



Housing Conditions and Associations with Social Outcomes in First Nations Communities in Quebec

REPORT TO THE FIRST NATIONS OF QUEBEC AND LABRADOR
HEALTH AND SOCIAL SERVICES COMMISSION (FNQLHSSC)



FIRST NATIONS OF QUEBEC
AND LABRADOR HEALTH
AND SOCIAL SERVICES
COMMISSION



Housing Conditions and Associations with Social Outcomes in First Nations Communities in Quebec

**REPORT TO THE FIRST NATIONS OF QUEBEC AND LABRADOR
HEALTH AND SOCIAL SERVICES COMMISSION (FNQLHSSC)**



Authors

René Iwo, research assistant, Institute for Health and Social Policy and Department of Geography, McGill University

Mylène Riva, assistant professor, Institute for Health and Social Policy and Department of Geography, McGill University; Canada Research Chair in Housing, Community and Health (CIHR 950-231678)

Reviewers

Marie-Jeanne Disant, Surveillance Plan Development Agent, FNQLHSSC

Mathieu Olivier-Côté, Senior Data Analyst, FNQLHSSC

Nancy Gros-Louis McHugh, Research Sector Manager, FNQLHSSC

Acknowledgements

The authors would like to thank First Nations communities and members of the communities who gave their time to respond to the surveys. The authors would like to acknowledge the contributions of Ella Myette, Lauren Nagel and Sophie Kingunza Makasi for their help in the preparation of this report. We also thank Guy Latouche, Housing and Infrastructure Advisor for the AFNQL, for reviewing an earlier version of the report. Work conducted for the production of this report was made possible through funding from the Trottier Institute for Science and Public Policy at McGill University and from the Canada Research Chair Program.

Linguistic revision

Heidi Rooke

Graphic design and page layout

Patricia Carignan

Photo credits

CEPN, CSSSPNQL, Depositphotos, iStock, Marc Tremblay, Shutterstock and ThinkstockPhotos.

This document is also available in French and can be downloaded from the FNQLHSSC website at centredoc.cssspnql.com/.

Suggested citation

First Nations of Quebec and Labrador Health and Social Services Commission. (2020). *Housing Conditions and Associations with Social Outcomes in First Nations Communities in Quebec*. Wendake, QC.

ISBN: 978-1-77315-293-6

Legal deposit – 2020

Bibliothèque et Archives nationales du Québec / Library and Archives Canada

All intellectual property rights reserved by the FNQLHSSC

© FNQLHSSC 2020

TABLE OF CONTENTS

1	Introduction	— 1
2	Data sources and methods	— 3
3	Housing conditions in First Nations communities in Quebec	— 5
3.1	Overview of housing provision in First Nations communities in Quebec	— 5
3.2	Housing conditions for First Nations children, youth and adults	— 6
3.3	Variation in housing conditions between First Nations communities	— 8
3.4	Housing conditions, policies and programs in First Nations communities	— 11
4	Housing and social outcomes	— 15
4.1	Housing and education outcomes in children and youth	— 17
4.1.1	Overview of the literature	— 17
4.1.2	Descriptive statistics	— 18
4.1.3	Association between housing conditions and education outcomes	— 18
4.2	Housing and employment in adults	— 21
4.2.1	Overview of the scientific literature	— 21
4.2.2	Descriptive statistics	— 21
4.2.3	Association between housing conditions and employment	— 21
4.3	Housing and food security in adults	— 22
4.3.1	Overview of the scientific literature	— 22
4.3.2	Descriptive statistics	— 23
4.3.3	Association between housing conditions and food insecurity	— 24
4.4	Housing and sense of control over one’s life (mastery)	— 25
4.4.1	Overview of the scientific literature	— 25
4.4.2	Descriptive statistics	— 25
4.4.3	Association between housing conditions and mastery	— 26
5	Conclusion	— 29
	References	— 32
	Appendix	— 36
	Education regression results	— 37
	Employment regression results	— 40
	Food security regression results	— 41
	Mastery regression results	— 42

LIST OF FIGURES

- Figure 1 Prevalence of household overcrowding in First Nations communities in Quebec, by community characteristics — 8
- Figure 2 Prevalence of various forms of housing tenure in First Nations communities in Quebec, by community characteristics — 9
- Figure 3 Prevalence of housing in need of major repairs in First Nations communities in Quebec, by community characteristics — 9
- Figure 4 Prevalence of reported problems with mould in First Nations communities in Quebec, by community characteristics — 10
- Figure 5 Prevalence of adults who consider housing as a main challenge faced by the community, by community characteristics — 10

LIST OF BOXES

- Box 1 Housing variables used in analysis — 6
- Box 2 Community-level characteristics considered — 8
- Box 3 Education-related outcomes used in analyses — 18
- Box 4 Components of the Household Food Security Survey Module Six-Item Short Form and the prevalence of food insecurity — 23
- Box 5 Components of the Pearlin Mastery Scale — 26

LIST OF ABBREVIATIONS

- FNCS First Nations Community Survey
- FNQLHSSC First Nations of Quebec and Labrador Health and Social Services Commission
- HFSSM Household Food Security Survey Module
- OCAP® Ownership, Control, Access and Possession
- OR Odds Ratio
- PPR Persons per room
- REEES Regional Early Childhood, Education and Employment Survey
- RHS Regional Health Survey
- 95% CI 95% confidence interval

LIST OF TABLES

Table 1	Breakdown of sample sizes of REEES 2014 and RHS 2015 — 4
Table 2	Housing conditions of children and youth in First Nations communities in Quebec (REEES Children and Youth 2014) — 6
Table 3	Housing conditions of adults living in First Nations communities in Quebec (RHS Adults 2015) — 7
Table 4	Shelter and infrastructure conditions in First Nations communities in Quebec (n = 20 communities; FNCS 2015) ^a — 12
Table 5	Housing policies and programs in First Nations communities in Quebec (n = 19 communities; FNCS 2015) ^a — 13
Table 6	Breakdown of variables included in regression models — 16
Table 7	Example of summary table presenting results of the association between housing conditions and social outcomes — 16
Table 8	Summary results of the associations between housing conditions and education outcomes in children (n = 433; REEES Children 2014) — 19
Table 9	Summary results of the associations between housing conditions and education outcomes in youth (n = 284; REEES Youth 2014) — 20
Table 10	Summary results of the associations between housing conditions and employment in working-age adults (n = 1,402; RHS Adults 2015) — 22
Table 11	Summary results of the associations between housing conditions and food insecurity in adults (n = 1,574; RHS Adults 2015) — 24
Table 12	Summary results of the associations between housing conditions and mastery in adults (n = 1516; RHS Adults 2015) — 26
Table A1	Associations between housing conditions and good grades on last report card (at or above 80%/mainly A's) for children in primary school (n = 410; REEES Children 2014) — 37
Table A2	Associations between housing conditions and being late to school at least once a month for children in primary school (n = 413; REEES Children 2014) — 37
Table A3	Associations between housing conditions and good grades in last report card (at or above 70%/mainly B's or better) for youth in secondary school (n = 268; REEES Youth 2014) — 38
Table A4	Associations between housing conditions and ever repeating a year in school for youth in secondary school (n = 284; REEES Youth 2014) — 38
Table A5	Associations between housing conditions and skipping classes at least once a month for youth in secondary school (n = 267; REEES Youth 2014) — 39
Table A6	Associations between housing conditions and employment for working-age adults (n = 1402; RHS Adults 2015) — 40
Table A7	Associations between housing conditions and food insecurity (n = 1574; RHS Adults 2015) — 41
Table A8	Associations between housing conditions and mastery for adults (n = 1516; RHS Adults 2015) — 42



SUMMARY

Housing conditions are important social determinants of health and other social outcomes. There are important disparities in housing conditions between First Nations and the general Canadian population. This report describes housing conditions in First Nations communities in Quebec and their variation between communities. It also examines the relationship between housing conditions and education, employment, food security, as well as perceived control over one's life.

Data analyzed are from three cross-sectional surveys representative of First Nations communities in Quebec: the 2014 First Nations Regional Early Childhood, Education and Employment Survey (REEES); the 2015 First Nations Regional Health Survey (RHS) Phase 3; and the 2015 First Nations Community Survey (FNCS). These surveys were conducted by the First Nations of Quebec and Labrador Health and Social Services Commission (FNQLHSSC). The REEES and RHS questionnaires were administered to a representative sample of children (0-11 years), youth (12-17 years) and adults (≥ 18 years). In the FNCS, questionnaires were completed by community representatives.

The report presents housing conditions for First Nations overall and then explores variations by community-level characteristics, namely remoteness and population size. Findings from the FNCS provide a picture of housing conditions and related programs at the community level, connecting findings with policy. Then, associations between various housing conditions and education outcomes for children and youth (from 2014 REEES), and employment, food security and perceived control over one's life for adults (from 2015 RHS) are reported.

Living in a dwelling in need of major repairs and with mould problems was reported by one in four adults. One in ten adults lived in an overcrowded dwelling, defined as a dwelling with more than one person per room. Among children, 25% lived in an overcrowded dwelling; this prevalence was 14% among youth. Housing conditions varied by the remoteness of the communities. In general, housing conditions were more favourable in communities near urban areas (within 50 kilometres of a service centre). Across communities, the rate of construction of new housing units was low. In communities, many people are on the priority list for housing, with wait times generally longer than two years.

For children in primary school, living in larger households was associated with poorer academic performance, whereas living in overcrowded dwellings was associated with a higher likelihood of being late to school. For youth in secondary school, larger household size and overcrowding were associated with poorer academic performance and a higher likelihood of repeating a year. Among adults, household overcrowding and major repairs needed were associated with a lower likelihood of being employed. Overcrowding, rental tenure (vs. homeownership), major repairs needed and mould problems in the house were all associated with higher food insecurity. Being a homeowner and not living in an overcrowded dwelling was associated with a higher sense of control over one's life.

Results speak to the diverse social impacts of housing needs in First Nations communities in Quebec. Programs seeking to improve housing conditions might be most effective when combined with other social interventions, calling for cross-sectoral collaboration.





1 Introduction

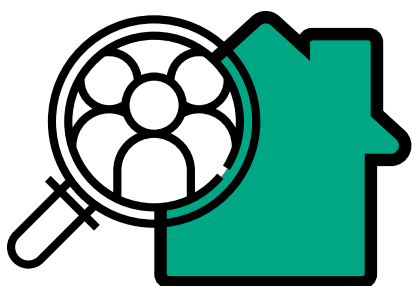
Housing is recognized as a human right under Article 11 of the *United Nations International Covenant on Economic, Social and Cultural Rights*, ratified by Canada in 1976¹. Housing is also considered a key determinant of health and poor housing conditions can have cumulative negative effects on a person over their life course²⁻⁴. The housing situation of Indigenous Peoples in Canada, which make up nearly 5% of the Canadian population⁵, is a matter of social justice. They are by and large more likely to be in core housing need, that is living in houses that are overcrowded, unaffordable and/or in need of major repairs⁶. Among Indigenous Peoples identifying as First Nations, the prevalence of living in an overcrowded dwelling and in a dwelling in need of major repairs is about three times higher than for the general Canadian population. These inequalities are even more important when the housing conditions of First Nations living in First Nations communities are considered⁷.

Colonial and assimilationist policies drove the oppression, displacement and sedentarization of First Nations, which have lasting impacts on all aspects of their lives today. The adoption of the *Indian Act* in 1876 created “Indian reserves” (hereafter referred to as First Nations communities) that are held by the Crown with only restrictive land management rights given to band governments. Among other factors, all this has created major barriers for maintaining good housing quality and sufficient housing stock in many communities^{8,9}. This is compounded by a myriad of other factors including poor construction quality of existing houses, which leads to accelerated deterioration; underfunding for new construction and repairs of houses for a rapidly growing population; and

limited capacity in terms of labour, finance, infrastructure, and geography (land amenable to development and remoteness)². Historically, the federal government has provided limited funding for housing in First Nations communities, but to this day there remains conflict over funding responsibilities between various levels and sectors of government¹⁰⁻¹³. In addition, Eurocentric ideas of housing guide government-imposed housing design and policies, which often leads to unsuitable dwellings that do not meet the needs of First Nations given the environmental conditions in which they live or their culture, values and lifestyles (e.g., broader definitions of family, need for space to handle hunted animals and need for quick access to outdoor spaces)¹⁴⁻¹⁷.

Housing conditions are important social determinants of health and other social outcomes. This report focuses on housing conditions in First Nations communities in Quebec and their implications for education, employment, food security and sense of control over one's life (hereafter referred to as mastery). While these social outcomes are important determinants of health and well-being, their associations with housing are relatively under-researched among First Nations living in communities.





2 Data sources and methods

This report draws on data from three cross-sectional surveys of First Nations communities in Quebec conducted by the First Nations of Quebec and Labrador Health and Social Services Commission (FNQLHSSC). All three surveys were part of larger nationwide surveys undertaken in First Nations communities by the First Nations Information Governance Centre. In Quebec, surveys were conducted in a subset of 27 First Nations communities¹ under the mandate of the FNQLHSSC. Survey procedures comply with *First Nations in Quebec and Labrador's Research Protocol* and with the principles of Ownership, Control, Access and Possession (OCAP®)¹⁸.

The 2014 First Nations Regional Early Childhood, Education and Employment Survey (REEES) and the 2015 First Nations Regional Health Survey (RHS) Phase 3 are surveys of individuals living in First Nations communities^{19,20}. Questionnaires were administered to a representative sample of children (0-11 years, completed through interviews of someone with close ties to the child,

usually a parent), youth (12-17 years), and adults (18 years and older). A breakdown of samples is presented in **TABLE 1**. The REEES was conducted in 20 randomly selected communities of eight Nations and the RHS in 21 communities of eight Nations in Quebec.

1 * Does not include the Cree Nation

TABLE 1
Breakdown of sample sizes of REEES 2014 and RHS 2015

	Total sample	Children (0-11y)	Youth (12-17y)	Adults (≥18y)	Response rate
REEES 2014	2,436	923	472	1,041 ^a	82%
RHS 2015	3,261	825 ^a	769 ^a	1,667	96%

^a REEES Adults, RHS Children and RHS Youth samples were not used in this report.

The third source of data is the 2015 First Nations Community Survey (FNCS). The FNCS provides a portrait of community conditions through 12 questionnaires, each focusing on a specific theme ranging from socioeconomic and environmental conditions to governance and identity²¹. Each questionnaire was completed by select community members who are knowledgeable on the theme in question. In this report, we used information collected about shelter and infrastructure (n = 20 out of 31 communities) and about housing policies and programs (n = 19 out of 31 communities).

To provide a general picture of housing conditions in First Nations communities in Quebec, we present data from the REEES and RHS questionnaires. We further explore how housing conditions vary by community remoteness and population size. Findings from the FNCS provide a picture of housing conditions and related programs at the community level, connecting findings with policy.

Then, we analyze associations between housing conditions and selected social outcomes: education, employment, food security and mastery. Education outcomes are from the REEES Children and Youth questionnaires. Outcomes related to employment, food security and mastery are from the RHS Adults questionnaire. Analyses for these outcomes conducted using REEES Adults data produced similar results. Therefore, for these three outcomes, we only present results from the RHS, which was collected more recently and had a larger sample size. All analyses are weighted so that estimates produced are representative of First Nations in Quebec living in communities (excluding the Cree Nation).



3 Housing conditions in First Nations communities in Quebec

This section first begins with a brief overview of housing provision in First Nations communities in Quebec. It then provides a portrait of the housing situation using data from the three surveys.



3.1 OVERVIEW OF HOUSING PROVISION IN FIRST NATIONS COMMUNITIES IN QUEBEC

In 2018, there were about 15,500 housing units in 36 (of the 40) First Nations communities in Quebec. Of these units, 19% are social rental housing subsidized by Canada Mortgage and Housing Corporation (CMHC); 38% are non-subsidized rental housing (band housing); and 43% are private housing belonging to individuals.

The main stakeholders financing housing in First Nations communities in Quebec are governmental partners, First Nations, and financial institutions. At the federal level, contributions generally come from Indigenous Services Canada, which allocates an annual capital budget to

First Nations for the construction and renovation of housing; CMHC, particularly its program on social housing under article 95 of the National Housing Act and its housing renovation support programs; and special initiatives that translates in spontaneous injection of supplementary housing funds. From First Nations, the contributions usually come from communities' own source revenues; renewable credit fund established by some communities to support housing development; individual down payments in the case of privately-owned housing units; and loan from financial institutions to complete the funding of certain projects.



3.2 HOUSING CONDITIONS FOR FIRST NATIONS CHILDREN, YOUTH AND ADULTS

Housing variables considered in this report include: household size, i.e. total number of people in the house, household crowding and overcrowding, housing tenure, repairs needed and the presence of mould or mildew in the house. The definitions and measures of housing variables are in BOX 1.

BOX 1 Housing variables used in analysis

HOUSEHOLD SIZE:

Total number of people (children, youth and adults) living in the dwelling.

HOUSEHOLD CROWDING:

The number of people living in the dwelling (household size) divided by the number of rooms in the dwelling.

- crowding: persons per room (PPR), continuous measure
- overcrowding: defined as >1 PPR

HOUSING TENURE^a:

Whether the respondent owns the dwelling in which they live or if they live in rented or band-owned housing.

HOUSING IN NEED OF REPAIRS^a:

The need for repairs to the dwelling along three categories: no repair needed, only maintenance work; minor repairs; major repairs needed, including defective plumbing or electrical wirings, structural problems in walls, floors or ceilings.

PRESENCE OF MOULD OR MILDEW IN THE HOUSE^a:

Whether the respondent has seen mould or mildew in their dwelling over the past year.

TABLE 2 presents the housing conditions for children and youth in First Nations communities in Quebec using data from the REEES Children and Youth questionnaires. Average household size was higher for children than for youth at 5.17 and 5.02 people respectively. Almost 25% children and 14% of youth lived in an overcrowded dwelling, defined as more than one person per room.

TABLE 2
Housing conditions of children and youth in First Nations communities in Quebec^a (REEES Children and Youth 2014)

Children ages 0-11 (n = 923)		Youth ages 12-17 (n = 472)	
Household size (range: 2-12)		Household size (range: 1-15)	
Mean (standard error)	5.17 (0.09)	Moyenne (écart type)	5.02 (0.12)
Crowding (PPR; range: 0.2-6.0)		Crowding (PPR; range: 0.2-5.0)	
Mean (standard error)	0.91 (0.02)	Mean (standard error)	0.81 (0.02)
Median	0.75	Median	0.72
Overcrowding (>1 PPR)	23.9%	Overcrowding (>1 PPR)	14.4%

TABLE 3 presents the housing conditions of adults living in First Nations communities in Quebec, using data from the RHS Adult questionnaires. Average number of occupants in the house was 3.65 people and 10% lived in overcrowded dwellings. Four in ten adults (41%) lived in rented or band-owned housing. Twenty-one percent lived in a house in need of major repairs, and 23% reported problems with mould or mildew in their house.

TABLE 3
Housing conditions of adults living in First Nations communities in Quebec (RHS Adults 2015)

Adults, 18 years and older (n = 1,667)

Household size (range: 1-20)	
Moyenne (écart type)	3.65 (0.07)
Crowding (PPR; range: 0.07-6.0)	
Mean (standard error)	0.62 (0.01)
Median	0.50
Overcrowding (>1 PPR)	10.0%
Housing tenure	
Own property	59.3%
Rented or band-owned	40.7%
Housing in need of repairs	
None, maintenance only	54.9%
Yes, minor repairs	24.4%
Yes, major repairs	20.8%
Mould/mildew present in house	23.1%

Overcrowding in First Nations communities in Quebec is more prevalent among households with children below the age 12 compared to older age groups, consistent with research in non-Indigenous populations suggesting that crowding is a larger problem in households with children²². This is problematic, as being exposed to overcrowding in childhood has long-term effects on health and social outcomes, including lower education and income in adulthood^{3,4,22,23}. Major repairs needed in the house and problems with mould were reported by one in five respondents. Home ownership is the most common form of tenure among adult respondents to the survey. However, as we explore in the next section of the report, there is variation in these housing conditions between First Nations communities.





3.3 VARIATION IN HOUSING CONDITIONS BETWEEN FIRST NATIONS COMMUNITIES

In this section, we examine variation in housing conditions along two community characteristics: remoteness²⁴ and population size. See BOX 2 for a description of these variables.

BOX 2

Community-level characteristics considered

REMOTENESS

First Nations communities are classified into four zones by Indigenous and Northern Affairs Canada:

- Urban (zone 1) : <50 km from a service centre with year-round road access
- Rural (zone 2) : 50-350 km from a service centre with year-round road access
- Isolated (zone 3) : more than 350 km from a service centre with year-round road access
- Special Access (zone 4) : no year-round road access to a service centre

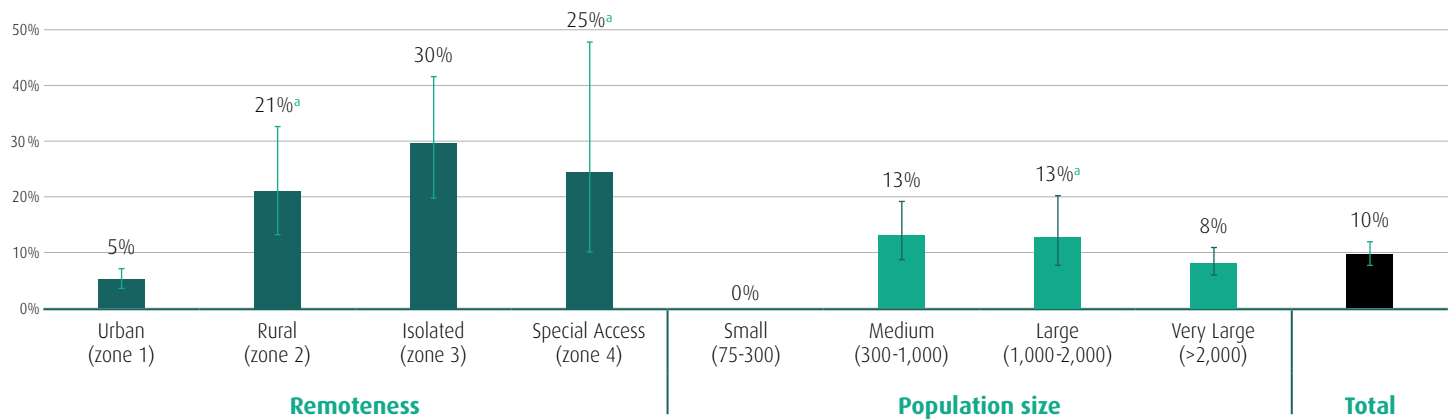
POPULATION SIZE (FROM 2016 CENSUS)

Population size is categorized into small (75-300), medium (300-1,000), large (1,000-2,000), and very large (>2,000). Community size might reflect the funding available or the level of need for infrastructures in the community.

We expand upon a previous publication by the FNQLHSSC that contained similar analyses²⁵, by analyzing other housing variables and considering more community-level characteristics in addition to remoteness. Using data from the RHS Adult questionnaire, the following graphs consider how selected housing conditions vary by remoteness and population size.

FIGURE 1 presents the prevalence of household overcrowding (>1 PPR) by community characteristics. While 10% of the adult respondents lived in overcrowded households overall, overcrowding increases with remoteness: the prevalence was significantly higher at 30% in isolated communities (zone 3). Overcrowding did not vary by the size of the community.

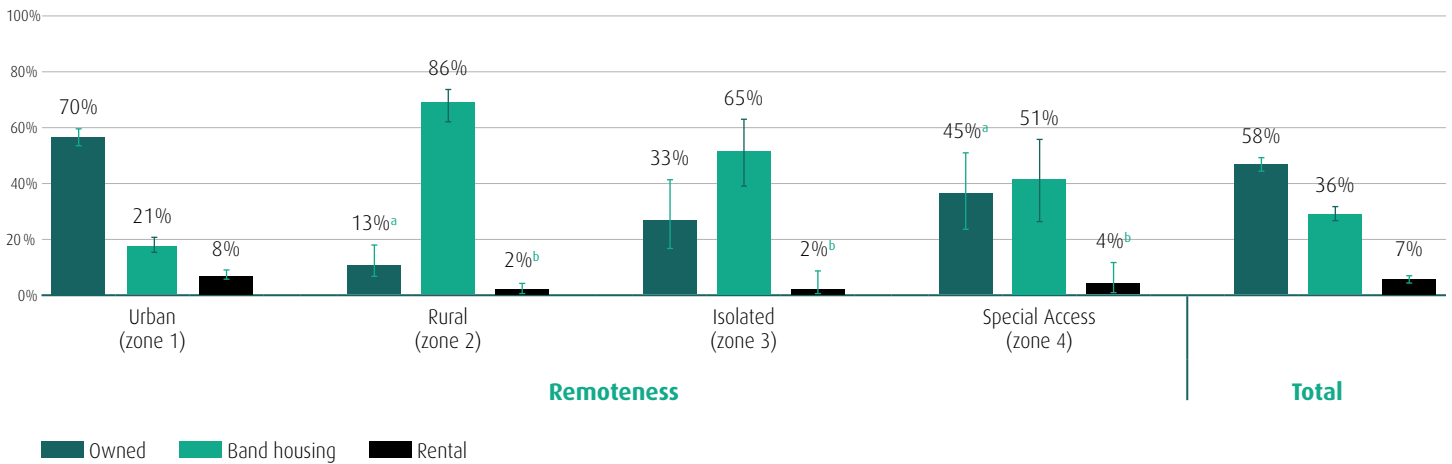
FIGURE 1
Prevalence of household overcrowding (>1 PPR) in First Nations communities in Quebec, by community characteristics (RHS 2015 Adults)



NOTE: The estimates are weighted using the appropriate weight variables, with lines showing confidence intervals at the 95% confidence level. ^a indicates estimates with a coefficient of variation of 16.6%-33.3% and should be interpreted with caution. ^b indicates a coefficient of variation >33.3% and is not published, except for estimates below 5%.

Regarding housing tenure (FIGURE 2), band-owned housing is the most common form of tenure for all zones except urban, where 70% of respondents are homeowners and only 21% lives in band-owned housing. Housing tenure did not vary by community size (results not shown).

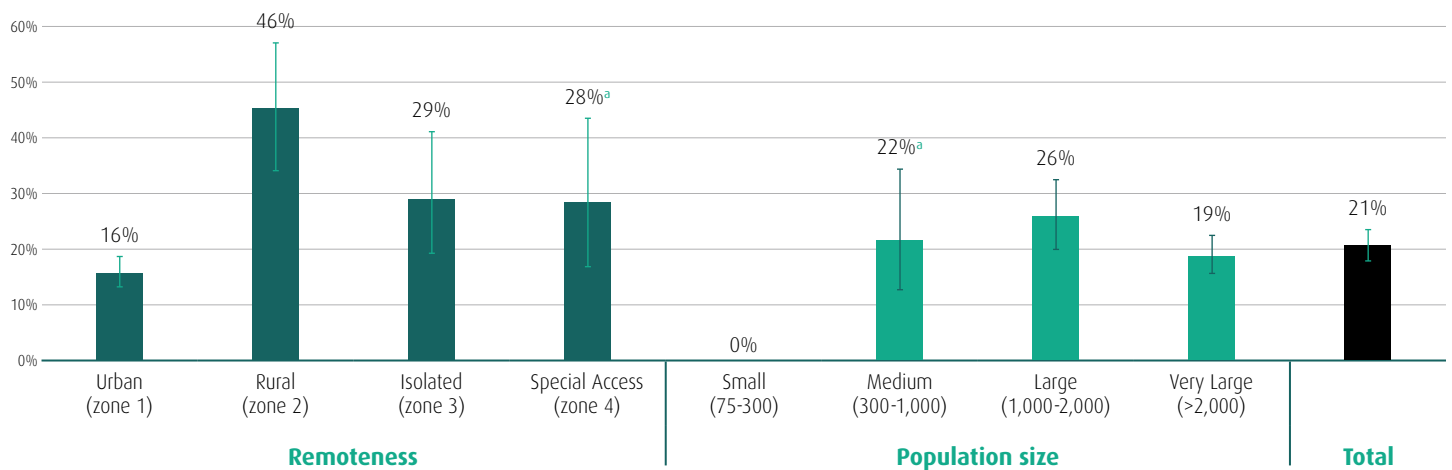
FIGURE 2
Prevalence of various forms of housing tenure in First Nations communities in Quebec, by community characteristics (RHS 2015 Adults)



NOTE: The estimates are weighted using the appropriate weight variables, with lines showing confidence intervals at the 95% confidence level. ^a indicates estimates with a coefficient of variation of 16.6%-33.3% and should be interpreted with caution. ^b indicates a coefficient of variation >33.3% and is not published, except for estimates below 5%.

FIGURE 3 presents the prevalence of housing in need of major repairs by community-level characteristics. Overall, 21% reported that their dwelling needed major repairs, but this prevalence was higher in rural communities at 46% compared to 16% in urban communities. There was no variation by community size.

FIGURE 3
Prevalence of housing in need of major repairs in First Nations communities in Quebec, by community characteristics (RHS 2015 Adults)

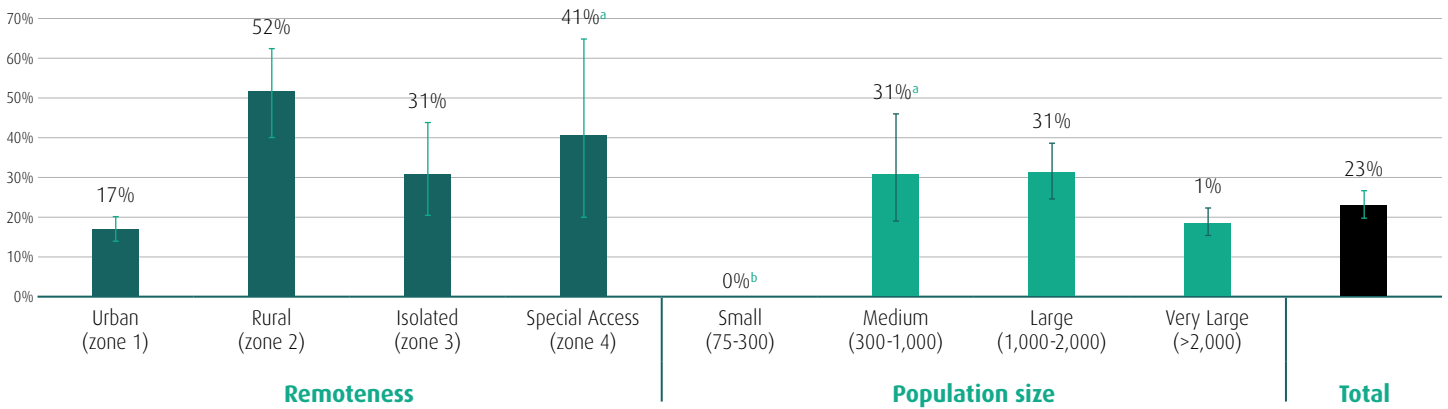


NOTE: The estimates are weighted using the appropriate weight variables, with lines showing confidence intervals at the 95% confidence level. ^a indicates estimates with a coefficient of variation of 16.6%-33.3% and should be interpreted with caution. ^b indicates a coefficient of variation >33.3% and is not published, except for estimates below 5%.

The variation in mould problems by community-level variables is presented in **FIGURE 4**. Twenty-three percent of respondents reported mould problems in their house. About 17% of respondents in urban communities reported problems with mould. This prevalence was significantly higher in all the other

zones, especially in rural communities, where the prevalence of problems with mould was reported by 52% of respondents. While there seems to be variation in mould problems by community size, there is no clear trend.

FIGURE 4
Prevalence of reported problems with mould in First Nations communities in Quebec, by community characteristics (RHS 2015 Adults)

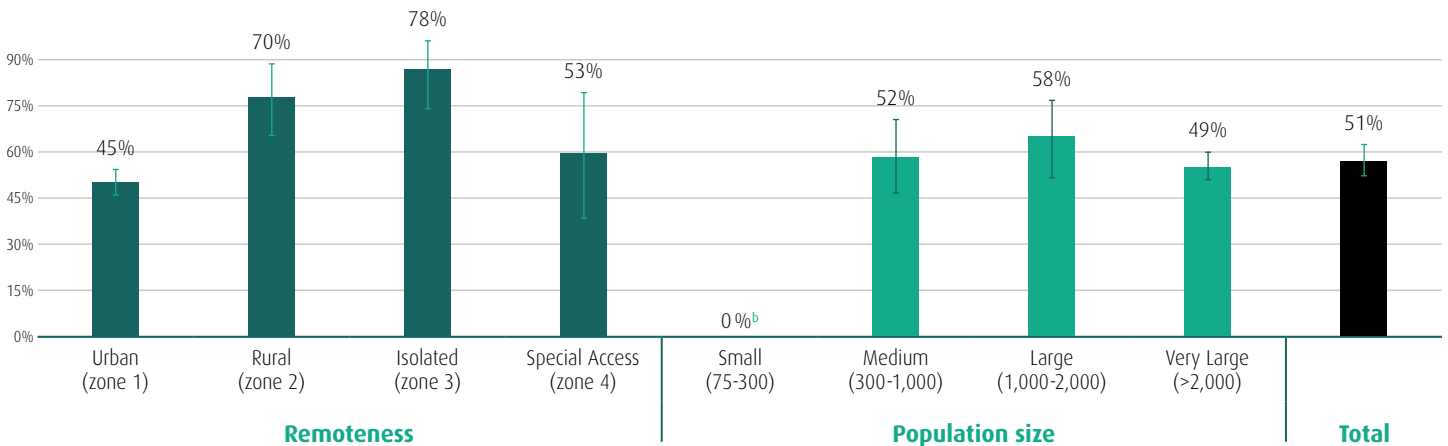


NOTE: The estimates are weighted using the appropriate weight variables, with lines showing confidence intervals at the 95% confidence level. ^a indicates estimates with a coefficient of variation of 16.6%-33.3% and should be interpreted with caution. ^b indicates a coefficient of variation >33.3% and is not published, except for estimates below 5%.

FIGURE 5 presents variation by community-level variables in terms of prevalence of respondents who consider housing as a main challenge in their community. Overall, 51% of respondents saw housing as a main challenge faced by the community. However, this concern varied by remoteness:

rural and isolated communities had a significantly larger proportion of respondents who considered housing a main challenge at 70% and 78% respectively. No clear trend was discernible based on community size.

FIGURE 5
Prevalence of adults who consider housing as a main challenge faced by the community, by community characteristics (RHS 2015 Adults)



NOTE: The estimates are weighted using the appropriate weight variables, with lines showing confidence intervals at the 95% confidence level. ^a indicates estimates with a coefficient of variation of 16.6%-33.3% and should be interpreted with caution. ^b indicates a coefficient of variation >33.3% and is not published, except for estimates below 5%.

Overall, we observed significant variation in housing conditions by remoteness, but not by community size. Housing conditions tend to be more favourable in urban communities, likely attributable to their proximity to large population centres providing better access to materials and services required to maintain houses²⁶ and perhaps more opportunities for social mobility. Homeownership was higher in urban than

in more remote communities. Previous research reported that homeownership is associated with better maintained houses; not only are homeowners more likely to have more economic means to purchase materials for housing repair and maintenance, they also feel a stronger sense of responsibility over their property compared to those who are renters²⁷.



3.4 HOUSING CONDITIONS, POLICIES AND PROGRAMS IN FIRST NATIONS COMMUNITIES

The housing situation in the 20 communities that completed the FNCS questionnaire on shelter and infrastructure is presented in **TABLE 4**. Having a range of housing-related resources in their community, such as certified workers and licensed expertise, materials and funds for construction, and land to develop was reported by at least three quarters of the communities. The number of housing units constructed in the past year varied between communities, with some seeing the construction of more than 10 units, and others none. Considering population growth, demand for new housing is high and likely to increase. Overcrowding will accelerate the wear and tear of housing^{2,28}. Since one-third of newly constructed housing in First Nations communities each year are replacing existing homes that have fallen into disrepair²⁷, addressing the need for new housing is even more important.

Three out of four communities surveyed reported mould to be a moderate to serious problems in their community and about half reported having conducted a community-wide inspection or having access to technical personnel trained in addressing mould problems. This might explain the decrease in the prevalence of problems with mould reported by 51% of the RHS respondents in 2010 (RHS Phase 2)²⁹ to 23% in 2015 (RHS Phase 3). Regarding housing amenities, most of the communities surveyed (but not all) indicated that all homes in their community have electricity, indoor plumbing, and safe drinking water. However, one community reported that less than 20% of the houses in the community had any of these three services. This underlines the disparities between First Nations communities in Quebec in terms of basic utilities, which might negatively impact health³⁰⁻³² and other social outcomes.

TABLE 4
Shelter and infrastructure conditions in First Nations communities in Quebec (n = 20 communities; FNCS 2015)^a

	n (%)
Housing-related resources accessible to the community:	
Certified housing construction crews/workers	16 (80%)
Certified inspection services	18 (90%)
Licensed experts (electrician, plumber, etc.)	16 (80%)
Building materials year round	17 (85%)
Funds for maintenance and repairs	15 (79%)
Accessible land that can be developed	15 (75%)
Serviced lots (water, electricity, natural gas, fuel)	17 (89%)
Number of housing units constructed in the past year:	
None	3 (15%)
1-2	6 (30%)
3-5	5 (25%)
10-16	6 (30%)
Major cause of damages to housing in the community:	
Normal aging/wear and tear	3 (15%)
Overcrowding	2 (10%)
Extreme weather	11 (55%)
Poor initial construction or design	4 (20%)
Community has a mould problem:	
Not a problem	3 (15%)
Minor problem	2 (10%)
Moderate problem	11 (55%)
Serious problem	4 (20%)
Community-wide mould inspection conducted	9 (47%)
Community has technical personnel trained in evaluating/addressing mould	10 (53%)
All homes in the community have:	
Electricity	17 (85%)
Indoor plumbing	18 (90%)
Safe drinking water	16 (80%)

^a Percentages are unweighted and based on the number of communities with non-missing responses

TABLE 5 presents information on housing policies and programs locally available in the 19 communities that completed the FNCS questionnaire on this theme. Eleven communities had a community-based housing plan in place, while 12 approved Certificates of Possession for homes. Several housing programs exist to support First Nation governments and community members, funded by both the private sector (e.g., banks) and various government bodies, such as Indigenous and Northern Affairs Canada and the Canada Mortgage and Housing Corporation (CMHC). These programs are available for individual or community projects and range from direct financial assistance, loans, to loan guarantees to fund purchase, housing construction or renovation. Housing programs or initiatives, such as CMHC On-Reserve Non-Profit Housing Program,

low-income band-owned housing, private homeownership and rent-geared to income, were commonly available in the communities surveyed. Band-owned public rental housing, housing co-operatives and transitional housing were less frequent. The data, however, did not provide information regarding the extent of actual use and implementation of these programs or how they may have benefitted communities with regard to priority lists for housing. Five communities surveyed reported that more than 40% of their community's population was on the priority list for housing. Average wait times on the priority list was longer than two years for more than half of the surveyed communities. The low rate of construction likely contributed to this situation.

TABLE 5
Housing policies and programs in First Nations communities in Quebec (n = 19 communities; FNCS 2015)^a

	n (%)
FN has community-based housing plan	11 (65%)
FN approves Certificates of Possession	12 (67%)
Housing programs/initiatives in the community:	
CMHC On-Reserve Non-Profit Housing Program	15 (94%)
FN-owned low-income rental housing	14 (78%)
FN-owned public rental housing	8 (44%)
Housing co-operative	0 (0%)
Transitional housing	3 (17%)
Private homeownership	14 (78%)
Rent geared to income	12 (67%)
Proportion of the community on the priority list for housing:	
0-19%	7 (54%)
20-39%	1 (8%)
40-59%	3 (23%)
60-100%	2 (15%)
Average wait time on priority list for housing:	
<2 years	3 (20%)
2-3 years	4 (27%)
4-6 years	4 (27%)
>6 years	4 (27%)

^a Percentages are unweighted and based on the number of communities with non-missing responses





4 Housing and social outcomes

This section explores associations between housing conditions and four social outcomes: education outcomes for children and youth, and employment, food security and a sense of control over one's life for adults. Each subsection begins with a brief overview of the literature, followed by relevant descriptive statistics and a summary of the associations between housing variables and social outcome variables.

Associations between housing variables and the four social outcome variables were examined using weighted regression models. As illustrated in **TABLE 6**, each regression analysis began by examining the simple (bivariate) association between housing and outcome variables (Model 1), and then adjusted the association for age and sex (Model 2). Then, various

confounding variables were sequentially included in the regression models (Models 3 and 4) based on their relevance for the outcome variable of interest, in order to see if the influence of housing conditions remains statistically significant after an adjustment for the confounders.

TABLE 6
Breakdown of variables included in regression models

Models	REEES Child & Youth 2014							RHS Adults 2015											
	Education outcomes (CHILDREN AGED 6-11)				Education outcomes (YOUTH AGED 11-17)			Current employment (ADULTS AGED 18-64)			Food insecurity (ADULTS AGED ≥18)				Mastery (ADULTS AGED ≥18)				
	1	2	3	4	1	2	3	1	2	3	1	2	3	4	1	2	3	4	
Housing variable	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Age and sex		●	●	●		●	●		●	●		●	●	●		●	●	●	
Mother's education			●	●			●												
Household income				●									●	●			●	●	
Remoteness										●				●				●	

For each of the social outcomes, results are summarized as in TABLE 7. Plus (+) signs indicate a positive association (e.g., overcrowding associated with a higher likelihood of the outcome variable to happen). Minus (-) signs indicate a negative association, signifying the opposite (e.g., overcrowding associated with a lower likelihood of the outcome variable to happen).

Cells in dark green signify that the association between the housing condition and outcome variable is statistically significant after controlling for all confounders in the regression models. Cells in light green indicate statistically significant association only when controlling for some (but not all) confounders. Cells in white with a plus or minus sign indicate significant results only in bivariate analysis (not controlling for age and sex or any confounders) while empty white cells indicate no statistically significant association, even in bivariate analysis. Statistical significance is established at the 5% level, meaning that we can be 95% confident that the true value of the variable is within the values of the confidence interval. Full results of the regression models are presented in the Appendix.

TABLE 7
Example of summary table presenting results of the association between housing conditions and social outcomes

Variables	Outcome variable
Household size	-
Crowding (PPR)	-
Overcrowding (>1 PPR)	-
Homeownership	+
Housing in need of repairs	
Presence of mould or mildew	-

NOTE: The relationship between the housing and outcome variable is:

- Statistically significant after controlling for all confounders.
- Statistically significant only when controlling for some, but not all, confounders.
- Not statistically significant in the bivariate analysis. (With symbol: statistically significant only in the bivariate analysis, but not when controlling for any confounders.)



4.1 HOUSING AND EDUCATION OUTCOMES IN CHILDREN AND YOUTH

This subsection focuses on the relationship between housing conditions and various indicators related to education for children in primary schools and youth in secondary schools.

4.1.1 Overview of the literature

In Canada, there is a gap in educational attainment between Indigenous Peoples and the general population. According to the 2016 Census, 70% of First Nations aged 25-64 had obtained a high school diploma compared to 86% of non-Indigenous Canadians³³. Research has shown that poor housing conditions have a negative impact on educational attainment. One study conducted with non-Indigenous Americans reported a lower likelihood of obtaining a high school diploma and a lower level of educational attainment at age 25 among those who had lived in overcrowded housing before age 19²³. This association remained after controlling for socioeconomic status, underlining the cumulative negative effects of housing conditions on education over the life course²³. A large-scale study in France observed that 59% of adolescents living in overcrowded dwellings had been held back a grade, compared to 30% of adolescents living in less crowded conditions. Adolescents who did not have their own bedroom at age 11 (a proxy of overcrowding in that study) were almost twice as likely to drop out before finishing high school than those who had their own bedroom³⁴.

Suggested mechanisms to explain the association between household overcrowding and educational achievement include the lack of quiet time to study in overcrowded homes^{35,36} and poor quality of sleep^{37,38}. According to one report, in some overcrowded First Nations and Inuit households people have to sleep in shifts due to lack of space³⁹. This can lead to numerous negative effects for the academic achievement of children and youth, including lack of concentration and fatigue due to sleep deprivation and lack of space or quiet time for homework or studying³⁹. Two randomized controlled intervention studies from New Zealand and one from the UK reported that improvements in home heating and insulation reduced the likelihood of absence from school⁴⁰⁻⁴², providing further evidence of the link between housing conditions and success at school.

Poor housing conditions can also impact children's behaviour in a school environment. A U.S. study reported that children living in crowded homes were more likely to exhibit behavioural disturbances in school, which the authors posited was probably related to stress at home⁴³. Another U.S. study found negative effects of overcrowded housing on children's wellbeing, behaviour and social interaction skills, all of which may cause disadvantages that accumulate over the life course²². Behavioural problems can lead to lack of engagement in school, which might manifest as repeated lateness, absenteeism, skipping classes, disruptive behaviour, suspension or expulsion, poor academic performance and eventually dropping out⁴⁴⁻⁴⁷. These effects of poor housing on education are compounded in Indigenous children and youth, who are already at risk of lower educational attainment due to present and historical socioeconomic, familial and linguistic barriers, and Eurocentric education style or policies that are often unaccommodating of their worldviews and lifestyles⁴⁴.



4.1.2 Descriptive statistics

Using data from REEES 2014, seven indicators related to education were examined in relation to housing conditions. Their definitions and prevalence among the sample of children (n = 433) and youth (n = 286) in school at the time REEES was conducted are presented in BOX 3.

BOX 3

Education-related outcomes used in analyses

	Children (n = 433)	Youth (n = 286)
GOOD GRADES ON LAST REPORT CARD Whether the student has an overall average of 80% or above (mainly A's) for children in primary school or an overall average of 70% or above (mainly B's or better) for youth in secondary school. Good grades are defined differently between children and youth to account for the difference between grading in primary and secondary schools.	37.6%	65.1%
EVER REPEATED A YEAR	14.0%	43.8%
ABSENT FROM SCHOOL AT LEAST ONCE A MONTH	67.4%	76.1%
LATE TO SCHOOL AT LEAST ONCE A MONTH	47.9%	65.3%
SKIP CLASSES AT LEAST ONCE A MONTH (YOUTH ONLY)		50.0%
CAUSED TROUBLE IN SCHOOL LAST YEAR (CHILDREN ONLY) Whether the parent/guardian have talked with the school principal or other administrator because the child caused trouble at school in the past school year.	23.6%	
EVER BEEN SUSPENDED/KICKED OUT OF SCHOOL	7.4%	29.7%

Among children in primary school, 38% had good grades on their last report card, 14% had repeated a year, 67% were absent and 48% were late to school at least once per month. About 24% caused trouble in school last year and 7% had been suspended or kicked out of school. Among youth in secondary school, 65% had good grades in their last report card, 44% had repeated a year, 76% were absent and 65% were late to school at least once a month. Half skipped classes at least once a month and 30% had been suspended or kicked out of school.

4.1.3 Association between housing conditions and education outcomes

For education outcomes in children and youth, selected variables about the socioeconomic status of the family of children and youth were included in regression as confounders: mother's education status (whether mother graduated high school) and annual household income (only for children; this variable not available for youth). These confounding variables may indicate the family's ability to afford and maintain good housing, while at the same time influencing children's achievement in school as previously observed in studies of non-Indigenous⁴⁸ and Indigenous children⁴⁹.

4.1.3.1 Children in primary school

TABLE 8 presents summary results for the associations between all education-related variables for children in primary schools and housing conditions. Full regression results of education-related variables for children that had significant associations with any of the housing variables are presented in the Appendix: having good grades (TABLE A1) and being late to school (TABLE A2).

TABLE 8
Summary results of the associations between housing conditions and education outcomes in children (n = 433; REEES Children 2014)

Variables	Good grades	Repeated a year	Absent from school	Late to school	Trouble in school	Suspended/kicked out
Number of people	-					
Crowding (PPR)				+		
Overcrowding (>1 PPR)				+		

NOTE: The relationship between the housing and education outcome variables is:

- Significant after controlling for all confounders.
- Significant only when controlling for some, but not all, confounders.
- Not significant in the bivariate analysis.

Overall, academic performance was lower for children living in larger household as suggested by previous research. Housing conditions were not associated with repeating a year in school, possibly because only a small portion of the sample had ever been held back, as they are still quite early in their education. However, children in more crowded households were more likely to be late to school, which could relate to the quality of children's sleep in a crowded home. Housing conditions were not associated with absenteeism, behavioural problems in school and suspension or expulsion for children.

Higher household size was significantly associated with a lower likelihood of having good grades. Children living in more crowded and overcrowded households were significantly more likely to arrive late to school at least once per month. For children, there were no significant associations between any of the housing variables and having repeated a year, absence from school at least, causing trouble in school or being suspended/kicked out of school.

4.1.3.2 Youth in secondary school

TABLE 9 presents summary results for the associations between all education-related variables for youth in secondary schools and various housing conditions. Full regression results are presented in the Appendix (having good grades, TABLE A3; repeating a year, TABLE A4; and skipping classes, TABLE A5).

Large household size was significantly associated with a lower likelihood of having good grades, even after controlling for all confounders. Other measures of crowding were not associated with having good grades. Youth living in larger households and in more crowded dwellings were more likely to have repeated a year. Other measures of household crowding had no significant associations with repeating a year. Larger household size and both measures of crowding were significantly associated with a higher likelihood of skipping classes, but this association was no longer significant after adjusting for the mother's education. For youth, there were no significant associations between any of the housing variables and absence from school, being late to school or having been suspended/kicked out of school.

TABLE 9
Summary results of the associations between housing conditions and education outcomes in youth (n = 284; REEES Youth 2014)

Variables	Good grades	Repeated a year	Absent from school	Late to school	Skip classes	Suspended/kicked out
Household size	-	+		+		
Crowding (PPR)		+		+		
Overcrowding (>1 PPR)				+		

NOTE: The relationship between the housing and education outcome variables is:

- Significant after controlling for all confounders.
- Significant only when controlling for some, but not all, confounders.
- Not significant in the bivariate analysis.

Similar to what we observed for children, youth in secondary school also saw their grades influenced by poor housing conditions. Although housing conditions were not associated with suspension or expulsion from school, we observed that students in more crowded housing were more prone to skip classes. Academic performance (e.g., grades or repeating a year) and rule-breaking behaviour (e.g., skipping classes) are closely related. Previous research conceptualized these education variables within the concept of school engagement,

which is an important component of educational achievement and success. Low engagement is related to a higher likelihood of students having repeated a year⁴⁷. Absenteeism and lateness, which are also signs of low engagement in school, were not correlated with housing conditions perhaps because of their high prevalence in the sample, therefore limiting variation by housing variables.





4.2 HOUSING AND EMPLOYMENT IN ADULTS

This subsection focuses on the relationship between housing conditions and employment in working-age adults, i.e. those between 18 and 64 years.

4.2.1 Overview of the scientific literature

Housing conditions can affect one's employment, including employment status, type of employment (part-time or full-time) and frequency of absence from work. A 2012 study of low-income Canadian families in urban areas also reported fewer missed days of work due to illness associated with homeownership⁵⁰. Housing intervention studies reported a lower likelihood of missed days of work for adults in houses that received improvements in heating and insulation^{40,41}.

The Families First Edmonton Study found that 78% of Indigenous families in the study were more likely to be headed by a single female caretaker compared to the general Edmonton population. Indigenous families in the study also had a higher unemployment rate compared to the city's general population, especially if there were young children in the household⁵¹. Furthermore, participants in the study reported that available employment opportunities did not allow them to meet their housing needs. When caretakers did work, they were more likely to have jobs with lower wages and 64% of participating families were still unable to afford their homes even when employed. Lower employment may limit the capacity of disadvantaged families to cover housing-related costs, such as maintenance, utilities, and rent⁵²⁻⁵⁴, thus creating a vicious cycle leading to housing needs and insecurity, which in turn limits social and economic development.

A U.S. study of non-Indigenous renters found housing instability to be a stronger predictor of job loss, than job loss was of housing instability⁵⁵. This points to the importance of housing as a factor of employment success, rather than the opposite. In addition, participants who were forced to move due to late or missed rent payments and property condemnation by the city (due to unliveable conditions) were more likely to be laid off from work, indicating that housing instability may negatively affect performance at work. The current literature on housing and employment shows that housing conditions can impact a person's employment status and performance at work, a link that is relevant to investigate for First Nations given the higher prevalence of housing needs.

4.2.2 Descriptive statistics

Using data from RHS 2015, we analyzed employment among working age adults (18-64 years old) using a binary variable regarding current employment status, from the question "Are you currently working at a job or business for pay (wages, salary, self-employed)?" A little more than half of the working adults (55.3%; weighted) were employed at the time of survey.

4.2.3 Association between housing conditions and employment

Remoteness was considered as a confounding variable in the association between housing and employment, because remote communities tend to have more difficulty accessing materials for maintaining and constructing new houses. Similarly, remoteness also influences the labour market, as communities that are further from population centres tend to have more limited employment opportunities, which is also compounded by transportation and infrastructure that can negatively affect investment in and development of local businesses⁵⁶.

TABLE 10 presents summary results of the associations between housing conditions and employment status among working-age adults (18-64 years) using RHS data. Full regression results for employment are presented in the Appendix, **TABLE A6**.

TABLE 10
Summary results of the associations between housing conditions and employment in working-age adults (n = 1,402; RHS Adults 2015)

Variables	Currently employed
Household size	–
Crowding (PPR)	–
Overcrowding (>1 PPR)	–
Homeownership	
Housing in need of repairs	–
Presence of mould or mildew	–

NOTE: The relationship between the housing variables and current employment is:

- Significant after controlling for all confounders.
- Significant only when controlling for some, but not all, confounders.
- Not significant in the bivariate analysis.
 (With symbol: significant only in the bivariate analysis, but not when controlling for any confounders.)

Living in a large household was associated with a lower likelihood of employment. Both measures of household crowding were significantly associated with a lower likelihood of employment, with higher crowding associated with a lower likelihood of being employed, even after controlling for remoteness. Adults living in housing needing major repairs were less likely to be employed. Presence of mould or mildew in the house was also associated with a lower likelihood of being employed, but this association was not statistically significant when controlling for remoteness. Homeownership was not significantly associated with employment.

We observed that large household size, household overcrowding and housing in need of major repairs were associated with unemployment, suggesting that poor housing could be a barrier to employment for adults living in First Nations communities in Quebec, consistent with findings from previous research.



4.3 HOUSING AND FOOD SECURITY IN ADULTS

This subsection focuses on the relationship between housing conditions and food security in adults.

4.3.1 Overview of the scientific literature

Food security describes the ability to “obtain safe, sufficient, and nutritiously adequate foods for a healthy life in socially and culturally acceptable ways.” Food insecurity is common in Indigenous communities due to various factors, including high food prices⁵⁷ combined with low income and unemployment, as well as diminished access to country foods⁵⁸. In Canada, the prevalence of food insecurity is much higher among Indigenous than non-Indigenous families⁵⁸. While an association between housing and food security has been established for Inuit populations and First Nations living outside communities, fewer studies examined whether housing conditions are a risk factor for food security in First Nations communities.

Among Indigenous Peoples in Canada, food insecurity was observed to be higher in overcrowded households⁵⁷ and in houses needing major repairs⁵⁸. Larger households and single-parent households^{58,59} are at an increased risk of food insecurity⁶⁰.

Compared to the general population, Indigenous Peoples face additional barriers to accessing available food. Cost, lack of transportation and required preparation time are identified as significant barriers that led to food insecurity in a study of American Indian families⁶⁰. Affordability is an important issue in northern or remote Indigenous communities in Canada, where the cost of food is disproportionately higher compared to more southern or urban regions of the country⁵⁷. While studies in Inuit communities in Canada have shown that having a hunter in the family increases food supply and decreases the risk of food insecurity, the decreasing number of full-time hunters and the limited availability of wildlife due to environmental change means that even this protective factor might be compromised⁶¹.

4.3.3 Association between housing conditions and food insecurity

For food insecurity, household income and remoteness were considered as confounding variables. Income and remoteness are related to one’s ability to afford and maintain good housing, as well as to buy sufficient and nutritious food. Lower-income households might not have much to spend on housing and food, and the costs associated with food and housing are higher in more remote communities.

TABLE 11 presents summary results of the associations between food insecurity and various housing conditions. Full results of regression models are presented in the Appendix TABLE A7.

TABLE 11
Summary results of the associations between housing conditions and food insecurity in adults (n = 1,574; RHS Adults 2015)

Variables	Food insecure
Household size	+
Crowding (PPR)	+
Overcrowding (>1 PPR)	+
Homeownership	-
Housing in need of repairs	+
Presence of mould or mildew	+

NOTE: The relationship between the housing variables and food insecurity is:

- Significant after controlling for all confounders.
- Significant only when controlling for some, but not all, confounders.
- Not significant in the bivariate analysis.
 (With symbol: significant only in the bivariate analysis, but not when controlling for any confounders.)

Larger household size was associated with a higher likelihood of food insecurity, but this association was no longer significant once remoteness was included as a confounding variable. Only the continuous PPR measure remained statistically significant in fully adjusted models; other crowding measures lost significance once remoteness was included in the model. Rental tenure, housing needing major repairs and presence of mould in the house were significantly associated with higher odds of food insecurity.

These results echo previous findings regarding overcrowding, higher number of occupants, rental tenure and repairs needed being commonly associated with food insecurity, because such housing conditions can be a reflection of low socioeconomic status. Yet, although some associations between housing and food insecurity were not statistically significant when remoteness was considered, all associations were significant when adjusted for household income. This suggest that living in poor housing conditions adds another layer of vulnerability for food insecurity, in addition to living with a low income.



4.4 HOUSING AND SENSE OF CONTROL OVER ONE'S LIFE

This section focuses on the relationship between housing conditions and sense of control over one's life in adults, measured using the concept of 'mastery'.

4.4.1 Overview of the scientific literature

Mastery can be defined as "the degree to which a person feels that they are able to solve problems, have control over the events that occur in their life and are able to determine what will happen to them in the future"⁶⁵. The concept of mastery has particular relevance for Indigenous Peoples' health given the experience of dispossession and loss of control over lands and social structures⁶⁶. In Indigenous populations, mastery has been associated with well-being⁶⁷, lower stress and more favourable health-related behaviours⁶⁸. Mastery has been studied in relation to various social factors, including academic achievement, racism, resilience, aging and housing conditions, but most studies were conducted in non-Indigenous contexts. Among research linking mastery and housing, the limited amount of existing research concerning Indigenous populations rarely includes those living in Indigenous communities.

Mastery is most commonly assessed using the seven-item Pearlin Mastery scale⁶⁵, which has been used to assess mastery in First Nations populations in Canada⁶⁹ and Indigenous populations elsewhere⁶⁸. Various housing-related variables have been found to correlate with mastery, with most studies undertaken in non-Indigenous contexts. Poor housing quality, the inability to control one's space and determining who has access to the house are discussed as reducing mastery in non-Indigenous populations⁷⁰. This could be particularly relevant to Indigenous communities where overcrowding is more common and regulating who comes in and stays in the house might be more difficult. Having to constantly negotiate vital space with other household members might lead to stress and social tension, both of which might relate to mastery. Homeownership was also reported as an important determinant of perceived security for Indigenous Peoples⁷¹ and therefore could be assumed to be correlated with higher levels of mastery, as it does for the general population⁷².



4.4.2 Descriptive statistics

Mastery was assessed in RHS 2015 using a modified version of the seven-item Pearlin Mastery scale. Respondents indicate their level of agreement with seven statements on a scale of 1 to 5 (instead of 1 to 7 in the original version of the scale), from strongly agree to strongly disagree. These numbers are summed, with higher scores indicating a stronger sense of mastery. The scores range between 7 to 35, with a mean score of 27. Components of the mastery scale and the mean score are presented in **BOX 5**.

BOX 5

Components of the Pearlin Mastery Scale and proportions responding to strongly agree or agree with each statement in RHS Adults 2015

HOW STRONGLY DO YOU AGREE WITH EACH STATEMENT? ^a	
I can solve the problems that I have	90.0%
No one pushes me around in life	88.9%
I have control over the things that happen to me	82.2%
I can do just about anything I really set my mind to	89.5%
I often feel helpless in dealing with the problems in life ^a	66.8%
What happens to me in the future mostly depends on me	86.4%
There is little I can do to change many of the important things in my life ^a	53.3%
Mean of final scores (standard error)	27.35 (0.11)

^a Proportions for those who responding to strongly disagree, disagree, or neither disagree or agree with the statement.

4.4.3 Association between housing conditions and mastery

In the analysis, household income and remoteness were included as confounding variables as both variables are related to housing conditions as explained above. Household income is linked with mastery as it expands one’s agency and accessible range of choices, as well as affects one’s ability to provide for the needs of oneself and the family. Remoteness might be related to well-being and mastery, with remote settings providing both protective factors (e.g., stronger community support) and risks (e.g., isolation and disadvantage).

TABLE 12 presents a summary of the regression results of mastery on various housing conditions. Full regression results for mastery are presented in the Appendix, TABLE A8. Larger household size and both measures of crowding were associated with lower mastery. Living in houses requiring major repairs and in houses with problems with mould was also associated with lower mastery. Whereas these associations were statistically significant when household income was considered, remoteness seems to be a confounding factor of some of these associations. Homeownership was associated with higher mastery, independently of household income and remoteness.

TABLE 12
Summary results of the associations between housing conditions and mastery in adults (n = 1516; RHS Adults 2015)

Variables	Mastery score
Household size	-
Crowding (PPR)	-
Overcrowding (>1 PPR)	-
Homeownership	+
Housing in need of repairs	-
Presence of mould or mildew	-

NOTE: The relationship between the housing variables and mastery is:

- Significant after controlling for all confounders.
- Significant only when controlling for some, but not all, confounders.
- Not significant in the bivariate analysis.

Similar to previous findings, larger household size, overcrowding, housing tenure and living in housing requiring repairs were associated with lower mastery, independently of income. More research is needed to understand the role of remoteness in the association between housing conditions and mastery.







5 Conclusion

In First Nations communities in Quebec, housing needs are high and vary between communities, illustrating inequalities in housing conditions. About 51% of First Nations surveyed in the RHS 2015 cited housing conditions as a main challenge in their community. In a 2014 report from the Assembly of First Nations Quebec-Labrador, it was estimated that addressing housing needs in First Nations communities in Quebec and Labrador would cost at least \$2.5 billion over 5 years²⁸. These costs include measures to increase the housing stock and service new lots, along with renovation, expansion, decontamination and maintenance of existing housing stock.

For some communities, redressing their housing situation is further compelled by poor access to services or programs to improve local housing conditions and by the quickly growing population which adds pressure to the current housing stock and housing needs. In this report, we reported associations between poor housing and education, employment, food security and mastery. Most of the associations were independent of socioeconomic indicators (such as household income for adults, parents' employment and education for children/youth). Many of these associations were replicated using two datasets, indicating their robustness.

Nonetheless caution is required when interpreting the results presented. The cross-sectional nature of the data prevents us from identifying whether it is poor housing conditions that cause less favourable social outcomes. Reverse causality is possible. For example, it is possible that people experiencing poor socioeconomic circumstances, such as unemployment, 'drift' into poorer housing conditions. Whereas living in poorer housing conditions is associated with a range of social outcomes, other factors not measured in the study might be important for the outcomes investigated. For example, the quality of relationships between household members might be an important factor to understand mastery. More research is needed to better understand why and how living in overcrowded conditions influences the social outcomes investigated in this study.

Results presented in this report indicate an increased probability of experiencing selected social outcomes when living in selected housing conditions. Results cannot be interpreted to mean that everyone in poor housing conditions will experience poor social outcomes. For example, when associations are observed between overcrowding or household size and education outcomes among children and youth, this does not mean that all children and youth living in overcrowded conditions will face more hardship in school. But rather that, overall, children living in such a home environment, have a higher probability to do less well at school. It is possible that, for some children and youth, living in large and well-functioning households is supportive of their success at school. By no means should results reported in this report be used to support interventions to remove children from homes.

In conclusion, results speak to the diverse social impacts of housing needs in First Nations communities in Quebec. This suggests that programs aiming to improve housing conditions might be most effective when combined with other social interventions, calling for more cross-sectoral collaboration. Findings also inform directions of future research, such as in-depth qualitative studies to further unpack the mechanisms linking overcrowding to a lower level of engagement in school for children and to lower mastery for adults, or to understand why these outcomes might be more positive in some overcrowded households.





REFERENCES

- 1 United Nations Treaty Collection. International Covenant on Economic, Social and Cultural Rights 1976. https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=IV-3&chapter=4&clang=_en.
- 2 National Collaborating Centre for Aboriginal Health. Housing as a Social Determinant of First Nations, Inuit and Métis Health, 2009.
- 3 Shaw M. Housing and public health. *Annual Review of Public Health* 2004; 25: 397-418.
- 4 Weitzman M, Baten A, Rosenthal DG, Hoshino R, Tohn E, Jacobs DE. Housing and child health. *Current Problems in Pediatric and Adolescent Health Care* 2013; 43(8): 187-224.
- 5 Statistics Canada. The Aboriginal population in Canada, 2016 Census of Population, 2017.
- 6 Canada Mortgage and Housing Corporation. Housing in Canada Online: Definitions of Variables. 2006. https://cmhc.beyond2020.com/HiCODefinitions_EN.html#_Housing_Standards.
- 7 Statistics Canada. Census in Brief: The housing conditions of Aboriginal people in Canada, 2017.
- 8 Patterson DG, Dyck LE. Housing on First Nation Reserves: Challenges and Successes. Interim Report of the Standing Senate Committee on Aboriginal Peoples, 2015.
- 9 Indigenous Foundations (UBC). Reserves. n.d. <https://indigenousfoundations.arts.ubc.ca/reserves/> (accessed 10 June 2019).
- 10 Abele F, Graham KAH. Federal Urban Aboriginal Policy: The Challenge of Viewing the Stars in the Urban Night Sky. In: Peters EJ, ed. *Urban Aboriginal Policy Making in Canadian Municipalities*. Montreal & Kingston: McGill-Queen's University Press; 2011: 33-52.
- 11 Heritz JM. Indigenous Inclusion in Public Policy: A comparison of urban Aboriginal Peoples in Canada and Travellers in Ireland. *The International Indigenous Policy Journal* 2016; 7(3).
- 12 Peters EJ. "[W]e do not lose our treaty rights outside the... reserve": challenging the scales of social service provision for First Nations women in Canadian cities. *GeoJournal* 2006; 65(4): 315-27.

- 13 Snyder M, Wilson K, Whitford J. Examining the Urban Aboriginal Policy Gap: Impacts on Service Delivery for Mobile Aboriginal Peoples in Winnipeg, Canada. *Aboriginal Policy Studies* 2015; 5(1): 3-27.
- 14 Callaghan M, Farha L, Porter B. Women and housing in Canada: Barriers to equality. Toronto, ON: Centre for Equality Rights in Accommodation (CERA), 2002.
- 15 United Nations Housing Rights Programme. Report no. 7: Indigenous peoples' right to adequate housing. Nairobi: United Nations Human Settlements Programme (UN-HABITAT), Office of the High Commissioner for Human Rights (OHCHR), 2005.
- 16 Olsen S. Making Poverty: A history of on-reserve housing programs, 1930-1996: University of Victoria; 2016.
- 17 Anderson JT, Collins D. Prevalence and causes of urban homelessness among Indigenous Peoples: A three-country scoping review. *Housing Studies* 2014; 29(7): 959-76.
- 18 First Nations Information Governance Centre (FNIGC). The First Nations Principles of OCAP®. <https://fnigc.ca/ocapr.html> (accessed 14 December 2018).
- 19 First Nations of Quebec and Labrador Health and Social Services Commission (FNQLHSSC). Quebec First Nations Regional Early Childhood, Education and Employment Survey: Methodological Booklet, 2015.
- 20 First Nations of Quebec and Labrador Health and Social Services Commission (FNQLHSSC). Quebec First Nations Regional Health Survey Phase 3: Methodology, 2018.
- 21 First Nations Information Governance Centre (FNIGC). The First Nations Community Survey (informational brochure), 2015.
- 22 Solari CD, Mare RD. Housing crowding effects on children's wellbeing. *Social Science Research* 2012; 41(2): 464-76.
- 23 Lopoo LM, London AS. Household crowding during childhood and long-term education outcomes. *Demography* 2016; 53(3): 699-721.
- 24 Indigenous and Northern Affairs Canada. Band Classification Manual, 2000. Available at: <http://publications.gc.ca/collections/Collection/R22-1-2000F.pdf>
- 25 First Nations of Quebec and Labrador Health and Social Services Commission (FNQLHSSC). Quebec First Nations Regional Health Survey Phase 3: Housing, 2018.
- 26 Assembly of First Nations. Fact Sheet - First Nations Housing On-Reserve. Ottawa, ON: Assembly of First Nations, 2013.
- 27 MacTavish T, Marceau M-O, Optis M, Shaw K, Stephenson P, Wild P. A participatory process for the design of housing for a First Nations Community. *Journal of Housing and the Built Environment* 2012; 27(2): 207-24.
- 28 Latouche G. The Housing Needs of First Nations in Quebec and Labrador (2014). Wendake, QC: Assembly of First Nations Quebec-Labrador, 2014.
- 29 Health Canada. A statistical profile on the health of First Nations in Canada: Determinants of health, 2006 to 2010: Health Canada, 2014.
- 30 Hennessy TW, Ritter T, Holman RC, et al. The relationship between in-home water service and the risk of respiratory tract, skin, and gastrointestinal tract infections among rural Alaska natives. *American Journal of Public Health* 2008; 98(11): 2072-8.
- 31 Bulkow LR, Singleton RJ, DeByle C, et al. Risk Factors for Hospitalization With Lower Respiratory Tract Infections in Children in Rural Alaska. *Pediatrics* 2012; 129(5): e1220-7.
- 32 Bulkow LR, Singleton RJ, Karron RA, Harrison LH. Risk factors for severe Respiratory Syncytial Virus infection among Alaska Native children. *Pediatrics* 2002; 109(2): 210-6.
- 33 Statistics Canada. Education in Canada: Key results from the 2016 Census, 2017.
- 34 Goux D, Maurin E. The effect of overcrowded housing on children's performance at school. *Journal of Public Economics* 2005; 89(5-6): 797-819.
- 35 Basham M, Shaw S, Barton A. Central Heating: Uncovering the impact on social relationships and household management. A final report to the Eaga Partnership Charitable Trust., 2004.
- 36 Bullen C, Kearns RA, Clinton J, Laing P, Mahoney F, McDuff I. Bringing health home: Householder and provider perspectives on the healthy housing programme in Auckland, New Zealand. *Social Science & Medicine* 2008; 66(5): 1185-96.

- 37 Dewald JF, Meijer AM, Oort FJ, Kerkhof GA, Bögels SM. The influence of sleep quality, sleep duration and sleepiness on school performance in children and adolescents: A meta-analytic review. *Sleep Medicine Reviews* 2010; 14(3): 179-89.
- 38 Chambers EC, Pichardo MS, Rosenbaum E. Sleep and the housing and neighborhood environment of urban Latino adults living in low-income housing: The AHOME Study. *Behavioral Sleep Medicine* 2014; 14(2): 169-84.
- 39 Front d'action populaire en réaménagement urbain (FRAPRU). Emergency in the House: Report of the Popular Travelling Commission on the Right to Housing, 2013.
- 40 Howden-Chapman P, Matheson A, Crane J, et al. Effect of insulating existing houses on health inequality: cluster randomised study in the community. *BMJ* 2007; 334(7591): 460.
- 41 Howden-Chapman P, Pierse N, Nicholls S, et al. Effects of improved home heating on asthma in community dwelling children: randomised controlled trial. *BMJ* 2008; 337(7674): a1411.
- 42 Somerville M, Mackenzie I, Owen P, Miles D. Housing and health: does installing heating in their homes improve the health of children with asthma? *Public Health* 2000; 114(6): 434-9.
- 43 Maxwell LE. Multiple effects of home and day care crowding. *Environment and Behavior* 1996; 28(4): 494-511.
- 44 Demmert WG, Jr. Improving academic performance among Native American students: A review of the research literature. Office of Educational Research And Improvement (ED): Washington, DC, 2001.
- 45 Wotherspoon T, Bernard S. Marginalization, Decolonization and Voice: Prospects for Aboriginal Education in Canada. Council of Ministers of Education of Canada, 1998.
- 46 Finn JD, Rock DA. Academic success among students at risk for school failure. *Journal of Applied Psychology* 1997; 82(2): 221-34.
- 47 Finn JD, Zimmer KS. Student Engagement: What Is It? Why Does It Matter? In: Christenson SL, Reschly AL, Wylie C, eds. *Handbook of Research on Student Engagement*. Boston, MA: Springer US; 2012: 97-131.
- 48 Thomson S. Achievement at school and socioeconomic background—an educational perspective. *npj Science of Learning* 2018; 3(1): 5.
- 49 Demmert WG, Jr., Grissmer D, Towner J. A review and analysis of the research on Native American Students. *Journal of American Indian Education* 2006; 45(3): 5-23.
- 50 Canada Mortgage and Housing Corporation. Building families' futures and opportunities through Habitat homeownership, 2013.
- 51 Templeton L, Durksen T, Zhang X. Social Determinants of Health for the Aboriginal families who participated in the Families First Edmonton study. Alberta Centre for Child, Family and Community Research and Ministry of Human Services, 2012.
- 52 Canada Mortgage and Housing Corporation. Canadian Housing Observer 2005: Focus on Aboriginal Housing, 2005.
- 53 Dyck LE, Patterson DG. We Can Do Better: Housing in Inuit Nunangat. Report of the Standing Senate Committee on Aboriginal Peoples., 2017.
- 54 Reading JL, Halseth R. Pathways to Improving Well-Being for Indigenous Peoples: How Living Conditions Decide Health. National Collaborating Centre for Aboriginal Health., 2013.
- 55 Desmond M, Gershenson C. Housing and employment insecurity among the working poor. *Social Problems* 2016; 63(1): 46-67.
- 56 National Collaborating Centre for Aboriginal Health. Employment as a social determinant of First Nations, Inuit and Métis health, 2017.
- 57 Ruiz-Castell M, Muckle G, Dewailly É, et al. Household crowding and food insecurity among Inuit families with school-aged children in the Canadian Arctic. *American Journal of Public Health* 2015; 105(3): e122-32.
- 58 Huet C, Rosol R, Egeland GM. The prevalence of food insecurity is high and the diet quality poor in Inuit communities. *The Journal of Nutrition* 2012; 142(3): 541-7.
- 59 Willows ND, Veugelers P, Raine K, Kuhle S. Prevalence and sociodemographic risk factors related to household food security in Aboriginal peoples in Canada. *Public Health Nutrition* 2009; 12(8): 1150-6.
- 60 Mullany B, Neault N, Tsingine D, et al. Food insecurity and household eating patterns among vulnerable American-Indian families: Associations with caregiver and food consumption characteristics. *Public Health Nutrition* 2013; 16(4): 752-60.
- 61 Ford JD, Beaumier M. Feeding the family during times of stress: experience and determinants of food insecurity in an Inuit community. *The Geographical Journal* 2011; 177(1): 44-61.
- 62 U.S. Department of Agriculture. U.S. Household Food Security Survey Module: Six-Item Short Form, 2012.

- 63 Pirkle CM, Lucas M, Dallaire R, et al. Food insecurity and nutritional biomarkers in relation to stature in Inuit children from Nunavik. *Canadian Journal of Public Health* 2014; 105(4): e233-8.
- 64 Willows ND, Veugelers P, Raine K, Kuhle S. Associations between household food insecurity and health outcomes in the Aboriginal population (excluding reserves). *Health Reports* 2011; 22(2).
- 65 Pearlin LI, Schooler C. The Structure of Coping. *Journal of Health and Social Behavior* 1978; 19(1): 2-21.
- 66 Reilly RE, Doyle J, Bretherton D, et al. Identifying psychosocial mediators of health amongst indigenous Australians for the Heart Health Project. *Ethnicity & Health* 2008; 13: 351-73.
- 67 Wingert S. The social distribution of distress and well-being in the Canadian Aboriginal population living off reserve. *The International Indigenous Policy Journal* 2011; 2(1).
- 68 Daniel M, Brown A, Dhurrkay JG, Cargo MD, O'Dea K. Mastery, perceived stress and health-related behaviour in northeast Arnhem Land: a cross-sectional study. *International Journal for Equity in Health* 2006; 5: 10.
- 69 First Nations Information Governance Centre (FNIGC). National Report of the First Nations Regional Health Survey Phase 3: Volume Two, 2018.
- 70 Evans GW, Wells NM, Moch A. Housing and mental health: A review of the evidence and a methodological and conceptual critique. *Journal of Social Issues* 2003; 59(3): 475-500.
- 71 Bailie R, Wayte KJ. Housing and health in Indigenous communities: Key issues for housing and health improvement in remote Aboriginal and Torres Strait Islander communities. *Australian Journal of Rural Health* 2006; 14(5): 178-83.
- 72 Dunn, JR. The Population Health Approach to Housing: A Framework for Research. Canada Mortgage and Housing Corporation. Canada Mortgage and Housing Corporation. 2004.

APPENDIX

Full regression results summarized in Tables 8 to 12 above are provided in this section. Each regression analysis begins by examining the simple (bivariate) association between the housing variable and the outcome in model 1, followed by the inclusion of confounding variables as explained below each table.



EDUCATION REGRESSION RESULTS

As all the education outcome variables are binary (yes/no), we used weighted logistic regression models to estimate their associations with various housing conditions. Results are presented using odds ratio (OR) and 95% confidence intervals (95% CI). An OR larger than 1 signifies a higher likelihood of the outcome to happen, while an OR smaller than 1 signifies a lower likelihood. If the 95% CI does not include the value of 1, the association between one housing variable and one outcome variable is statistically significant at the 5% level.

TABLES A1 and A2 present regression results of education-related variables that had significant associations with any of the housing variables for children aged 6-11 who were attending primary school: having good grades (TABLE A1) and being late to school (TABLE A2). TABLES A3 to A5 presents regression results of education-related variables that had significant associations with any of the housing variables for youth aged 12-17 who were attending secondary school: having good grades (TABLE A3), repeating a year (TABLE A4) and skipping classes (TABLE A5). Regression results of other education-related outcome variables that have no significant associations with any of the housing variables are available upon request.

TABLE A1
Associations between housing conditions and good grades on last report card (at or above 80%/mainly A's) for children in primary school (n = 410; REEES Children 2014)

	Model 1 BIVARIATE		Model 2 + AGE + SEX		Model 3 + MOTHER'S EDUCAT'N		Model 4 + HOUSEHOLD INCOME	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Number of people	0.82	(0.72 - 0.95)**	0.83	(0.72 - 0.95)**	0.84	(0.74 - 0.96)**	0.84	(0.73 - 0.96)*
Crowding (PPR)	0.75	(0.28 - 1.97)	0.76	(0.29 - 2.02)	0.87	(0.36 - 2.11)	0.98	(0.44 - 2.19)
Overcrowding (>1 PPR)	0.71	(0.35 - 1.42)	0.70	(0.35 - 1.41)	0.77	(0.39 - 1.52)	0.89	(0.45 - 1.77)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

NOTE: Each housing variable represents a separate regression model. Coefficients for confounding variables are not shown. Model 1 shows bivariate regression results; models 2 to 4 sequentially adjust for confounders: child's age and sex, mother's education and household income.

TABLE A2
Associations between housing conditions and being late to school at least once a month for children in primary school (n = 413; REEES Children 2014)

	Model 1 BIVARIATE		Model 2 + AGE + SEX		Model 3 + MOTHER'S EDUCAT'N		Model 4 + HOUSEHOLD INCOME	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Number of people	1.12	(0.98 - 1.29)	1.12	(0.98 - 1.29)	1.10	(0.96 - 1.26)	1.08	(0.94 - 1.24)
Crowding (PPR)	2.83	(1.31 - 6.16)**	2.86	(1.34 - 6.11)**	2.73	(1.26 - 5.90)*	2.22	(1.03 - 4.81)*
Overcrowding (>1 PPR)	2.70	(1.30 - 5.61)**	2.74	(1.33 - 5.65)**	2.65	(1.29 - 5.48)**	2.24	(1.09 - 4.60)*

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

NOTE: Each housing variable represents a separate regression model. Coefficients for confounding variables are not shown. Model 1 shows bivariate regression results; models 2 to 4 sequentially adjust for confounders: child's age and sex, mother's education and household income.

TABLE A3
Associations between housing conditions and good grades in last report card (at or above 70%/mainly B's or better)
for youth in secondary school (n = 268; REEES Youth 2014)

	Model 1 BIVARIATE		Model 2 + AGE + SEX		Model 3 + MOTHER'S EDUCATION	
	OR	95% CI	OR	95% CI	OR	95% CI
Number of people	0.79	(0.64, 0.96)*	0.79	(0.65, 0.95)*	0.83	(0.71 - 0.98)*
Crowding (PPR)	0.51	(0.14, 1.85)	0.52	(0.15, 1.83)	0.70	(0.34 - 1.44)
Overcrowding (>1 PPR)	1.14	(0.45, 2.86)	1.16	(0.44, 3.05)	1.64	(0.56 - 4.79)

* p < 0.05, ** p < 0.01, *** p < 0.001

NOTE: Each housing variable represents a separate regression model. Coefficients for confounding variables are not shown. Model 1 shows bivariate regression results; models 2 and 3 sequentially adjust for confounders: youth's age and sex, and mother's education.

TABLE A4
Associations between housing conditions and ever repeating a year in school for youth in secondary school
(n = 284; REEES Youth 2014)

	Model 1 BIVARIATE		Model 2 + AGE + SEX		Model 3 + MOTHER'S EDUCATION	
	OR	95% CI	OR	95% CI	OR	95% CI
Number of people	1.23	(1.04, 1.46)*	1.23	(1.04, 1.45)*	1.16	(1.00 - 1.34)*
Crowding (PPR)	4.38	(1.36, 14.09)*	4.39	(1.46, 13.20)**	2.80	(1.16 - 6.75)*
Overcrowding (>1 PPR)	1.91	(0.81, 4.50)	1.94	(0.77, 4.91)	1.54	(0.55 - 4.36)

* p < 0.05, ** p < 0.01, *** p < 0.001

NOTE: Each housing variable represents a separate regression model. Coefficients for confounding variables are not shown. Model 1 shows bivariate regression results; models 2 and 3 sequentially adjust for confounders: youth's age and sex, and mother's education.

TABLE A5
Associations between housing conditions and skipping classes at least once a month for youth in secondary school
 (n = 267; REEES Youth 2014)

	Model 1 BIVARIATE		Model 2 + AGE + SEX		Model 3 + MOTHER'S EDUCATION	
	OR	95% CI	OR	95% CI	OR	95% CI
Number of people	1.26	(1.02, 1.56)*	1.24	(1.01, 1.53)*	1.18	(0.97 - 1.43)
Crowding (PPR)	4.69	(1.13, 19.38)*	4.17	(1.21, 14.42)*	2.54	(0.86 - 7.52)
Overcrowding (>1 PPR)	2.48	(1.01, 6.05)*	2.58	(1.06, 6.31)*	2.12	(0.84 - 5.32)

* p < 0.05, ** p < 0.01, *** p < 0.001

NOTE: Each housing variable represents a separate regression model. Coefficients for confounding variables are not shown. Model 1 shows bivariate regression results; models 2 and 3 sequentially adjust for confounders: youth's age and sex, and mother's education.



EMPLOYMENT REGRESSION RESULTS

As the employment status outcome variable is binary (yes/no), we used weighted logistic regression models to estimate the association between employment and various housing conditions. Results are presented using odds ratio and 95% confidence intervals (see explanation for interpretation in the previous section). TABLE A6 presents regression results of employment status on various housing variables using RHS Adults. Analysis was restricted to adults aged 18-64 years old (working-age adults).

TABLE A6
Associations between housing conditions and employment for working-age adults
(n = 1402; RHS Adults 2015)

	Model 1 BIVARIATE		Model 2 + AGE + SEX		Model 3 + REMOTENESS	
	OR	95% CI	OR	95% CI	OR	95% CI
Number of people	0.89	(0.84, 0.94) ^{***}	0.91	(0.86, 0.97) ^{**}	0.93	(0.88, 0.99) [*]
Crowding (PPR)	0.42	(0.28, 0.63) ^{***}	0.44	(0.29, 0.67) ^{***}	0.50	(0.33, 0.77) ^{**}
Overcrowding (>1 PPR)	0.45	(0.30, 0.69) ^{***}	0.47	(0.30, 0.74) [*]	0.55	(0.34, 0.89) [*]
Homeownership	1.21	(0.94, 1.57)	1.19	(0.91, 1.56)	1.05	(0.79, 1.41)
Housing in need of repairs						
None, maintenance only	1.00	(ref)	1.00	(ref)	1.00	(ref)
Yes, minor repairs	0.64	(0.47, 0.87) ^{**}	0.55	(0.40, 0.77) ^{***}	0.55	(0.40, 0.77) ^{**}
Yes, major repairs	0.38	(0.27, 0.53) ^{***}	0.31	(0.22, 0.44) ^{***}	0.33	(0.23, 0.47) ^{***}
Presence of mould/mildew	0.72	(0.53, 0.96) [*]	0.67	(0.49, 0.92) [*]	0.73	(0.53, 1.01)

* p < 0.05, ** p < 0.01, *** p < 0.001

NOTE: Each housing variable represents a separate regression model. Coefficients for confounding variables are not shown. Model 1 shows bivariate regression results; models 2 and 3 sequentially adjust for confounders: age, sex and remoteness.

FOOD SECURITY REGRESSION RESULTS

As the food insecurity outcome variable is binary (yes/no), we used weighted logistic regression models to estimate the association between housing variables and food insecurity. Results are presented using odds ratio and 95% confidence intervals (see explanation for interpretation in the previous section). TABLE A7 presents regression results of food insecurity on various housing variables using RHS Adults.

TABLE A7
Associations between housing conditions and food insecurity
(n = 1574; RHS Adults 2015)

	Model 1 BIVARIATE		Model 2 + AGE + SEX		Model 3 + HOUSEHOLD INCOME		Model 4 + REMOTENESS	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Number of people	1.11	(1.06, 1.17) ^{***}	1.07	(1.01, 1.13) [*]	1.07	(1.01, 1.13) [*]	1.02	(0.96, 1.09)
Crowding (PPR)	2.58	(1.83, 3.63) ^{***}	2.20	(1.57, 3.07) ^{***}	1.93	(1.40, 2.67) ^{***}	1.68	(1.21, 2.33) ^{**}
Overcrowding (>1 PPR)	2.28	(1.51, 3.42) ^{***}	1.97	(1.30, 2.98) ^{**}	1.74	(1.10, 2.75) [*]	1.51	(0.94, 2.42)
Homeownership	0.35	(0.27, 0.46) ^{***}	0.39	(0.30, 0.50) ^{***}	0.46	(0.35, 0.60) ^{***}	0.54	(0.40, 0.73) ^{***}
Housing in need of repairs								
None, maintenance only	1.00	(ref)	1.00	(ref)	1.00	(ref)	1.00	(ref)
Yes, minor repairs	3.53	(2.57, 4.83) ^{***}	3.64	(2.63, 5.04) ^{***}	3.26	(2.33, 4.58) ^{***}	2.99	(2.12, 4.22) ^{***}
Yes, major repairs	4.66	(3.36, 6.46) ^{***}	5.01	(3.56, 7.05) ^{***}	4.21	(2.97, 5.97) ^{***}	3.65	(2.54, 5.23) ^{***}
Presence of mould/mildew	2.86	(2.14, 3.82) ^{***}	2.83	(2.10, 3.81) ^{***}	2.64	(1.93, 3.61) ^{***}	2.28	(1.65, 3.14) ^{***}

* p < 0.05, ** p < 0.01, *** p < 0.001

NOTE: Each housing variable represents a separate regression model. Coefficients for confounding variables are not shown. Model 1 shows bivariate regression results; models 2 to 4 sequentially adjust for confounders: age and sex, household income and remoteness.

MASTERY REGRESSION RESULTS

As the mastery outcome variable is continuous, we used weighted linear regression models to estimate the association between housing variables and mastery. Results are presented with β coefficients (with 95% confidence intervals), which indicates the average change (increase or decrease) in mastery score related to the housing variable included in the regression. If the 95% CI does not include the value of 0, the association between the housing variable and mastery is statistically significant at the 5% level. TABLE A8 presents regression results of mastery on various housing variables using RHS Adults.

TABLE A8
Associations between housing conditions and mastery for adults (n = 1516; RHS Adults 2015)

	Model 1 BIVARIATE		Model 2 + AGE + SEX		Model 3 + HOUSEHOLD INCOME		Model 4 + REMOTENESS	
	β	95% CI	β	95% CI	β	95% CI	β	95% CI
Number of people	-0.21	(-0.30, -0.12)***	-0.22	(-0.31, -0.13)***	-0.20	(-0.29, -0.11)***	-0.05	(-0.14, 0.03)
Crowding (PPR)	-1.45	(-2.00, -0.90)***	-1.52	(-2.08, -0.96)***	-1.17	(-1.69, -0.65)***	-0.43	(-0.90, 0.05)
Overcrowding (>1 PPR)	-1.56	(-2.34, -0.77)***	-1.55	(-2.34, -0.76)***	-1.20	(-1.92, -0.48)**	-0.26	(-0.92, 0.39)
Homeownership	1.79	(1.35, 2.22)***	1.86	(1.41, 2.31)***	1.46	(1.01, 1.91)***	1.06	(0.58, 1.54)***
Housing in need of repairs								
None, maintenance only	0.00	(ref)	0.00	(ref)	0.00	(ref)	0.00	(ref)
Yes, minor repairs	-0.57	(-1.07, -0.07)*	-0.62	(-1.11, -0.12)*	-0.27	(-0.77, 0.22)	-0.15	(-0.63, 0.32)
Yes, major repairs	-1.45	(-1.98, -0.91)***	-1.49	(-2.02, -0.96)***	-1.02	(-1.54, -0.49)***	-0.57	(-1.09, -0.05)*
Presence of mould/mildew	-0.97	(-1.46, -0.49)***	-1.02	(-1.51, -0.52)***	-0.72	(-1.20, -0.23)**	-0.35	(-0.83, 0.13)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

NOTE: Each housing variable represents a separate regression model. Coefficients for confounding variables are not shown. Model 1 shows bivariate regression results; models 2 to 4 sequentially adjust for confounders: age and sex, household income and remoteness.







RHS

QUEBEC FIRST NATIONS
REGIONAL HEALTH SURVEY



FIRST NATIONS OF QUEBEC
AND LABRADOR HEALTH
AND SOCIAL SERVICES
COMMISSION