



MIND THE GAP: ASSESSING CLIMATE CHANGE VULNERABILITY ACROSS POPULATIONS

Knowledge Synthesis
Report 2021

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We would like to thank the participants, stakeholders, and research team members for their contributions to this project (KSG LEGG 872-2019-1026). We would also like to gratefully acknowledge the funding support of the Social Sciences and Humanities Research Council of Canada (SSHRC), the Natural Sciences and Engineering Research Council (NSERC) and the Canadian Institutes of Health Research (CIHR).

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BACKGROUND

Climate change is a significant issue globally, but particularly for Canada and South Asia. Between 1948-2012, Canada's annual average surface air temperature over landmass rose by 1.7°C, twice the global average.[1] South Asia, which is home to over 20% of the world's population, is also heavily affected by climate change.[2] Temperature and precipitation rates in countries such as Nepal are also changing faster than the global average.[3]

CLIMATE CHANGE AND HEALTH

As a result, health risks in Canada and South Asia are also changing (geographic areas, populations at risk, burden).[4-6] In Canada, important climate change pathways that impact health are weather-related events (e.g. heat waves, floods, wildfires) and air pollution.[5] South Asia is also facing increasing morbidity and mortality related to heat waves[4, 7, 8] as well as drought (among others), which will impact food security and malnutrition.[7, 9, 10] In both regions, increased precipitation could also lead to more frequent flooding events, resulting in higher risks of water-borne diseases, displacement, and psychological effects.[3, 7, 9, 11, 12]

Climate change could also exacerbate ambient and household air pollution exposure from wildfires, mold, and pollen/spores, resulting in the aggravation of existing respiratory conditions and allergies and increasing the risk of cardiovascular disease and premature mortality in both regions.[5, 12-15] Urban and rural areas will face both common and unique challenges (e.g. population pressures, isolation, migration, urban-heat island effects).[5, 7, 13, 16, 17]



AT RISK POPULATIONS

Certain population subgroups are recognized as experiencing disproportionate vulnerability in both these regions, including older adults, pregnant women, children, outdoor workers, and some immigrant communities.[7, 9, 13] Canadian and South Asian populations are shifting with increases in life expectancy, migration, immigration, and the proportion who are obese, physical inactive, and who live in urban centers, which can compound effects.[9, 18, 19] Poverty and other sociodemographic factors will also exacerbate climate change effects.[9, 13, 20, 21]



Older adults

Increases in the frequency of hot days and warm nights can lead to a rise in morbidity and mortality from cardiovascular, respiratory, and cerebrovascular disease. [9, 22, 23]



Pregnant women

Physiological and psychosocial stress from extreme events can impact pregnant women, which increase the risks of adverse birth outcomes.[9, 24, 25]



Children

The developing physiology of children can increase potential climate change-related health risks (e.g., respiratory conditions).[7, 9, 13, 21]



Immigrants

Issues related to assistance-seeking and discrimination may also affect people's willingness and ability to seek assistance for health issues related to climate change.[26]



OBJECTIVES

Our goal was to explore experiences of health-related vulnerability to climate change and air pollution in older adults, women, children, and immigrants in Canada and South Asia.

Our framework used three dimensions of vulnerability: **exposure**, which is related to contact with something that can affect populations (e.g. wildfires); [27] **sensitivity**, which refers to characteristics that can increase individuals' risk of experiencing an exposure-related adverse outcome (e.g. age);[27] and **adaptive capacity**, which is the “ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences” (e.g. green space).[27]

Our **research objectives** were:

1. To investigate exposure and sensitivity to climate and air pollution-related health impacts in older adult and immigrant populations in Canada
2. To investigate exposure and sensitivity to climate and air pollution-related health impacts in women and children in South Asia
3. To explore adaptive capacity specifically focused on climate and air pollution-related health impacts globally in older adults, women, children, and immigrants

Methods

Review protocols were developed with the assistance of a medical research librarian. Reviews were guided by scoping review methodology [28] and were reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews IPRISMA-ScR guidelines. [29]

Inclusion criteria

Exposure to climatic or air pollution variables; included health impacts; reported results for populations of interest; was a published journal article (2010 and June 2020); focused on Canada or South Asian countries (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka) for scoping reviews 1 and 2

Exclusion criteria

Did not include populations or countries of interest; did not focus on health, climate change, or air pollution

Key search terms

"vulnerable populations" and "climate change" or "air pollution" and "health impacts" and "Canada" or "South Asia"; "adaptive capacity" and "climate" or "air pollution" and "health"

Databases

PROSPERO, OVID Medline, OVID EMBASE, OVID Global Health, OVID PsycInfo, Cochrane Library (CDSR and Central), EBSCO CINAHL, Proquest Dissertations and Theses Global and SCOPUS

Screening and extraction

Two reviewers independently screened titles and abstracts followed by full text studies. Full text extraction was completed using a standardized spreadsheet.

OVERVIEW OF FINDINGS

Some population subgroups, including older adults, immigrant communities, pregnant women, and children, are recognized as potentially experiencing disproportionate vulnerability to climate change and air pollution, which was a finding echoed in our scoping reviews.[7, 9, 13] Little was found regarding adaptive behaviors and adaptive capacity focused on these populations. There were also several critical knowledge gaps that were identified.



Risks in older adult populations

Older adults face increased risks from air pollution-related exposures in Canada compared to younger populations. Intersecting risks (e.g., sex and age) were observed.



Risks for women and children

Women experience higher risks from extreme weather conditions compared to men in South Asia. Children also face increased diarrheal risk with increasing temperatures.



Adaptive behavior

Adaptive behavior was not widely studied in these groups. Commonly reported adaptive behavior in response to heat included avoidance, cooling activities such as drinking water, and staying indoors.



Knowledge gaps

There were notable gaps in the health outcomes studied including morbidity and vector-borne diseases across both regions. The impact of social and behavioral factors was understudied. Few studies focused on immigrant populations.



Disparities

Evidence points to limited research in terms of populations and geographic areas. Immigrants and pregnant women were understudied. Most studies focused only a few geographical areas in Canada (Ontario, Quebec) and South Asia (India, Bangladesh).

Risk And Resilience: How Is the Health of Older Adults and Immigrant People Living in Canada Impacted by Climate- and Air Pollution-Related Exposures?

Tilstra, M., Tiwari, I, Niwa, L., Jones, C.A., Campbell, S., Jones, C.A., Nielsen, C., Osornio Vargas, A., Quemerais, B., Salma, J., Sapkota, B.P., Yamamoto, S.S.

Objective:

- To investigate exposure and sensitivity to climate and air-pollution in older adults and immigrants in Canada and to explore socioeconomic, sociodemographic, and environmental characteristics that modify this relationship.

Findings: 52 papers

- Only quantitative studies
- 51 papers examined age differences
- 2 focused on immigrants
- Mortality was most frequent outcome
- Air pollution and weather risks higher in older adults
- Older adult health risks from climate- and air pollution-related hazards depend on multiple factors
- Fewer studies focused on social and behavioral factors
- Most research conducted in Southern Ontario and Quebec

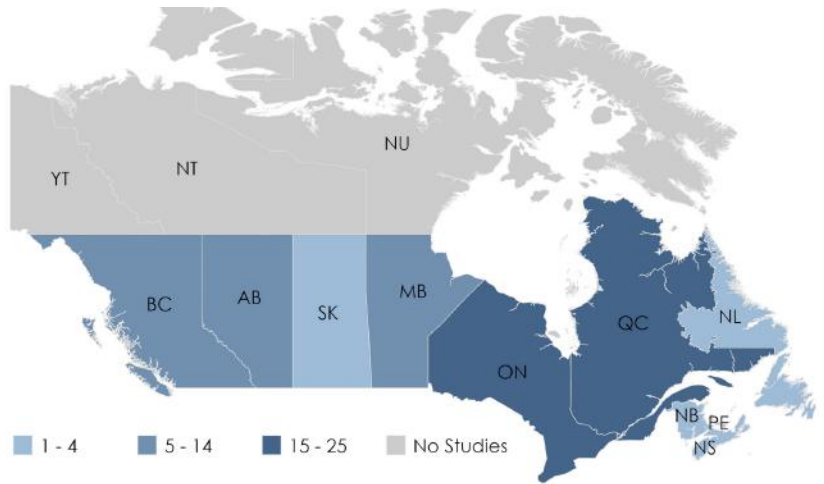


Figure 1: Distribution of (individual and multi-site) studies included in the scoping review by province

Few (3.8%) studies focused on immigrants

Older adults impacted by weather and air pollution exposures



Climate change impacts on the health of women and children in South Asia- A scoping review

Tiwari, I, Tilstra, M., Campbell, S., Hodgins, S., Jones, C.A., Nielsen, C., Osornio Vargas, A., Salma, J., Sapkota, B.P., Yamamoto, S.S.

Objective:

- To explore sensitivity and exposure to climate change and air pollution in women and children in South Asian countries (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka)

Findings: 42 papers

- Few qualitative studies
- Increased climate change and air pollution risks
- Main health impacts included undernutrition, diarrheal disease, low birth weight, premature mortality, and temperature-related illnesses
- Vector-borne diseases not explored in these groups
- Socio-demographic factors modify this risk
- Most of the studies were conducted in India and Bangladesh

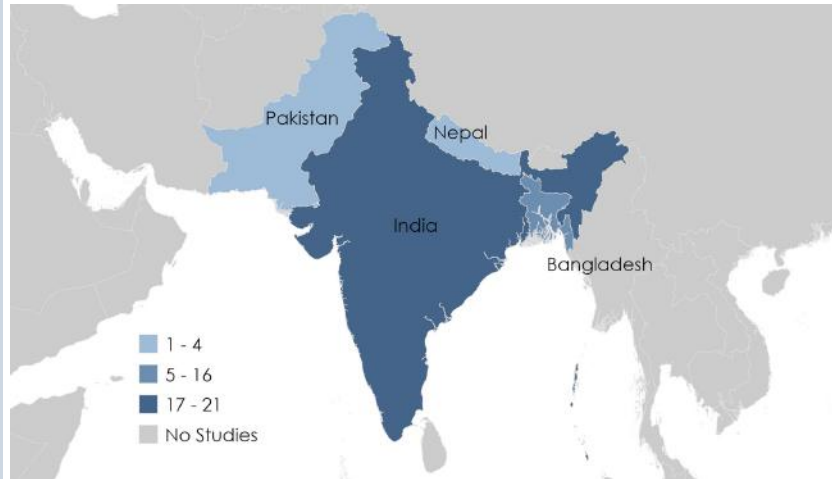


Figure 2: Distribution of studies included in the scoping review by country

Climate change disproportionately impacts women and children in South Asia

Sociodemographic and psychosocial factors affect this risk



Adaptation and adaptive capacity: Climate change and air pollution related health effects

Nielsen, C., Niwa, L., Tilstra, M., Campbell, S., Tiwari, I., Jones, C.A., Nielsen, C., Osornio Vargas, A., Salma, J., Sapkota, B.P., Yamamoto, S.S.

Objective:

- To investigate adaptation and adaptive capacity in response to climate change and air pollution-related exposures in older adults, immigrants, pregnant women, and children globally

Findings: 3 papers

- Studies included older adults (United States -1), children (Bangladesh - 1), and immigrants (Australia - 1)
- Pregnant women were not specifically studied
- Focus on heat and storms
- Other exposures included air pollution, flooding, and precipitation
- Mixed method and qualitative studies
- Adaptation actions included avoidance, cooling activities, and staying indoors
- Lack of exploration of adaptive capacity



Figure 3: Distribution of studies included in the scoping review by country

Very few studies focused on older adults, children, pregnant women, and immigrants

Lack of studies on adaptive capacity

Conversations with older adults

Salma, J., Ali Aziz, A., Bulut, O., Tiwari, I., Jones, C.A., Nielsen, C., Osornio Vargas, A., Sapkota, B.P., Tilstra, M., Yamamoto, S.S.

As part of ongoing work,* we also reached out to older adults and immigrants to discuss issues related to climate change, air pollution, and health. Concern about health impacts was evident as was the recognition that there is a need to address these issues. Participants expressed uncertainty as to what could be done.

"...they took away my bus, now I have to walk further, and we have icy sidewalks...we should become more of a pedestrian city, it'd be better for our health..."

"I'd say being in the latter part of our lives, I'm not so concerned about myself as I am with the next generation..."

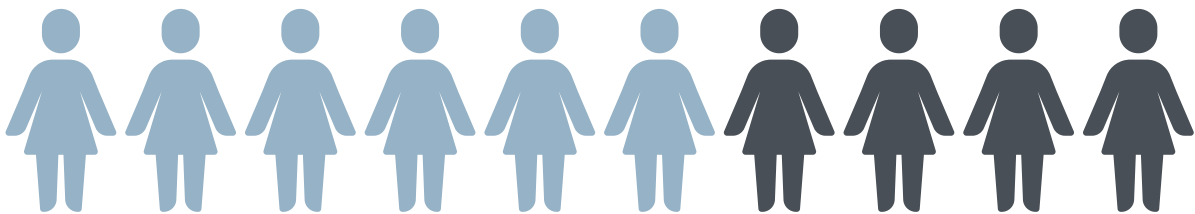
"Well, I'm a believer that I don't think that we can change it. I think we just have to adapt to it."

IMPLICATIONS FOR POLICY

Critical to consider the climate change and health needs across populations, including older adults, women, children, and immigrants

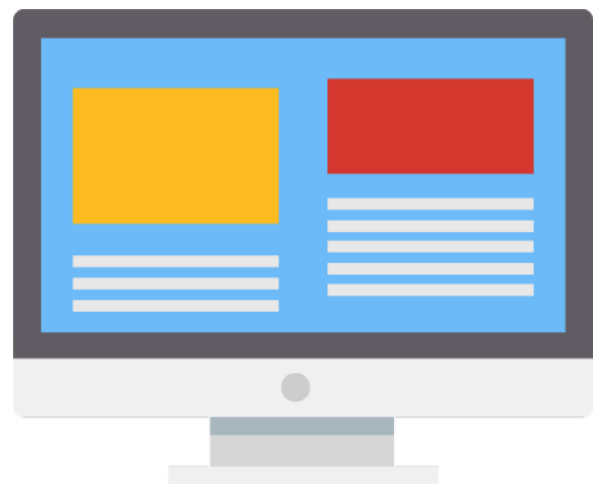


Compound risks and upstream determinants are important contextual factors that affect climate change experiences



Lack of focus on adaptive capacity across different populations and community-level adaptation

Need for inclusive engagement and development of appropriate strategies and policies



IMPLICATIONS FOR PRACTICE

Engage in conversations around climate change, air pollution, and health, particularly with older adults, women, children, and immigrants



Promote and access climate change and air pollution health resources

Include climate change, air pollution, and health in programs to raise awareness



Address gaps in climate change and health programs that do not include older adults, women, infants, children, and immigrants

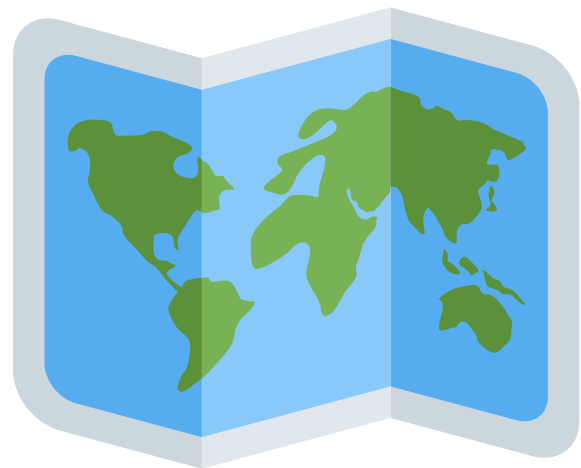
IMPLICATIONS FOR RESEARCH

Current research is focused on the general population, which ignores the circumstances of older adults, women, children, migrants, and immigrants



Lack of research on broader climate change-related health impacts and qualitative studies

Limited data from other provinces and territories in Canada and regions in South Asia



Limited findings on adaptive capacity focused on older adults, women, children, and immigrants



CONCLUSIONS

Existing literature focused on climate change resilience, vulnerability, and adaptation include health [7, 9, 13], but generally do not consider the heterogeneity of populations. Vulnerability (health) to climate change and air pollution can be experienced differently and risks can be compounded across populations and regions, but this has largely not been explored. The needs, experiences, and capacity of older adults, women, children, and immigrants were notably absent from studies, though existing data indicates increased risks and the potential for lower adaptive capacity in these groups, as compared to the general population.

The goals of this work were to synthesize existing evidence regarding climate change, air pollution, and health needs, experiences, and capacity to inform public policy, generate innovative approaches, guide inclusive adaptation and risk mitigation strategies, reduce health risks, and promote further research. During the course of this study, we also identified a number of critical knowledge gaps that need to be addressed.

Our findings also indicate that there is a lack of geographic representation across parts of Canada and South Asia and a narrow range of health outcomes associated with climate change and air pollution that have been examined. Adaptive capacity research that considered the needs of these groups was also missing. Globally, only a few selected studies assessed adaptive behaviors in older adults, children, and immigrants.

KNOWLEDGE MOBILIZATION ACTIVITIES



Stakeholder Engagement Days - Edmonton*

We hosted a virtual Stakeholder Engagement event to share findings and solicit feedback from climate change experts and representatives and organizations working with these groups.



Stakeholder Engagement Days - Kathmandu

We will host a virtual Stakeholder Engagement event to share findings with and solicit feedback from representatives, experts, and organizations in Nepal. The event was postponed due to the resurgence of COVID-19 in Nepal.



Publications

Three scoping reviews are being finalized for submission. Findings from the focus group discussions will be validated and submitted for publication in 2021.



Presentations

Findings have been shared with stakeholders during the Stakeholder Engagement Days. This work has also been presented at a national conference with additional presentations planned.



Reports and infographics

This report has been shared on our website and with the Social Sciences and Humanities Research Council. Infographics summarizing results will be shared online and with organizations.



Online and social media

Findings and links to manuscripts will be shared on social media and our website. Infographics will be shared online and on our website.

*Work conducted as part of NAPECA project

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