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Brent Parker
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November 30, 2023

Sent by email to: regionalrof-cdfregionale@iaac-aeic.gc.ca

Subject: Health Canada and Public Health Agency of Canada's response to the Impact Assessment Agency of Canada's request to update the original Federal Authority Advice Record for the Ring of Fire Regional Assessment

Dear Brent Parker,

Thank you for your letter dated October 24, 2023, requesting Health Canada to provide an update to the Federal Authority Advice Record (FAAR) for the Ring of Fire regional assessment (RA). On January 22, 2021, Health Canada and the Public Health Agency of Canada (PHAC) provided input to the original FAAR in support of the Impact Assessment Agency of Canada (the Agency)'s design of the RA process and the development of the terms of reference.

Health Canada participates in the RA process as a federal authority under the *Impact Assessment Act* (IAA). Health Canada makes available specialist or expert information or knowledge in its possession, and coordinates input from the PHAC, as required, at the request of the Agency.

Health Canada and PHAC have considered the proposed goal of the assessment cited in your letter and provided updated input, where appropriate, in the attached FAAR. Grey shading indicates text that was not modified from the 2021 submission. Should the Agency determine that the RA may include human health-related considerations, Health Canada and PHAC can provide expertise on issues within their mandates and federal jurisdiction.

Should you have any questions concerning Health Canada and PHAC's response, please contact the undersigned.

Sincerely,



Greg Carreau
Director General, Safe Environments Directorate
Healthy Environments and Consumer Safety Branch, Health Canada
greg.carreau@hc-sc.gc.ca

- Cc: Matt Jones, Assistant Deputy Minister, Healthy Environments and Consumer Safety Branch (HECSB), Health Canada
- Cc: Denise MacGillivray, Director General, Environmental Health and Pesticides Directorate, Regulatory Operations and Enforcement Branch (ROEB), Health Canada
- Cc: Marnie Johnstone, Executive Director, Health Equity Policy Division, PHAC
- Cc: Wambui Kipusi, A/Director, Chemicals and Environmental Health Management Bureau, HECSB, Health Canada
- Cc: Isabelle Lampron, A/National Director, Environmental Health Program (EHP), ROEB, Health Canada
- Cc: Kelsey Lucyk, Manager, Intersectoral Partnerships and Initiatives, Health Equity Policy Division, PHAC
- Cc: Heather Jones-Otazo, A/ Manager, Environmental Assessment and Contaminated Sites Division, HECSB, Health Canada
- Cc: Kitty Ma, Manager, EHP, ROEB, Health Canada

Annex 1: Federal Authority Advice Record for the Regional Assessment in the Ring of Fire Area



ANNEX 1

Regional Assessment in the Ring of Fire Area

October 24, 2023

Federal Authority Advice Record

Response due to regionalrof-cdfregionale@iaac-aeic.gc.ca by November 30, 2023

Department/Agency	Health Canada and Public Health Agency of Canada
Lead RA Contact(s)	Heather Jones-Otazo
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PART 1 – In providing your responses to the items below, please include any relevant information on associated Indigenous, public or other consultation or engagement activities and identify any partners or collaborations.

1. MANDATE AND AREA(S) OF EXPERTISE

Clearly outline the mandate of your department or agency and detail your area(s) of responsibility or expertise that may be related to the regional assessment

As federal authorities under the *Impact Assessment Act* (IAA), Health Canada and the Public Health Agency of Canada (PHAC) will support the Impact Assessment Agency of Canada (the Agency) on regional assessments (RAs) by providing specialist or expert information or knowledge in their possession (expertise) and by completing and presenting any new analysis of health-relevant datasets. The Agency ultimately determines how to use the expertise provided by Health Canada or PHAC.

Health Canada can provide human health expertise in the following areas:

- Air quality;
- Recreational and drinking water quality;
- Traditional foods (country foods);
- Noise;
- Methodological expertise in conducting human health risk assessment;
- Methodological expertise in conducting health impact assessment (HIA);
- Electromagnetic fields;
- Radiological emissions; and
- Public health emergency management of toxic exposure events.

In addition to the expertise routinely provided on project-specific impact assessments (IAs), Health Canada can also provide technical support on the following activities upon request:

- Design and delivery of outreach programs for public and Indigenous groups to increase awareness of potential risks, health impacts and mitigation strategies related to radon, chemicals, air quality and water quality;
- Development and provision of technical guidance and training to support sound management of contaminated sites;
- Design, implementation and interpretation of results related to human biomonitoring studies; and



- Design, implementation and interpretation of results related to climate change impacts on the health of Canadians, their communities and their health systems, to facilitate effective adaptation.

PHAC has expertise on the social determinants of health approach, positive mental health, and health equity¹, and may provide that expertise through Health Canada, upon request from the Agency. Additionally, Health Canada collaborates with Indigenous Services Canada (ISC)'s First Nations and Inuit Health Branch on areas of expertise pertaining to First Nations peoples' health, such as drinking water quality on reserves, country foods and food security, certain social determinants of health, and community health and wellness programs and services.

2. REGULATORY AUTHORITIES

List and summarize the nature of the regulatory authorities of your department or agency in relation to physical works or activities in the Ring of Fire area.

Neither Health Canada nor PHAC have a regulatory role with respect to major development projects subject to the IAA. Additionally, given the uncertain nature of the scope of future "physical works or activities in the Ring of Fire area", it is not possible to identify which existing regulatory authorities may be exercised in the future.

3. EXPERT INFORMATION OR KNOWLEDGE

List and summarize the specialists or expert information or knowledge that your department or agency has that may be relevant to the regional assessment. Include all research, reports and data sets in this response inventory.

Specific to the Ring of Fire area

Health Canada's internal subject matter expert groups identified few instances of Health Canada or PHAC research, reports or data sets specific to the Ring of Fire area. Knowledge in the general vicinity is typically limited to that provided by project proponents during various federal environmental or IA processes. Work directly relevant to the area includes:

- Health Canada's HealthADAPT program supported the development of climate change and health vulnerability and adaptation assessments for the seven health units within Northern Ontario², including the Porcupine Health Unit, from 2019 to 2022. The main deliverable of the project is a report³ providing an overview of the health impacts of climate change in Northern Ontario, including regional vulnerabilities and health risks from climate change, along with current capacity and possible mitigation strategies⁴;
- Health Canada piloted the EnviroScreen methodology (developed by the California Environmental Protection Agency) in the Northern Ontario context. The methodology integrates publicly available environmental, social, economic and health data and uses a scoring system to compare public health units. Alternative scoring based on environmental indicators only are also available at the secondary watershed level. This work was presented at the 2023 conference of the Indigenous Centre for Cumulative Effects⁵;
- Health Canada's Environmental Health Program conducts outreach and awareness activities surrounding environmental health risks that are relevant to Indigenous peoples in Northern Ontario. Health Canada has participated in the First Nation Housing conference in the Thunder Bay region as presenters and tradeshow exhibitors. In addition, the Department has past and ongoing collaborations with non-profit and Indigenous organizations in Northern Ontario to deliver Health Canada's environmental health messaging on indoor and outdoor air quality and household chemicals;
- Health Canada's Food Directorate provided an expert opinion on potential health risks from metal consumption, including mercury, present in marine animals of east Hudson Bay and James Bay. This

¹ Available at: <https://www.canada.ca/en/public-health/services/health-promotion/population-health/what-determines-health.html>

² Available at: <https://www.canada.ca/en/health-canada/programs/health-adapt.html>

³ Northern Ontario Climate Change and Health (NOCCH) Collaborative. 2022. Climate Change and Health in Northern Ontario. Available at: <https://www.nwhu.on.ca/wp-content/uploads/2022/10/Climate-Change-and-Health-in-Northern-Ontario-August-2022.pdf>

⁴ Indigenous Services Canada also funds First Nation community-designed and driven projects related to climate change adaptation in the Ring of Fire area.

⁵ Available at: <https://icceconferencecaec.ca/2023/>



is part of ongoing work conducted in support of the Northern Contaminants Program³⁸ (please also refer to Attachment 1 for detail); and

- Health Canada participated in Agency-led, in-community, early engagement sessions in 2020 with the Fort Albany First Nation (FN), Kasabonika Lake FN, Martin Falls FN, Webequie FN, Weenusk FN, and Grassy Narrows FN for the Webequie Supply Road Project and the Martin Falls Community Access Road Project IAs.

Information that may be applicable to the Ring of Fire area

Information or knowledge collected outside the area or at a larger scale may nevertheless be pertinent to the RA, depending on final scope. General information or knowledge on IA is available as follows:

Health Canada IA-specific Research:

(Please refer to response 4 for details on this initiative)

Completed Studies

- Developing science-based advice through systematic reviews to inform Health Canada's advice on the health effects of noise under the IAA^{6,7,8,9}
- Canadian perspectives on environmental noise survey^{10,11,12,13,14}
- Environmental scan to identify best practices related to the integration of gender-based analysis plus (GBA Plus) in IA¹⁵
- Grounding resources development and infrastructure projects in HIA and GBA Plus¹⁶

Studies in Progress

- Investigating the strength of evidence related to noise annoyance and biomarkers associated with adverse health: A systematic review of the human literature [Principal Investigator (PI): David Michaud]
- Training for GBA Plus in HIA for federal IA projects (PI: Tihut Asfaw and Matthew Goncalves)
- Relative contribution of country food consumption to nutrition, contaminant exposure and related health outcomes of First Nations children and youth in Canada (PI: Jiping Zhu)
- Modelling environmental noise in rural and non-rural Canada (PI: Stephen Keith)

⁶ Sivakumaran *et al.* 2022. Impacts of Noise Exposure on Risk of Developing Stress-Related Health Effects to the Cardiovascular System: A Systematic Review and Meta-Analysis. *Noise and Health*, 24:107-129. Available at:

<https://pubmed.ncbi.nlm.nih.gov/36124520/>

⁷ Sivakumaran *et al.* 2022. Impacts of Noise Exposure on Risk of Developing Stress-Related Obstetric Health Effects: A

Systematic Review and Meta-Analysis. *Noise and Health*, 24:137-114. Available at: <https://pubmed.ncbi.nlm.nih.gov/36124522/>

⁸ Sivakumaran *et al.* 2022. Impact of Noise Exposure on Risk of Developing Stress-Related Metabolic Effects: A Systematic

Review and Meta-Analysis. *Noise and Health*, 24:215-230. Available at: <https://pubmed.ncbi.nlm.nih.gov/36537446/>

⁹ Sivakumaran *et al.* 2022. Effect of Sleep Disturbance on Biomarkers Related to the Development of Adverse Health Outcomes:

A Systematic Review of the Human Literature. *Journal of Sleep Research*, e13775. Available at:

<https://pubmed.ncbi.nlm.nih.gov/36330773/>

¹⁰ Michaud *et al.* 2022. A comparison of self-reported health status and perceptual responses toward environmental noise in rural, suburban, and urban regions in Canada. *The Journal of Acoustical Society of America*, 151:1532-1544. Available at:

<https://pubs.aip.org/asa/jasa/article/151/3/1532/2838078/A-comparison-of-self-reported-health-status-and>

¹¹ Michaud *et al.* 2022. Annoyance toward transportation and construction noise in rural suburban and urban regions across

Canada. *Environmental Impact Assessment Review*, 97. Available at:

<https://www.sciencedirect.com/science/article/pii/S0195925522001470?via%3Dihub>

¹² Michaud *et al.* 2022. Implications of the COVID-19 Pandemic on Self-Reported Health Status and Noise Annoyance in Rural

and Non-Rural Canada. *Nature Portfolio*, 12:1-10. Available at: <https://www.nature.com/articles/s41598-022-19907-w>

¹³ Michaud *et al.* 2022. Annoyance Toward Landscaping Equipment Noise in Canada. *Journal of Acoustical Society of America*

(Express Letters), 2, 083602. Available at: [https://pubs.aip.org/asa/jel/article/2/8/083602/2842473/Annoyance-toward-](https://pubs.aip.org/asa/jel/article/2/8/083602/2842473/Annoyance-toward-landscaping-equipment-noise-in)

[landscaping-equipment-noise-in](https://pubs.aip.org/asa/jel/article/2/8/083602/2842473/Annoyance-toward-landscaping-equipment-noise-in)

¹⁴ Michaud *et al.* 2023. Chronic Sleep Disturbance among Adult Canadians: Associations and Implications to the Evaluation of

Noise Impacts under Canada's Impact Assessment Act. *Environmental Impact Assessment Review*, 101:1-11. Available at:

<https://www.sciencedirect.com/science/article/pii/S0195925523000756?via%3Dihub>

¹⁵ Sax *et al.* 2021. Environmental Scan to Identify Domestic and International Good Practices to Integrate SGBA+ in Health

Impact Assessment. Available at: <https://www.criaw-icref.ca/publications/environmental-scan-sgba/>

¹⁶ Waheed *et al.* 2022. Grounding Resource Development and Infrastructure Projects in HIA and GBA Plus. Available upon request to: ia-ei@hc-sc.gc.ca



Health Canada Guidance for IAs:

Health Canada has published a series of guidance documents for evaluating the health impacts of major projects on the following topics:

- Human health risk assessment¹⁷;
- Air quality¹⁸;
- Drinking and recreational water quality¹⁹;
- Country foods²⁰;
- Noise²¹; and,
- Radiological impacts²².

Health Canada has developed interim guidance on methodological best practices in HIAs of major projects under the IAA²³. It is being distributed to key groups, and upon request, for the purpose of gathering external feedback on its merit and on areas that may be further developed in the finalized version. This guidance complements the Agency's practitioner guide on *Analyzing Health, Social and Economic Effects under the IAA*.

Other Health Canada Activities:

Health Canada participates in the development of guidelines for the protection of human health. Activities potentially relevant to the Ring of Fire area include:

- Providing human health-related guidance and advice to support an assessment of human health risks from multi-media exposures to metals [e.g. chromium (III and VI), nickel, copper, methylmercury] and other chemicals that may be associated with mining activities. The Department also collaborates with the Canadian Council of Ministers of the Environment to develop and update human health components of soil quality guidelines.
- Participating in the development of the Canadian Ambient Air Quality Standards (CAAQS) as part of the Air Quality Management System, including periodic reviews to enable continuous improvement in air quality. A process is underway to determine the need to update the CAAQS for fine particulate matter (PM_{2.5}). In support of updating the CAAQS for PM_{2.5}, the Department published a report²⁴ that summarizes the health science for PM_{2.5} in the context of ambient air pollution in Canada.
- Developing health-based air quality objectives (HBAQOs)²⁵ that represent the highest safe exposure levels for outdoor air pollutants of concern for human health. The HBAQOs will support all levels of governments and other partners in managing air quality.
- Providing estimates of human exposure levels to air pollutants (e.g., PM_{2.5}, nitrogen dioxide, sulphur dioxide, and ozone) at both local and national scales based on combined air quality data from modelling and monitoring. The data may be useful in informing baseline air quality in the Ring of Fire area.
- Establishing and updating the *Guidelines for Canadian Drinking Water Quality*, in collaboration with the Federal/Provincial/Territorial Committee on Drinking Water.

¹⁷ Health Canada. 2019. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment. Available at: https://publications.gc.ca/collections/collection_2019/sc-hc/H129-54-6-2019-eng.pdf

¹⁸ Health Canada. 2016. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Air Quality. Available at: https://publications.gc.ca/collections/collection_2017/sc-hc/H129-54-1-2017-eng.pdf

¹⁹ Health Canada. 2016. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Drinking and Recreational Water Quality. Available at: https://publications.gc.ca/collections/collection_2017/sc-hc/H129-54-2-2017-eng.pdf

²⁰ Health Canada. 2018. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Country Foods. Available at: https://publications.gc.ca/collections/collection_2018/sc-hc/H129-54-5-2018-eng.pdf

²¹ Health Canada. 2017. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise. Available at: https://publications.gc.ca/collections/collection_2017/sc-hc/H129-54-3-2017-eng.pdf

²² Health Canada. 2017. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Radiological Impacts. Available at: https://publications.gc.ca/collections/collection_2017/sc-hc/H129-54-4-2017-eng.pdf

²³ Health Canada. 2022. Interim Guidance Document for the Health Impact Assessment of Designated Projects under the Impact Assessment Act (draft for review). Available upon request to: ia-ei@hc-sc.gc.ca

²⁴ Health Canada. 2022. Canadian Health Science Assessment for Fine Particulate Matter (PM_{2.5}). Available at: https://publications.gc.ca/collections/collection_2022/sc-hc/H144-100-2022-eng.pdf

²⁵ Available at: <https://www.canada.ca/en/health-canada/services/air-quality/outdoor-pollution-health/standards-objectives/health-based-air-quality-objectives.html>

Health Canada released a national assessment report²⁶ on climate change -related risks to the health of Canadians and the health system. The report includes national-level information on issues, such as climate change impacts on health risks from wildfires, extreme weather events such as floods, droughts, and ice storms, and special challenges faced by Indigenous peoples, such as food and water insecurity, threats to their cultures and livelihoods, and other impacts on the health and health systems of Indigenous peoples.

Datasets and scientific articles of relevance to IAs, which have been created and authored by Health Canada, are being onboarded onto the Government of Canada's Open Science Data Platform²⁷ for direct access by external stakeholders. Searching this platform may yield secondary information applicable to the Ring of Fire or may provide examples of methodologies to capture useful primary data for the RA.

Health Canada also participates in a variety of research initiatives, and Attachment 1 provides a selection of research initiatives to illustrate the topics covered.

4. POLICIES, PROGRAMS OR INITIATIVES

List and summarize the past, current and planned policies, programs or initiatives of your department or agency that may be relevant to the regional assessment. Include an outline of related funding initiatives in this response and provide information on geographic locations, next steps and timing for the program/initiative.

Health Canada has relatively limited resources (and PHAC virtually none) to develop new information or programs in support of RAs under the IAA. The following existing programs or initiatives may yield specialist or expert information or knowledge relevant to the Ring of Fire RA. Launched in 2019-20, Health Canada's Impact Assessment Research Fund provides annual funding for expert groups internal to the Department (and their partners) to address knowledge gaps and support novel scientific efforts that contribute to the health-related knowledge and expertise provided to reviewing bodies during IA processes. This initiative typically provides a maximum of \$40,000 per project per year, with an annual maximum funding capacity of \$200,000. The Department solicits new proposals for funding yearly and is expected to run until the fiscal year 2027-2028 (Cycle 2). Please refer to response 3 for a list of previously and currently funded projects.

Health Canada's HealthADAPT program provided \$3 million of contribution funding (over three years) to 10 Canadian health sector projects at the local, regional, provincial and territorial levels. These projects aim to build health authority capacity by enabling them to undertake climate change and health risk assessments, develop plans, and implement adaptations. One of the 10 projects is located in the Ring of Fire area (see details in response to question 3 above). Health Canada also provides related, ongoing technical support through its participation in meetings, a community of practice, and development of resources and guidance.

Relevant funding opportunities related to health promotion, positive mental health, infectious disease, social determinants of health, and chronic disease prevention may be available through PHAC²⁸.

5. Outline any additional responsibilities, information or knowledge and any partners or collaborations that have not been specified, above.

Health Canada participates in various federal government networks on Indigenous Consultation across the country, which aim to maintain relationships across federal departments, share knowledge and contribute to the whole-of-government approach to Indigenous consultation and engagement.

Health Canada is involved in interdepartmental discussions related to the assessment, monitoring and management of cumulative effects.

Health Canada has collaborated on the following research projects led by ISC:

- First Nations Food, Nutrition and Environment Study (2008-2018); and
- First Nations Food Environmental Health and Nutrition for Children and Youth (2020-2030).

²⁶ Health Canada. 2022. Health of Canadians in a Changing Climate: Advancing our Knowledge for Action. Available at: https://publications.gc.ca/collections/collection_2022/sc-hc/H129-121-2022-eng.pdf

²⁷ Available at: <https://osdp-psdo.canada.ca/dp/en>

²⁸ The current list of grant and contribution funding opportunities from PHAC are available at: <https://www.canada.ca/en/public-health/services/funding-opportunities/grant-contribution-funding-opportunities.html>



Statistics Canada collects and interprets information with a focus on nutrition and food insecurity in the Canadian Community Health Surveys since 2004²⁹. Persons living in remote northern communities or in First Nation communities are often under-represented or not represented in the surveys' coverage. Additional studies and surveys (e.g., First Nations Food, Nutrition and Environment Study, Inuit Health Survey, Aboriginal Peoples Survey, First Nations Regional Health Survey) provide information on nutrition and food security, although data collection may not be regular or consistent. Data from these various sources are informative but may not be reflective of conditions specific to the Ring of Fire communities.

Health Canada has been gathering knowledge on HIA from reviews of published literature, including a few noteworthy ones^{30,31}. The Department's expertise may be useful for the Ring of Fire RA to gain insights into potential interactions among economic, social, and cultural factors that have implications for physical and mental well-being.

PHAC has expertise on the social determinants of health approach. A social determinants of health approach is important in identifying and describing the causal chain linking determinants/factors to the risk factors that determine health outcomes. This approach recognizes that health is more than the absence of disease, and is a state of overall well-being that is impacted by many factors, including the social and physical environment and Indigenous views of health. This approach places emphasis on factors from the individual level (health-related behavioural and biological factors); community and social environment level (service access and social, cultural and economic factors); and systemic level (structural and equity factors). Relevant social determinants of health to be considered in the RA should be selected based on community input if possible, to reflect the setting and circumstances of the impacted communities. Guidance on selecting relevant determinants may be drawn from the suite of determinants recognized by PHAC³².

²⁹ Available at: <https://www.canada.ca/en/health-canada/services/food-nutrition/food-nutrition-surveillance/health-nutrition-surveys/canadian-community-health-survey-cchs/household-food-insecurity-canada-overview.html>

³⁰ Aalhus *et al.* 2018. The Social Determinants of Health Impacts of Resource Extraction and Development in Rural and Northern Communities: A Summary of Impacts and Promising Practices for Assessment and Monitoring. Available at: https://www.northernhealth.ca/sites/northern_health/files/services/office-health-resource-development/documents/impacts-promising-practices-assessment-monitoring.pdf

³¹ Firelight Research Inc. 2021. Indigenous Mental Wellness and Major Project Development: Guidance for Impact Assessment Professionals and Indigenous Communities. Available at: <https://www.canada.ca/content/dam/iaac-acei/documents/research/indigenous-mental-wellness-and-ia-en.pdf>

³² Available at: <https://www.canada.ca/en/public-health/services/health-promotion/population-health/what-determines-health.html>



PART 2 – To contribute to the design of the regional assessment process and development of the terms of reference, please provide information or advice in relation to the items below.

Health Canada has no further input than what was provided in the original FAAR at this time.

1. POTENTIAL OUTCOMES OF THE REGIONAL ASSESSMENT

2. RELEVANT GEOGRAPHIC AND TEMPORAL BOUNDARIES

3. FACTORS TO BE CONSIDERED IN THE REGIONAL ASSESSMENT AND THE SCOPE OF THOSE FACTORS

4. MEANS OF COMMUNICATION AND ENGAGEMENT THAT WOULD BEST FACILITATE PARTICIPATION OF YOUR DEPARTMENT OR AGENCY IN THE REGIONAL ASSESSMENT

5. INPUT OR ADVICE ON ANY OTHER ASPECT OF THE REGIONAL ASSESSMENT



ATTACHMENT 1

Health Canada's Healthy Environments and Consumer Safety Branch - Selection of research initiatives since 2010

To support broader internal collaboration, partnerships and knowledge translation and exchange objectives, the Office of Science Policy, Liaison and Coordination has published an internal (to Health Canada) annual compilation of Healthy Environments and Consumer Safety Branch research abstracts since 2010³³. The following excerpts summarize information on initiatives that may be relevant to the Ring of Fire RA. Publications associated with some of these initiatives may be available or forthcoming. Further details may be obtained upon request.

1. *Indoor air quality and the effects on children's respiratory health in First Nations reserves in the Sioux Lookout Zone*³⁴: This study evaluated Indoor Environmental Quality in houses of approximately 100 children living in four isolated communities in relation to respiratory health and related utilization of health care services. This research identified simple home improvements or building interventions that may improve the respiratory health of children living in the homes. The findings may inform future, similar studies/interventions in remote First Nations reserves across Canada.
2. Updates to the *Air Quality Health Index*³⁵: Designed for national usage, and currently based on urban areas only due to data availability on air pollution, the update provides new information on short-term exposure among vulnerable subpopulations in rural areas and during days of local extreme events such as wildfires and winter wood smoke which are related to PM_{2.5} concentrations.
3. *Health impact analysis PM_{2.5} from wildfire smoke in Canada (2013-2015, 2017-2018)*³⁶: A retrospective analysis of air quality modelling to quantify human exposure to wildfire-PM_{2.5} and to estimate the associated health impacts.
4. *The Canadian House Dust Study*³⁷: Characterization of residential exposures to metals and organics based on samples collected from 1,025 homes in 13 cities.
5. Design of cost-effective drinking water surveys in the 21-st century. This project is in preparation for anticipated future surveys and builds on multiple targeted surveys and two national surveys on drinking water to generate data used for the development of Guidelines for Canadian Drinking Water Quality.
6. *Impacts of major projects on traditional foods and implications for food security of Indigenous Peoples*: Designed to summarize the principles, current practices and methodologies, and basic information that Health Canada will seek during its review of traditional food and food security assessments, submitted by proponents of major projects under the IAA.
7. *Northern Contaminants Program*³⁸: Established in response to concerns about human exposure to elevated levels of contaminants in wildlife species that are important to the traditional diets of northern indigenous people. The objective is to work towards reducing and, where possible, eliminating contaminants in traditional/country foods, while providing information that assists individuals and communities in making informed decisions about their food use.
8. *National Biomonitoring Program*³⁹ under the *Canadian Health Measures Survey Cycles 7-8 (2021-2024)*: This project includes a regional analysis of biomonitoring survey data to help relate exposures to regional or point sources of pollutants and/or sociodemographic or lifestyle factors unique to a region.

³³ Health Canada. 2022. Compilation of Research Abstracts 2021-2022. Available at: <https://www.canada.ca/content/dam/hc-sc/documents/services/publications/science-research-data/compilation-research-abstracts-2021-2022/compilation-research-abstracts-2021-2022-eng.pdf>

³⁴ Kovesi *et al.* 2022. Housing Conditions and Respiratory Morbidity in Indigenous Children in Remote Communities in Northwestern Ontario, Canada. *Canadian Medical Association Journal*, 194 (3) E80-E88. Available at: <https://www.cmaj.ca/content/194/3/E80>

³⁵ Available at: <https://www.canada.ca/en/environment-climate-change/services/air-quality-health-index.html>

³⁶ Matz *et al.* 2020. Health impact analysis of PM_{2.5} from wildfire smoke in Canada (2013-2015, 2017-2018). *Science of the Total Environment*, 725:138506. Available at: <https://pubmed.ncbi.nlm.nih.gov/32302851>

³⁷ Available at: <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/environmental-contaminants/canadian-house-dust-study.html>

³⁸ Available at: <https://science.gc.ca/site/science/en/northern-contaminants-program>

³⁹ Available at: <https://www.canada.ca/en/health-canada/services/chemical-substances/chemicals-management-plan/monitoring-surveillance/national-biomonitoring-initiatives.html>



9. *Cross-Canada Survey of Radon Concentrations in Homes (2009-2011)*⁴⁰.
10. Radon outreach campaign for Thunder Bay public health, Thunder Bay libraries and Nokiwin Tribal Council.
11. *The Canadian Total Diet Study*⁴¹ is an ongoing food surveillance program that monitors the concentrations of chemical contaminants in commercial foods⁴² that Canadians typically consume. The study results on the concentrations of the chemicals in the different food composites are publicly available⁴³. Some study results are published in peer-reviewed scientific literature⁴⁴.
12. Economic analysis of climate change impacts on health and on the health system: The analysis, impacts, methods and data identified in this project may inform economic cost-benefit analyses.

⁴⁰ Available at: https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/radiation/radon/survey-sondage-eng.pdf

⁴¹ Available at: <https://www.canada.ca/en/health-canada/services/food-nutrition/food-nutrition-surveillance/canadian-total-diet-study.html>

⁴² These activities are specific to commercial foods, which are subject to the provisions of the *Food and Drugs Act* and the *Food and Drug Regulations*.

⁴³ Available at: <https://www.canada.ca/en/health-canada/services/food-nutrition/food-nutrition-surveillance/canadian-total-diet-study/concentration-contaminants-other-chemicals-food-composites.html>

⁴⁴ Available at: <https://www.canada.ca/en/health-canada/services/food-nutrition/food-nutrition-surveillance/canadian-total-diet-study/list-publications-presentations.html>