Climate Change and Infectious Disease – A Rapid Scoping Review to Support Public Health Preparedness in Canada

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Background

Many infectious diseases are impacted by climate change. In temperate or colder countries, the public health impact of changes to the range and concentration of some infectious diseases is of increasing importance.

Objective

To characterize the global evidence on the impact of climate change or weather on infectious diseases in humans that are not transmitted by food or water.

The results will be used to provide evidence for a document entitled "Health of Canadians in a Changing Climate: Advancing our Knowledge for Action[1]" to be published in 2021 by the Government of Canada.

Methodology

Synthesis Methodology: Rapid Scoping Review (rScR).

Rapid Review Process: Relevance screening conducted by two reviewers, data characterization by one.

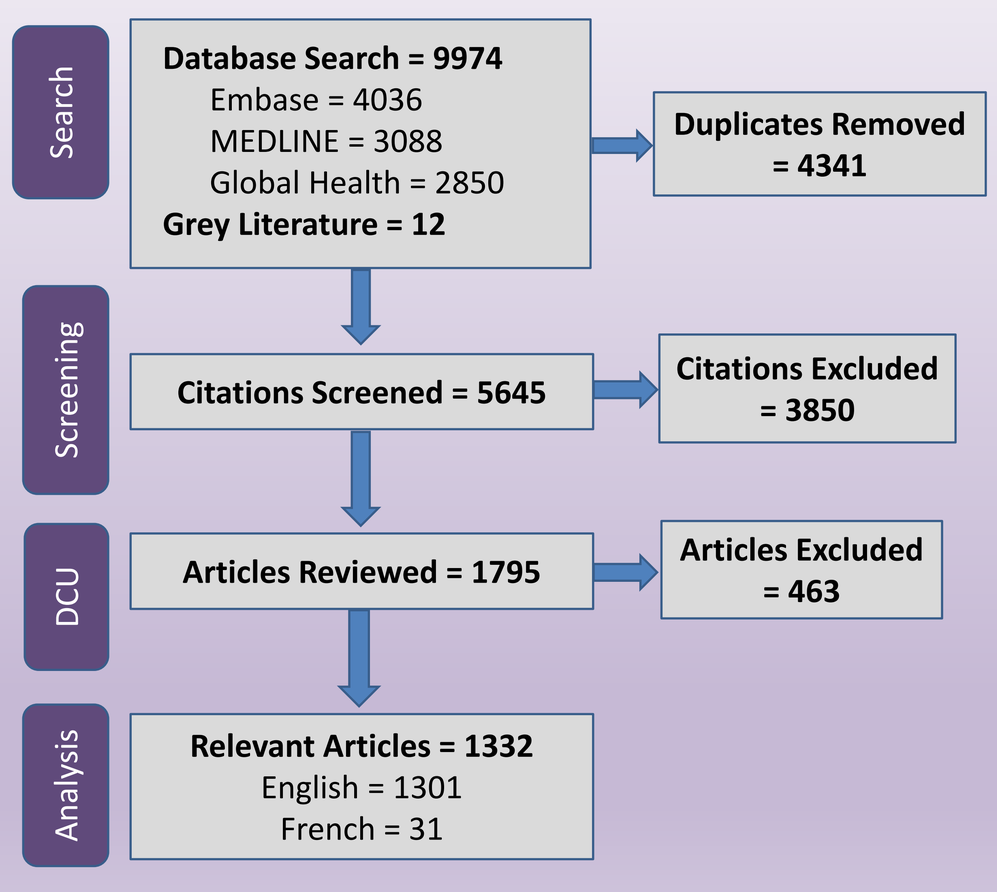

Fig.1 PRISMA Flow Diagram for rScR

Results

The rScR included 1332 unique articles relevant to the impact of weather, climate and/or climate change on infectious diseases.

Despite variable terminology, the articles were organized into three categories of complementary yet distinct areas of relevant research and publications.

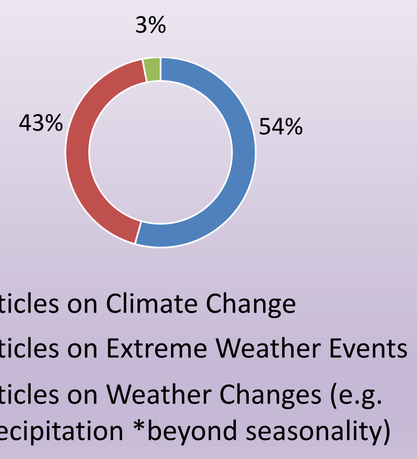

Fig.2 Terms Used in the Literature (n=1332)

Results

- Both primary and secondary literature were included and characterized.
- There is a low proportion of primary research (12%) among climate change articles, whereas 82% of articles on weather changes were classified as primary research.

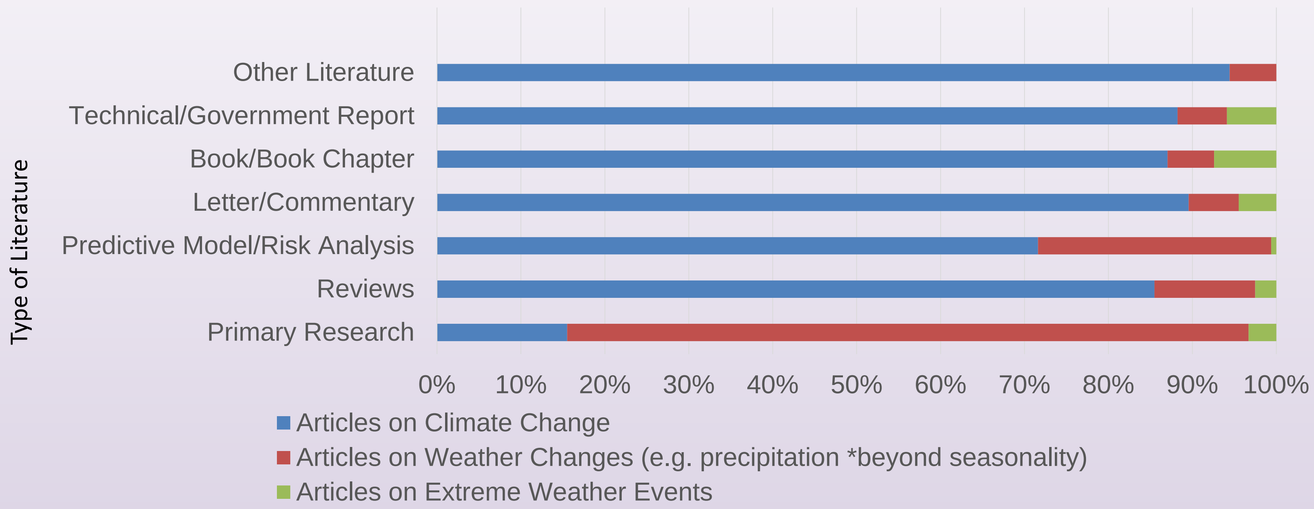

Fig.3 Types of Literature by Research Category in 1332 Articles

- 67 infectious diseases in humans were examined for the impact of climate or weather changes on the disease (19/67 had 10 or more articles, Fig.4).
- A large proportion of the literature (355/1332; 26.7%) did not focus on a specific disease.

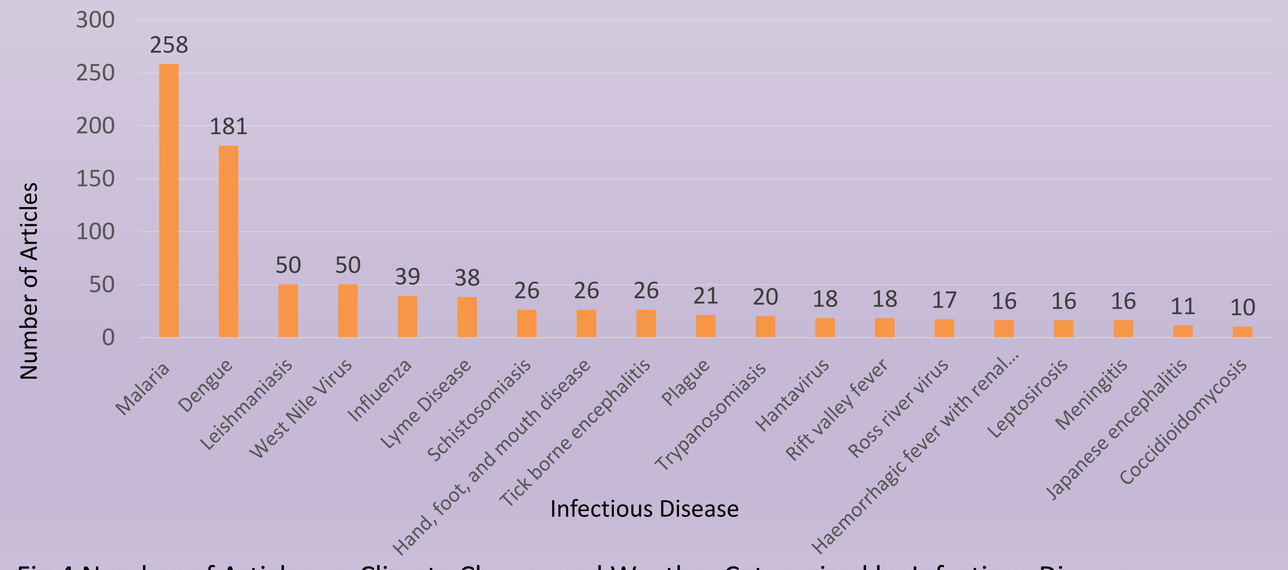

Fig.4 Number of Articles on Climate Change and Weather Categorized by Infectious Disease

- The mode of transmission among the top studied diseases (had >10 articles) was vector-borne (11/19; 57.9%), direct (7/19), air/wind (4/19), and human-to-human (1/19) transmission. *infectious diseases can have more than one mode of transmission

Discussion & Conclusion

Challenges

- The diversity, complexity, and volume of literature on infectious diseases impacted by climate and weather changes makes it challenging to identify and summarize global evidence.
- Various terms used to describe climate change (e.g. global warming, increase in precipitation, etc.) in the literature.
- Development of a complex search strategy by librarians and public health experts.
- More secondary literature (e.g. reviews, editorials) than primary research.

Conclusion

- Climate change impacts on infectious diseases is a complex issue that will continue to be a public health priority.
- Understanding and using the existing evidence for justifying recommendations and stakeholder engagement will drive both research and public health adaptation, prevention and control efforts.
- To date, primary research largely focuses on the short term impacts of weather on infectious diseases, where as climate change as a phenomenon is demonstrated within predictive models and is used as a platform for discussion and hypothesis generation in literature reviews, editorials, books, and government reports.
- This work highlighted knowledge gaps for a number of diseases that will likely be affected by climate change, but for which primary research and other evidence has not been published to date.

Acknowledgements & References

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[1] Ogden, et al. (2021) Infectious diseases. In: Health of Canadians in a Changing Climate: Advancing our Knowledge for Action. Government of Canada. In review."

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