

Housing in the Canadian North:
Recent Advances and Remaining Knowledge Gaps and Research Opportunities

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Content

- Abstract and Methodology
- Overview
- Recent Advances
- Knowledge Gaps and Research Opportunities
- References

Abstract and Methodology

This summary presents housing-related research gains, gaps and opportunities gathered by the Canadian Polar Commission in fulfillment of its mandate to monitor and communicate polar knowledge in Canada and around the world. It is focused on the Canadian North, comprising the Yukon, Northwest Territories, Nunavut, Nunavik, and Nunatsiavut, during the seven-year period beginning with the International Polar Year (IPY) in 2007. The following observations are organized under recent advances and knowledge gaps and research opportunities. They are based on semi-structured interviews with northern housing research experts and practitioners, which have been supplemented and validated with both peer-reviewed and 'grey' literature.

Overview

- There is a significant housing shortage, which is exacerbated in some areas of the North by a growing population (Nunavut Housing Corporation, 2012a; Pulla, 2012; Zanasi & Pomeroy, 2013) and increased demand for units as a result of economic development activity (National Aboriginal Health Organization, 2008; Zanasi & Pomeroy, 2013). The costs of maintaining the current housing stock and building new homes to keep pace with growth will be significant (Kativik Regional Government & Makivik Corporation, 2010; Northwest Territories Housing Corporation, 2011; Nunavut Housing Corporation, 2012a).
- Housing affordability is also a significant issue in the North. Costs associated with construction logistics, building materials and transporting materials to the North are high. Home maintenance and operation costs are also significant, including those for repairs and utilities, which in turn contributes to a high cost of living (Northwest Territories Housing Corporation, 2011; Nunavut Housing Corporation, 2012a).
- The availability of land for housing development is an issue in some areas of the North as a result of unsettled land claims and insufficient land use planning capacity (Pulla, 2012).
- The capacity to build homes can be limited given lack of skills with respect to construction and equipment operation and maintenance, the limited number of builders, and high turnover, which can make it difficult to incorporate new designs and technologies and complete housing projects within planned timeframes (Northwest Territories Housing Corporation, 2011).
- With high unemployment, high cost of living, and the lack of affordable and available private ownership or rental options, especially in smaller communities where there is little or no housing market and in larger communities where the real estate and rental market is inflated, there is a substantial reliance on public housing. This is putting strain on all types of housing options, including supportive/assisted living, rent-geared-to-income, and market housing/ private ownership, and can prevent people from being able to transition along the housing continuum, with homelessness at one extreme to owner-occupied housing (Nunavut Housing Corporation, 2012a; Pulla, 2012; Falvo, 2012).
- Overcrowding is common, which has negative implications for health and well-being, such as respiratory illness and mental health issues (Kativik Regional Government & Makivik Corporation, 2010; Knotsch & Kinnon, 2011).
- Although much work has been done to design and construct houses that are suited to northern realities and lifestyles (Canada Mortgage and Housing Corporation, 2009; Pulla, 2012), in many areas of the North, housing is designed and constructed according to southern perspectives and practices, and as a result, may not necessarily accommodate the needs of Northerners or be appropriate for the northern environmental context. This can lead to accelerated deterioration and the need for more repairs and upgrades (Pulla, 2012).
- The National Building Code and green building rating systems, which are reflective of southern design, construction and industry standards, can be difficult to apply in

the northern context (Goldhar et al., 2012; Ladik, 2013). The Government of Nunavut is currently working to implement a Nunavut Building Code in 2014 that is modeled on the National Building Code, with allowances that are more suited to the northern environment (Ladik, 2013). The quality of housing in the North can also be a concern, with some incidences of non-compliance with building codes and standards that can result in negative implications for human health and well-being (Corea, 2007; Goldhar et al., 2012).

- Energy security and efficiency of homes is a concern especially given the availability and affordability of fuels (Northwest Territories Housing Corporation, 2011).
- The lack of long-term, sustainable funding for housing hinders the ability to develop long-term housing plans in terms of building new homes and repairing existing stock, and building capacity and economies of scale in the areas of project management, procurement of supplies, and construction and logistics (Nunavut Housing Corporation, 2006). With limited funds available for the construction of new houses, attention is also being put towards examining existing housing stock in some regions of the North, much of which is in need of repair, to determine whether and how older houses can be retrofitted (Northwest Territories Housing Corporation, 2011; Nunavut Housing Corporation, 2012b).
- The extent to which these housing challenges are faced in the North vary as a result of differences in factors such as the availability and costs associated with transportation networks, land tenure, and the extent to which there is a housing market (Northwest Territories Housing Corporation, 2011).

Recent Advances

- The relationship between housing and health and social conditions is becoming more documented. The International Polar Year (IPY) Inuit Health Survey 2007-08, for example, brought attention to the high prevalence of overcrowding in homes with children and hidden homelessness (Minich et al., 2011). The 2011 report published by the National Aboriginal Health Organization *If Not Now... When? Addressing the Ongoing Inuit Housing Crisis in Canada* documents the relationship between housing and health for Inuit (Knotsch & Kinnon, 2011). A number of research initiatives have also contributed to better understanding of impacts of indoor air quality on health (Kovesi et al., 2007; Verhille et al., 2009).
- Many regions have completed (e.g. Nunavut and Nunavik) or are in the process of completing (e.g. Nunatsiavut) a housing survey to document housing conditions and some of the associated household and demographic information to objectively inform housing related policies, programs and investments (The Bayswater Consulting Group Inc., 2005; Kativik Regional Government & Makivik Corporation, 2010; Nunavut Housing Corporation, 2012a; Government of Newfoundland and Labrador, 2013).
- Significant gains have also been made with respect to building science. Research has led to the identification of more high performance building envelopes, enhanced ventilation systems to improve air quality, and foundations that are more suited to permafrost conditions (Canada Mortgage and Housing Corporation, n.d.). There is

increased knowledge of the heat, air and moisture performance of houses in the Arctic, and research has been conducted to test the durability and energy efficiency of high performance building envelope options (National Research Council, 2009). Electronic performance monitoring is also being conducted, for example, in 19 housing units in the Yukon (Energy, Mines and Resources – Yukon Government, 2012).

- A Tri-Territorial Technical Subcommittee was formed in 2009 which includes technical and programs managers from the territorial housing corporations and from the Canada Mortgage and Housing Corporation (CMHC) to identify, investigate and overcome technical issues (Canada Mortgage and Housing Corporation, 2012). The Tri-Territorial Heat Recovery Ventilator (HRV) Initiative is underway in Whitehorse, YT and Cambridge Bay, NU to address mechanical ventilation (the top technical issue identified by the Subcommittee) by monitoring the installation and operation of HRVs to develop a specification that will facilitate the development of HRVs that are more suited to the northern environment (Yukon College, 2012; Canada Mortgage and Housing Corporation, 2012).
- The Northern Sustainable Housing Initiative has made gains with respect to the design of a culturally appropriate home in Tr’ondek Hwech’in YT, Inuvik NT, and Arviat NU through the use of community design charrettes and workshops. The homes constructed in Tr’ondek Hwech’in and Arviat were designed to consume 50 percent less energy than the Model National Energy Code for Houses, while the home in Inuvik was designed to achieve an Energuide efficiency rating of 85 (Canada Mortgage and Housing Corporation, 2009; Northwest Territories Housing Corporation, 2012).
- A housing design charrette is planned for 2014 as part of the “InosiKatigeKagiamik Illumi” (Healthy Homes in Nunatsiavut) Project, which aims to inform the design of a sustainable house that is designed and built by Inuit for Inuit, and build the pilot home to evaluate performance over time (Nain Research Centre, 2013).
- With respect to housing insecurity and homelessness in the North, Julia Christensen’s housing research in Yellowknife and Inuvik has furthered understanding of: 1) the factors that lead to it, which centre around institutionalization and dependency; 2) common areas of vulnerability that are present in the lives of people who are homeless, including corrections histories, addictions and mental health, and education, training and employment; 3) the effect of policy and economic factors; and, 4) how urban-rural dynamics can lead to homelessness in more urban centres (Christensen, 2011).
- Policy-related research on homelessness and affordable housing in the NWT and Yukon by Nick Falvo provided a closer look at housing-related policy and funding initiatives and the associated challenges, as well as program responses to homelessness, and identified a number of policy recommendations such as increasing accountability, developing shelter standards, and providing more affordable housing options (Falvo, 2011a & b, 2012).
- A review and assessment was undertaken of housing issues in the Yukon, including an examination of the housing situation and housing trends and issues in Whitehorse and the more rural areas, and future housing requirements were

projected. It was found that there is a well functioning market in Whitehorse, with data available to support an analysis of the housing system there. In contrast, it was found that the housing system in smaller communities was not as well-developed, with limited options and opportunities (Zanasi & Pomeroy, 2013).

- Nunavut Housing Corporation released a housing and homelessness strategy framework which outlines the current housing situation in Nunavut, including projections for future housing needs (Nunavut Housing Corporation, 2012a).
- There have also been initiatives to identify research and collaboration that is needed to inform effective housing related policies, programs and investments such as the 2011 report published by the National Aboriginal Health Organization (NAHO) *If Not Now... When? Addressing the Ongoing Inuit Housing Crisis in Canada* which focuses on housing as it relates to health (Knotsch & Kinnon, 2011). The Centre for the North's 2012 Report *Framing Sustainable Options for Housing in Canada's North* also provides recommendations to address housing challenges, based on an assessment of past, previous, and future northern housing policies and programs (Pulla, 2012).

Knowledge Gaps and Research Opportunities

- There is a need to continue designing and testing the viability of more low-cost and energy-efficient building envelope options and cold climate technologies that are durable in harsh northern conditions and reflective of building, operational and maintenance capacity in the North (Northwest Territories Housing Corporation, 2008; Pulla, 2012). This includes wall designs, window selection and installation techniques, insulation products, building material durability in extreme climates, ventilation equipment design and selection, and heating systems. Further and better application of building science to northern housing is also needed.
- With the high costs of energy in the North, there is a need for further research regarding alternative sources for more affordably energizing and heating housing units (e.g. bio-mass, etc.) and testing and adapting of renewable energy technologies (e.g. wind, solar, ground source heat pumps) to overcome problems that may arise during demonstration and pilot projects, such as capacity building issues and varying energy production levels at different times of the year. There is also a need for further research to better understand how each of these elements or technologies fit with other systems or components within a housing unit (Nunavut Housing Corporation, 2012a).
- There is no 'one-size-fits-all' design that can appropriately meet the needs of all Northerners. More research is needed, including that which involves community participation, to design houses that better accommodate the varying individual, family and community needs, and traditional lifestyles (Université Laval, 2012).
- Further research is needed to better understand the relationship between housing and socioeconomic conditions to inform policies and programs. With insufficient uptake and follow through with respect to research regarding the relationship between housing and social conditions, a northern-specific analysis of the costs and benefits of investing in social housing is needed to inform and support meaningful

investment in housing that can reduce expenditures on other social services (Nunavut Housing Corporation, 2012a). There is also a need for further research to demonstrate linkages and document evidence of the relationship between housing, health, education attainment, and economic prosperity to inform education and economic related policies and plans (Knotsch & Kinnon, 2011).

- Research is needed to “examine the life-long and multi-generational effects of Inuit spending a childhood in inadequate housing” (Knotsch & Kinnon, 2011).
- Research is needed to determine the factors that will affect housing demand in the future and analyze demand pressures for various types of housing along the housing continuum. This includes identifying where the need exists and what the need will be in the future to allow planners and builders to supply housing that fits with demand and inform policy that encourages appropriate types of construction for efficient and effective investment allocation. This is particularly important in smaller communities where access to various housing options is extremely limited (Nunavut Housing Corporation, 2012a; Pulla, 2012).
- Further research is needed to inform policies, programs, and private sector incentives, and identify and facilitate partnering opportunities that can help to reduce risks associated with building homes for rental or private ownership, and support and expand the development of private housing and rental markets (Nunavut Housing Corporation, 2012b).
- The 2011 NAHO report *If Not Now... When? Addressing the Ongoing Inuit Housing Crisis in Canada* outlines research gaps pertaining to housing and its relationship to health, including the need for a framework to analyze housing as a social determinant of Inuit health; and more longitudinal studies and ongoing surveillance to strengthen understanding of the long-term impacts of housing on health (Knotsch & Kinnon, 2011).
- This report, along with the Centre for the North’s report *Framing Sustainable Options for Housing in Canada’s North* provide a number of research opportunities to address current housing challenges, including researching the role of lenders, mortgage insurers, and the private sector with respect to housing programs, policies, and development; forecasting public and private housing demand over the next 20 years, while incorporating life-cycle housing costs; and researching the relationship between housing and health and social and economic development to provide evidence to support action and inform the design and implementation of housing and housing related policies and programs (Knotsch & Kinnon, 2011; Pulla, 2012).
- There is a need to establish and/or strengthen collaborative partnerships between federal, territorial, and regional governments, NGOs and industry to undertake multi-disciplinary research to inform policies and programs to support effective housing options (Yukon Housing Corporation, 2012; Nunavut Housing Corporation, 2012a).

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