

Housing-related determinants of lung health in Nunavik, Canada

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Abstract

The impact of climate change on lung health has been long established. The Inuit Nunangat region of Nunavik in Quebec, Canada has long started to face the consequences of climate change. In conjunction with the region's existing vulnerabilities rooted in social determinants of health and historic injustices, this leads to poor lung health across Nunavik as evidenced by much higher lung disease rates than the Canadian average. This paper aims to describe the aims, objectives and methodology of a new project that has recently been launched to address these issues with specific emphasis on mould detection as well as indoor and building fabric survey: "Resilient Responses to Protect Lung Health in Nunavik" (Anirniq, 2022-2025) funded as part of the Canada-Inuit Nunangat-United Kingdom (CINUK) Arctic Research Programme.

Peer-review under the responsibility of the organizing committee of the ICMB23.

Keywords: lung health; climate change; Arctic; housing; Inuit; Nunavik; mould

1. Introduction/Background

The potential impact of anthropogenic climate change on long health through factors including shifts in temperature normals, precipitation patterns and airborne allergen burdens, as well as extreme air-polluting events such as wildfires and forest fires has long been established [1]. The Inuit Nunangat region of Nunavik in the Canadian Arctic experiences these and other climatic impacts, making it one of the most adversely affected territories globally [2]. In conjunction also with the disparities in health services infrastructure, it was previously noted that the Inuit populations' health is likely to suffer disproportionately from all these factors compared to the rest of Canada [3], which is confirmed by the data: the hospitalization in Nunavik for respiratory disease and tuberculosis are several- and hundreds-times higher than the Canadian average, respectively [4, 5].

To address these issues, "Resilient Responses to Protect Lung Health in Nunavik" (Anirniq, 2022-2025) project was set up in 2022 with funding from NERC (NE/X003361/1) and NRC (ANCP-310197) with the following primary objectives: (1) co-create a novel community health worker-led lung health programme and (2) develop local capacity for assessing housing-determinants of lung health. This paper describes and discusses the methodological outlook of Objective 2.

2. Methodology and Impact

The Anirniq project aims to develop local capacity for assessing housing-related drivers of health and wellbeing of Inuit communities through a protocol to enable the local housing authority to undertake rapid and accurate measurements of housing-related determinants of lung health, including the detection of mould. This requires a holistic and crossdisciplinary methodology to collect information with regard to building and ventilation system performance, occupancy patterns, long-term indoor hygrothermal conditions, indoor pollutants (VOCs, formaldehyde etc.) and microbiome (Figure 1).

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Figure 1. Methodological outline for the field investigations of Anirniq project Objective 2

The first phase of the fieldwork will be completed between May and December 2023 on a minimum of 70 homes in total to be recruited through help from the Kativik Municipal Housing Bureau (KMHB). In the second phase, ~30 homes will be examined for fungal burden to use the outcomes of Phase 1 for a quick appraisal method to be used by the KMHB from early 2024.

Housing characteristics are known to have the potential to elevate fungal burden within homes, heavy and systematic exposure of which can have serious health implications, including asthma, wheezing, respiratory infections, allergic rhinitis and upper respiratory tract symptoms, especially in children [6]. When combined with overcrowding, fuel poverty, inadequate ventilation, unrepaired moisture damage and escape of water, visible mould is reported to be present in a significant portion of the Nunavik households [7] where asthma is listed among the most common chronic conditions for Inuit children under age 6. However thorough research into the extent of the mould problem in Inuit homes is yet to be conducted [8], considering also that the lack of visible mould does not necessarily indicate low mould burden [9]. The Anirniq project aims to develop a comprehensive understanding of Inuit homes and the interrelations between home characteristics and mould propensity and poor indoor environment.

Acknowledgements

It is acknowledged that the Anirniq project is supported by the Kativik Municipal Housing Bureau (KMHB) and Ungava Tulattavik Health Centre, as well as a Steering Committee with representatives from each of the 3 coasts.

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