2020 EH Scan



ENVIRONMENTAL HEALTH RESEARCH SCAN

VOL 4 (4) APRIL 2020



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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. "We focus on health risks associated with the physical environment and identify evidence-based interventions to mitigate those risks." This review is not official or 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. How to access the items? Click on the link related to each entry and it should take you to the item. Not all links are open access; some are abstract links where paid journal subscription is required.



EDITOR PICKS

COVID-19 and use of disinfectants and sanitizers in food premises [blog] Tina Chen, Knowledge Translation Scientist, National Collaborating Centre for Environmental Health

"This blog is based on the NCCEH guidance document <u>Disinfectants and Sanitizers for Use on Food Contact Surfaces</u> to reflect recent developments due to COVID-19."



COVID-19 Precautions for multi-unit residential buildings [guidance]

National Collaborating Centre for Environmental Health

"This document was developed to synthesize the available evidence and guidance regarding COVID-19 precautions for multi-unit residential housing."



Using shared laundry facilities during the COVID-19 pandemic [guidance] National Collaborating Centre for Environmental Health [(right) Angela Eykelbosh, Knowledge Translation Scientist, NCCEH]

"This poster highlights the Dos and DON'Ts of laundry in shared facilities. Feel free to print this resource and post it in commercial and residential laundry facilities."



Crematoria emissions and air quality impacts [field inquiry] National Collaborating Centre for Environmental Health

"A municipality received an application from a funeral home to install a cremator within their facility. Objections were received from nearby residents who were concerned about potential exposure to harmful emissions. A public health unit was...."



Crematoria and air quality [fact sheet]

National Collaborating Centre for Environmental Health [(right) Juliette O'Keeffe, Knowledge Translation Scientist, NCCEH]

"This fact sheet outlines the key facts about potential exposure to emissions from crematoria, and controls for reducing risks."



Social connection as a public health adaptation to extreme heat events Amani Kafeety, BCCDC (right), Sarah B. Henderson, Amy Lubik, Jesse Kancir, Tom Kosatsky, Michael Schwandt

"Interventions rooted in social connection, a concept widely applied in interventions for public health and social well-being, should be applied as a tool for adaptation to extreme heat events."





EDITOR PICKS

Environmental public health professionals can support health equity in the time of COVID-19 [blog]

Karen Rideout, Guest Blogger, National Collaborating Centre for Environmental Health

"...Environmental public health (EPH) professionals are playing an essential role to help control the spread of the SARS-CoV-2 virus, but roles have shifted. (more)..."



Environmental Health Resources for the COVID-19 Pandemic [topic page [topic page]

National Collaborating Centre for Environmental Health

"This topic page has been created to promote key COVID-19 resources to environmental health practitioners and related professions."



Masking During the COVID-19 Pandemic [guidance]

National Collaborating Centre for Environmental Health

"This document outlines the main types of masks, their effectiveness in providing protection against pathogenic hazards, and considerations for the safe use."



COVID-19 and outdoor safety: considerations for use of outdoor recreational spaces [guidance]

National Collaborating Centre for Environmental Health

"This document was developed to address concerns related to the safe use of public spaces during the COVID-19 outbreak."



Special issue: COVID-19 Research scan [blog]

National Collaborating Centre for Environmental Health

"The NCCEH has compiled a list of valuable scientific resources related to Covid-19. The resources are divided into categories relevant to environmental health professionals."





ENVIRONMENTAL HEALTH RESEARCH SCAN

SELECTED STAFF PUBLICATIONS (NCCEH or BCCDC)

- Arrandale V. Exposures in Nail Salons: Implications for Public and Occupational Health [webinar].
 Vancouver, BC: National Collaborating Centre for Environmental Health; 20200326 Mar 26.

 Available from: http://www.ncceh.ca/content/ncceh-environmental-health-seminar-series.
- 2. Bartlett K. Buildings, Occupants and the Changing Environment [webinar]. Vancouver, BC: National Collaborating Centre for Environmental Health; 2020430 April 30, 2020, 12:00 PM 1:00 PM PDT. Available from: https://www.eventbrite.ca/e/buildings-occupants-and-the-changing-environment-registration-99576913228.
- 3. Chen T. COVID-19 and use of disinfectants and sanitizers in food premises [blog]. Vancouver, BC: National Collaborating Centre for Environmental Health; 2020 Apr 4. Available from: http://ncceh.ca/content/blog/covid-19-and-use-disinfectants-and-sanitizers-food-premises.
- 4. Kafeety A, Henderson SB, Lubik A, Kancir J, Kosatsky T, Schwandt M. Social connection as a public health adaptation to extreme heat events. Can J Public Health. 2020 Mar 16. Available from: https://doi.org/10.17269/s41997-020-00309-2.
- National Collaborating Centre for Environmental Health. COVID-19 Precautions for Multi-unit
 Residential Buildings [guidance]. Vancouver, BC: National Collaborating Centre for
 Environmental Health; 2020 Mar 31. Available from: http://www.ncceh.ca/documents/guide/covid-19-precautions-multi-unit-residential-buildings.
- National Collaborating Centre for Environmental Health. Using Shared Laundry Facilities During the COVID-19 Pandemic [guidance]. Vancouver, BC: National Collaborating Centre for Environmental Health; 2020 Mar 31. Available from: http://www.ncceh.ca/documents/guide/using-shared-laundry-facilities-during-covid-19-pandemic.
- 7. National Collaborating Centre for Environmental Health. Environmental Health Resources for the COVID-19 Pandemic [topic page]. Vancouver, BC: National Collaborating Centre for Environmental Health; 2020 Apr 3. Available from: https://ncceh.ca/environmental-health-incanada/health-agency-projects/environmental-health-resources-covid-19.
- 8. National Collaborating Centre for Environmental Health. Drinking water guidelines and governance [topic page]. Vancouver, BC2020 03 Mar 25. Available from: http://www.ncceh.ca/environmental-health-in-canada/health-agency-projects/drinking-water-guidelines-and-governance.
- 9. National Collaborating Centre for Environmental Health. Mould [topic page]. Vancouver, BC2020 03 Mar 17. Available from: http://www.ncceh.ca/environmental-health-in-canada/health-agency-projects/mould.
- 10. National Collaborating Centre for Environmental Health. Mould Investigation: an online course for public health professionals [online course]. Vancouver, BC2020 03 Mar 17. Available from: http://www.ncceh.ca/content/mould-investigation-online-course-public-health-professionals.
- 11. National Collaborating Centre for Environmental Health. Crematoria emissions and air quality impacts [field inquiry]. Vancouver, BC: National Collaborating Centre for Environmental Health; 2020 03 mars 24. Available from: http://www.ncceh.ca/documents/field-inquiry/crematoria-emissions-and-air-quality-impacts.



- 12. National Collaborating Centre for Environmental Health. March research scan [blog]. Vancouver, BC: National Collaborating Center for Environmental Health; 2020 03 Feb 22. Available from: http://www.ncceh.ca/content/blog/february-research-scan-0.
- 13. National Collaborating Centre for Environmental Health. Special Edition March: Covid-19 Research Scan [blog]. Vancouver, BC: National Collaborating Center for Environmental Health; 2020 03 Mar 27. Available from: http://www.ncceh.ca/content/blog/special-edition-covid-19-research-scan.
- 14. National Collaborating Centre for Environmental Health. Crematoria and Air Quality [fact sheet]. Vancouver, BC2020 03 Mar 30. Available from: http://www.ncceh.ca/documents/guide/crematoria-and-air-quality-fact-sheet.
- 15. National Collaborating Centre for Environmental Health. Urban natural spaces and public health: a matter of challenges or common sense? [weminar]. Vancouver, BC: NCCEH; 2020 03 Mar 20. Available from: http://www.ncceh.ca/events/urban-natural-spaces-and-public-health-matter-challenges-or-common-sense.
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- 17. National Collaborating Centre for Environmental Health. Masking during the pandemic [guidance document]. Vancouver, BC: NCCEH; 2020 04 17 Apr 17. Available from: https://ncceh.ca/documents/guide/masking-during-pandemic.
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- 19. Rideout K. Environmental public health professionals can support health equity in the time of COVID-19 [blog]. Vancouver, BC: National Collaborating Center for Environmental Health; 2020 04 17 Apr 17. Available from: https://ncceh.ca/content/blog/environmental-public-health-professionals-can-support-health-equity-time-covid-19.

NCCEH e-News (English)

1. National Collaborating Centre for Environmental Health. NCCEH eNews: New NCCEH Online Course: Mould Investigation; Updated Mould Topic Page; Upcoming Indoor Air Quality Webinars; more... . Vancouver, BC: NCCEH; 2020 03 Mar. Available from: https://tinyurl.com/u94mjqg.

Upcoming Webinar

 Bartlett K. Buildings, Occupants and the Changing Environment [webinar]. Vancouver, BC: National Collaborating Centre for Environmental Health; 2020430 April 30, 2020, 12:00 PM – 1:00 PM PDT. Available from: https://www.eventbrite.ca/e/buildings-occupants-and-the-changing-environment-registration-99576913228.

INDIGENOUS ENVIRONMENTAL HEALTH

1. Cordier S, Anassour-Laouan-Sidi E, Lemire M, Costet N, Lucas M, Ayotte P. Association between exposure to persistent organic pollutants and mercury, and glucose metabolism in two Canadian



Indigenous populations. Environ Res. 2020;184:109345. Available from: https://www.sciencedirect.com/science/article/pii/S0013935120302383?via%3Dihub.

 Hanemaayer R, Anderson K, Haines J, Lickers KR, Lickers Xavier A, Gordon K, et al. Exploring the Perceptions of and Experiences with Traditional Foods among First Nations Female Youth: A Participatory Photovoice Study. Int J Environ Res Public Health. 2020;17(7). Available from: http://www.mdpi.com/resolver?pii=ijerph17072214.

AGRICULTURAL OPERATIONS

1. Edmondson JL, Cunningham H, Densley Tingley DO, Dobson MC, Grafius DR, Leake JR, et al. The hidden potential of urban horticulture. Nature Food. 2020 Mar 1;1(3):155-9. Available from: https://doi.org/10.1038/s43016-020-0045-6.

BIOLOGICAL AGENTS

BUILT ENVIRONMENT

- Letarte L, Pomerleau S, Tchernof A, Biertho L, Waygood EOD, Lebel A. Neighbourhood effects on obesity: scoping review of time-varying outcomes and exposures in longitudinal designs. BMJ open. 2020;10(3):e034690. Available from: http://bmjopen.bmj.com/cgi/pmidlookup?view=long&pmid=32213520.
- 2. Litman T. If Health Matters: Integrating Public Health Objectives in Transportation Planning. Victoria, BC: Victoria Transport Policy Institute; 2020 Mar. Available from: https://www.vtpi.org/health.pdf.
- 3. Lukmanji A, Williams JVA, Bulloch AGM, Dores AK, Patten SB. The Association of Active Living Environments and Mental Health: A Canadian Epidemiological Analysis. Int J Environ Res Public Health. 2020;17(6):1910. Available from: https://www.mdpi.com/1660-4601/17/6/1910.
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 Available from: http://www.ncceh.ca/events/urban-natural-spaces-and-public-health-matter-challenges-or-common-sense.
- 5. Rugel E, Brauer M. Quiet, clean, green, and active: A Navigation Guide systematic review of the impacts of spatially correlated urban exposures on a range of physical health outcomes. Environ Res. 2020 Mar 19:109388. Available from:

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- Shin JC, Parab KV, An R, Grigsby-Toussaint DS. Greenspace exposure and sleep: A systematic review. Environ Res. 2020 Mar 1;182:109081. Available from: http://www.sciencedirect.com/science/article/pii/S0013935119308771.
- 7. Tracey D, Gray T, Sweeting J, Kingsley J, Bailey A, Pettitt P. A Systematic Review Protocol to Identify the Key Benefits and Associated Program Characteristics of Community Gardening for Vulnerable Populations. Int J Environ Res Public Health. 2020;17(6):2029. Available from: https://www.mdpi.com/1660-4601/17/6/2029.



CHEMICAL AGENTS – METALS, GENERAL

General

 Xu L, Mondal D, Polya DA. Positive Association of Cardiovascular Disease (CVD) with Chronic Exposure to Drinking Water Arsenic (As) at Concentrations below the WHO Provisional Guideline Value: A Systematic Review and Meta-Analysis. Int J Environ Res Public Health. 2020;17(7):2536.
 Available from: https://www.mdpi.com/1660-4601/17/7/2536.

CHEMICAL AGENTS – PESTICIDES

CHEMICAL AGENTS - SHALE GAS

 Deziel NC, Brokovich E, Grotto I, Clark CJ, Barnett-Itzhaki Z, Broday D, et al. Unconventional oil and gas development and health outcomes: A scoping review of the epidemiological research. Environ Res. 2020 Mar 1;182:109124. Available from: http://www.sciencedirect.com/science/article/pii/S0013935120300153.

CHILDREN'S ENVIRONMENTAL HEALTH

- 1. Rousell D, Cutter-Mackenzie-Knowles A. A systematic review of climate change education: giving children and young people a 'voice' and a 'hand' in redressing climate change. Children's Geographies. 2020;18(2):191-208. Available from: https://www.tandfonline.com/doi/full/10.1080/14733285.2019.1614532.
- 2. Shah S, Jeong KS, Park H, Hong Y-C, Kim Y, Kim B, et al. Environmental pollutants affecting children's growth and development: Collective results from the MOCEH study, a multi-centric prospective birth cohort in Korea. Environ Int. 2020;137:105547. Available from: https://www.ncbi.nlm.nih.gov/pubmed/32088541.

CLIMATE CHANGE

- 1. Islam S, Chu C, Smart JCR, Liew L. Integrating disaster risk reduction and climate change adaptation: a systematic literature review. Climate & Development. 2020;12(3):255-67. Available from: https://www.tandfonline.com/doi/full/10.1080/17565529.2019.1613217.
- 2. Kafeety A, Henderson SB, Lubik A, Kancir J, Kosatsky T, Schwandt M. Social connection as a public health adaptation to extreme heat events. Can J Public Health. 2020 Mar 16. Available from: https://doi.org/10.17269/s41997-020-00309-2.
- 3. Xu R, Li S, Guo S, Zhao Q, Abramson MJ, Li S, et al. Environmental temperature and human epigenetic modifications: A systematic review. Environmental pollution (Barking, Essex : 1987). 2020;259:113840. Available from:

https://www.sciencedirect.com/science/article/pii/S0269749119355812.

COMMUNICABLE AND INFECTIOUS DISEASES

1. National Collaborating Centre for Environmental Health. COVID-19 Precautions for Multi-unit Residential Buildings [guidance]. Vancouver, BC: National Collaborating Centre for



Environmental Health; 2020 Mar 31. Available from: http://www.ncceh.ca/documents/guide/covid-19-precautions-multi-unit-residential-buildings.

- National Collaborating Centre for Environmental Health. Using Shared Laundry Facilities During the COVID-19 Pandemic [guidance]. Vancouver, BC: National Collaborating Centre for Environmental Health; 2020 Mar 31. Available from: http://www.ncceh.ca/documents/guide/using-shared-laundry-facilities-during-covid-19-pandemic.
- 3. National Collaborating Centre for Environmental Health. Environmental Health Resources for the COVID-19 Pandemic [topic page]. Vancouver, BC: National Collaborating Centre for Environmental Health; 2020 Apr 3. Available from: https://ncceh.ca/environmental-health-incanada/health-agency-projects/environmental-health-resources-covid-19.
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- 6. National Collaborating Centre for Environmental Health. Masking during the pandemic [guidance document]. Vancouver, BC: NCCEH; 2020 04 17 Apr 17. Available from: https://ncceh.ca/documents/guide/masking-during-pandemic.
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- 8. Rideout K. Environmental public health professionals can support health equity in the time of COVID-19 [blog]. Vancouver, BC: National Collaborating Center for Environmental Health; 2020 04 17 Apr 17. Available from: https://ncceh.ca/content/blog/environmental-public-health-professionals-can-support-health-equity-time-covid-19.

DRINKING WATER

- Kullar SS, Shao K, Surette C, Foucher D, Mergler D, Cormier P, et al. A benchmark concentration analysis for manganese in drinking water and IQ deficits in children. Environ Int. 2019 Sep;130:104889. Available from: http://www.sciencedirect.com/science/article/pii/S0160412019305495.
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EMERGENCY PREPAREDNESS

- Kulig JC, Dabravolskaj J. The psychosocial impacts of wildland fires on children, adolescents and family functioning: a scoping review. Int J Wildland Fire. 2020;29(2):93-103. Available from: https://www.publish.csiro.au/paper/WF18063.
- 2. Umeda M, Chiba R, Sasaki M, Agustini EN, Mashino S. A Literature Review on Psychosocial Support for Disaster Responders: Qualitative Synthesis with Recommended Actions for Protecting and



Promoting the Mental Health of Responders. Int J Environ Res Public Health. 2020;17(6):2011. Available from: https://www.mdpi.com/1660-4601/17/6/2011.

ENVIRONMENTAL HEALTH SURVEILLANCE

ENVIRONMENTAL PLANNING

- Nickel Snud, von dem Knesebeck O. Effectiveness of Community-Based Health Promotion Interventions in Urban Areas: A Systematic Review. J Community Health. 2020 Apr;45(2):419-34. Available from: https://dx.doi.org/10.1007/s10900-019-00733-7.
- 2. Sampson L, Ettman CK, Galea S. Urbanization, urbanicity, and depression: a review of the recent global literature. Curr Opin Psychiatry. 2020;33(3):233-44. Available from: http://dx.doi.org/10.1097/YCO.00000000000000588.

FOOD

Safety

- Chen T. COVID-19 and use of disinfectants and sanitizers in food premises [blog]. Vancouver, BC:
 National Collaborating Centre for Environmental Health; 2020 Apr 4. Available from:
 http://ncceh.ca/content/blog/covid-19-and-use-disinfectants-and-sanitizers-food-premises.
- Guntzburger Y, Théolier J, Barrere V, Peignier I, Godefroy S, de Marcellis-Warin N. Food industry perceptions and actions towards food fraud: Insights from a pan-Canadian study. Food Control. 2020 Jul;113:107182. Available from:
 http://www.sciencedirect.com/science/article/pii/S0956713520300980.
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- 4. Liu X, Zhang B, Sohal IS, Bello D, Chen H. Is "nano safe to eat or not"? A review of the state-of-the-art in soft engineered nanoparticle (sENP) formulation and delivery in foods. In: Lim L-T, Rogers MA, editors. Food applications of nanotechnology. Cambridge, MA: Elsevier; 2019. Available from: https://www.sciencedirect.com/science/article/pii/S1043452619300336.
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Security

1. Pai S, Bahadur K. The Impact of Food Insecurity on Child Health. Pediatr Clin North Am. 2020;67(2):387-96. Available from: https://www.pediatric.theclinics.com/article/S0031-3955(19)30180-4/pdf.

GENERAL

 National Collaborating Centre for Environmental Health. February research scan [blog]. Vancouver, BC: National Collaborating Center for Environmental Health; 2020 02 Feb 22. Available from: http://www.ncceh.ca/content/blog/february-research-scan-0.



National Collaborating Centre for Environmental Health. March research scan [blog]. Vancouver, BC:
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Health Policy

- McLaren L, Braitstein P, Buckeridge D, Contandriopoulos D, Creatore MI, Faulkner G, et al. Why
 public health matters today and tomorrow: the role of applied public health research. Can J
 Public Health. 2019 Jun;110(3):317-22. Available from: https://doi.org/10.17269/s41997-019-00196-2.
- 2. van der Vliet N, Suijkerbuijk AWM, de Blaeij AT, de Wit GA, van Gils PF, Staatsen BAM, et al. Ranking Preventive Interventions from Different Policy Domains: What Are the Most Cost-Effective Ways to Improve Public Health? Int J Environ Res Public Health. 2020;17(6):2160. Available from: https://www.mdpi.com/1660-4601/17/6/2160.

HEALTH EQUITY

- Bell R, Khan M, Romeo-Velilla M, Stegeman I, Godfrey A, Taylor T, et al. Ten Lessons for Good Practice for the INHERIT Triple Win: Health, Equity, and Environmental Sustainability. Int J Environ Res Public Health. 2019;16(22):4546. Available from: https://www.mdpi.com/1660-4601/16/22/4546.
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HEALTH IMPACT ASSESSMENT

- 1. Guijarro F, Tsinaslanidis P. Analysis of the Academic Literature on Environmental Valuation. Int J Environ Res Public Health. 2020;17(7):2386. Available from: https://www.mdpi.com/1660-4601/17/7/2386.
- 2. Hunsberger C, Froese S, Hoberg G. Toward 'good process' in regulatory reviews: Is Canada's new system any better than the old? Environ Impact Assess Rev. 2020;82. Available from: https://www.sciencedirect.com/science/article/pii/S0195925519303592.

INDOOR AIR

- 1. National Collaborating Centre for Environmental Health. NCCEH eNews: New NCCEH Online Course: Mould Investigation; Updated Mould Topic Page; Upcoming Indoor Air Quality Webinars; more... . Vancouver, BC: NCCEH; 2020 03 Mar. Available from: https://tinyurl.com/u94mjqq.
- 2. National Collaborating Centre for Environmental Health. Mould [topic page]. Vancouver, BC2020 03 Mar 17. Available from: http://www.ncceh.ca/environmental-health-in-canada/health-agency-projects/mould.
- 3. National Collaborating Centre for Environmental Health. Mould Investigation: an online course for public health professionals [online course]. Vancouver, BC2020 03 Mar 17. Available from: http://www.ncceh.ca/content/mould-investigation-online-course-public-health-professionals.



NUISANCE CONTROL

OUTDOOR AIR

- 1. Bergmann S, Li B, Pilot E, Chen R, Wang B, Yang J. Effect modification of the short-term effects of air pollution on morbidity by season: A systematic review and meta-analysis. Sci Total Environ. 2020;716:136985. Available from:
 - https://www.sciencedirect.com/science/article/pii/S0048969720304952.
- Fouladi F, Bailey MJ, Patterson WB, Sioda M, Blakley IC, Fodor AA, et al. Air pollution exposure is associated with the gut microbiome as revealed by shotgun metagenomic sequencing. Environ Int. 2020 May 1;138:105604. Available from: http://www.sciencedirect.com/science/article/pii/S0160412019345726.
- 3. National Collaborating Centre for Environmental Health. Crematoria emissions and air quality impacts [field inquiry]. Vancouver, BC: National Collaborating Centre for Environmental Health; 2020 03 mars 24. Available from: http://www.ncceh.ca/documents/field-inquiry/crematoria-emissions-and-air-quality-impacts.
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- Zhang M, Wang C, Zhang X, Song H, Li Y. Association between exposure to air pollutants and attention-deficit hyperactivity disorder (ADHD) in children: a systematic review and metaanalysis. Int J Environ Health Res. 2020:1-13. Available from: https://doi.org/10.1080/09603123.2020.1745764.

PERSONAL SERVICE ESTABLISHMENTS

- Arrandale V. Exposures in Nail Salons: Implications for Public and Occupational Health [webinar].
 Vancouver, BC: National Collaborating Centre for Environmental Health; 20200326 Mar 26.

 Available from: http://www.ncceh.ca/content/ncceh-environmental-health-seminar-series.
- Cherkaoui El Baraka F, Kluger N, Ollivier I, Bourgoin R, Grossin M, Zeboulon C, et al. [Melanoma within tattoos: Two cases and a systematic literature review]. Ann Dermatol Venereol.
 2020;147(4):285-92. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0151-9638(19)31007-5.

PEST CONTROL

PHYSICAL AGENTS



RADIATION

 Chiavacci SJ, Shapiro CD, Pindilli EJ, Casey CF, Rayens MK, Wiggins AT, et al. Economic valuation of health benefits from using geologic data to communicate radon risk potential. Environ Health. 2020 Mar 20;19(1):36. Available from: https://doi.org/10.1186/s12940-020-00589-8.

RECREATIONAL AND SURFACE WATER

RISK ASSESSMENT, COMMUNICATION

SENIORS' ENVIRONMENTAL HEALTH

1. King AC, King DK, Banchoff A, Solomonov S, Ben Natan O, Hua J, et al. Employing Participatory Citizen Science Methods to Promote Age-Friendly Environments Worldwide. Int J Environ Res Public Health. 2020;17(5):1541. Available from: https://www.mdpi.com/1660-4601/17/5/1541.

TOBACCO, CANNABIS

Rotermann M. What has changed since cannabis was legalized? Ottawa, ON: Statistics Canada,
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WASTE

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