of Alberta; 2018 Apr. Available from: https://open.alberta.ca/dataset/ef53cf81-d8df-4687-8eea-d07edbf56bb1/resource/f5ba24f0-4874-4825-89ed-4cabf21e606e/download/horse-river-wildfire-response-technical-summary-2018.pdf.
2. Alberta Health. **Post-disaster food assessment and salvaging best practices : literature review and jurisdictional scan**. Edmonton, AB: Government of Alberta; 2020 Aug. Available from: https://open.alberta.ca/publications/9781460142790.
3. Alberta Health. **Human health risks associated with surface water impacts after a wildfire : problem formulation**. Edmonton, AB: Government of Alberta; 2021 Nov. Available from: https://open.alberta.ca/publications/human-health-risks-associated-with-surface-water-impacts-after-wildfire-problem-formulation.
4. Alberta Health. **Human health risks associated with aerially applied fire retardants : screening level risk assessment**. Edmonton, AB: Government of Alberta; 2022 Mar. Available from: https://open.alberta.ca/publications/human-health-risks-associated-with-aerially-applied-fire-retardants.

5. Han J, He S. **Urban flooding events pose risks of virus spread during the novel coronavirus (COVID-19) pandemic**. Sci Total Environ. 2021;755(Pt 1):142491. Available from: https://doi.org/10.1016/j.scitotenv.2020.142491.
6. Kayano R, Lin M, Shinozaki Y, Nomura S, Kim Y. **Long-Term Mental Health Support after Natural Hazard Events: A Report from an Online Survey among Experts in Japan**. Int J Environ Res Public Health. 2022;19(5):3022. Available from: https://www.mdpi.com/1660-4601/19/5/3022.
7. Public Health Ontario. **Conducting a Hot Wash or Debrief: Common Components for Public Health [evidence brief; emergency preparedness]**. Toronto, ON: PHO; 2022 Jan 27. Available from: https://www.publichealthontario.ca/-/media/Documents/C/2022/conducting-hot-wash-debrief-public-health.pdf?sc_lang=en.
8. Rosenkrantz L. **Mobilizing extreme cold response plans for people experiencing homelessness [blog]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 20220309 Mar 9. Available from: https://ncceh.ca/content/blog/mobilizing-extreme-cold-response-plans-people-experiencing-homelessness.

ENVIRONMENTAL HEALTH SURVEILLANCE

1. Crooks V, Rosenkrantz L. **Spatially exploring COVID-19 risks in BC neighbourhoods [ARCGIS Storymap)**. Burnaby, BC: Simon Fraser University; 2022 Jan 25. Available from: https://storymaps.arcgis.com/stories/b390728f6d6f43c8bfcddf0b9e4dbbc4.
2. Crooks V, Rosenkrantz L. **Spatially exploring COVID-19 risks in BC neighbourhoods [webinar]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 01 25 Jan 25. Available from: https://ncceh.ca/content/webinar-recording-spatially-exploring-covid-19-risks-bcs-neighbourhoods.
3. US Environmental Protection Agency. **EnviroAtlas Use Cases**. Washington, DC: US EPA; 2022. Available from: https://www.epa.gov/enviroatlas/enviroatlas-use-cases.

ENVIRONMENTAL PLANNING

1. Harrison SL, Dyer SM, Laver KE, Milte RK, Fleming R, Crotty M. **Physical environmental designs in residential care to improve quality of life of older people**. Cochrane Database Syst Rev. 2022;3:Cd012892. Available from: https://doi.org/10.1002/14651858.cd012892.pub2.
2. Mirza NA, Hulko W. **The complex nature of transportation as a key determinant of health in primary and community care restructuring initiatives in rural Canada**. J Aging Stud. 2022;60:101002. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35248314.

FOOD

Safety

1. Ahmed M, Schermel A, Lee J, Weippert M, Franco-Arellano B, L'Abbe M. **Development of the Food Label Information Program: A Comprehensive Canadian Branded Food Composition Database**. Front Nutr. 2021;8:825050. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35187026.
2. Godoy MG, Kibenge MJT, Kibenge FSB. **SARS-CoV-2 transmission via aquatic food animal species or their products: A review**. Aquaculture. 2021;536:736460. Available from: https://www.ncbi.nlm.nih.gov/pubmed/33564203.

3. James K. **"Out of the box" food safety considerations for meal kits [blog]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 Mar 11. Available from:https://ncceh.ca/content/blog/out-box-food-safety-considerations-meal-kits.
4. Kolakowski BM, Johaniuk K, Zhang H, Yamamoto E. **Analysis of Microbiological and Chemical Hazards in Edible Insects Available to Canadian Consumers**. J Food Prot. 2021;84(9):1575-81. Available from: https://doi.org/10.4315/JFP-21-099.
5. Maille RL. **Using Community Food Assessments to Improve Local Food Systems**. Journal of Extension. 2022;60(1). Available from: https://doi.org/10.34068/joe.60.01.13.
6. Pouillot R, Smith M, Van Doren JM, Catford A, Holtzman J, Calci KR, et al. **Risk Assessment of Norovirus Illness from Consumption of Raw Oysters in the United States and in Canada**. Risk Anal. 2022;42(2):344-69. Available from: https://www.ncbi.nlm.nih.gov/pubmed/34121216.

Security

1. Blom CDB, Steegeman P, Voss C, Sonneveld BGJS. **Food in the cold: exploring food security and sovereignty in Whitehorse, Yukon**. Int J Circumpolar Health. 2022;81(1):2025992. Available from: https://doi.org/10.1080/22423982.2022.2025992.
2. Music J, Charlebois S, Toole V, Large C. **Telecommuting and food E-commerce: Socially sustainable practices during the COVID-19 pandemic in Canada**. Transportation research interdisciplinary perspectives. 2022;13:100513-. Available from: https://pubmed.ncbi.nlm.nih.gov/35128387.
3. Olstad DL, Nejatinamini S, Victorino C, Kirkpatrick SI, Minaker LM, McLaren L. **Trends in Socioeconomic Inequities in Diet Quality between 2004 and 2015 among a Nationally Representative Sample of Children in Canada.** Journal of Nutrition. 2021;151(12):3781-94. Available from: https://doi.org/10.1093/jn/nxab297.
4. Polsky JY, Garriguet D. **Household food insecurity in Canada early in the COVID-19 pandemic**. Health Rep. 2022. Available from: https://www150.statcan.gc.ca/n1/pub/82-003-x/2022002/article/00002-eng.htm.
5. Seed B, Kurrein M, Hasdell R. **A Food Security Indicator Framework for British Columbia, Canada**. Health Promot Pract. 2022:15248399211073801. Available from: https://journals.sagepub.com/doi/abs/10.1177/15248399211073801.

GENERAL

1. Lawton G. **How our environment is making us sick – and what we can do about it**. New Scientist. 2022. Available from: https://www.newscientist.com/article/mg25333710-800-how-our-environment-is-making-us-sick-and-what-we-can-do-about-it/#ixzz7LGNNuJjE.
2. Yu J, Gustafson P, Tran M, Brauer M. **Assessing Trade-Offs and Optimal Ranges of Density for Life Expectancy and 12 Causes of Mortality in Metro Vancouver, Canada, 1990-2016**. Int J Environ Res Public Health. 2022;19(5):2900. Available from: https://www.mdpi.com/1660-4601/19/5/2900.

Health Policy

1. Amri M, Chatur A, O'Campo P. **Intersectoral and multisectoral approaches to health policy: an umbrella review protocol**. Health Research Policy and Systems. 2022;20(1):21. Available from: https://doi.org/10.1186/s12961-022-00826-1.
2. Tamarack Institute. **The collective impact toolkit**. Waterloo, ON: Tamarack Institute. Available from: https://www.tamarackcommunity.ca/collective-impact-toolkit-ebook?hsCtaTracking=1c201269-e242-4d61-

a1ec-92e41bfcde1d%7C38d03a36-c0b0-4fa1-882a-da54da37e0db&mc_cid=52b06fc5df&mc_eid=04816d6ac3.

HEALTH EQUITY

1. Blair A, Pan SY, Subedi R, Yang FJ, Aitken N, Steensma C. **Social inequalities in COVID-19 mortality by area and individual-level characteristics in Canada, January to July/August 2020: Results from two national data integrations**. Can Commun Dis Rep. 2022;48(1):27-38. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35273467.
2. Brown C, Wilkins K, Craig-Neil A, Upshaw T, Pinto AD. **Reducing Inequities During the COVID-19 Pandemic: A Rapid Review and Synthesis of Public Health Recommendations**. Public Health Rev. 2022;42. Available from: https://www.ssph-journal.org/articles/10.3389/phrs.2021.1604031.
3. Chakraborty L, Rus H, Henstra D, Thistlethwaite J, Minano A, Scott D. **Exploring spatial heterogeneity and environmental injustices in exposure to flood hazards using geographically weighted regression.** Environ Res. 2022:112982. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35218710.
4. Lam AT, Bacani-Angus K, Richards K, Griffin R, Karachiwalla F. **A Health Equity Lens Contributes to an Effective Pandemic Response: A Canadian Regional Perspective**. Health Promot Pract.0(0):15248399211072530. Available from: https://journals.sagepub.com/doi/abs/10.1177/15248399211072530.
5. Thobani TR, Butt ZA. **The Increasing Vulnerability of South Asians in Canada during the COVID-19 Pandemic**. Int J Environ Res Public Health. 2022;19(5):2786. Available from: https://www.mdpi.com/1660-4601/19/5/2786.
6. Xia Y, Ma H, Moloney G, Velásquez García HA, Sirski M, Janjua NZ, et al. **Geographic concentration of SARS-CoV-2 cases by social determinants of health in metropolitan areas in Canada: a cross-sectional study**. Can Med Assoc J. 2022;194(6):E195-E204. Available from: https://www.cmaj.ca/content/cmaj/194/6/E195.full.pdf.

HEALTH IMPACT ASSESSMENT

1. Eykelbosh A. **Human health risk assessments addressing artificial turf and crumb rubber [guidance document]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 Mar 1. Available from: https://ncceh.ca/documents/guide/human-health-risk-assessments-addressing-artificial-turf-and-crumb-rubber-0.

INDOOR AIR

1. Dovjak M, Vene O, Vaupotič J. **Analysis of Ventilation Efficiency as Simultaneous Control of Radon and Carbon Dioxide Levels in Indoor Air Applying Transient Modelling**. Int J Environ Res Public Health. 2022;19(4):2125. Available from: https://www.mdpi.com/1660-4601/19/4/2125.
2. Piscitelli P, Miani A, Setti L, De Gennaro G, Rodo X, Artinano B, et al. **The role of outdoor and indoor air quality in the spread of SARS-CoV-2: Overview and recommendations by the research group on COVID-19 and particulate matter (RESCOP commission).** Environ Res. 2022:113038. Available from: https://www.sciencedirect.com/science/article/pii/S0013935122003656.

NUISANCE CONTROL

OUTDOOR AIR

1. American Lung Association. **State of the air report**. Seattle, WA: American Lung Association; 2021. Available from: https://www.lung.org/getmedia/17c6cb6c-8a38-42a7-a3b0-6744011da370/sota-2021.pdf.
2. Glazener A, Wylie J, van Waas W, Khreis H. **The Impacts of Car-Free Days and Events on the Environment and Human Health**. Curr Environ Health Rep. 2022. Available from: https://doi.org/10.1007/s40572-022-00342-y.
3. Heydari S, Asgharian M, Kelly FJ, Goel R. **Potential health benefits of eliminating traffic emissions in urban areas**. PLoS ONE. 2022;17(3):e0264803. Available from: https://doi.org/10.1371/journal.pone.0264803.
4. Liu Y, Tong D, Cheng J, Davis S, Yu S, Yarlagadda B, et al. **Role of climate goals and clean-air policies on reducing future air pollution deaths in China: a modelling study**. The Lancet Planetary Health. 2022;6:e92-e9. Available from: https://doi.org/10.1016/S2542-5196(21)00326-0.
5. Poulin P, Marchand A, Lévesque B, Dubé M, Aubin D, Ouazia B, et al. **Impact of improved indoor air quality in Nunavik homes on children's respiratory health**. Indoor Air. 2022;32(2):e13009. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/ina.13009.
6. Sharma A, Kumar P. **Air pollution exposure assessment simulation of babies in a bike trailer and implication for mitigation measures**. Journal of Hazardous Materials Advances. 2022;5:100050. Available from: https://www.sciencedirect.com/science/article/pii/S2772416622000079.
7. Yu Y, Zou WW, Jerrett M, Meng Y-Y. **Acute Health Impact of Convectional and Wildfire-related PM2.5: a narrative review**. Environmental Advances. 2022:100179. Available from: https://www.sciencedirect.com/science/article/pii/S2666765722000151.

PERSONAL SERVICE ESTABLISHMENTS

PEST CONTROL

1. Robinson SJ, Finer R, Himsworth CG, Pearl DL, Rousseau J, Weese JS, et al. **Evaluating the utility of pest control sourced rats for zoonotic pathogen surveillance**. Zoonoses Public Health. 2022. Available from: https://doi.org/10.1111/zph.12936.

PHYSICAL AGENTS

1. Gong X, Fenech B, Blackmore C, Chen Y, Rodgers G, Gulliver J, et al. **Association between Noise Annoyance and Mental Health Outcomes: A Systematic Review and Meta-Analysis**. Int J Environ Res Public Health. 2022;19(5):2696. Available from: https://www.mdpi.com/1660-4601/19/5/2696.

RADIATION

1. El Jarrah I, Rababa M. **Impacts of smartphone radiation on pregnancy: A systematic review**. Heliyon. 2022;8(2):e08915-e. Available from: https://pubmed.ncbi.nlm.nih.gov/35155842.

2. Glover PWJ, Blouin M. **Increased Radon Exposure From Thawing of Permafrost Due To Climate Change**. Earth's Future. 2022;10(2):e2021EF002598. Available from: https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2021EF002598.
3. Lamberink L. **Thawing permafrost can expose northerners to cancer-causing gas, study says**. CBC North. 2022 Feb 16. Available from: https://www.cbc.ca/news/canada/north/radon-gas-exposure-permafrost-1.6351615?utm_source=ActiveCampaign&utm_medium=email&utm_content=Top+news%3A++ATF_LEAD_STORY_TITLE&utm_campaign=ATF+Daily+-+Outlook.
4. Nash A, Nicol A-M. **Climate change in the Arctic and radon gas: a rising threat from the ground up [blog]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 Mar 11. Available from: https://ncceh.ca/content/blog/climate-change-arctic-and-radon-gas-rising-threat-ground.
5. Sulaiman Z, Ahmad Sugiran HS, Hasbullah NN, Mas'od A, Hashim S, Bradley DA. **Public Awareness of Consumer Products Containing Radioactive Materials: Empirical Evidence from Malaysia**. Int J Environ Res Public Health. 2022;19(4):2326. Available from: https://www.mdpi.com/1660-4601/19/4/2326.
6. US National Radon Action Plan Leadership Council. **The National Radon Action Plan 2021–2025**. Washington, DC: Radon Leaders, anchored by the U.S. Environmental Protection Agency (EPA); 2022. Available from: http://www.radonleaders.org/resources/nationalradonactionplan.

RECREATIONAL AND SURFACE WATER

1. Lalonde C. **Backyard swimming pool rentals: Making a splash with some environmental public health risks [blog]**. Vancouver, BC: National Collaborating Centre for Environmental Health; Mar 2. Available from: https://ncceh.ca/content/blog/backyard-swimming-pool-rentals-making-splash-some-environmental-public-health-risks.

RISK ASSESSMENT, COMMUNICATION

1. Barton-Maclaren TS, Wade M, Basu N, Bayen S, Grundy J, Marlatt V, et al. **Innovation in regulatory approaches for endocrine disrupting chemicals: The journey to risk assessment modernization in Canada**. Environ Res. 2022;204(Pt C):112225. Available from: https://www.ncbi.nlm.nih.gov/pubmed/34666016.

SENIORS' ENVIRONMENTAL HEALTH

1. Canham SL, Weldrick R, Sussman T, Walsh CA, Mahmood A. **Aging in the Right Place: A Conceptual Framework of Indicators for Older Persons Experiencing Homelessness**. The Gerontologist. 2022. Available from: https://doi.org/10.1093/geront/gnac023.
2. Capicio M, Panesar S, Keller H, Gramlich L, Popeski N, Basualdo-Hammond C, et al. **Nutrition Risk, Resilience and Effects of a Brief Education Intervention among Community-Dwelling Older Adults during the COVID-19 Pandemic in Alberta, Canada.** Nutrients. 2022;14(5). Available from: https://www.ncbi.nlm.nih.gov/pubmed/35268084.
3. Cheung ESL, Mui AC. **Do Home and Community Environments Explain Self-Rated Health Among Older Canadians? Evidence From the 2018 Canadian Housing Survey**. HERD. 2022:19375867221085603. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35272519.

4. Hammond NG, Stinchcombe A. **Prospective Associations between Physical Activity and Memory in the Canadian Longitudinal Study on Aging: Examining Social Determinants.** Res Aging. 2022:1640275211070001. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35230196.
5. Rootman I, Edwards P, Levasseur M, Grunberg F, editors. **Promoting the health of older adults: The Canadian experience**. Toronto, ON: Canadian Scholars; 2021. Available from: https://www.canadianscholars.ca/books/promoting-the-health-of-older-adults.

TOBACCO, CANNABIS

1. Burns G, Moore L. **It's not just THC, marijuana labs are testing for metals, pesticides and even insects**. 2022 [updated Mar 9]; Available from: https://www.mlive.com/public-interest/2022/03/its-not-just-thc-marijuana-labs-are-testing-for-metals-pesticides-and-even-insects.html?utm_source=ActiveCampaign&utm_medium=email&utm_content=Top+news%3A++ATF_LEAD_STORY_TITLE&utm_campaign=ATF+Daily+-+Outlook.
2. Yousufzai SJ, Cole AG, Nonoyama M, Barakat C. **Changes in Cannabis Consumption Among Emerging Adults in Relation to Policy and Public Health Developments**. Subst Use Misuse. 2022:1-12. Available from: https://doi.org/10.1080/10826084.2022.2034873.

Vaping

1. Callard C, Gagné T, O'Loughlin JL. **Towards a Canadian evidence base to inform action to prevent and control vaping in Canada**. Health Promot Chronic Dis Prev Can. 2022;42(1):1-3. Available from: https://doi.org/10.24095/hpcdp.42.1.01.
2. Chaiton MO, Cunningham R, Hagen L, Dubray J, Borland T. **Taking global leadership in banning menthol and other flavours in tobacco: Canada's experience**. Tob Control. 2022;31(2):202-11. Available from: https://tobaccocontrol.bmj.com/content/tobaccocontrol/31/2/202.full.pdf.
3. Holmes LM, Lempert LK, Ling PM. **Flavored Tobacco Sales Restrictions Reduce Tobacco Product Availability and Retailer Advertising**. Int J Environ Res Public Health. 2022;19(6):3455. Available from: https://www.mdpi.com/1660-4601/19/6/3455.
4. Taylor E, Aleyan S, East K, Michael Cummings K, Thrasher JF, Fong GT, et al. **Associations Between Noticing Nicotine Vaping Product Health Warning Labels, Harm Perceptions, and Use Among Adult Vapers, Current and Former Smokers. Findings From the 2018 ITC Four Country Smoking and Vaping Survey**. Nicotine Tob Res. 2021. Available from: https://doi.org/10.1093/ntr/ntab256.

WASTE

ZOONOSES

1. Auld A. **Researchers detect first potential case of deer to human**. Halifax, NS: Dalhousie University; 2022 Mar 2. Available from: https://www.dal.ca/news/2022/03/02/covid-deer-animals.html.
2. Chan JF-W, Siu GK-H, Yuan S, Ip JD, Cai J-P, Chu AW-H, et al. **Probable Animal-to-Human Transmission of SARS-CoV-2 Delta Variant AY.127 Causing a Pet Shop-Related COVID-19 Outbreak in Hong Kong**. Clin Infect Dis. 2022. Available from: https://doi.org/10.1093/cid/ciac171.
3. Delahay RJ, de la Fuente J, Smith GC, Sharun K, Snary EL, Flores Girón L, et al. **Assessing the risks of SARS-CoV-2 in wildlife**. One Health Outlook. 2021;3(1):7. Available from: https://doi.org/10.1186/s42522-021-00039-6.

4. Food and Agriculture Organization (FAO), World Organisation for Animal Health (OIE), **World Health Organization (WHO). Joint statement on the prioritization of monitoring SARS-CoV-2 infection in wildlife and preventing the formation of animal reservoirs.** Geneva, Switzerland: WHO; 2022 Mar 7. Available from: https://www.who.int/news/item/07-03-2022-joint-statement-on-the-prioritization-of-monitoring-sars-cov-2-infection-in-wildlife-and-preventing-the-formation-of-animal-reservoirs.
5. Fritz M, de Riols de Fonclare D, Garcia D, Beurlet S, Becquart P, Rosolen SG, et al. **First Evidence of Natural SARS-CoV-2 Infection in Domestic Rabbits**. Veterinary Sciences. 2022;9(2):49. Available from: https://www.mdpi.com/2306-7381/9/2/49.
6. Goethert HK, Mather TN, Johnson RW, Telford SR. **Incrimination of shrews as a reservoir for Powassan virus**. Communications Biology. 2021;4(1):1319. Available from: https://doi.org/10.1038/s42003-021-02828-1.
7. Haydock LAJ, Abrams-Ogg ACG, Weese JS, Goldstein MR, Clifford AB, Sebastian A, et al. **Diagnostic and public health investigation of Mycobacterium tuberculosis infection in a dog in Ontario, Canada**. J Vet Diagn Invest.0(0):10406387221074706. Available from: https://journals.sagepub.com/doi/abs/10.1177/10406387221074706.
8. Kuchipudi SV, Surendran-Nair M, Ruden RM, Yon M, Nissly RH, Vandegrift KJ, et al. **Multiple spillovers from humans and onward transmission of SARS-CoV-2 in white-tailed deer**. Proc Natl Acad Sci U S A. 2022;119(6). Available from: https://www.ncbi.nlm.nih.gov/pubmed/35078920.
9. Meisner J, Baszler TV, Kuehl KH, Ramirez V, Baines A, Frisbie LA, et al. **Household transmission of SARS-CoV-2 from humans to pets in Washington and Idaho: burden and risk factors**. bioRxiv. 2022. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35233573.
10. Neill WA, Kading RC. Investigations on Vector-Borne and Aerosol Transmission Potential of Kaeng Khoi Virus in Cave-Dwelling Wrinkle-Lipped Free-Tailed Bats (Chaerephon plicatus) in Thailand. Microorganisms. 2021;9(10). Available from: https://doi.org/10.3390/microorganisms9102022.
11. Pickering B, Lung O, Maguire F, Kruczkiewicz P, Kotwa JD, Buchanan T, et al. **Highly divergent white-tailed deer SARS-CoV-2 with potential deer-to-human transmission**. bioRxiv. 2022:2022.02.22.481551. Available from: https://www.biorxiv.org/content/biorxiv/early/2022/02/25/2022.02.22.481551.full.pdf.
12. Yen H-L, Sit THC, Brackman CJ, Chuk SSY, Gu H, Tam KWS, et al. **Transmission of SARS-CoV-2 delta variant (AY.127) from pet hamsters to humans, leading to onward human-to-human transmission: a case study.** The Lancet. 2022;399(10329):1070-8. Available from: https://doi.org/10.1016/S0140-6736(22)00326-9.
13. Zhang L, Ma D, Li C, Zhou R, Wang J, Liu Q. **Projecting the Potential Distribution Areas of Ixodes scapularis (Acari: Ixodidae) Driven by Climate Change**. Biology. 2022;11(1):107. Available from: https://www.mdpi.com/2079-7737/11/1/107.
14. Zinck CB, Lloyd VK. **Borrelia burgdorferi and Borrelia miyamotoi in Atlantic Canadian wildlife**. PLoS ONE. 2022;17(1):e0262229. Available from: https://doi.org/10.1371/journal.pone.0262229.

National Collaborating Centre for Environmental Health

Centre de collaboration nationale en santé environnementale

COVID-19 ADDITIONAL TOPICS & GUIDANCE

CONTENTS

GUIDANCE (for 'Occupational Guidance' – see separate topic heading)

Build Back Better

1. Kalb L, Bäßler P, Schneider-Brachert W, Eckl DB. **Antimicrobial Photodynamic Coatings Reduce the Microbial Burden on Environmental Surfaces in Public Transportation-A Field Study in Buses**. Int J Environ Res Public Health. 2022;19(4):2325. Available from: https://www.mdpi.com/1660-4601/19/4/2325.
2. Walls A. **Futuristic coating for hospital fabrics and activewear kills COVID and E. coli**. UBC News. 2022 Feb 10. Available from: https://news.ubc.ca/2022/02/10/futuristic-coating-for-hospital-fabrics-and-activewear-kills-covid-and-e-coli/.
3. Wright T, Vlok M, Shapira T, Olmstead AD, Jean F, Wolf MO. **Photodynamic and Contact Killing Polymeric Fabric Coating for Bacteria and SARS-CoV-2**. ACS Applied Materials & Interfaces. 2022;14(1):49-56. Available from: https://doi.org/10.1021/acsami.1c14178.

Cleaning

1. Bayarri B, Cruz-Alcalde A, López-Vinent N, Micó MM, Sans C. **Can ozone inactivate SARS-CoV-2? A review of mechanisms and performance on viruses**. J Hazard Mater. 2021;415:125658. Available from: https://www.sciencedirect.com/science/article/pii/S0304389421006221.
2. Bispo-Dos-Santos K, Barbosa PP, Granja F, Martini MC, Oliveira CFS, Schuck DC, et al. **Ultraviolet germicidal irradiation is effective against SARS-CoV-2 in contaminated makeup powder and lipstick**. Journal of photochemistry and photobiology. 2021;8:100072. Available from: https://doi.org/10.1016/j.jpap.2021.100072.
3. Burgos-Ramos E, Urbieta IR, Rodríguez D. **Is hydrogen peroxide an effective mouthwash for reducing the viral load of SARS-CoV-2 in dental clinics?** The Saudi dental journal. 2022. Available from: https://doi.org/10.1016/j.sdentj.2022.01.005.
4. Edwards D, Csontos J, Gillen E, Lewis R, Cooper A, Gal M, et al. The efficacy, effectiveness and safety of SARS-CoV-2 disinfection methods (including ozone machines) in educational settings for children and young people. medRxiv. 2022:2022.02.21.22271281. Available from: https://www.medrxiv.org/content/medrxiv/early/2022/02/22/2022.02.21.22271281.full.pdf.
5. Farooq S, Tizaoui C. **A critical review on the inactivation of surface and airborne SARS-CoV-2 virus by ozone gas**. Crit Rev Environ Sci Technol. 2022:1-23. Available from: https://doi.org/10.1080/10643389.2022.2043094.
6. Health Canada. **Rapid antigen test kits and potential exposure to hazardous substances**. Ottawa, ON: Health Canada; 2022 Feb 24. Available from: https://recalls-rappels.canada.ca/en/alert-recall/rapid-antigen-test-kits-and-potential-exposure-hazardous-substances.
7. Kruszewska E, Czupryna P, Pancewicz S, Martonik D, Bukłaha A, Moniuszko-Malinowska A. **Is Peracetic Acid Fumigation Effective in Public Transportation?** Int J Environ Res Public Health. 2022;19(5):2526. Available from: https://www.mdpi.com/1660-4601/19/5/2526.
8. Price E. **Gels from hand sanitizers may be deposited on inanimate surfaces: what is the effect on viral viability and transmission if these surfaces are subsequently contaminated with SARS-CoV-2?** J Hosp Infect. 2021;110:210. Available from: https://www.ncbi.nlm.nih.gov/pubmed/33460642.

9. Shepert E. **Safety alert: Canada-wide is recalling multiple hand sanitizers due to 'health risks'**. Vancouver Is Awesome. 2022 Feb 22. Available from: https://www.vancouverisawesome.com/local-news/safety-alert-canada-wide-is-recalling-multiple-hand-sanitizers-due-to-health-risks-5090173.

Face Masks, Distancing, PPE, etc

1. Bourdon E, Schaefer T, Kittel M, Raedle M, Heininger A. **Effectiveness of Safety Interventions in Fire Engines to Reduce Potential Airborne Transmission of SARS-CoV-2**. Fire (2571-6255). 2021;4(4):1-18. Available from: https://www.mdpi.com/2571-6255/4/4/98.
2. Domingues JM, Teixeira MO, Teixeira MA, Freitas D, Silva SFd, Tohidi SD, et al. Inhibition of Escherichia Virus MS2, Surrogate of SARS-CoV-2, via **Essential Oils-Loaded Electrospun Fibrous Mats: Increasing the Multifunctionality of Antivirus Protection Masks**. Pharmaceutics. 2022;14(2):303-. Available from: https://www.mdpi.com/1999-4923/14/2/303.
3. Locke L, Dada O, Shedd JS. **Aerosol Transmission of Infectious Disease and the Efficacy of Personal Protective Equipment (PPE): A Systematic Review**. J Occup Environ Med. 2021;63(11):e783-e91. Available from: https://doi.org/10.1097/jom.0000000000002366.
4. Mello VM, Eller CM, Salvio AL, Nascimento FF, Figueiredo CM, Silva E, et al. **Effectiveness of face masks in blocking the transmission of SARS-CoV-2: A preliminary evaluation of masks used by SARS-CoV-2-infected individuals**. PLoS ONE. 2022;17(2):e0264389. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35196363.
5. Public Health Ontario. **Universal Mask Use in Health Care Settings and Retirement Homes**. Toronto, ON: PHO; 2022 Feb. Available from: https://www.publichealthontario.ca/-/media/documents/ncov/ipac/report-covid-19-universal-mask-use-health-care-settings.pdf?la=en.
6. Sanchez JN, Reyes GA, Martinez-Lopez B, Johnson CK. **Impact of social distancing on early SARS-CoV-2 transmission in the United States**. Zoonoses Public Health. 2022. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35048530.

Policy

1. Buckeridge D. **An Evidence-Informed Vision for a Public Health Data System in Canada**. Prince George, BC: National Collaborating Centre for Indigenous Health; 2021 Dec. Available from: https://nccph.ca/images/uploads/general/OCPHO_Report_David_Buckeridge_NCCMT_EN.pdf.
2. Chief Public Health Officer (CPHO) of Canada, Dr. Theresa Tam. **A vision to transform Canada's public health system. State of Public Health in Canada 2021**. Ottawa, ON: Public Health Agency of Canada; 2022 Mar. Available from: https://nccph.ca/projects/reports-to-accompany-the-chief-public-health-officer-of-canadas-report-2021.
3. COVID-19 Evidence Network (COVID-END). **How has the COVID-19 pandemic (e.g., public health measures, such as lockdowns, and associated isolation) affected the mental health (i.e., anxiety, depression, chronic loneliness) of the general population**? Hamilton, ON: McMaster University; 2022 Feb 6. Available from: https://www.mcmasterforum.org/docs/default-source/covidend/responses/covid-19-existing-resource-response-15.pdf?sfvrsn=3b3f6744_7.
4. Crooks V, Rosenkrantz L. **Spatially exploring COVID-19 risks in BC neighbourhoods [webinar]**. Vancouver, BC: National Collaborating Centre for Environmental Health; 2022 01 25 Jan 25. Available from: https://ncceh.ca/content/webinar-recording-spatially-exploring-covid-19-risks-bcs-neighbourhoods.
5. Di Ruggiero E, Bhatia D, Umar I, Arpin E, Champagne C, Clavier C, et al. **Governing for the public's health: governance options for a strengthened and renewed public health system in Canada**.

National Collaborating Centres for Public Health; 2022. Available from: https://nccph.ca/projects/reports-to-accompany-the-chief-public-health-officer-of-canadas-report-2021/governing-for-the-publics-health-governance-options-for-a-strengthened/?utm_source=Cyberimpact&utm_medium=email&utm_campaign=E-Bulletin-March-2022.

6. Mulligan K. **Strengthening community connections: the future of public health is at the neighbourhood scale**. Toronto, ON: University of Toronto, Dalla Lana School of Public Health; 2022 Jan. Available from: https://nccph.ca/projects/reportsto-accompany-the-chief-public-health-officer-ofcanadas-report-2021/strengthening-communityconnections-the-future-of-public-health.
7. Public Health Agency of Canada. **Statement from the Council of Chief Medical Officers of Health (CCMOH) on the next phase of the COVID-19 pandemic response**. Ottawa, ON: PHAC; 2022 Feb 14. Available from: https://www.canada.ca/en/public-health/news/2022/02/statement-from-the-council-of-chief-medical-officers-of-health-ccmoh-on-the-next-phase-of-the-covid-19-pandemic-response.html#shr-pg0.
8. Public Health Ontario. **At a glance - Coronavirus Disease 2019 (COVID-19)**. Toronto, ON: Queen's Printer for Ontario; 2022 Feb 15. Available from: https://www.publichealthontario.ca/-/media/documents/ncov/ncov-daily-lit.pdf?sc_lang=en.
9. Public Health Ontario. **Cohorting in Outbreaks in Congregate Living Settings**. Toronto, ON: PHO; 2022 Feb. Available from: https://www.publichealthontario.ca/-/media/documents/ncov/cong/2020/06/focus-on-cohorting-outbreaks-congregate-living-settings.pdf?la=en.

Schools

1. Yuan H, Reynolds C, Ng S, Yang W. **Factors affecting the transmission of SARS-CoV-2 in school settings**. Influenza Other Respir Viruses. 2022. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35146922.

HOMELESS, VULNERABLE POPULATIONS, HOUSING

1. Cawley C, Kanzaria HK, Zevin B, Doran KM, Kushel M, Raven MC. **Mortality Among People Experiencing Homelessness in San Francisco During the COVID-19 Pandemic**. JAMA Network Open. 2022;5(3):e221870-e. Available from: https://doi.org/10.1001/jamanetworkopen.2022.1870.
2. Corey J, Lyons J, O'Carroll A, Stafford R, Ivers J-H. **A Scoping Review of the Health Impact of the COVID-19 Pandemic on Persons Experiencing Homelessness in North America and Europe**. Int J Environ Res Public Health. 2022;19(6):3219. Available from: https://www.mdpi.com/1660-4601/19/6/3219.
3. Kent K, Alston L, Murray S, Honeychurch B, Visentin D. **The Impact of the COVID-19 Pandemic on Rural Food Security in High Income Countries: A Systematic Literature Review**. Int J Environ Res Public Health. 2022;19(6):3235. Available from: https://www.mdpi.com/1660-4601/19/6/3235.

MENTAL/PHYSICAL HEALTH

General

1. Denis-Robichaud J, Aenishaenslin C, Richard L, Desmarchelier M, Carabin H. **Association between Pet Ownership and Mental Health and Well-Being of Canadians Assessed in a Cross-Sectional**

Study during the COVID-19 Pandemic. Int J Environ Res Public Health. 2022;19(4):2215. Available from: https://www.mdpi.com/1660-4601/19/4/2215.
2. Kondo MC, Felker-Kantor E, Wu K, Gustat J, Morrison CN, Richardson L, et al. **Stress and Distress during the COVID-19 Pandemic: The Role of Neighborhood Context**. Int J Environ Res Public Health. 2022;19(5):2779. Available from: https://www.mdpi.com/1660-4601/19/5/2779.

MULTI-UNIT BUILDINGS

OCCUPATIONAL GUIDANCE

Occupational

PUBLIC FACILITIES

Transportation (see separate category, 'Transit, Transportation'

SURVIVAL TIME

1. Cherrie JW, Cherrie MPC, Smith A, Holmes D, Semple S, Steinle S, et al. **Contamination of Air and Surfaces in Workplaces with SARS-CoV-2 Virus: A Systematic Review**. Annals of work exposures and health. 2021;65(8):879-92. Available from: https://doi.org/10.1093/annweh/wxab026.
2. Katona P, Kullar R, Zhang K. **Bringing Transmission of SARS-CoV-2 to the Surface: Is there a Role for Fomites?** Clin Infect Dis. 2022. Available from: https://doi.org/10.1093/cid/ciac157.
3. Kim S, Kim WY, Nam S-H, Shin S, Choi SH, Kim DH, et al. **Microstructured Surfaces for Reducing Chances of Fomite Transmission via Virus-Containing Respiratory Droplets**. ACS Nano. 2021;15(9):14049-60. Available from: https://pubs.acs.org/doi/10.1021/acsnano.1c01636.
4. Tharayil A, Rajakumari R, Mozetic M, Primc G, Thomas S. **Contact transmission of SARS-CoV-2 on fomite surfaces: surface survival and risk reduction**. Interface Focus. 2022;12(1):20210042. Available from: https://www.ncbi.nlm.nih.gov/pubmed/34956610.

TRANSIT, TRANSPORTATION

1. Zhang J, Hayashi Y. **Research frontier of COVID-19 and passenger transport: A focus on policymaking**. Transport policy. 2022;119:78-88. Available from: https://pubmed.ncbi.nlm.nih.gov/35233151

TRANSMISSION

Singing, Wind Instruments, Theatre

1. Gantner S, Echternach M, Veltrup R, Westphalen C, Köberlein MC, Kuranova L, et al. **Impulse dispersion of aerosols during playing wind instruments**. PLoS ONE. 2022;17(3):e0262994. Available from: https://doi.org/10.1371/journal.pone.0262994.

General

1. Addleman S, Leung V, Asadi L, Sharkawy A, McDonald J. **Mitigating airborne transmission of SARS-CoV-2**. CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne. 2021;193(26):E1010-E1. Available from: https://doi.org/10.1503/cmaj.210830.

2. Alsved M, Nygren D, Thuresson S, Medstrand P, Fraenkel CJ, Löndahl J. **SARS-CoV-2 in exhaled aerosol particles from covid-19 cases and its association to household transmission**. Clin Infect Dis. 2022. Available from: https://pubmed.ncbi.nlm.nih.gov/35271734/.
3. Cheng Q, Spear RC. **Exploring the Local Determinants of SARS-CoV-2 Transmission and Control via an Exposure-Based Model**. Environ Sci Technol. 2022;56(3):1801-10. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35015513.
4. Delaugerre C, Foissac F, Abdoul H, Masson G, Choupeaux L, Dufour E, et al. **Prevention of SARS-CoV-2 transmission during a large, live, indoor gathering (SPRING): a non-inferiority, randomised, controlled trial**. Lancet Infect Dis. 2022;22(3):341-8. Available from: https://www.ncbi.nlm.nih.gov/pubmed/34843662.
5. Dinoi A, Feltracco M, Chirizzi D, Trabucco S, Conte M, Gregoris E, et al. **A review on measurements of SARS-CoV-2 genetic material in air in outdoor and indoor environments: Implication for airborne transmission**. Sci Total Environ. 2022;809:151137. Available from: https://doi.org/10.1016/j.scitotenv.2021.151137.
6. England R, Peirce N, Wedatilake T, Torresi J, Kemp S, Cook M, et al. **The Potential for Airborne Transmission of SARS-CoV-2 in Sport: A Cricket Case Study**. Int J Sports Med. 2021;42(5):407-18. Available from: https://doi.org/10.1055/a-1342-8071.
7. Greenhalgh T, Jimenez JL, Prather KA, Tufeki Z, Fisman D, Schooley R. **Transmission of SARS-CoV-2: still up in the air - Authors' reply**. Lancet. 2022;399(10324):519-20. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35123690.
8. Greenhalgh T, Peng Z, Jimenez JL, Bahnfleth W, Dancer SJ, Bourouiba L, et al. **Quantifying transmission risk of SARS-CoV-2 in different situations**. BMJ. 2022;376:o106. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35058231.
9. Li W, Chong A, Lasternas B, Peck TG, Tham KW. **Quantifying the effectiveness of desk dividers in reducing droplet and airborne virus transmission**. Indoor Air. 2022;32(1):e12950. Available from: https://doi.org/10.1111/ina.12950.
10. Lopez A, Srigley J. **Transmission of SARS-CoV-2: still up in the air**. Lancet. 2022;399(10324):519. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35123691.
11. Miani A, Piscitelli P, Setti L, De Gennaro G. **Air quality and COVID-19: Much more than six feet. Evidence about SARS-COV-2 airborne transmission in indoor environments and polluted areas**. Environ Res. 2022;210:112949. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35181308.
12. Mikszewski A, Stabile L, Buonanno G, Morawska L. **Increased close proximity airborne transmission of the SARS-CoV-2 Delta variant**. Sci Total Environ. 2022;816:151499. Available from: https://doi.org/10.1016/j.scitotenv.2021.151499.
13. National Collaborating Centre for Methods and Tools. **Living Rapid Review Update 4: What is known about the risk of transmission of COVID-19 within post-secondary institutions and the strategies to mitigate on-campus outbreaks?** Hamilton, ON: NCCMT; 2022 Feb 4. Available from: https://www.nccmt.ca/covid-19/covid-19-rapid-evidence-service/34.
14. Nazaroff WW. **Indoor aerosol science aspects of SARS-CoV-2 transmission**. Indoor Air. 2022;32(1):e12970. Available from: https://doi.org/10.1111/ina.12970.
15. Oswin HP, Haddrell AE, Otero-Fernandez M, Mann JFS, Cogan TA, Hilditch T, et al. **The Dynamics of SARS-CoV-2 Infectivity with Changes in Aerosol Microenvironment**. medRxiv. 2022:2022.01.08.22268944. Available from: https://www.medrxiv.org/content/10.1101/2022.01.08.22268944v1.

16. Robey AJ, Fierce L. **Sensitivity of airborne transmission of enveloped viruses to seasonal variation in indoor relative humidity**. International Communications in Heat & Mass Transfer. 2022;130:N.PAG-N.PAG. Available from: https://www.sciencedirect.com/science/article/pii/S0735193321006400.
17. Saccani C, Guzzini A, Vocale C, Gori D, Pellegrini M, Fantini MP, et al. **Experimental testing of air filter efficiency against the SARS-CoV-2 virus: The role of droplet and airborne transmission**. Build Environ. 2022;210:108728. Available from: https://doi.org/10.1016/j.buildenv.2021.108728.
18. Schreiber S, Faude O, Gartner B, Meyer T, Egger F. **Risk of SARS-CoV-2 transmission from on-field player contacts in amateur, youth and professional football (soccer)**. Br J Sports Med. 2022;56(3):158-64. Available from: https://www.ncbi.nlm.nih.gov/pubmed/34663570.
19. Timmons S, Belton CA, Robertson DA, Barjaková M, Lavin C, Julienne H, et al. **Is it riskier to meet 100 people outdoors or 14 people indoors? Comparing public and expert perceptions of COVID-19 risk.** J Exp Psychol Appl. 2022.
20. Wang W, Wang F, Lai D, Chen Q. **Evaluation of SARS-COV-2 transmission and infection in airliner cabins**. Indoor Air. 2022;32(1):e12979. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35048429.

Outbreaks (selected)

1. Cheng P, Luo K, Xiao S, Yang H, Hang J, Ou C, et al. **Predominant airborne transmission and insignificant fomite transmission of SARS-CoV-2 in a two-bus COVID-19 outbreak originating from the same pre-symptomatic index case.** J Hazard Mater. 2022;425:128051. Available from: https://doi.org/10.1016/j.jhazmat.2021.128051.
2. Gu H, Krishnan P, Ng DYM, Chang LDJ, Liu GYZ, Cheng SSM, et al. **Probable Transmission of SARS-CoV-2 Omicron Variant in Quarantine Hotel, Hong Kong, China, November 2021**. Emerg Infect Dis. 2022;28(2):460-2. Available from: https://www.ncbi.nlm.nih.gov/pubmed/34860154.
3. Han T, Park H, Jeong Y, Lee J, Shon E, Park M-S, et al. **COVID-19 Cluster Linked to Aerosol Transmission of SARS-CoV-2 via Floor Drains**. Journal of infectious diseases. 2022. Available from: https://doi.org/10.1093/infdis/jiab598.
4. Kim EY, Choe YJ, Park H, Jeong H, Chung JH, Yu J, et al. **Community Transmission of SARS-CoV-2 Omicron Variant, South Korea, 2021**. Emerg Infect Dis. 2022;28(4). Available from: https://www.ncbi.nlm.nih.gov/pubmed/35171760.
5. Li C, Tang H. **Comparison of COVID-19 infection risks through aerosol transmission in supermarkets and small shops**. Sustainable cities and society. 2022;76:103424. Available from: https://doi.org/10.1016/j.scs.2021.103424.
6. Ou C, Hu S, Luo K, Yang H, Hang J, Cheng P, et al. **Insufficient ventilation led to a probable long-range airborne transmission of SARS-CoV-2 on two buses**. Build Environ. 2022;207:108414. Available from: https://doi.org/10.1016/j.buildenv.2021.108414.
7. Pekar JE, Magee A, Parker E, Moshiri N, Izhikevich K, Havens JL, et al. **SARS-CoV-2 emergence very likely resulted from at least two zoonotic events**. Zenodo preprint. 2022. Available from: https://zenodo.org/record/6291628#.Yh0gZujMI2w.
8. Peng Z, Rojas ALP, Kropff E, Bahnfleth W, Buonanno G, Dancer SJ, et al. **Practical Indicators for Risk of Airborne Transmission in Shared Indoor Environments and Their Application to COVID-19 Outbreaks.** Environ Sci Tech. 2022;56(2):1125-37. Available from: https://pubs.acs.org/doi/10.1021/acs.est.1c06531.

9. Sami S, Horter L, Valencia D, Thomas I, Pomeroy M, Walker B, et al. **Investigation of SARS-CoV-2 Transmission Associated With a Large Indoor Convention - New York City, November-December 2021**. MMWR Morb Mortal Wkly Rep. 2022;71(7):243-8. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35176005.
10. Toyokawa T, Shimada T, Hayamizu T, Sekizuka T, Zukeyama Y, Yasuda M, et al. **Transmission of SARS-CoV-2 during a 2-h domestic flight to Okinawa, Japan, March 2020**. Influenza Other Respir Viruses. 2022;16(1):63-71. Available from: https://www.ncbi.nlm.nih.gov/pubmed/34605181.
11. Wang Q, Li Y, Lung DC, Chan PT, Dung CH, Jia W, et al. **Aerosol transmission of SARS-CoV-2 due to the chimney effect in two high-rise housing drainage stacks**. J Hazard Mater. 2022;421:126799. Available from: https://www.ncbi.nlm.nih.gov/pubmed/34396958.
12. White PF, Boland M, O'Sullivan MB, Bambury N, Deignan P, Dean J, et al. **Transmission of SARS-CoV-2 arising from international flights arriving in Ireland in December 2020: a descriptive analysis using national surveillance data.** Public Health. 2022;204:49-53. Available from: https://www.ncbi.nlm.nih.gov/pubmed/35172222.
13. Worobey M, Levy JI, Serrano LMM, Crits-Christoph A, Pekar JE, Goldstein SA, et al. **The Huanan market was the epicenter of SARS-CoV-2 emergence**. Zenodo preprint. 2022. Available from: https://zenodo.org/record/6299600#.Yh0gZOjMI2w.

Variants

1. Cheng VC-C, Ip JD, Chu AW-H, Tam AR, Chan W-M, Abdullah SMU, et al. **Rapid spread of SARS-CoV-2 Omicron subvariant BA.2 in a single-source community outbreak**. Clin Infect Dis. 2022. Available from: https://doi.org/10.1093/cid/ciac203.
2. Koelle K, Martin MA, Antia R, Lopman B, Dean NE. **The changing epidemiology of SARS-CoV-2**. Science. 2022;375(6585):1116-21. Available from: https://www.science.org/doi/abs/10.1126/science.abm4915
3. O'Keeffe J, Eykelbosh A, Nicol A-M. **The Omicron variant - Updating our knowledge as the surge subsides [blog]**. Vancouver, BC: National Collaborating Centre for Environmental Health; Feb 14. Available from: https://ncceh.ca/content/blog/omicron-variant-updating-our-knowledge-surge-subsides.

For more on environmental health information and evidence, visit NCCEH.ca

To provide feedback on this document, please visit www.ncceh.ca/en/document_feedback

This document can be cited as: National Collaborating Centre for Environmental Health. Environmental health research scan. Vancouver, BC: NCCEH. 2021 December.

 Production of this document has been made possible through a financial contribution from the Public Health Agency of Canada through the National Collaborating Centre for Environmental Health.